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Telework within Department of the Navy Shore Commands: Recommendations from History and Analysis of Industry and Academic Literature

March 2022

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

ACQUISITION RESEARCH PROGRAM
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ABSTRACT

The COVID-19 pandemic acted as a forcing function, requiring industry—both civilian and military—to quickly adapt to maximizing telework. In this thesis, I look at the academic literature as well as military reports to analyze how the Navy could adjust its telework policy to maximize its benefits. I find that telework shows overall increased productivity and quality of life for employees, and that the risks associated with shifting traditionally on-site work to remote work are outweighed by the benefits. It is clear that telework will remain a staple in both the civilian and federal workforces. The Navy must adapt its policies to ensure it is competitive in recruiting and retaining younger generations entering the workforce.

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LIST OF ACRONYMS AND ABBREVIATIONS

COOP	Continuity of Operations
DOD	Department of Defense
DON	Department of the Navy
NAVMAC	Navy Manpower Analytics Center
NEBC	Navy Enlisted Billet Classification
NOBC	Navy Officer Billet Classification
NROTC	Naval Reserve Officer Training Corps
O*NET	Occupational Information Network
OMB	Office of Management and Budget
OPM	Office of Personnel Management
OWA	Outlook Web Access
PIN	Personal Identification Number
RCT	Randomized Controlled Trial
SECNAV	Secretary of the Navy
SWAA	Survey of Working Arrangements and Attitudes
TFJD	Total Force Job Directory
USD(P&R)	Undersecretary of Defense for Personnel and Readiness
USN	United States Navy
WFA	Work-from-Anywhere
WFH	Work-from-Home

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I. INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 pandemic that began in December of 2019 and the follow-on corona virus disease 2019 (COVID-19) lead to unprecedented disruptions of business on a global scale. In order to mitigate the spread of COVID-19 many workers lost their jobs, were forced to take a reduction in hours, or shifted to a telework environment. The goal of this thesis is to examine Department of Defense (DOD) and Navy practices and policies regarding telework and remote work, and present recommendations informed by evidence-based findings in the academic literature.

The Navy was not immune to these effects brought on by the pandemic. In order to ensure mission success, commands all over the world took swift action to implement remote work programs for civilians and service members alike. Telework and remote work, however, are not new concepts developed as a result of the COVID-19 pandemic; the ability to complete work away from traditional worksites has had some form of presence in the federal workforce since the 1970s and continues to be an area of academic research. The Telework Enhancement Act of 2010 required federal agencies to establish telework and remote work programs for the purposes of recruiting, retention, environmental concerns, and continuity of operations should inclement weather or pandemic events force agencies to work away from their traditional work sites (Telework Enhancement Act, 2010). Within the academic literature, studies have looked at how the ability to work remotely has affected productivity, how the policies authorizing telework and remote work affected quality of life, as well as how the pandemic has played a role in attitudes towards working from home and returning to traditional work sites.

This thesis addresses the following research questions:

1. What remote work practices are effective according to the academic literature?
2. What civilian job positions were frequently performed remotely before the COVID-19 pandemic? What positions were performed remotely during the pandemic?
3. What remote work policies should the Navy consider adopting/adding? to their remote work policy?
4. What shore-based Navy positions can effectively be performed by telework employees? What positions cannot?
5. What are the risks and benefits to offering expanded telework opportunities to Department of the Navy (DON) employees and service members?

I answer these research questions by looking at the academic literature surrounding telework as well as reports and testimony from the federal government concerning best practices and recommendations. I look at Navy shore-based jobs in the top civilian categories and compare the feasibility of transitioning these to remote work positions.

Chapter II provides background and history of telework within the federal government, the DOD, and the Navy. While telework has roots in the federal government dating back to the 1960s, it was not until the Telework Enhancement Act of 2010 where federal agencies were required to establish telework programs and defined overall employee eligibility for telework (Joice, 2000; Telework Enhancement Act, 2010). It was in this year that the DOD developed its own telework policy, emphasizing the benefits to recruitment, retentions, the environment, and cost savings in facilities and utilities (USD[P&R]), 2020). The Navy established its own telework policy in 2015 using the DOD policy as its framework.

Chapter III looks at the academic literature surrounding telework and remote work. Several studies look at productivity for employees who work remotely and the literature overwhelmingly supports the idea that remote work leads to increased productivity. Many of the studies were performed before the COVID-19 pandemic, so it is important to note that remote working conditions during the pandemic are not conducive to those observed in these earlier studies. Several ongoing surveys conducted throughout the pandemic indicate positive attitudes from both employees and firms around telework. The Survey of Working Arrangements and Attitudes, and ongoing survey conducted by Barrero et al. (2021) and the Federal Employee Viewpoint Survey conducted by the Office of Personnel Management (OPM) (2020) both indicate telework will continue to be an important consideration for both employees and firms.

The COVID-19 pandemic tested federal agencies in their implementation of an typically underutilized resource. Concerns about network capacity, hardware and computer performance, and information security all had to be addressed in a timely manner. The DOD Inspector General conducted a study regarding the implementation of telework during the crisis and found many organizations, including the Navy, fell short (Gorman, 2021). RAND corporation looked at several federal agencies regarding best practices for information technology and security in remote work environments and noted the importance of agency investment in these areas to ensure successful telework programs (Weinbaum et al., 2018).

In Chapter IV I look at Navy jobs and assess their viability to be performed remotely. I do this by looking at jobs listed in particular job families from the Total Force Job Directory, a document maintained by the Navy Manpower Analytics Center. By using the criteria determined through the Telework Enhancement Act, DOD, and DON policy, I assess whether or not each job could be performed remotely. Once this value is determined, I compare my calculated share of Navy jobs to the share of civilian jobs in particular job families as determined by Dingel and Neiman (2020) . Unsurprisingly, due to the nature of working with classified information and the need for on-site work on naval vessels, the Navy has a much lower share of jobs compared to Dingel and Neiman's (2020) determination of civilian occupations that can be performed remotely.

This chapter also addresses risks involved with expanding telework practice in the Navy might present. Specifically, the risk of spillage of classified material, required cultural shifts and management practices must all be addressed. I emphasize that, based on my analysis and that of the academic literature, that the risks for not working towards telework expansion are far greater than those brought on. With younger generations who are more technologically savvy and will have grown up expecting similar flexibility enter the workforce, the Navy needs to tailor its policies accordingly in order to continue to recruit and retain the best talent, ensuring its sustained superior performance.

The final chapter summarized the thesis and provides my recommendations to the Navy for future study and research. I also provide several policy recommendations surrounding adoption and implementation of telework practices.

II. BACKGROUND OF TELEWORK IN THE FEDERAL GOVERNMENT, THE DEPARTMENT OF DEFENSE, AND THE DEPARTMENT OF THE NAVY

The history of telework in the federal government spans nearly six decades, only growing in prominence and importance. While it is difficult to quantify exactly how many jobs are performed remotely, we see over these last 60 years a change in attitudes towards telework and remote work, as well as the availability of such positions have increased. This chapter provides a brief history of telework and remote work as it pertains to the federal government and associated agencies. It is broken into three sections, beginning with the history of laws and policies affecting the federal government at large, narrowing to the DOD and its application policies and instructions, and finishing with specific instructions governing telework and remote work within the Navy.

A. TELEWORK IN THE FEDERAL GOVERNMENT

The earliest effort to develop a federal government-wide telework program occurred in the early 1960s. While working as a consultant on a U.S. Air Force space program, Jack Nilles began teleworking from Los Angeles to Washington, D.C., and actually coined the terms "telework" and "telecommuting" (Joice, 2000). Inspired by his success in remote work, he became an advocate for the importance of the concept. Unfortunately, Nilles was unable to gather much momentum within the federal government to develop any official telework policy (Joice, 2000).

The second proposal for a remote work policy was written by the then-vice president and chief economist of the Committee for Economic Development, Frank Schiff. In a 1979 *Washington Post* article, Schiff argued that working from home, even as little as two days a week, could significantly save on gasoline usage (Schiff, 1979). Because the U.S. was undergoing an energy crisis, the federal government wanted to find efficient ways to reduce energy consumption, save costs, improve productivity ("Business: Oil Squeeze," 1979; Joice, 2000). Schiff's article introduced the term "flexiplace," which included other alternative working arrangements beyond simply work-from-home (WFH). In contrast to the term "telecommuting," which traditionally

meant completing work with the use of telecommunications equipment from home, this article emphasized the increased flexibility in the location where work is completed over what equipment was used to perform the duties (Schiff, 1979). Schiff's article led to an U.S. Office of Personnel Management (OPM) study, which identified that there was "no law that required federal employees to perform their work at a particular site" (Joice, 2000; Schiff, 1993).

While remote work within the federal government has roots in the 1960s and into the early 1980s, momentum was lost in the mid-1980s with a newly elected administration's focus on workforce reduction and eliminating fraud, waste and abuse (Joice, 2000). The main fear was that employees would take advantage of working outside of direct oversight from managers and may abuse the system. Because of this, remote work experimentation was limited to primarily pilot programs conducted at individual organizations with little oversight or coordination from the top. The first official, government-wide "flexiplace" pilot began in 1989, emphasizing working from home, specifically. Beginning in 1990, the Treasury, Postal Service and General Government Appropriations Act authorized the use of appropriated funds within agencies who participated in the Federal Flexiplace Project to "install telephone lines, necessary equipment, and pay monthly charges, in any private residence or private apartment" (Treasure, Postal Service and General Government Appropriations Act, 1990, §624) so long as agency leadership could ensure no misuse of funds occurred (Treasure, Postal Service and General Government Appropriations Act, 1990).

In 1996, the GSA was authorized to establish telecommuting centers (telecenters) for government employees in the Omnibus Consolidated Appropriations Act of 1997 (Omnibus Consolidated Appropriations Act, 1996). Additionally, this law authorized GSA to provide oversight, guidance, and assistance to aid in developing and planning alternative worksite arrangements for government organizations. The updated Omnibus Consolidated Appropriations Act of 1999 allocated funding for executive agencies to implement telecommuting programs where employees were authorized to complete all or a portion of their work at telecenters (Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999).

Going a step further, in 2000 the Department of Transportation and Related Agencies Appropriations Act required that each executive agency "establish a policy under which eligible employees of the agency may participate in telecommuting to the maximum extent possible without diminished employee performance" (§359) (Department of Transportation and Related Agencies Appropriations Act, 2000). This Act required OPM to ensure agencies applied these requirements to "25 percent of the Federal workforce, and to an additional 25 percent of such workforce each year thereafter" (§359). Oversight and assurance of effective implementation of telecommuting programs was then established in the Treasury, Postal Service, and General Government Appropriations Act of 2002, requiring executive agencies to report to OPM their efforts in implementing flexiplace telecommuting programs (Treasury, Postal Service, and General Government Appropriations Act, 2002).

The following year saw the Telecommuting and Other Alternative Workplace Arrangements Law passed, addressing development of alternative worksites and directed the GSA to provide "guidance, assistance, and oversight to any person regarding the establishment and operation of alternative workplace arrangements" (Telecommuting and Other Alternative Workplace Arrangements, 2003, §587). This law allocated a minimum of $50,000 for alternate worksite funding to the following specific executive agencies: Department of Agriculture, Department of Commerce, Department of Defense, Department of Education, Department of Energy, Department of Health and Human Services, Department of Housing and Urban Development, Department of Interior, Department of Justice, Department of Labor, Department of State, Department of Transportation, Department of the Treasury, Department of Veterans Affairs, Environmental Protection Agency, General Services Administration, Office of Personnel Management, Small Business Administration, Social Security Administration, and the United States Postal Service.

