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THESIS

AN EXPLORATORY ANALYSIS OF THE NAVY PERSONNEL SUPPORT DELIVERY MODEL

by

Joseph M. Fleshman

September 2017

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13. ABSTRACT (maximum 200 words)

Navy sailors administratively begin and end their careers through the Pay and Personnel Management Department (PERS-2). The current pay and personnel service delivery model is manpower heavy and relies on legacy systems. High costs and rigid, face-to-face antiquated systems fail to provide flexible consistent Human Resources (HR) support to a technology-competent generation. Our efforts are focused on providing a quantitative effort to understanding past trends in Personnel Support Detachment (PSD) and Customer Service Desk (CSD) transactions that may aid manpower policies in the future composition of the pay and personnel services delivery model. Methods include data visualization techniques and multiple linear regression modeling. Our analysis supports a consolidation effort where size of PSD or CSD does not affect performance but transaction volume does. The workforce mix of the unit also affects performance. PSDs and CSDs with higher percentages of military and civilian contractor personnel have higher rates of timeliness and acceptance. The future pay and personnel service delivery model will benefit from streamlined processes and concentrated efforts.

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AN EXPLORATORY ANALYSIS OF THE NAVY PERSONNEL SUPPORT DELIVERY MODEL

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ABSTRACT

Navy sailors administratively begin and end their careers through the Pay and Personnel Management Department (PERS-2). The current pay and personnel service delivery model is manpower heavy and relies on legacy systems. High costs and rigid, face-to-face antiquated systems fail to provide flexible consistent Human Resources (HR) support to a technology-competent generation. Our efforts are focused on providing a quantitative effort to understanding past trends in Personnel Support Detachment (PSD) and Customer Service Desk (CSD) transactions that may aid manpower policies in the future composition of the pay and personnel services delivery model. Methods include data visualization techniques and multiple linear regression modeling. Our analysis supports a consolidation effort where size of PSD or CSD does not affect performance but transaction volume does. The workforce mix of the unit also affects performance. PSDs and CSDs with higher percentages of military and civilian contractor personnel have higher rates of timeliness and acceptance. The future pay and personnel service delivery model will benefit from streamlined processes and concentrated efforts.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFFIPS-A	Air Force Integrated Pay and Personnel System
AMD	Activity Manning Document
AR-PERSCOM	U.S. Army Reserve Personnel Command
ASN (FM&C)	Assistant Secretary of the Navy (Financial Management and Comptroller)
ATM	Automated Teller Machine
ATTA	Annual Transaction and Acceptance Analysis (ATAA) report
BA	Billet Authorized
BUPERS	Bureau of Naval Personnel
CIVSUB	Civilian Substitution
CNIC	Commander Navy Installations Command
CNP	Chief of Naval Personnel
CNO	Chief of Naval Operations
CNRFC	Commander Navy Reserve Forces Command
CNSSC (SUP 56)	Commander Navy Supply Systems Command (SUP 56)
COB	Current on Board
CONOPS	Concept of Operations
CONUS	Continental United States
CPC	Command PASS Coordinator
CPPA	Command Pay and Personnel Administrator
CSC	Customer Service Center
CSD	Customer Service Desk
CSV	Comma Separated Values
DEERS	Defense Enrollment Eligibility Reporting System
DFAS	Defense Finance and Accounting Services
DISA	Defense Information Systems Agency
DIMHRS	Defense Integrated Military Human Resources System
DJMS	Defense Joint Military Pay Systems
DK	Disbursing Clerk
DOD	Department of Defense

ERP	Enterprise Resource Planning
FID	Format Identifier
FPPS	Future Personnel and Pay System
FSC	Functional Service Center
FTE	Full Time Equivalent
FY	Fiscal Year
GS	General Schedule
HR	Human Resources
HROC	Human Resources Operation Center
IATS	Integrated Automated Travel System
IPPS-A	Integrated Personnel and Pay System-Army
IT	Information Technology
MER	Month End Restructure
MNP	My Navy Portal
MPT&E	Manpower, Personnel, Training, and Education
N1B	Assistant Deputy Chief of Naval Operations (Manpower, Personnel, Training, and Education)
NAVADMIN	Naval Administrative
NEC	Navy Enlisted Classification
NPC	Navy Personnel Command
NPPSC	Navy Pay and Personnel Support Center
NSIPS	Navy Standard Integrated Personnel System
OCONUS	Outside Continental United States
OSD	Office of Secretary of Defense
PAPA DET	Pay and Personnel Afloat Detachment
PASS	Pay/Personnel Administrative Support System
PASSMAN	PASS Management Manual
PCS	Permanent Change of Station
PERS-2	Pay and Personnel Management Department
PERS-211	Navy Standards and Metrics Branch
PERSCOM	U.S. Total Army Personnel Command
PSDT	Personnel Service Delivery Transformation

PN	Personnelman
PS	Personnel Specialist
PSA	Personnel Support Activity
PSD	Personnel Support Detachment
RTC	Recruit Training Command
SECNAV	Secretary of the Navy
SOP	Standard Operating Procedures
SRB	Soldier Record Brief
TSC	Travel Service Center
UIC	Unit Identification Code
UNSECNAV	Under Secretary of the Navy
USAA	United States Automobile Association
USD	Under Secretary of Defense
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
VBA	Visual Basic for Applications
VCNO	Vice Chief of Naval Operations

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EXECUTIVE SUMMARY

Inconsistent and confusing delivery of pay and personnel services among Personnel Support Detachment (PSD) and Customer Service Desk (CSD) units negatively affect a sailor's career as a sailor executes permanent change of station (PCS) orders and with changes in life events such as marriage and birth of children. From the leadership perspective, the current pay and personnel service delivery model is manpower heavy and relies on legacy systems (Department of the Navy, 2010).

According to the 2016 Department of the Navy Personnel and Pay Special Task Force Final Report, the Department of Defense (DOD) cancelled the Defense Integrated Military Human Resources System (DIMHRS) in 2010 after 15 years of unsuccessful development and implementation. Each military service was then tasked to develop their own system to replace the outdated pay and personnel service system and utilize DIMHRS information technology investments. The Navy responded with Future Personnel and Pay System (FPPS).

The Navy Pay and Personnel Support Center (NPPSC) developed a plan to consolidate the pay and personnel service system from the face-to-face transaction system at PSD and CSD units to a centralized system with two major operation centers, an online self-service portal, and local Command Pay and Personnel Administrators (CPPA). We focused on providing a quantitative effort to understanding past trends in PSD and CSD unit transactions that may aid manpower policies in the future composition of the pay and personnel services delivery model. Methods of analysis include data visualization techniques and multiple linear regression.

The largest inhibitor to this study was a lack of a common source for data. Multiple systems contain multiple reports that are processed separately; significant effort is required to merge the many reports into a single dataset for analysis. All of the data reports were received as Microsoft Excel files therefore Visual Basic for Applications (VBA) was the tool of choice to combine them. The Navy should look to merging systems or developing a database where reports are pulled from a single source.

NPPSC measures and ranks all PSD and CSD units on timeliness and acceptance rates for pay and personnel transactions. Every transaction is given a number of calendar days to complete in order to be "timely." Acceptance is determined on whether the transaction paperwork contained all of the necessary requirements for processing; it does not guarantee that the amount of the transaction is correct. We use monthly timeliness and acceptance rates averaged over all transactions for each PSD and CSD unit as the response variable for a multivariable linear regression model. We use manning data from October 2015 to February 2017 to show how each PSD and CSD unit was staffed and its effect on timeliness and acceptance.

CSD Recruit Training Command (RTC) Great Lakes, shown in Figure 1, is a representation of our results. Figure 1a shows manning levels with total manning in red, military in blue, federal civilians in green, and contractors in gold. Figure 1b shows mean timeliness in red and mean acceptance in blue over time. While total manning or size does not indicate high performance, transaction volume does. CSD RTC Great Lakes handles all enlisted accessions and is primarily staffed by contractors with federal civilians and military leadership for oversight. Contractors are effective because the contract is responsive to poor performance and can be replaced.