Additionally, the Consolidated Appropriations Acts of 2003, 2004, and 2005 saw ever-stricter reporting requirements regarding establishment and maximization of telecommuting opportunities for the eligible workforce (Consolidated Appropriations Act, 2003; Consolidated Appropriations Act, 2004; Consolidated Appropriations Act,

2005). Congress withheld $5 million of the budgets for Commerce, Justice and State departments until they certified that "telecommuting opportunities were made available to 100 percent of the eligible workforce" (Consolidated Appropriations Act, 2005, §622).

Most recently, the Telework Enhancement Act of 2010 requires that each executive agency "establish a policy under which eligible employees of the agency may be authorized to telework" (§6502) and "determine the eligibility for all employees of the agency to participate in telework" (§6502) (Telework Enhancement Act [TEA], 2010). This law also directs each agency to designate "an employee of the agency as the Telework Managing Officer" (§6505) and requires both employees and managers to have "successfully completed the interactive training telework training program before that employee enters into a written agreement to telework" (§6503). The law directs telework to "be incorporated as part of the continuity of operations [COOP] plans of the agency in the event of an emergency" (§6502), and establishes guidelines for coordinating with OPM to ensure annual reporting criteria are met (TEA, 2010).

OPM established a website, telework.gov, to provide information for agencies looking to develop, implement, and manage their telework and remote work employees. The site provides guidance on official worksite for pay purposes, locality tables, performance management, emergency telework, security and IT infrastructure, and dependent care information. In 2011, OPM published the "Guide to Telework in the Federal Government" and in 2021 updated to the "Guide to Telework and Remote Work in the Federal Government" to provide background and benefits for both the employers and employees of telework and remote work as well as update information and resources for both telework and remote work (Office of Personnel Management [OPM], 2021). This document acts as a guidebook for federal agencies and covers different telework arrangements, applicable laws, agency roles and responsibilities, and provides guidance on how to establish telework programs within agencies; it also provides considerations with respect to implications and strategies for how to most appropriately utilize remote work arrangements (OPM, 2021).

B. TELEWORK IN THE DEPARTMENT OF DEFENSE

In their article covering the history of telework, Joice (2000) describes one of the earliest remote work programs in the DOD was conducted within the Department of the Army in 1980. In an attempt to overcome work scheduling conflicts and difficulties, an Army unit in St. Louis conducted an 18-month program for its workforce. The author describes project managers' evaluations, indicating the program worked well and was considered a success; an Army audit team, however, concluded the risks of continuing the program outweighed the benefits, specifically, risks concerned with fraud, waste and abuse (Joice, 2000). Although there was no specific instance of fraud, waste, or abuse, the fear from leadership was that without oversight of employees, these risks would become exacerbated and so the program was dismantled (Joice, 2000).

Beyond this initial pilot from the Army, there is very little history of DOD policy regarding telework until Congress passed laws described above authorizing and eventually requiring executive agencies to develop and implement telework programs and policies. After the passing of the Telework Enactment Act in 2010, the DOD implemented DOD Instruction (DODI) 1035.01 in October 2010, and has updated it twice, in April 2012 and April 2020 (Office of the Undersecretary of Defense for Personnel and Readiness [USD (P&R)], 2020). This instruction "establishes policy, assigns responsibilities, and prescribes procedures for implementing DOD telework programs" (p. 1) and applies to both employees (defined as "DOD civilian employee, to include foreign national employees, paid from appropriated or non-appropriated funds" [p. 24]) and military service members (USD [P&R], 2020).

This governing instruction outlines the policy that telework "shall be actively promoted and implemented throughout the DOD" (p. 2) for the maximum number of eligible positions throughout the DOD "to the extent that mission readiness is not jeopardized" (p. 2) (USD [P&R], 2020). All "employees are considered eligible for telework *except the following*":

- Employees in positions that require, on a daily basis, direct handling of classified materials. Classified work at an approved alternative secure

location may be allowed contingent on individual DOD Component requirements regarding such work, when situations warrant.

- Employees in positions that require, on a daily basis, an on-site activity or face-to-face personal contacts that cannot be handled remotely or at an alternative worksite (e.g., hands-on contact with machinery, equipment, or vehicles; direct patient care).
- Employees whose performance or conduct warrants more close supervisory direction than telework may provide; whose rating of record is below fully successful (or its equivalent); whose conduct has resulted in disciplinary action within the past 12 months; or who have unresolved security issues that might influence telework eligibility (e.g., based on personal conduct, handling protected information, or use of information technology information systems).
- Employees recently assigned or newly appointed to trainee or entry level positions. The length of time for which the employee is deemed ineligible for telework is at the Component's discretion and should be based upon criteria identified and addressed in the Component's telework guidance (e.g., the employee's performance within the first 6 months in the position or at mid-term review is at an acceptable level)." (p. 2)
- The employee has been officially disciplined for being absent without permission for more than 5 days in any calendar year.
- The employee has been officially disciplined for violations of subpart G of the Standards of Ethical Conduct of Employees of the Executive Branch for viewing, downloading, or exchanging pornography, including child pornography, on a Federal Government computer or while performing Federal Government duties. (USD [P&R], 2020, p. 12; Use of Government Property, 1997)

The instruction provides a caveat should one or more of the ineligibility requirements be met certain responsibilities such as "reading and analyzing documents, and preparing reports or other documents" (USD[P&R]), 2020) may still be performed remotely at the discretion of the local commanders.

DODI 1035.01 continues on to describe the benefits of telework including efficient accomplishment of work, emergency preparedness, recruitment and retention, employment of people with disabilities, and reduced office, parking, and transportation costs. It also provides definitions of key terms and outlines responsibilities for commanders, supervisors, and employees. Security and IT considerations are also addressed, specifically the use of personal devices versus government furnished equipment and concerns with spillage. DODI 1035.01 incorporated one change in April

2020 with only minor updates to references and organizational titles and adjustments to specific language. The DOD considers telework to be a "discretionary workplace flexibility" (p. 11), and therefore it is not a requirement (USD[P&R], 2020). Service member eligibility is always at the discretion of the local commander or supervisor so long as they are consistent with all relevant instructions and local component guidance (USD[P&R], 2020). Neither service members nor employees can be required to telework, except when the use of alternate worksites is a part of normal job duties and responsibilities, such as site inspections (USD[P&R], 2020).

C. TELEWORK IN THE DEPARTMENT OF THE NAVY

Apart from general DOD guidance, the Secretary of the Navy instruction (SECNAVINST) 12271.1 was issued in May 2015 in order to provide specific guidance for Navy commanders. In line with DODI 1035.01, this instruction identifies the Navy's "[commitment] to promoting and implementing telework to the greatest extent possible consistent with mission capability and readiness" (Office of the Secretary of the Navy [SECNAV], 2019, p.1). This instruction, nor the governing DODI 1035.01, provide any guidance for what constitutes degradation in mission performance. Because every command has a different mission that requires varying resources and requirements for its accomplishment, this leaves much of the interpretation open to local commanders. Change one was implemented in February 2019, providing updated references. SECNAVINST 12271.1 follows telework ineligibility criteria consistent with DODI 1035.01 and U.S. code, adding that "'mission requirements' shall include consideration of the impact of telework on the DON remote access information technology network capacity and appropriate information security…" (SECNAV, 2019, p. 2). This policy directs local commands to "develop an [information technology] strategy plan for telework" (p.2), acknowledging that existing DON network and technological infrastructure is not sufficient to support the maximizing of telework. Investment in network capacity, technology, and software to reduce the impact on networks are short-term investments with long-term benefits.

It is important to note that while the Navy has an official telework policy, there does not seem to be any substantive guidance on how local commanders should implement telework in an effort to compliment the Navy's mission; rather, on the Navy Personnel Command's website (mynavyhr.navy.mil), under the section for "life-work balance," telework and its benefits are listed and it is noted that "telework shall be actively promoted and implemented throughout the DOD" (Navy Personnel Command, 2021), but only directs commanders who wish to implement a telework program to OPM's telework website (telework.gov) and the governing DODINST 1035.01, not the Navy's own instruction (Naval Personnel Command, 2021). This leaves much of the effort on managing telework to the local commanders with no program management guidance from top Navy leadership.

OPM provides an annual report to congress on the current state of telework in the federal government, directed by the Telework Enhancement Act. Using a data call to executive agencies, OPM provides trends in telework and analysis for policy consideration. The Navy provides information to this annual report regarding total number of employees eligible for telework and the number actually working remotely. Compared to fiscal year 2019, where 49 percent of the total Navy workforce was eligible for telework, fiscal year 2020 saw 81 percent of its total workforce eligible for telework (OPM, 2021b; OPM, 2021c). These OPM reports show a change in percentage of employees who engaged in telework in the Navy rise from 20 percent in fiscal year 2019 to 32 percent in fiscal year 2020. Of the Navy employees who teleworked in fiscal year 2020, within a five-day work week 66 percent teleworked three or more days, 11 percent teleworked one or two days, and 4 percent teleworked once per month, with 74 percent working remotely only situationally as needed (OPM, 2021c). Additionally, there was an increased number of DON employees who utilized Outlook Web Access (OWA), a program to remotely access official government e-mail from an internet browser, rose from about 10,000 users prior to the pandemic to above 300,000 users by the end of March, 2020 (Lopez, 2020). Fiscal year 2020s survey report added a section specifically addressing the COVID-19 pandemic and the DOD provided a response indicating the pandemic directly contributed to the increase in teleworking employees (OPM, 2021c).

These reports do not distinguish between civilian employees and service members, so we are unable to compare differences between the two.

In the next chapter I will review and analyze the academic literature surrounding telework in both the civilian and federal workforces.

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III. ANALYSIS OF ACADEMIC AND INDUSTRY LITERATURE AND KEY OUTCOMES IN TELEWORK

This chapter describes remote work practices as documented in the academic literature and government reports and studies.

A. PRODUCTIVITY

Firms and managers have long been concerned with how telework and remote work would affect workers' productivity; because managers would have less direct oversight of their employees, there is fear that productivity would dramatically decrease and lead employees to shirk responsibility while also creating challenges to traditional management styles (Emanuel and Harrington, 2021; Mahler, 2012). The academic literature does not seem to support the concern for decreased productivity, especially prior to the COVD-19 pandemic; rather, telework and the option to work remotely has shown to increase worker's productivity, quality of life, and views towards their employer.

In one experiment, Choudhury et al. (2021) examined the effects on productivity from the adoption of policy at the U.S. Patent and Trademark Office (USPTO). This policy originated from negotiations between USPTO leadership and patent examiners' union. Union workers wanted to be allowed to "work-from-anywhere" (WFA) rather than the already established work-from-home (WFH) policy (Choudhury et al., 2021). This new policy allowed employees to live anywhere they chose and not necessarily in the same location as the office where they were employed. In an effort to monitor changes in productivity, all independent patent examiners in the study were previously registered in the USPTO's WFH program prior to the nuanced authorization work-from-anywhere rather than work-from-home. The results in the study saw in a 4.4 percent increase in productivity with no effect on quality of work (Choudhury et al., 2021). In this study, the measure of productivity was how many patents were reviewed with quality measured by the amount of times rework was required. The mechanism for increased productivity is attributed to increased job satisfaction, leading to increased effort on the job being

performed. It is worth noting this study only looked at employees who were already utilizing a WFH policy, and simply adapted to being allowed to work from anywhere. Because there is not a direct comparison between workers who worked in a traditional office setting and then began a WFA program, they are unable to make a direct correlation with increase in overall productivity within the organization. It is possible that workers who already choose WFH as their default have certain personality or work ethic traits different from peers who work on site. The adjustment to WFA may simply show improvement on employee performance that is already below the average performance and productivity metrics of their on-site peers. This information is not provided in the study.