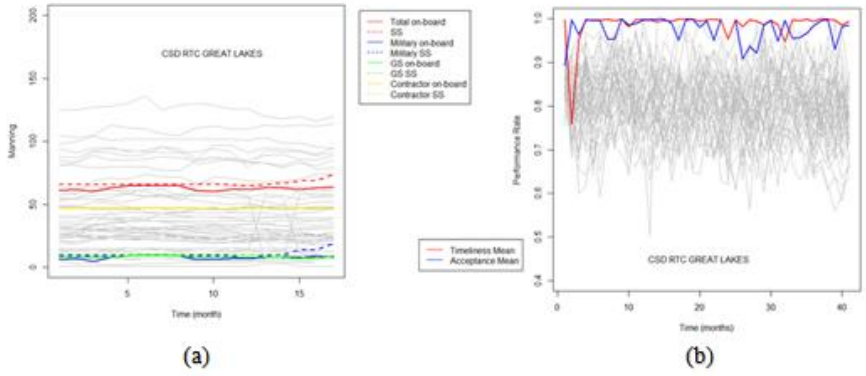

Figure 1. CSD RTC Great Lakes Manning and Performance.

Figure 2 shows PSD Yokosuka and the effect of changes in military manning. As the military majority decreases, so does timeliness. From the regression model, when

contractors or military made up 40% or more of the staff, performance increased. The data supports a consolidation effort with increased volume of transactions for a given workforce. The workforce mix should take into account the effectiveness of military and civilian contractor employees. Ensuring the workforce is responsive to evaluations suggests higher performance in both timeliness and acceptance.

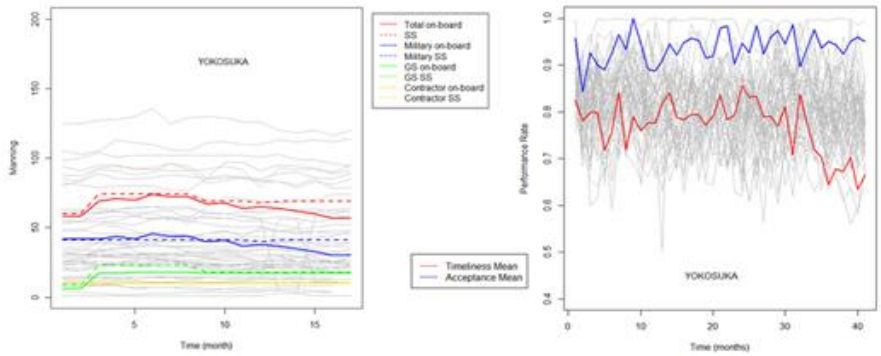

Figure 2. Effects of Unit Manning on Performance.

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Department of the Navy (2016) Personnel and Pay Special Task Force Final Report (March 15), Washington, DC.

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I. INTRODUCTION

A. PROBLEM STATEMENT

Navy sailors administratively begin and end their career through the Pay and Personnel Management Department (PERS-2), which falls under the Chief of Naval Personnel (CNP). Physical unit locations called Personnel Support Detachments (PSD) and Customer Service Desks (CSD) are positioned on all military bases and are locally responsible for executing pay and personnel services in support of active duty, reserves, retirees, and their dependents. All military personnel will interact with multiple PSD and CSD units during their time in the military, from the initial contract to the sailor serving to retirement. Inconsistent and confusing delivery of pay and personnel services between PSD and CSD units negatively affect a sailor's career as the sailor executes permanent change of station (PCS) orders and changes in life events such as marriage and birth of children.

From the leadership perspective, the current pay and personnel service delivery model is manpower heavy and relies on legacy systems (Department of the Navy, 2010). The report notes that high costs and rigid, face-to-face antiquated systems fail to provide flexible consistent Human Resources (HR) support to a technology competent generation. It also observes that authority and responsibility of personnel service delivery has fragmented ownership between Commander Navy Reserve Forces Command (CNRFC), Commander Navy Installations Command (CNIC), Navy Personnel Command (NPC), and Bureau of Naval Personnel (BUPERS).