Emanuel and Harrington (2021) reported productivity increased nearly 8 percent in a large U.S. based Fortune 500 call center when the option to work remotely was given. The researchers were able to use three quasi-experiments to determine how remote work affected employees' productivity (Emanuel and Harrington, 2021). First, in 2018, the firm began a program that allowed on-site employees to work remotely, thus providing the researchers the ability to compare productivity before and after the shift to remote work; second, the firm began hiring employees and assigning them to remote work based on their distance to the call center; third, in 2020, COVID-19 forced the firm's call center to close, which required all employees to work remotely, regardless of their choice or location upon hiring, allowing the authors to look at productivity before and after this shift (Emanuel and Harrington, 2021). Their study found a sharp 7.5 percent increase in productivity after employees began to work remotely without degrading customer satisfaction, complementing Choudhury et al. (2020). Interestingly, when all employees were required to work remotely, a difference-in-difference showed that for employees who previously worked on site productivity rose 7.6 percent compared to their peers who were already working remotely. This study also found employees were a 12 percentage point disadvantage of being promoted if they chose to work remotely prior to the COVID-19 compared to their peers that remained working on-site until required to work remotely (Emanuel and Harrington, 2021). These results, especially surrounding productivity and promotion rates, emphasizes a concern held by both

managers and employees. Specifically, managers have traditionally believed that less motivated employees would choose to work remote while more career-focused employees would rather work in a traditional work environment. These results seem to support the notion that employees who are routinely out of sight of their managers may be less likely to advance in their career.

It is important to note that while these results are insightful, the studies above are only able to determine correlation between remote work and productivity, not a causal relationship. In each case, the employees were able to make a choice on whether or not they would work remote. There is a possibility that certain types of people are more prone to choose this working environment such as those with family obligations, varying personality types, scheduling conflicts, etc. We are able to make correlations between telework and productivity, but we cannot definitively determine a cause for the increase. In order to do this we must ensure that there is no selection bias of individuals into remote work status in the study and the only difference between study participants is whether or not they worked remotely or on a traditional work site. The best way to accomplish this is by conducting a randomized control trial (RCT). The RCT is the gold-standard for effective research due to reduction in bias and can help aid in cause-effect relationships between control and treatment groups (Hariton and Locascio, 2018). RCT is considered the optimal method of study because eliminates selection bias by randomizing who is in the treatment and control groups. This provides the optimum testing environment to provide causation with the treatment; that is, only the treatment is what affects the outcome (Hariton and Locascio, 2018).

In a large-scale RCT of telework, Bloom et al. (2015) found that telework increased productivity by an average of 13 percent. For this study, managers of one Chinese call center for a large travel agency asked their 996 employees if they would be interested in working from home four days a week and working one day in the office. Over half of the employees (503) volunteered. Further criteria such as broadband access, space to work at home, and having worked with the company at least six months reduced the pool of eligible employees to 249. Of this group, those with odd-numbered birthdays remained in the office as the control group with those with even-numbered birthdays

chosen to work from home became the treatment group. Both groups received the same work tasking through a centralized server, utilized the same company-furnished IT equipment, and received the same pay benefits (Bloom et al., 2015).

The 13 percent increase in productivity seen in Bloom et al. (2015) over the trial period broke down with 4 percent reflecting more calls per minute and nine percent due to more minutes worked (equated to fewer breaks taken). Sacrificing quality of service for quantity did not seem to be impacted. This study also saw no drop in performance for employees in the control group compared to previous performance, as well as comparison with another call center in a different location. An additional benefit was that the treatment group reported significantly higher job satisfaction and attrition dramatically decreased in the treatment group by 50 percent when compared to the control group. The study seemed to show one downside to telework being, conditional on performance, promotion rates for those working in the treatment group were approximately 50 percent lower than the control group (Bloom et al., 2015).

At the conclusion of the RCT, the company opened the option for telework to all eligible employees and saw a longer-run impact of employee performance increase by 22 percent (Bloom et al., 2015). This increase in productivity is associated with strong selection effects; teleworking employees who did not perform as well relatively returned to the office and those who were not selected for the trial were able to switch to telework if they desired.

Angelici and Profeta (2020) studied employers utilizing what they call "smart-working." Smart-working is a term to define a flexible working arrangement between employee and supervisor where the employee is free to complete assigned tasking for a defined period whenever and wherever the employee sees fit (Angelici and Profeta, 2020). For their study, they conducted an RCT with a large, traditional company in Italy, where 310 workers were randomly divided into two groups. The treatment group had the option to work "smart" one day per work week for nine months, with the control group was required to continue to work traditionally. Performance results were objectively determined by the firm's calculation and number of days of annual leave. This information was supplemented with questionaries administered to each employee as well

as their supervisors. They found that after nine months, the treatment group's productivity was approximately 19 percentage points higher than that of the control group. Throughout the course of study, employees in the treatment group consistently took less time off, averaging 5.6 fewer days in total, a result likely attributed to smart-work employees being able to better manage their time with responsibilities such as daycare or doctors' appointments (Angelici and Profeta, 2020). Although no specific cause is identified as to why productivity increased, similar to other studies, the authors surmise it is due to time saved by taking fewer breaks and little-to-no commute, allowing employees to stay more focused during the workdays. One other possibility the Angelici and Profeta (2020) point out is the concept of the "Hawthorne Effect," described by Saha (2018) where employees have a positive feeling toward the firm and thus want to work harder for the firm (Angelici and Profeta, 2020; Saha, 2018).

The ability to work from home seems to have benefits not only for the organization with respect to productivity, but also in employee compensation. Mas and Pallais (2017) conducted a field experiment of individuals seeking call center jobs. The researchers posted an electronic job ad in 68 metro areas, describing basic job qualifications, but did not provide any information regarding the job schedule or location. During telephone interviews, Mas and Pallais (2017) asked applicants whether they would prefer a traditional 40-hour, Monday through Friday schedule, or a choice of randomly assigned alternate arrangement (Mas and Pallais, 2017). These alternate arrangements "included flexible scheduling, working from home, and positions that gave the employer discretion over scheduling" (Mas and Pallais, 2017, p. 3725). With nearly 7,000 applicants, results showed that, of the alternate work arrangements considered, applicants viewed the ability to work from home was valued equal to receiving 8 percent lower wages (Mas and Pallais, 2017). Similarly, results from Barrero et al. (2021)'s monthly on-going Survey of Working Arrangements and Attitudes (SWAA) show that nearly 63 percent of respondents would value the option to work from home commensurate with a pay increase of at least 5 percent (Barrero et al., 2021).

B. TELEWORK STUDIES IN THE FEDERAL GOVERNMENT

In an effort to evaluate how various federal agencies were undergoing telework, RAND published two reports in 2018. In the first report, the authors evaluated the different telework practices of seven federal agencies, taking lessons learned from both successes and failures, and provided recommendations for improvement (Weinbaum et al., 2018a). There seems to be varying levels of success due to the individual nature of policy development, with little communication between federal agencies. The General Service Administration, for example, was able to shift 88 percent of their total work force to remote work (95 percent were eligible), whereas the Federal Emergency Management Agency (FEMA) only reported 46 percent of their work force worked remotely, with 61 percent eligible (Weinbaum et al., 2018a). FEMA was the only agency to put in place an agency-wide COOP telework exercise, Determined Sentry, to test the effectiveness of their telework policy by requiring all eligible employees to work from home and authorizing work that could be performed remotely to be done so (Federal Emergency Management Agency [FEMA], 2013; Weinbaum et al., 2018a). This exercise was able to pull lessons learned on technology and IT shortcomings, network connectivity, and other issues (FEMA, 2013). The exercise was able to draw out failures in FEMA's COOP plans so they could be addressed prior to requiring implementation in the event of a real emergency or disaster. After completion of Determined Sentry, FEMA published a handbook template for other organizations and agencies to frame their own exercises.

The National Aeronautics and Space Association (NASA) gained valuable lessons with respect to technology and security while working on sensitive-but-unclassified and personally identifiable information. NASA was able to implement more elaborate security measures for access to the NASA network, which consisted of required use of a government-furnished computer with VPN software installed, a smart-card reader for their NASA badge, personal identification number (PIN) for logging into the computer and access to the VPN, a SecurID token and a separate eight-digit alphanumeric password for access to token-required websites and applications (Weinbaum et al., 2018a). The Nuclear Regulatory Commission (NRC) also made use of software to afford employees the ability to work with sensitive information while out of the office through

their secure intranet, Citrix Online (Weinbaum et al., 2018a). NRC employees are required to get special permission from their supervisors in order to work on sensitive material remotely, otherwise they may only work on unclassified tasks and projects.

This concern for security was the major focus for RAND's second 2018 study. In this report, the authors looked at various intelligence community organizations and provide lessons-learned recommendations to aid in promotion of telework and remote work, even within classified and sensitive spaces. Interest for this rose with the need for more and more collaboration among intelligence organizations and outside partners who would not have access to SCIFs (Weinbaum et al., 2018b).

Policy considerations involve those surrounding an agency's policies that hinder or promote telework and remote work. If organizations want to enact policy to encourage telework for unclassified systems, Weinbaum et al. (2018b) argue "agencies should also establish clear, easily interpreted policies that facilitate communications between employees and supervisors" (Weinbaum et al., 2018b). The authors further recommend that policies should also directly define what training is required for both employees and supervisors who choose to telework, explain rules, explicitly define under what conditions employees may use personal versus government-furnished equipment, and lay out clear requirements for the handling of sensitive information (Weinbaum et al., 2018b).

Technology considerations include both hardware and software that may enable employees to work remotely outside of classified and/or government spaces. Weinbaum et al. (2018b) recommend leveraging emerging technology to promote telework such as utilizing a VPN or other remote-access tools, scanning classified systems for unclassified capabilities and transfer these to an unclassified system to better facilitate remote work, providing access to online team collaboration software, and issuing government equipment directly to employees to facilitate remote work (Weinbaum et al., 2018b).

The DOD Inspector General (DODIG) published a report in 2021 to evaluate the DOD's process for accessing information technology and communications during the COVID-19 pandemic (Gorman, 2021). In August of 2020 the DODIG sent out a 43

question survey to both DOD civilian employees and service members to determine to what extent DOD organizations provided DOD information technology and communications access, receiving over 56,000 responses (Gorman, 2021). Of the 88.2 percent of respondents who reported teleworking full- or part-time, a majority reported troubles with DOD furnished equipment, accessing DOD networks, voice systems, and other telecommunications software at the height of the pandemic (Gorman, 2021). Respondents reported these issues waning as network capacity increased, new voice and video applications were introduced, and new equipment was purchased and furnished. One major reason for some of the initial problems was because "some DOD components had not fully tested whether their information systems could support government-wide mandated telework and had not conducted telework exercises with their personnel before March 2020 as required by the DOD Implementation Plan and the DOD Telework Policy [DODINST 1035.01]" (Gorman, 2021, p. 49). The report recommends policy alignment where there are discrepancies and for DOD components to update COOP plans to "include revised assumptions regarding telework for personnel and the resources required to support the teleworking workforce" (Gorman, 2021, p. 49).

Weinbaum et al. (2018b) make a point to emphasize one of the largest considerations and hurdles organizations need to overcome is organizational culture. This includes employee and supervisor perceptions about telework and remote work, and the training of those involved (Weinbaum et al., 2018b). There is often a stigma associated with employees who choose not to work on-site and is shown to have an effect on employees' productivity (Emanuel and Harrington, 2021).

C. POST-PANDEMIC TELEWORK

Because the COVID-19 pandemic had such large effects over much of our lives, not just in the realm of working remote, it is not possible to extrapolate the results from studies prior to the pandemic out beyond post-pandemic life. Spouses and children at home, shared working spaces, and worry about illness have reduced general homelife satisfaction, especially for mothers and individuals shifting from full to part-time work (Möhring et al., 2021). Results from the 2020 Federal Employee Viewpoint Survey show

that 39 percent of employees reported requiring child-care during the work day and 29 percent relied on in-home childcare or required shifting to alternate work hours to accommodate taking care of children (Office of Personnel Management [OPM], 2020). One section asked questions regarding work load and quality of work, with 23 percent of respondents saying that pandemic was extremely or very disruptive to their quality of work and 48 percent reporting greatly or somewhat increased work demands due to the pandemic (OPM, 2020). This is exacerbated by more (though shorter) meetings, more e-mails and on-screen time, and generally longer work days by an average of 45 minutes (DeFilippis et al., 2020).

There does appear to be stark differences in how telework has affected various groups. Specifically, telework tends to be mostly available to executive, white collar, and lower-wage administrative workers (Barrero et al., 2021). There also seems to be some bias from leadership as to who may opt in to work remotely (Emanuel and Harrington, 2021). Emanuel and Harrington (2021) point out that managers maybe believe that lower performers would rather work remotely, out of direct supervision from management and more likely to shirk responsibilities. Emanuel and Harrington (2021) noted that, prior to the pandemic, promotions for call center workers who teleworked were 12 percentage points lower when compared to promotions of their onsite peers. Once the pandemic forced all employees to work remotely, the on-site workers (now working from home) outperformed their peers by over seven percent (Emanuel and Harrington, 2021). Bloom et al.'s (2015) experiment in a Chinese call-center saw nearly half of remote workers bypassed for promotion compared to their on-site peers, prompting the concern that employees feel the need to be seen in order to advance their careers (Bloom et al., 2015). When employers provide the option to telework, it is possible that lower performers will choose this option, but none of these studies determine direct causality between opting into telework and being a lower performer.

This is not to say that telework and remote work will not be normalized in a post-pandemic world. The COVID-19 pandemic acted as a forcing function to provide an environment where these policies and arrangements may be been too costly to conduct without a catalyst. The on-going Survey of Working Arrangements and Attitudes

conducted by Barrero et al. (2021) in 2020 indicates that once telework has been established as a norm, it will be difficult for employers to remove (Barrero et al., 2021). Looking towards the future, patents focusing on telework infrastructure and technology rose dramatically in 2020. Bloom et al. (2021) found that a large number of patents were filed with the U.S. Patent Office relating to software, hardware, IT, and infrastructure to support remote work in the future. This points to the idea that telework is here to stay.

The COVID-19 pandemic was a shock to many industries including childcare, and schools, among others. It forced industry's hand in normalizing working remotely. Once systems are able to be steadied and individuals negatively affected are able to return to work without at-home distractions, the literature shows overwhelmingly an increase in quality of life for the employees as well as productivity. Edwards et al. (2020) wrote a RAND article arguing that it may be impossible for managers to "stuff the genie back into the bottle" (Edwards et al., 2020). Both supervisors and employees have experienced work-ready mornings without a commute, the ability to take breaks at their leisure, and disproven many theories about work roles requiring physical presence at an office (Edwards et al., 2020). Their analysis is commensurate with Barrero et al.'s (2021) recommendation that telework and remote work are not all-or-nothing, but that the answer most likely lies within a hybrid environment (Barrero et al., 2021; Edwards et al., 2020). According to their survey results, most employees do desire some form of face-to-face interaction with one another, especially when collaborating on projects, resulting in two or three days in the office for these activities and the remaining days working remotely (Barrero et al., 2021).

The academic literature is clear that affording employees the opportunity to work remotely can have major benefits with respect to productivity. Concern over management perception of employees who utilize the option to telework remains a valid concern, but could potentially wane as more and more organizations make the shift to more flexible working arrangements. While the academic studies focused on the civilian workforce, Weinbaum et al. (2018) focus on how federal organizations have succeeded and faltered, addressing concerns regarding security and information technology. Because there are concerns regarding information security and promotion within the DON, in the next

chapter I analyze jobs in the Navy compared to similar civilian roles and determine to what extent the Navy may work to promote telework among its uniformed members and what roles are not appropriate for such a shift.

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IV. RESEARCH APPROACH AND METHODS

In response to the COVID-19 pandemic, many industries, companies, and organizations required their staffs to shift to a remote work environment to enhance social distancing and minimize the spread of the disease. Dingel and Neiman (2020) addressed concerns regarding the economic impact of shifting such a wide array of industries to remote environments, inspiring them to research which jobs can actually be completed effectively while offsite. The researchers classified which occupations could be reasonably performed remotely utilizing responses from two surveys that were included in the 24.2 database release from the Online Information Network (O*NET) (Dingel and Neiman, 2020). The O*NET database was developed under the U.S. Department of Labor/Employment and Training Administration and operates through a grant to the North Carolina Department of Commerce and contains nearly 1,000 descriptions for occupations within the U.S. (Online Information Network, 2021). The authors merged this O*NET data with data from the Bureau of Labor Statistics' 2018 occupational employment statistics regarding the number and wages for workers within these occupations (Dingel and Neiman, 2020). After cleaning the aggregate data, the authors removed occupations that were determined to never be able to be performed remotely. Criteria for removal included "majority of time spent walking or running," "majority of time spent wearing protective or safety equipment" and "performing or working directly with the public" (Dingel and Neiman, 2020). Results indicate that, overall, 37 percent of U.S. jobs could potentially be shifted successfully to remote work. These results vary widely among occupations and localities. Table 1 shows the O*NET occupation category title and the share of jobs that could be performed remotely within that occupation along with the Navy share of jobs from the Total Force Job Directory (TFJD).

For my analysis I looked at the occupations studied by Dingel and Neiman (2020) and compared them with the TFJD. The TFJD is maintained by the Navy Manpower Analytics Center and provides job descriptions for various types of jobs found within all ratings and officer codes. The spreadsheet also classifies each of these jobs into the same

O*NET occupation major groups used by Dingel and Neiman (2020). I assess whether the job can immediately be performed remotely, is appropriate to be performed remotely under certain circumstances and local policy adjustments, or not performed remotely at all based on DOD and DON eligibility criteria. Within this criteria, I only consider jobs performed at shore-based commands; any job that requires the sailor or officer to be on board a naval vessel will not be considered a candidate for remote work. Based on job descriptions provided in the NEOCS and NOOCS, if the responsibilities require direct handling of classified material, then the job is not a good candidate for remote work. This analysis assesses only the primary responsibilities of the jobs described, and similar to Weinbaum et al. (2018b)'s recommendation and guidance from DODI 1035.01, any unclassified work that may be performed in a remote environment should be encouraged, but is not addressed here. There are too many variables and tasking requirements to ascertain for certain if each billet classified with one of these jobs is or is not wholly appropriate for remote work. I assume that all other eligibility requirements such as time on station, ethical and conduct standards, and positive evaluations are all otherwise met. This results in the determining criteria to be whether or not the job requires on-site activity or direct handling of classified material. If these are not met, I assess the job is a good candidate for remote work.

The types of jobs in the Navy that fall into the major occupation groups with a high representation in both the civilian and military industries are computer and mathematical, education, training, and library, legal, business and financial operations, and office and administrative support occupations. Because these jobs in the civilian sector can plausibly be performed remotely, I take a deep dive into specific ratings and billets that fall into these occupations to assess their potential for remote work in the Navy. I identify occupations that translate to Navy enlisted/officer billet classifications (NEBC, NOBC, respectively) and whether or not the eligibility requirements of the military would allow these positions to be performed remotely similar to the civilian sector. Table 1 provides the share of Navy jobs within an O*NET job family that can be performed remotely. This value is determined by dividing the number of positions determined to be candidates for remote work by the total jobs in the category.

Table 1. Share of Jobs That Can Be Performed at Home, by Occupation Major Group. Adapted from Dingel and Neiman (2020).

Occupation	O*NET Share-Baseline	TFJD Navy Share
Computer and Mathematical	1.00	0.71
Education, Training, and Library	0.98	0.80
Legal	0.97	0.44
Business and Financial Operations	0.88	0.62
Management	0.87	-
Arts, Design, Entertainment, Sports, and Media	0.76	-
Office and Administrative Support	0.65	0.59
Architecture and Engineering	0.61	-
Life, Physical, and Social Science	0.54	-
Community and Social Service	0.37	-
Sales and Related	0.28	-
Personal Care and Service	0.26	-
Protective Service	0.06	-
Healthcare Practitioners and Technicians	0.05	-
Transportation and Material Moving	0.03	-
Healthcare Support	0.02	-
Farming, Fishing, and Forestry	0.01	-
Production	0.01	-
Installation, Maintenance, and Repair	0.01	-
Construction and Extraction	0.00	-
Food Preparation and Serving	0.00	-
Building and Grounds Cleaning and Maintenance	0.00	-

A. COMPUTER AND MATHEMATICAL OCCUPATIONS

The TFJD has descriptions for 38 job codes that fall into computer and mathematical occupations, 27 enlisted and 11 officer. This major occupation group is broken down into jobs across various enlisted ratings and officer codes, both for shore and sea-going activities. The enlisted ratings represented are cryptologic technician, information systems technician, and electronics technician. Each of these ratings falls under the information warfare domain, with the exception of electronics technician, which falls under surface combat systems. Of these 38 job codes, I determined that 10

would be appropriate to shift to remote, 17 that could plausibly move to a remote environment with policy or local security considerations, and 11 job codes that would not be appropriate to perform in a remote setting. Table 2 provides a consolidated summary of these findings. While Dingel and Neiman (2020) determined that 100 percent of computer and mathematical jobs could be performed in a work-from-home environment, in looking at Navy-specific jobs, we see a much smaller number at 26.32 percent could easily shift to remote and 71.05 percent if we include in this total jobs that could possibly be performed remotely, after policy and procedural changes were in effect (Dingel and Neiman, 2020).

Table 2. Computer and Mathematical Jobs. Adapted from MyNavy HR (2021).

Rating or Officer Code	Job Title	Candidate For Remote Work?	Requires On-Site Activity Or Face-To-Face Contact?	Requires Direct Handling Of Classified Material?
NRS (Non Rating Specific)	Special Compartmented Information Security Program Specialist	No	No	Yes
CTR	Analyst And Reporter	No	No	Yes
CTR	Signals Analyst	No	Yes	Yes
CTT	Surface Electronic Warfare Operator	No	Yes	Yes
IS	Operational Intelligence Analyst	No	Yes	Yes
CTT	Surface Electronic Warfare Maintainer	No	Yes	Yes
CTR	Collection Operator	No	Yes	Yes
CTN	Cyber R&D Specialist	Maybe	Situational	Situational

Rating or Officer Code	Job Title	Candidate For Remote Work?	Requires On-Site Activity Or Face-To-Face Contact?	Requires Direct Handling Of Classified Material?
IT	Technical Support Specialist	Yes	No	No
IT	System Administrator	Yes	No	No
IT	Systems Security Analyst	Yes	No	No
IT	Information Systems Security Manager	Yes	No	No
IT	Cyber Defense Infrastructure Support Specialist	Maybe	Situational	Situational
IT	Cyber Defense Incident Responder	Maybe	No	Situational
IT	Vulnerability Assessment Analyst	Maybe	No	Situational
ITS	Electronic Warfare Technician	No	Yes	Yes
ITS	Communications Specialist	No	Yes	Yes
ITS	Communications Technician	No	Yes	Yes
ITS	Electronic Warfare Specialist	No	Yes	Yes
CTN	Cyber Defense Analyst	Maybe	No	Situational
CTN	Cyber Defense Forensics Analyst	Maybe	No	Situational
CTN	Cyber Exploitation Analyst	Maybe	No	Situational
CTN	Access Network Operator	Maybe	No	Situational

Rating or Officer Code	Job Title	Candidate For Remote Work?	Requires On-Site Activity Or Face-To-Face Contact?	Requires Direct Handling Of Classified Material?
CTN	Interactive Operator	Maybe	No	Situational
CTN	Digital Network Analyst	Maybe	No	Situational
CTN	Cyber Threat Emulation Operator	Maybe	No	Situational
ET	Electronics Data Systems Technician	Maybe	No	Situational
2050	Mathematics Research Officer (General)	Yes	No	No
2085	Statistical Data Analyst	Yes	No	No
9085	Operations Analyst	Maybe	No	Situational
9086	Strategic Plans Officer	Maybe	No	Situational
9517	Communication Security Officer	Yes	No	No
9730	Data Base Management Officer	Yes	No	No
9735	Computer Systems Analyst	Yes	No	No
9740	Digital Computer System Programmer	Yes	No	No
9890	Computer Network Operations	Maybe	No	Situational
9891	Computer Network Capability Development	Maybe	No	Situational
9519	Information Management Officer	Maybe	No	Situational

1. Cryptologic Technician

The largest rating represented in the computer and mathematical occupation code is the cryptologic technician family. This includes collection (CTR), technical (CTT), and networks (CTN).