In 2015, Assistant Secretary of the Navy (Financial Management and Comptroller) (ASN (FM&C)) and CNP created a special joint task force to review the current operational capabilities of the Pay/Personnel Administrative Support System (PASS). The PASS network oversees the execution and delivery of pay, personnel, and travel services to subordinate PSD units, CSD units, and deployable ships and squadrons. The purpose of the task force was to review the current operational health of PASS and identify key trends that would aid in an upcoming program transformation.

Focus areas were quality of services, service delivery alignment, automation of processes, and audibility (Department of the Navy, 2016). The report identified several areas that negatively affect the mission capability, organizational structure, and efficiency of operations.

The Chief of Naval Operations (2016) announced operational changes and policies due to the task force findings in Naval Administrative (NAVADMIN) 235/16. The document outlines short-term solutions that include increased training and promotion opportunities for PSD unit personnel, increased support to the commands via Command Pay and Personnel Administrator (CPPA), and returning military billets to the PSD unit. It includes a complete restructuring of the geographic model with reductions and centralization of processes, technology upgrades, and new service delivery methods are to occur later under the Navy Personnel Delivery Transformation. With exception of the two reports that we cite from, there has been no systematic analysis of the pay and personnel system. This thesis aims to provide insight based on the analysis of metrics collected from PSD and CSD units from October 2013 to February 2017 of previous personnel delivery operations to improve policy, future service models, and pay and personnel delivery methods.

B. PURPOSE AND OBJECTIVE

In October 2015, the metrics collected on each PSD were changed, ranked, and distributed to all PSD and CSD unit commands through monthly messages in order to promote transparency and accountability (S. Friloux, personal communication, March 22, 2017). There has been a need for metric-based analysis within the PERS-2 department as new models have been proposed and discussed. The author's efforts are focused at providing a quantitative effort to understanding past trends in PSD and CSD unit transactions that may aid manpower policies in the future composition of the pay and personnel services delivery model. Some aspects of higher performance will be personnel driven such as leadership ability or experience of workforce; the most important features we hope to find are those beyond the control of the command

personalities such as function-based delivery, type of customer community, or workforce structure.

C. RESEARCH QUESTIONS

The scope of this thesis is guided by the following research questions posed by the thesis sponsor Navy Pay and Personnel Support Center (NPPSC).

1. Do larger PSD and CSD units perform significantly better than smaller PSD and CSD units and support the reduction policy.
2. What variables/factors affect PSD and CSD unit performance?
3. How variable are PSD and CSD unit services between function and geographic location?
4. Does military, civilian, and contractor workforce mix effect timeliness and accuracy?

Insights gained by answering these research questions will guide current pay and personnel policies and provide justification for the Navy transition model.

D. BENEFITS OF RESEARCH

The Department of Defense (DOD) was unsuccessful in bringing an all-services solution for military HR services. Now that each service is creating their own new system or modifying their existing system, both positive and negative results have occurred. This research aims to bring other military lessons learned or advances in HR ERP systems to improve the Navy's future service model. Multiple efforts were required to create a dataset that was usable for data analysis. This thesis highlights the need for a streamlined data storage system with for ease of future analysis.

E. ORGANIZATION OF THESIS

This thesis is organized into five chapters. The next chapter covers the historical background of military pay and personnel services, the current and future Navy operating models, and a literature review. In Chapter III, we discuss the data and the sources it came from. Post processing of the data in VBA was required to combine the multiple sources into a single dataset for analysis. In Chapter IV, we first analyze the

data with a general statistical summary. As an exploratory analysis we then use multiple data analysis techniques to best understand the data; methods include regression analysis, clustering, and time series analysis. Finally, Chapter V answers the research questions, summarizes the results, and identifies areas of future work.

II. BACKGROUND

In this chapter, we provide background information on the pay and personnel system, the current structure, and future plans. We also look at two military services' approach to pay and personnel service upgrades and a civilian company's approach to web-based services.