CTR duties and responsibilities generally include collection, analysis and reporting of signals utilizing computers and specialized collection equipment (Department of the Navy [DON], 2022a). CTRs will perform their duties both on shore and at sea and have billets assignable world-wide. Within the TFJD, jobs CTRs can perform include analyst and reporter, signals analyst, and collection operator. By analyzing the jobs as described in the Navy Enlisted Occupations Standards (NEOCS) volume I, none of the jobs for CTR could be performed remote, without classification and security modifications (Weinbaum et al., 2018). Commands that employ these jobs may have individualized tasking that is of an unclassified nature, and some of that work may be able to be performed remotely, but without changing local and command policy, the majority of tasking within these jobs are required to be performed in a sensitive compartmented information facility (SCIF).

Analyst and reporter job responsibilities include collecting, fusing, and analyzing data to aid in determining targets and executing communications electronic attacks; draft and distribute intelligence and cryptologic mission reports for the area of responsibility; conduct analysis of defensive and offensive cyberspace operations; and ensure compliance with all classified information storage, transportation, and protection requirements (DON, 2022a). The majority responsibility of this job-type requires the use of classified information, which requires working in a SCIF. Some collateral unclassified tasking may be performed outside of a SCIF and could thus be conducive to remote work.

Next, the job of signals analyst is responsible for collecting and conducting signals searches and analysis for signals of interest; reporting operations and target identification; developing, executing and evaluating target mission plans involving "exploitation and manipulation of the electromagnetic spectrum" (DON, 2022a); developing tools and scripts for offensive and defensive cyberspace operations; and

ensure compliance with all "classified information storage, transportation, storage and protection requirements" (DON, 2022a). Many of these jobs will be performed on naval vessels and can therefore not be performed remotely.

Last, the collection operator utilizes and maintains collection systems for intercepting signals of interest for identification, exploitation and reporting. Additionally, collection operators "optimize signals intelligence collection resources and prioritize Navy unit tasking while balancing relationships between mission requirements, resources, operating procedures, and target identification techniques" (DON, 2022a). They assist commands with "requests for information, reporting, special intelligence communications networks and equipment" (DON, 2022a), and aid with emergency action plans. These job tasks all require sailors to be on board to operate the equipment required for collection and analysis. Because of this, collection operator jobs cannot be shifted to remote work environments.

The next rating represented is Cryptologic Technician (Technical) (CTT), which is generally responsible for "operating and maintaining electronic intelligence receiving and direction-finding equipment, digital recording devices, analysis terminals, and all associated computer systems and equipment" (DON, 2022a). CTT only have two NEBC which specifically relate to the computer and mathematical O*NET occupation code, both of which require being on board naval assets for operation and maintenance. These jobs are electronic warfare operator and electronic warfare maintainer. Because these jobs require the sailor to be on board ships, submarine, and aircraft in order to perform their duties and responsibilities, they would not be viable candidates for remote work.

Finally, the Cryptologic Technician (Network) (CTN) rating has a wide variety of responsibilities including both defensive and offensive cyber operations, cyber planning, forensic, network, and exploitation analysis, expeditionary operations, and research and development (DON, 2022a). CTNs have eight NEBC which fall into the computer and mathematical occupation code, each of which have the potential to work remotely, so long as access to computer systems is possible and local commanders adjust policy and risk tolerance (Weinbaum et al., 2018).

In a job coded for cyber research and development, sailors "perform capability development through reverse engineering" (DON, 2022a), research adversary and domestic vulnerabilities, utilize all-source intelligence and most up-to-date industry practices to enable offensive and defensive operations (DON, 2022a). Some of these responsibilities could potentially be performed remotely, given classification restrictions.

Cyber analysts, including defense, forensic, network and exploitation analysts utilize network capabilities to collect and target useful information for the purposes of mitigating threats, exploiting target networks, and analyze potential threats. Depending on network classification and virtual private network (VPN) availability, some of the responsibilities within these jobs could be performed at remote locations, while others will still require the use of a SCIF.

CTN operator jobs include access network operator, interactive operator, and cyber threat emulation operator. Access network operators perform "collection, processing, and determination of location for both wired and wireless computer and digital networks with the intent to exploit, locate, and track targets of interests" (DON, 2022a). Interactive operators utilize computer networks in order to exploit enemy cyber vulnerabilities, test and evaluate capabilities, data acquisition, and forensic analysis. Finally, cyber threat emulation operators replicate cyber and network threats for full-scope mission assessments. These assessments are used for operational planning "in support of commander's training, or operational requirements to perform aggressive threat assessments of information and combat systems to inform defensive tactics, techniques and procedures and posture" (DON, 2022a). Given the sensitive nature of many of these responsibilities, the majority would have to be performed in a SCIF, unless specific changes were made with respect to VPN access or separate equipment for classified and unclassified work.

2. Information Systems Technician

The information systems technician rating falls into two categories, surface (IT) and submarine (ITS). Sailors in these ratings operate and maintain global satellite telecommunications systems, mainframe computers, local and wide area networks, as

well as micro-computer system utilized throughout the fleet (DON, 2022a). The IT rating has seven NEBC that fall into the computer and mathematical occupation. Of these, I assess three are plausible for remote work with policy and practice changes and four that could be performed remotely as is. I will discuss the three jobs that could potentially be shifted to remote with changes.

First, the NEBC that could be performed remotely with little-to-no change to policy or practice include technical support specialist, system administrator, system security analyst, and information systems security manager. Many of their duties and responsibilities are similar to civilian counterparts, including customer support with hardware, software, and networks; installing, configuring, troubleshooting, and maintaining server and systems configurations to ensure security, integrity, and availability; distribute software updates, security testing and maintenance; and policy enforcement, security awareness and training, and emergency planning (DON, 2022a). Similar to civilian IT professions, these NEBC are able to work remotely assuming the classification of the network and hardware allow via VPN or through a cloud server. This shift to remote work assumes local commands can support this infrastructure. If not, adjustment to policy and budget may be required.

Jobs that would require specific changes to practice and policy include those responsible for cyber defense infrastructure support, cyber defense incident response, and vulnerability assessment analyst. Because the nature of this work involves testing, deploying, maintaining, and administering infrastructure hardware and administration needed to manage networks, assess, respond, and provide recommendations threats and vulnerabilities, adjusting to a remote environment can only be performed should the local requirements not need to be performed in a classified environment (DON, 2022a). Without nuance on the specific job tasks being performed, it is difficult to say whether or not these responsibilities may be performed remotely.

There are four jobs for ITS within the computer and mathematics occupation code. These jobs include electronic warfare technician and specialist, and communications technician and specialists. None of these jobs would be conducive to

shifting to a remote work setting because all require hands-on work with equipment on board submarines.

3. Officer

The officer occupation codes are not directly tied to specific officer designations, and are therefore much more open to the interpretations of local commanders with respect to scope and classification of work. The TFJD identifies 11 NOBC that fall under the O*NET computer and mathematical occupation code. Out of these, I assess that five jobs would require adjusting policy and practices in order to facilitate remote work and six that could be performed remotely immediately.

Officer jobs that would require changes to policy and security practices once again depend heavily on the classification of the systems they are working on. These jobs include operations analyst, strategic plans officer, computer network operations, computer network capability development, and information management. The fact that many of these jobs involve collecting and analyzing data for the purposes of defensive and offensive cyber actions, as well as developing and coding programs, plans, and policy for military networks and computers systems makes determining whether these can be performed remote or not difficult (DON, 2022b). There is a high probability that some of the responsibilities outlined will be required on classified devices and networks and therefore cannot be performed remote; however, other tasks, such as designing collaborative information environments for joint staffs, acting as advisors concerning computer systems, and maintaining liaisons with joint agencies and government departments could all potentially be done remotely. For these reasons, I determined that shift to remote work to be plausible given local adjustment to job requirements, if needed.

Six NOBCs could be transferred to remote working environments with very little effort. These include mathematics research officer, statistical data analyst, communications security, database management, computer systems analyst, and digital computer system programmer. Many of these roles have close counterparts in the civilian world which have been determined to have the capacity to be performed remotely (Dingel and Neiman, 2020).

Two roles that fall near to academic and research and development work are mathematics research officer and statistical data analyst. Mathematics research officers "develop mathematical techniques and formulas for computation and measurement of physical reactions…" and "collaborate in design and testing of computers and other mathematical devices, [solve] problems of mathematical theory involving derivation of calculation processes. [Mathematics research officers] exercise administrative and professional direction of naval research in mathematics" (DON, 2022b).

Statistical data analysts "perform professional statistical work involving collection, compilation, verification, analysis, and interpretation of data to aid in logistical planning, scientific research, and management control" (DON, 2022b). Using quantitative statistical data and methods, they develop trends and ratios in helping determine cause-effect relationships and present findings to assist with policy development and implementation (DON, 2022b). Both of these roles are academic in nature. Unless specific tasking requires working with classified data or in a SCIF, these jobs could be shifted to work remotely.

Communications security officers are responsible for providing and ensuring security within naval communication, "administers traffic controls and procedures and develops and promulgates security measures," as well as "review joint and naval communication policies and instructions" (DON, 2022b). Many of these responsibilities can be performed remote due to not requiring direct contact with equipment or customers. Much of the work involves ensuring compliance with policy regarding communications security, not necessarily at a classified level.

Database management officers supervise the maintenance of computerized databases. This includes collecting and transposing data to readable formats, controlling quality of input and output files, and providing distribution to user activities (DON, 2022b). Digital computer systems programmers develop and apply various computer systems to meet required objectives, provide system reliability and recovery procedures, and develop operating instructions, procedures, and standards (DON, 2022b). Computer systems analysts perform systemic analyses of operations and functions for computer systems and networks, define problems and aid in developing solutions. Additionally,

they provide computer programmers with quantitative and qualitative data in the form of flow diagrams, provide program parameters and approve computer programs (DON, 2022b). Once again assuming the work is not being performed on classified systems, all of the duties and responsibilities could easily be accomplished remotely, provided required resources were accessible.

B. EDUCATION, TRAINING, AND LIBRARY

The TFJD provides descriptions for five jobs that fall in O*NET job family for education, training, and library; see Table 3. Four of the five NOBC fall into the general training category of the NOOCS manual with one in the health services management category. Interestingly, there are many instructor NEBC/NOBC which are not included in the education, training, and library occupation code; but rather, these are found in the business and financial occupation code. Neiman and Dingel (2020) estimate 98 percent of education, training, and library and 88 percent of business and financial jobs can be performed remotely (Neiman and Dingel, 2020). In my assessment, 80 percent of military education, training, and library jobs can immediately be performed remotely with the potential of 100 percent possible for specific tasking or changes in local practices. I should note that because of the inconsistencies between job types in the NEOCS, NOOCS and TFJD, these results would mostly likely be lower due to more instructor roles that are not accounted for in the current TFJD of education, training, and library jobs.