A. HISTORY

The Department of Defense and Navy pay and personnel system has been under transformation for over two decades. In 1995, the Under Secretary of Defense (USD) introduced the concept for an all-service integrated personnel and pay system with common core software. The new program was called the Defense Integrated Military Human Resources System (DIMHRS) (Department of the Navy, 2016). By July 1999, multiple joint programs had been implemented within the Navy: Defense Joint Military Pay System (DJMS), Defense Enrollment Eligibility Reporting System (DEERS), Integrated Automated Travel System (IATS), and Automated Teller Machines at-sea (ATMs) (Department of the Navy, 2016). The new mission resulted in three ratings that shared commonality in purpose: the Yeoman (YN), the Personnelman (PN), and the Disbursing Clerk (DK). In April 2000, Commander Navy Supply Systems Command (CNSSC (SUP 56)) directed a study to determine if the ratings could be merged, the results concluded the merge would be infeasible and the ratings stayed as they were according to the report.

Prior to 2004, the Navy Fleet organizations controlled the four Personnel Support Activities (PSAs), organized geographically under PSA Far East, PSA Europe, PSA San Diego, and PSA Norfolk. Each PSA was responsible for a geographic collection of PSD and CSD units and operated in accordance with Fleet commands and directives (Navy Manpower Analysis Center, 2016). In October 2003, CNIC was created for Navy shore-wide installation management for improved policy control and effectiveness in support of the fleet (Commander, Navy Installation Command, 2017). That year, the Vice Chief of Naval Operations (VCNO) transferred pay and personnel mission responsibility from

fleet organizations to CNIC and maintained the PSA-to-PSD organization (Navy Manpower Analysis Center, 2016). CNIC acquired a separate pay and personnel program for deployable assets (ships, submarines, and squadrons) titled Pay and Personnel Afloat Detachment (PAPA DET) program at the same time, renamed PSD Afloat. The move was to reduce pay and personnel workload aboard ships and shift to shore-based installations. The CVN68 Class ships, AS39 Class ships, and LCC20 retained Pay and Personnel management functionality and ability to process pay and personnel services without a shore installation (Navy Manpower Analysis Center, 2016). At the end of 2004, Secretary of the Navy (SECNAV) merged the Personnelman (PN) and Disbursing Clerk (DK) ratings into the newly formed Personnel Specialist (PS) rating (Department of the Navy, 2016). The merge of ratings did not cite previous studies and contradicts previous findings.

The Navy continued to search for the right location and structure for the pay and personnel program. In 2007, OPNAVINST 1000.23C identified ASN (FM&C) and CNP as co-sponsors of the administration for Navy pay, personnel, and travel functions with the PASS network. One of most drastic changes occurred in 2008 when the Navy disestablished PSAs, the PSA-to-PSD relationship, and chartered NPPSC, which still fell under CNIC (Navy Manpower Analysis Center, 2016). In an attempt to better match the type of work, through the Civilian Substitution (CIVSUB)/A-76 initiative the Navy replaced 2,240 Enlisted (Active and reserve) end-strength billets with Federal Civil Servants from Fiscal Year (FY) 2008 to FY11 (Department of the Navy, 2016).

After 10 years, the all-service pay and personnel services program failed to develop. In 2009, the DOD canceled the DIMHRS project; Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) directed services to create service specific pay and personnel programs that utilized DIMHRS information technology (IT) investment (Department of the Navy, 2016). The Navy responded with Future Personnel and Pay System (FPPS). In October 2010 the Under Secretary of the Navy placed a strategic pause on the program for review. The report notes the then-current pay and personnel system struggled with organizational control issues, requirements definitions, and concept of operations (CONOPS). In order to continue

streamlining the program, Vice Chief of Naval Operations (VCNO) designated OPNAV (N1) as end-to-end business process owners of Navy pay and personnel services. In May of 2012, USD (AT&L) cancelled FPPS with a new program in development.

The Navy's current line of effort began in September 2012 when the Office of Secretary of Defense (OSD) approved the Integrated Personnel and Pay System, Navy (IPPS-N) strategy for pay and personnel organization and processes modernization prior to IT development (Department of the Navy, 2016). At the beginning on FY14, NPPSC, PASS, and all PSD and CSD units transferred from CNIC to NPC, where they are currently located (Navy Manpower Analysis Center, 2016). In January 2014, Assistant Deputy Chief of Naval Operations (Manpower, Personnel, Training, and Education) (N1B) announced the future pay and personnel plan with data strategy and modernization of the Navy Standard Integrated Personnel System (NSIPS) to include pay and personnel capabilities (Department of the Navy, 2016).

B. NAVY PAY AND PERSONNEL SYSTEM

1. Current Geographic Model

The legacy model includes 43 PSDs and 18 CSDs on 3 continents and 12 countries as shown in Figure 1. PSD and CSD unit staffs consist of military, federal service, and contractor employees led by an Officer-In-Charge at the Lieutenant or Lieutenant Commander Paygrade. The PSA command structure followed by CNIC control maintained a geographic model where each PSD/CSD unit operated nearly independently. Due to the historic construct, many PSD and CSD units operate under their own procedures and protocols to serve their unique population; this leads to various organizational constructs. Several PSD and CSD units separate their work into functional areas where specific employees execute only one type of process-related transactions (Navy Manpower Analysis Center, 2016). Other PSD and CSD units adopt a team approach where customer population is assigned to a service team. Standard Operating Procedures (SOP) are now used for all pay and personnel transactions to ensure common successful practices that conform to policy while operational constructs may still differ (NAVADMIN 043/15, 2015). All PSD and CSD units report directly to NPPSC,

establishing a unified pay and personnel services approach. In the past, sailors would go straight to the PSD or CSD unit to initiate pay and personnel transactions.

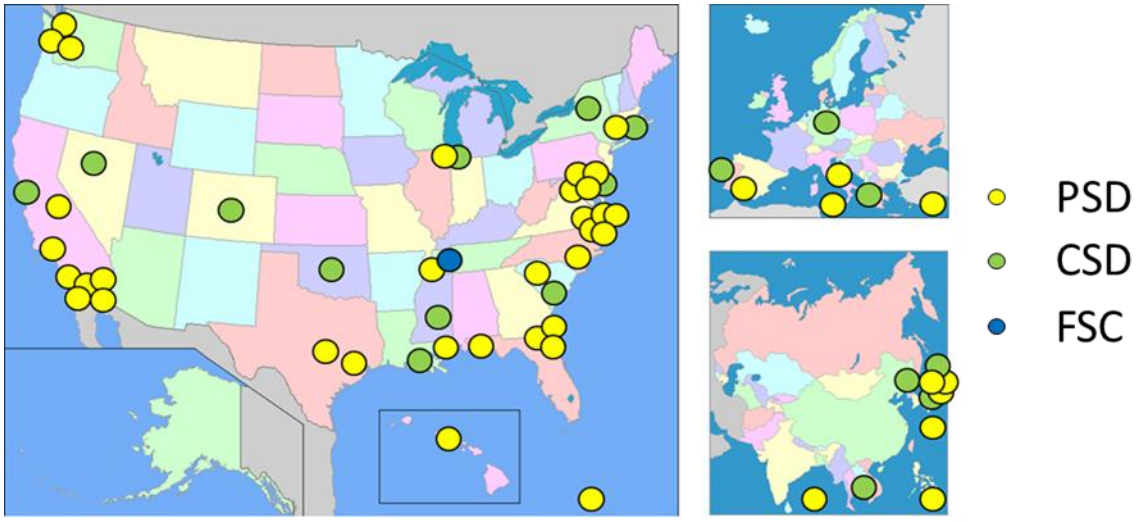


Figure 1. Legacy Model with PSD and CSD Unit Location Prior to 2016.
Source: Friloux (2017a, 3).

2. Command PASS Coordinator

In the current service model, sailors complete some transactions through self-service means via NSIPS. The activity-level Command PASS Coordinator (CPC) initiates all other pay and personnel transactions. The CPC is the liaison between the sailor and the assigned PSD or CSD unit. He or she is responsible for transmitting all required documentation for pay, personnel, and travel support via the approved electronic transaction system (Navy Manpower Analysis Center, 2016). Each activity CPC is an assigned collateral duty (NAVADMIN 043/15, 2015). CPCs may be military or civilian and are required to receive training from their assigned PSD or CSD unit. Figure 2 shows the conceptual process of a transaction that begins with the sailor, carried out through self-service or the CPC, where the PSD and CSD units fit, and the main operating systems.