Table 3. Education, Training, and Library Jobs. Adapted from MyNavy HR (2021).

Rating or Officer Code	Job Title	Candidate For Remote Work?	Requires On-Site Activity Or Face-To-Face Contact?	Requires Direct Handling Of Classified Material?
3255	Instructor, Academic (Physical Science)	Yes	No	No
3260	Instructor, Engineering	Yes	No	No
3274	Physical Training Officer	Yes	No	No
3298	Training Publications And Curriculum Officer	Yes	No	No
0010	Chairman Of Department, Teaching Program	Maybe	Situational	No

Two of the jobs listed are for instructors, one for physical sciences and the other for engineering. These instructors are involved in the development, coordination, and instruction of specified subjects as well as performing academic research. They evaluate trainees on their performance in their respective subjects and maintain documentation associated with evaluations. Much like we have seen in education around the world, these positions could be performed remotely, assuming technology could support this transition.

The physical training officer "plans, directs, or carries out instruction in physical training" (DON, 2022b). They "formulate physical training programs to maintain fitness of naval personnel" and "ensure conformance to compulsory requirements such as swimming instruction, calisthenics, obstacle course and judo" (DON, 2022b). They work with other services and civilian agencies to provide athletic contests and supervise the selection, procurement, and distribution of athletic gear. The majority of responsibilities can be performed remote and do not require physical presence to be accomplished.

The last NOBC within the general training group is the training publications and curriculum officer. These officers are responsible for supervising preparation of naval training publications by preparing manuscripts, manuals, correspondence, curricula descriptions, and directives. Additionally, they plan and supervise layouts and illustrations and obtain required clearances for distribution (DON, 2022b). Much of these duties are supervisory in nature and take place on unclassified materials, so the shift to remote would be relatively seamless.

Within the health services management category of the NOOCS Vol I, but still under the O*NET code for education, training, and library is the chairman of the teaching program department. They are in charge of the "training of interns, residents, fellows and treatment of patients within the professional service" (DON, 2022b). Along with this they "maintain appropriate standards and documentation to ensure accreditation of training programs" (DON, 2022b). In my assessment, many of these responsibilities can be performed in a location remote from the command, but may require in-person work for assessments and inspections.

C. LEGAL

O*NET's legal occupation code has 18 jobs within the TFJD, two enlisted within the Legalman (LN) rating and 16 officer jobs. Dingel and Neiman (2020) estimate that 97 percent of legal jobs in the U.S. can be performed remote. Of the 18 Navy jobs that fall into this occupation code, I assess that 44 percent can immediately be performed remote and the remaining 56 percent could potentially shift to a remote work environment with changes to current practice. These numbers could potentially be higher and be more in line with Dingel and Neiman (2020) with the aid of collaboration and remote work software. Aside from required courtroom appearances and work with sensitive information, the vast majority of tasks within the jobs can be performed away from a formalized work site, for all TFJD legal jobs, officer and enlisted. I have marked as potential the jobs that appear to have the most interaction with clients directly and court appearances.

Table 4. Legal Jobs. Adapted from MyNavy HR (2021).

Rating or Officer Code	Job Title	Candidate For Remote Work?	Requires On-Site Activity Or Face-To-Face Contact?	Requires Direct Handling Of Classified Material?
LN	Senior Paralegal	Yes	No	No
LN	Paralegal	Yes	No	No
2505	General Attorney	Yes	No	No
2510	Administrative Law Attorney	Yes	No	No
2515	Admiralty Attorney	Yes	No	No
2517	Appellate Military Judge	Maybe	Situational	No
2518	Appellate Counsel	Maybe	Situational	No
2520	Claims Attorney	Yes	No	No
2529	International Law Attorney	Yes	No	No
2530	Legislative Counsel	Maybe	Situational	No
2535	Legal Assistance Attorney	Maybe	Situational	No
2556	Military Judge, Special Courts-Martial	Maybe	Situational	No
2557	Trial Counsel	Maybe	Situational	No
2558	Defense Counsel	Maybe	Situational	No
2559	Capital Litigator	Maybe	Situational	No
2560	Environmental Law Attorney	Maybe	Situational	No
2591	Legal Officer	Yes	No	No
2592	Military Justice Management Officer	Maybe	Situational	No

1. Legalman

Legalman (LN) within the Navy generally "possess knowledge and expertise regarding military and civilian legal systems, substantive and procedural law which

qualify them to perform legal work under the supervision of a qualified attorney" (DON, 2022a). Within the O*NET legal job family, LN have two NEBC specifically identified, paralegal and senior paralegal. Paralegals "draft legal papers and documents to include appeals, motions, pleadings, pretrial agreements, legal briefs, routine legal assistance documents, and draft legal correspondence" and are required to work "under the supervision of attorneys and senior paralegals" (DON, 2022a). Additionally, paralegals "conduct advanced legal research and compile statistics for submission of required reports" and "provide routine advice to commanders on military justice and administrative measure" (DON, 2022a). Paralegals work to resolve client complaints, "conduct client and witness interviews, perform notarial acts, draft power of attorneys, trust instruments, wills, and estate planning documents" (DON, 2022a). In addition to the duties of paralegals, senior paralegals may work independently or under the supervision of an attorney to "investigate the facts of cases and ensure that all relevant information is considered" (DON, 2022a). They help in identifying appropriate laws and research for case preparation. They may also "help prepare legal arguments, draft pleadings and motions to be filed with the court, obtain affidavits, and assist attorneys during trial" (DON, 2022a). Without specific case requirements identifying the work to be of a classified or sensitive nature, all of the duties and responsibilities of both paralegals and senior paralegals can reasonably be performed in a location other than a dedicated work site.

2. Officers

The 16 officer jobs the TFJD identify within the legal job family cover a wide array of specialties within the law. These include general, admiralty, administrative law, claims, international and environmental law, legal assistance attorneys, judges of special courts-martial and military appellate, as well as legal officers, defense, trial, and legislative counsel. Attorneys provide general legal counsel as well as special knowledge and consideration for their specialty, be it environmental, admiralty, or administrative law. They review legal decisions and provide counsel to their clients (DON, 2022b). Aside from specific appearances required in court or with clients, much of their required duties and responsibilities may be performed remotely.

Command legal officers are responsible for administering command legal services. This includes "personnel investigations, administrative proceedings and disciplinary actions" (DON, 2022b). Command legal officers "maintains liaison with the nearest Naval Legal Service Office or Staff Judge Advocate's Office to obtain legal services in such fields as administrative law, admiralty matters, tort claims, litigation, legal assistance and jurisdiction" (DON, 2022b). With the exception of being present for specific administrative proceedings and disciplinary actions, most of the duties can be performed remotely.

Jobs that could plausibly be performed remote, should practices in the courtroom shift to allowing counsel and judges to meet via online meeting platform, are those of trial and defense counsel, as well as judges. Many of the responsibilities presently require these officers to be present during court proceedings, but with changes in practice and policy, some of this work may very well be performed at any location.

D. BUSINESS AND FINANCIAL OPERATIONS

The business and financial operation occupation category has 60 jobs in the TFJD, 13 for enlisted sailors of various ratings and 47 for officers. Overall, I asses that 29 of these jobs can immediately be performed remotely, with eight more that could be shifted to remote environments, assuming the job is being performed at a shore facility. In total, this results in 61.7 percent of the busines and financial operation jobs within the Navy being candidates for remote work, falling well below Dingel and Neiman's (2020) 88 percent. Table 5 provides a summary of these jobs and their potential for remote work.

Table 5. Business and Financial Operations Jobs. Adapted from MyNavy HR (2021).

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
NRS (Non Rating Specific)	EO Advisor	Yes	No	No
PS	Pay Supervisor	Yes	No	No
PS	Pay Manager	Yes	No	No
MA	Expeditionary Security Specialist	No	Yes	No
MA	Strategic Asset Security Specialist	No	Yes	No
NCC	Command Career Counselor	Yes	No	No
NCC	Career Specialist	Yes	No	No
MC	User Experience Director	Yes	No	No
NCR	Recruiter	No	Yes	No
NRS (Non Rating Specific)	Formal Instructor	Yes	No	No
NRS (Non Rating Specific)	Training Manager	Yes	No	No
NRS (Non Rating Specific)	Logistics Support Technician	No	Yes	No
NRS (Non Rating Specific)	Recruiter Canvasser	No	Yes	No
1940	Fuel Logistics Planning Officer	No	Yes	No
1955	Staff Supply Officer	Yes	No	No
1978	Supply Logistics Officer	No	Yes	No
1984	Supply Plans Officer	Yes	No	No
2160	Designated Project Manager	Yes	No	No
2161	Major Project Manager (Selected)	Yes	No	No

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
2162	Deputy Designated Project Manager	Yes	No	No
2163	Manager, Designated Project Functional Element	Yes	No	No
2164	Designated Project Business Administrator	Yes	No	No
2168	Designated Project Integrated Logistics System Coordinator	Yes	No	No
2170	Designated Project Support Officer	Yes	No	No
2610	Management Analysis And Control Officer	Yes	No	No
2642	Maintenance And Material Management Data Analyst	Yes	No	No
2715	Disaster Preparedness Officer	Maybe	Situational	No
3020	Procurement And Recruiting Officer	No	Yes	No
3035	Induction And Enlistment Officer	No	Yes	No
3125	Personnel Distribution Officer (General)	Yes	No	No
3126	Personnel Distribution Officer (Officer)	Yes	No	No
3127	Personnel Distribution Officer (Enlisted)	Yes	No	No
3240	Officer Candidate Company Officer	No	Yes	No

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
3242	Indoctrination Training Officer	No	Yes	No
3245	Instructor, General	Maybe	No	Situational
3250	Instructor, Technical	No	No	Yes
3251	Instructor, Academic	Maybe	No	Situational
3254	Instructor, Academic (Social Science)	Yes	No	No
3262	Instructor Training Officer	Maybe	Situational	Situational
3265	Advanced Command And Staff School Instructor	Yes	No	No
3270	Instructor, Naval Science	No	Yes	No
3271	Nuclear Weapons Instructor	No	No	Yes
3277	Professor Of Naval Science	No	Yes	No
3925	Military Manpower Requirements Control Officer	Yes	No	No
3943	Manpower Planning Officer	Yes	No	No
5965	Electronics Logistics Officer	No	Yes	No
6942	Weapons Logistics Officer	No	Yes	Situational
7931	Naval Engineering Logistics Officer	No	Yes	Situational
9051	Logistics Officer	Maybe	Situational	Situational
9087	Staff Plans Officer	Yes	No	No
9515	Communication Plans And Operations Officer	Yes	No	No

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
9970	Plans And Policies Chief	No	No	Yes
9980	Plans And Policies Director	No	No	Yes
9981	Naval Plans And Policies Director, Naval Command Systems	No	No	Yes
1005	Accounting Officer	Yes	No	No
1015	Internal Review Officer	Yes	No	No
1025	Budget Officer	Yes	No	No
8020	Aircraft Survivability Officer	No	Yes	Yes
9093	Assessment Analyst	No	Yes	Yes
3036	Selective Service System Reserved Force Officer	Yes	No	No

Jobs within the business and financial operations cover a wide variety of positions, including budgeting, pay and disbursing managers, security forces, career counselors and talent recruiters, communications specialists, instructors and training managers, project management, logistics assessment, supervision, and implementation, communications and operations planning.

1. Non-rating Specific

There are several ratings represented in the business and financial operations category, but not all jobs are rating specific. For example, the equal opportunity supervisor job can be performed as a collateral duty by any rating within a command, and each command is required to have one. Other jobs that may be held by any rating include recruiters general instructors, training managers, and logistical support technicians. Of

these jobs, instructors and training managers can perform their responsibilities in a remote environment, assuming they are not instructing classified curriculum. Additionally, equal opportunity supervisors can perform their duties remotely and continue to maintain equal opportunity standards within a command. Logistical support technicians' responsibilities are required to be on board naval vessels and would therefore not be candidates for remote work.

2. Personnel Specialist

Personnel specialists (PS) are responsible for pay and personnel records and aid with pay and travel processing, disbursement, and audit (DON, 2022a). Within the business and financial occupations category, PSs have two jobs: pay supervisor and pay manager. Pay supervisors oversee the actions of the pay clerks (in the office and administration occupation category) and are responsible for ensuring all actions are in accordance with applicable regulations, policies, and procedures (DON, 2022a). Pay managers oversee both the pay clerks and pay supervisors and are overall responsible for all payment and travel transactions that occur within the department. Both of these jobs can be performed remotely with little adjustment.

3. Master-at-Arms

There are two jobs for the master-at-arms (MA) rating within the business and financial occupation. These are expeditionary and strategic asset security specialists. Neither of these positions are candidates for remote work as they require the sailor to be present in order to perform security duties.

4. Navy Counselor

The navy counselor (NC) rating is only open to sailors who have already shown experience in a prior rating and have demonstrated "thorough knowledge in Navy organization, including personnel and administrative procedures and policies" (DON, 2022a). For this reason, it is only possible to transfer in to the NC rating as an E-5 or above. Within the business and financial operations category, three jobs are listed for NCs: command career counselor, career specialist, and recruiter.

Recruiting often requires the sailor to be out and canvassing for potential new recruits and officer candidates (DON, 2022a). By nature, this means they work out in town and away from their main worksite or office. Because this is the normal operating environment for recruiters, I consider it a requirement that they at least live in the area in which they are recruiting, and would probably not be good candidates for remote work. For this instance, I am specifically referring to the ability to perform their jobs from any geographical location. Some responsibilities may be able to be performed at home, such as application and contract creation, but often the core of a recruiter's success is the ability to seek out candidates where they are (DON, 2022a).

More apt for remote work are the jobs of command career counselor and career specialists. Command career counselors "provide career information guidance and assistance to help Sailors explore and evaluate their education, training, interests, and capabilities" (DON, 2022a). Additionally, they assist service members who are transitioning out of the Navy with applications and out-processing procedures. Career specialists play a role more akin to an analyst. They also "develop, coordinate, and implement career information programs and policies within the Navy; oversee regional, battle group, and command training and development; establish rating and staffing requirements; and collect and examine retention and attrition data and provide trend analysis" (DON, 2022a). Both of these career-based NC jobs can be shifted to remote work environments.

5. Mass Communications Specialist

Mass communications specialists have one job in the business and financial operations job family – user experience director. Sailors in this role "practice human-centered design to develop creative communication solutions and align communication strategies and tactics to leadership's intent; conduct research; develop audience profiles; manage inclusive design programs and the usability of communication delivery systems and channels; and develop unit content strategies" (DON, 2022a). Similar to what is seen in the civilian sector, these content managers are able to perform their responsibilities from any location.

6. Officers

Officer jobs within the business and financial operations occupation are just as varying as their enlisted counterparts; everything from fuel logistics to professor of naval science at Naval Reserve Officer Training Corps (NROTC) is represented. By and large we can see there are groupings of supply and logistics, project management, academic and military instruction, and manpower and personnel planning.

Most of the supply and logistic jobs can be performed remotely with some exceptions. These are fuel logistics, weapons logistics, electronics logistics, and naval engineering logistics planning officer and supply logistics officer. Each of these jobs are based on operational platforms and are therefore not candidates for remote work. Staff supply and supply plans officers are not necessarily stationed on these same operational platforms and do not require access to classified systems to perform their responsibilities. For these reasons they could be shifted to remote working environments.

There are several levels of project management represented in the TFJD. Project managers of functional elements, project logistics coordinator, project support officers, designated project manager and deputy, and selected major project manager. Assuming the projects being worked on are not classified, all of the major responsibilities can be performed remotely.

It is interesting that more instructor jobs are categorized in business and financial operations rather than education, training, and library. Within this occupation group there are 11 instructor and training officer jobs compared to three in education, training, and library. This category has a mixture of jobs that are good candidates for remote work and those that are not. Some of the jobs require instruction on technical material, such as flying aircraft, or classified material, such as nuclear weapons and power instructors (DON, 2022b). Others are, by nature, leadership roles that need more face-to-face support, such as NROTC professors and officer candidate company officers (DON, 2022b). These jobs would not be candidates for remote work because they require hands-on instruction and direct interaction with students. Other instructor roles are much more similar to civilian academic education jobs. These include social science, command and

staff, and general instruction. Much like civilian instruction, these jobs would be viable candidates for remote work.

Traditional finance roles are represented by the accounting, internal review, and budget officer jobs. These jobs are responsible for controlling funds, auditing, and maintaining budgets for commands and installations (DON, 2022b). They ensure monies are being appropriated properly and ensure no fraud, waste, and abuse are occurring. These responsibilities do not require the use of classified systems, nor do they require the officer to be present while performing their duties and are good candidates for telework.

E. OFFICE AND ADMINISTRATIVE SUPPORT

Twenty-two jobs are categorized in the TFJD for Navy's office and administrative support. Of these, 21 are enlisted jobs and one officer. In analyzing the feasibility of shifting these jobs to remote environments, I asses that 13 could immediately be performed remotely, and nine that would not be viable for remote work. This results in 59.1 percent of the Navy office and administrative support jobs having the potential to be shifted remote, compared to Dingel and Nieman's (2020) determination of 65 percent for the U.S. civilian equivalent workforce. Table 6 summarizes the Navy jobs and provides their potential for remote work.

Table 6. Office and Administrative Support Jobs. Adapted from MyNavy HR (2021).

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
PS	Pay Clerk	Yes	No	No
LN	Journeyman Paralegal	Yes	No	No
LS	Postal Clerk	No	Yes	No
PS	Personnel Clerk	Yes	No	No
PS	Personnel Supervisor	Yes	No	No
PS	Personnel Manager	Yes	No	No

Rating or Officer Code	Job Title	Candidate for Remote Work?	Requires On-Site Activity or Face-to-Face Contact?	Requires Direct Handling of Classified Material?
RP	Religious Program Supervisor	Yes	No	No
LS	Logistician	No	Yes	No
YN	Administrative Assistant	Yes	No	No
YN	Administrative Supervisor	Yes	No	No
YN	Office Manager	Yes	No	No
AO	Weapons Department Technician	No	Yes	Yes
AZ	Aviation Administrator	No	Yes	No
YNS	Submarine Administrative Assistant	No	Yes	Yes
YNS	Submarine Administrative Manager	No	Yes	Yes
YNS	Submarine Administrative Office Supervisor	No	Yes	Yes
LSS	Submarine Logistician	No	Yes	No
RP	Religious Program Senior Supervisor	Yes	No	No
RS	Postal Clerk	No	Yes	No
NRS (Non Rating Specific)	Limited Duty Coordinator	Yes	No	No
NRS (Non Rating Specific)	Office Support Specialist	Yes	No	No
2605	Administrative Assistant	Yes	No	No

1. Non-rating Specific

Two jobs for enlisted sailors in the office and administrative support job family are not limited to a specific rating. These jobs are for limited duty coordinator and office support specialist. Limited duty coordinator track limited duty personnel within the command and "maintains close liaison with relevant personnel support commands/ detachments and medical treatment facilities" (DOD, 2022a). This Office support specialists work in traditional office environments and perform clerical and secretarial work such as typing, copying, mailing, and filing (DOD, 2022a). Neither of these jobs require access to classified information nor require work in operational environments and would be good candidates for remote work.

2. Personnel Specialist

PS jobs within the office and administrative support category include pay clerk, personnel clerk, personnel supervisor, and personnel manager. Pay clerks are responsible for processing pay and travel transactions, and providing customer support for related actions (DON, 2022a). Personnel clerks maintain service members' records and provide assistance with a multitude of personnel related matters such as identification card issuance, security screenings, maintain and track command leave, and prepare naval messages (DON, 2022a). Personnel supervisors oversee the functions of personnel clerks and act as quality control while personnel managers maintain overall control of both clerks and supervisors, certifying all transactions that occur from the department (DON, 2022a). All three of these jobs are good candidates for remote work.

3. Legalman

The LN job categorized under office and administrative support is that of the journeyman paralegal. Interestingly not categorized in legal alongside the paralegal and senior paralegal, journeyman paralegals perform many of the same functions at a more junior level. They work under an attorney's supervision and are often directly supervised and guided by more senior LN (DOD, 2022a). Similar to paralegals and senior paralegals, journeyman paralegals could perform their responsibilities remotely, assuming their junior rank still meets the local command's minimum time on station for remote work.

4. Logistics Specialist

Logistics specialists (LS) are enlisted sailors who specialize in "supply and postal related surface and aviation logistics functions" (DON, 2022a). Within the office and administrative support job family, LSs have two jobs, both of which require direct handling of supplies and equipment. These jobs are postal clerk and logistician. Because both jobs need to receive postage and supplies, inventory and account for receipts and maintain records and reports, these jobs are not good candidates for remote work.

5. Religious Program Specialist

The religion program specialist (RP) rating provide administrative and program support to military chaplains (DON, 2022a). Within the office and administrative support occupation category are two jobs, the religious program supervisor and senior religious program supervisor. Religious program supervisors "assist in the facilitation of religious ministry; support the care of service members and their families; advise the chaplain; advise leadership on morale, program planning and execution; support the command religious program with data collection, research, and analysis; and provide technical expertise on force protection requirements for religious ministry teams in expeditionary and combat environments" (DON, 2022a). Performing similar functions, as the name implies, senior religious program supervisor jobs are reserved for more senior RPs and also provide oversight, mentorship, and guidance to junior personnel. These duties and responsibilities can be performed remotely as they do not require personnel to use classified systems nor require face-to-face interaction.

6. Yeoman

Yeomen (YN) in the Navy "perform administrative and clerical work… They type, organize files, and operate modern office equipment such as word processing computers and copiers" (DON, 2022a). There are two types of YN represented in the office and administrative support occupation code. These are traditional YN and submarine YN (YNS). The jobs listed in the TJFD include administrative assistant, administrative supervisor, and office manager. These roles are responsible for assisting and supervising daily office activities, generating and routing correspondence, and

support legal proceedings (DON, 2022a). The YN roles are able to be shifted to remote work in performing their duties, but the YNS counterparts all require access to the submarine and classified systems, so they are not candidates for remote work.

7. Officer

There is only one officer job specifically categorized in the office and administrative support occupation, the administrative assistant. These officers "assist the commanding officer, executive officer, or operating head of naval activity by performing administrative duties" (DON, 2022b). Additionally, they are involved in record keeping to include leave logs, muster reports, and directories (DON, 2022b). Similar to the YN rating above, these duties can all be performed remotely.

F. RISKS

Maximizing telework is not without its risks. Concerns regarding information and technology security remain valid, although advances in these realms regarding technology and best practices are observed to meet the growing demand of telework by employees. Another risk the Navy faces with the maximizing of telework and remote work is the adjustment in tradition and culture. Like many civilian institutions, the Navy is accustomed to standard brick-and-mortar facilities located around the world. Management of service members and employees remains a concern especially with respect to promotion (Bloom et al., 2015; Emanual and Harrington, 2021).

Risk involving classified material is a valid concern, assuming service members and employees are not trained properly. All applicable laws, policies, and instructions emphasize that daily contact with classified material constitutes ineligibility for telework. Other responsibilities that may be moved to the classified realm opens the pool of eligible candidates, but also increases the opportunity for spillage, or the crossing of classified information onto unclassified systems. Following guidance from Steinhardt (2007) in the GAO's testimony to congress, they recommend executive agencies ensure their telework policies, especially regarding security, are clear and manageable. Weinbaum et al. (2018) made similar recommendations 11 years later. It is imperative for successful information technology security to be successful, the boundaries of what is an is not acceptable

behavior and practices is made clear. Advances in software and hardware regarding security such and their adoption are another method for ensuring spillage does not occur while maximizing workplace flexibility.

The risks associated with adopting and enforcing stronger telework policies is far outweighed by the risk of not adopting such policies. Unlike previous generations who were apt to find a career and stay with one company until retirement, younger generations are more willing to quit jobs to seek better opportunities. According to the Bureau of Labor Statistics (BLS), 4.3 million people quit their jobs in 2021 and have much more bargaining power as many businesses still are in need of the work previously provided (BLS, 2022; Vesoulis, 2021). There are varying factors contributing to this sizable increase in resignations, but both job satisfaction and flexibility play large roles. DODI 1035.01 and SECNAVINST 12271.1 both specify recruitment and retention as benefits to telework and this importance cannot be understated. As younger generations continue enter the work force they have either grown accustomed to the flexibility that remote work and telework provide or, at the very least, expect such accommodations to be available. If the Navy wants to be competitive in its recruiting efforts and continue to meet end strength, emphases on flexibility and telework will be cornerstones in future recruiting efforts.

Management of teleworking employees is no simple task and is unfamiliar to many in the military profession. This is not to say that management of teleworking service members and employees is impossible; rather, it takes a different set of practices for success. There will be, without a doubt, a steep learning curve for both supervisors and employees when entering into teleworking and remotely working positions. The vision for the future is moving towards telework, not away from it. In this light, management and supervisors need to have training early in their careers on best practices for evaluating and supervising remote workers. This requires a change in management style and structure, not sticking to "the way we've always done it" – a phrase that screeches like nails on a chalkboard to most military leaders.

Regardless of the specifics in policies and practices adopted by DOD and Navy leadership, we cannot be ignorant to the fact that we must adapt our policies or be left

behind. The best talent will go where the best opportunities are. In order for the Navy to compete it is imperative to be on the cutting edge of telework opportunity.

G. SUMMARY

Through surveys and data merging, Dingel and Neiman (2020) were able to categorize jobs in the U.S. and determine what percentage of occupations could be performed in remote work environments. Because of unique requirements of the Navy, I expected to find numbers below what Dingel and Neiman (2020) determined. By looking at the job families and analyzing the job requirements in each category against the DOD and DON eligibility requirements for telework and remote work I was able to determine rough percentages of service member job types that could be shifted to remote work. Dingel and Neiman (2020) determined 100 percent of computer and mathematical jobs could be done remotely, while I determined only 71 percent; education, training, and library civilian jobs were determined to have 98 percent share with the Navy at 80 percent; legal jobs held the largest margin between civilian and Navy jobs at 97 percent and 44 percent, respectively; business and financial operations in the civilian sector had a share of remote work candidates at 88 percent compared to the Navy's 62 percent; and office and administrative support jobs between civilian and Navy held the smallest gap at 65 percent and 59 percent, respectively.

It is important to note that what has been analyzed are job types and not the specific number of billets that are classified as such. These percentages may affect varying number of sailors and officers. For example, there are much more YN administrative assistants than there are admiralty attorneys. While I determined both are candidates for remote work, these jobs will affect different numbers of shore billets.

I only looked at the specific job requirements as described in the NEOCS and NOOCS manuals. To this end, based on the descriptions alone, I made my determination for remote work candidacy in an all-or-nothing context using whether or not the work must be completed on-site or if it requires direct handling of classified material as deterministic criteria. Barrero et al. (2021) discuss how remote work does not need to be all-or-nothing; rather, some hybrid of in-office work and remote work is most likely the

best, most efficient option. This analysis also does not take into account non-tangible effects of shifting these jobs to remote work environments. Concerns regarding promotion rate, evaluation, and management perception from the civilian literature (Bloom et al., 2015; Emanuel & Harrington, 2021) have not been addressed in this thesis, nor has specific interventions to aid in facilitating remote work. In the next chapter I provide my recommendations for the Navy to consider in an effort to expand and improve upon the existing telework and remote work programs and policies while minimizing risk to mission.

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V. RECOMMENDATIONS AND CONCLUSION

In this concluding chapter, I provide recommendations for the Navy to consider regarding its remote work and telework policy and practice. Additionally, I summarize my findings and provide a conclusion.

A. RECOMMENDATIONS

In researching this topic, I have come up with four recommendations for the Navy to consider with respect to advancing its telework policies.

(1) The Navy conducts a randomized controlled trial in My Navy Career Center call centers.

To streamline personnel requests for sailors and officers, the Navy established two call centers which fall under My Navy Career Center (MNCC) (DON, 2021). These call centers are based out of Millington, Tennessee and Norfolk, Virginia and serve as a 24-hour service to support sailors across a myriad of issues from pay discrepancies to travel claims to record and detailing questions. The MNCC call centers employ approximately 800 civilian, 400 contractors and 800 military personnel across all MNCC. The jobs represented at MNCC centers are typically personnel related and administrative in nature (DON, 2021).

I recommend the Navy perform an RCT similar to Bloom et al.'s study (2015) at one MNCC call center and use the other as a control. This study would not necessarily be able to be extrapolated to all jobs across the Navy, but this RCT can serve as a pilot for other commands and even service branches to test their remote work capabilities. Like Bloom et al.'s (2015) study, and because telework cannot be mandated, the MNCC call centers can solicit volunteers for the study to telework during the trial period, determine eligibility based on criteria from DODI 1035.01 and SECNAV 12271.1, and further divide the groups by odd and even birthdays (DOD, 2010). Success metrics currently monitored such as number of calls taken and trouble tickets resolved can be measured as criteria for productivity. Other considerations for research are evaluation and fitness report scores, promotion rate, and physical fitness scores among service members.

Surveys for both employees and managers can solicit information regarding quality of life and work, and attitudes towards retention before and after the study. Results of this study could be used to guide future policy recommendations regarding telework for specific Naval shore-based activities.

(2) The Navy establishes local, regional, and national telework exercises.

Lack of preparation was recognized by the DODIG report as a major issue for DOD components, with the Navy specifically mentioned as facing challenges while transitioning to maximum telework (Gorman, 2021). This same report recommended that there should be oversight to ensure "testing, training, and exercise requirements" (p. 49) are being met. This points to the idea that requirements are currently not being met as intended. Weinbaum et al. (2018) discussed the success of FEMA's 2013 DETERMINED SENTRY exercise where all eligible employees were mandated to telework to test COOP plans and ensure networks, technology, and infrastructure could support. Utilizing the framework laid out in FEMA's handbook for DETERMINED SENTRY, the Navy would be able to test its COOP plans as well as find weak points in its information technology and communications networks and structure. Considering "'mission requirements' shall include consideration of the impact of telework on the DON remote access information technology network capacity and appropriate information security" (SECNAV, 2019, p. 2), the Navy should conduct exercises at least annually that test the whole breadth of the system. These annual exercises will allow the Navy to better identify needs and improvements to maximize the use of telework, test network capacities and limitations, verify security of emerging technology, and increase the general emergency response for members who do not regularly engage in telework.

(3) Shore-based activities engage in opt-out telework programs.

To meet the intent of the applicable laws, policies, and instructions surrounding telework in the Navy, I recommend applying an opt-out rather than an opt-in approach. Traditionally, all employees who are eligible for telework are required by the Telework Enhancement Act to be notified by their employer. Should the eligible employee desire to work remotely, they must then complete the requisite training and sign the DOD

Telework Agreement, DD form 2946, to be put into their record. Studies regarding the economic benefits of utilizing either opt-in or opt-out demonstrate the power this subtle difference in choice can make. Johnson and Goldstein (2003) looked at the default option of organ donation between various countries in Europe and found that countries that required citizens to opt-out of the organ donation program saw a 90 percent participation rate versus a nearly 15 percent participation in countries who required their citizens to opt-in to the program. The authors are sure to point out that these high participation rates are not solely due to the fact that citizens are not aware or do not read the applicable paperwork; rather, often times citizens assume the default choice is the encouraged choice by the policy maker (Johnson & Goldstein, 2003).

Similar psychology can be used with shore-based billets in the Navy. With encouragement from policy makers, establishing that specific billets are expected to be telework unless the individual requests to work on-site full time could have benefits with respect to increasing telework participation. Having service members and employees complete the applicable telework training and paperwork as part of standard onboarding process could work to destigmatize the option. After the initial onboarding time, outlined by local commanders, it can be expected that all telework-eligible employees and service members will engage as such, assuming all eligibility criteria continue to be met.

(4) Invest in information technology infrastructure conducive to telework.

The federal employment viewpoint survey conducted by OPM identified barriers to telework included limited access to naval networks and ineffective hardware (OPM, 2020). Intentional investment in annual budgets should include allocating funds specifically for telework. The fiscal year 2022 DOD budget allocates $295 million for services to invest in "information technology access controls and identity, credential, and access management systems" ("Defense budget overview," 2021, p. 8-4). The associated fiscal year 2022 Navy budget specifies funds for virtual health information technology improvements, modernizing infrastructure for auditability, and engage in "network modernization [to] increase cybersecurity and teleworking" (Office of the Assistant Secretary of the Navy, 2021, p. 2-22). These funds and purposes are a great start in the

investment towards increased telework, and directed investment in remote work technology needs to be continued to ensure the Navy is able to compete with emerging technologies used in the civilian industry.

B. CONCLUSION

The history of telework and remote work in the federal government has seen large growth since first attempted in the 1970s. The Telework Enhancement Act of 2010 was a landmark bill requiring all executive agencies to establish telework programs. However, from this law, we have seen relatively unchanging views towards telework within the DOD and DON, noting their respective policies have not had substantive updates since their inceptions. These policies establish eligibility requirements for employees and service members, list the benefits of telework, and direct local commanders to encourage the maximum use of telework the policies. These policies engage in double-speak—on one hand they encourage the maximum use of telework, but on the other acknowledge that due to technological and DON technology resources are not adequate.

The academic literature has corroborated the benefits in productivity, quality of life, and performance of employees who are provided the opportunity to engage in telework. Barrero et al. (2021) emphasize that these practices do not need to be all-or-nothing programs. The ability to engage in face-to-face employee interaction while also providing the telework option a few times a week seems to have the most lasting benefits and are shown to be the most popular among both employees and managers (Barrero et al., 2021).

The largest barriers to successful telework demonstrated in both the academic literature as well as the Federal Workforce Viewpoint Survey during the pandemic were responsibilities related to childcare and access to adequate, functional technology and systems (Möhring et al., 2021; OPM, 2021). These barriers are not necessarily conducive to typical telework situations as the COVID-19 pandemic disrupted much more than the working environment. Although the pandemic acted as a forcing function to require many jobs that otherwise would not be considered for remote work into such an environment,

the lasting disruptions should not be assumed. Attitudes toward remote work, however, are shown to be positively lasting (Barrero et al., 2021; Edwards et al., 2020).

With the assumption that telework is here to stay, investments in information technology, network capabilities, management training, and adjustments in culture are needed for widespread successful implementation across the Navy. In order for the Navy to recruit and retain the best talent and ensure its sustained superior performance, it is crucial that they take the necessary steps in advancing telework policy and practices.

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