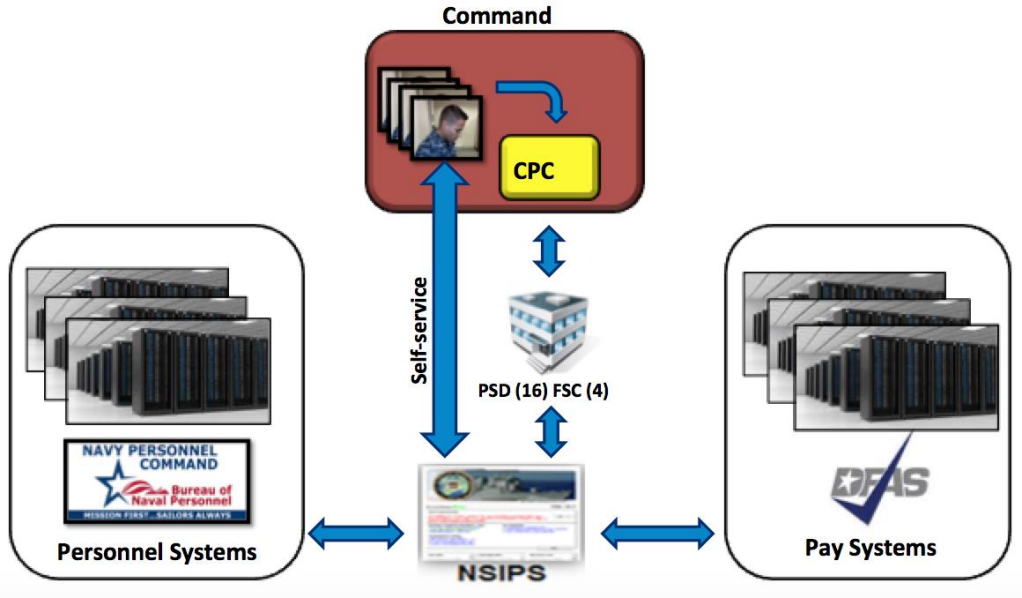


Figure 2. Conceptual Organization of Legacy System.
Source: Friloux (2017a, 4).

C. PROPOSED SOLUTIONS

1. Transition to Command Pay and Personnel Administrator

Following the Personnel and Pay Special Task Force Final Report, NAVADMIN 235/16 announced major changes to the CPC, renaming it Command Pay and Personnel Administrator (CPPA) (NAVADMIN 235/16, 2016). It required any command with its own Unit Identification Code (UIC), to have at least one CPPA to ensure auditability, command accountability, and full engagement with the assigned PSD or CSD unit. A new Navy Enlisted Classification (NEC), 95AD, CPPA was developed to ensure CPPAs receive the appropriate training and certifications within the pay and personnel services career field. New training included e-learning courses, exams, and on-the-job training with monthly engagements with their assigned PSD or CSD unit to cover current training topics. The CPPA will serve as the link between command and assigned PSD or CSD unit to bring timely and accurate pay and personnel services to the sailor (NAVADMIN 235/16, 2016).

2. Transitional Model

In order to streamline processes and improve effectiveness, NPPSC has created a new model that will aid in the transition of MPT&E IT domain upgrades. This new plan includes Functional Service Centers (FSC) and Customer Service Centers (CSC) to restructure service delivery. The plan will close all but sixteen major PSDs and open four FSCs and two CSCs (Friloux, 2017a). Figure 3 shows the distribution of the consolidated PSDs, FSCs, and CSCs. The four FSCs will cover all current global transactions; they include Travel Claims, Strength Gains, Reserve, and Retirements/ Separations/ Reenlistments. Eight PSDs will align with a CSC to create HR Operations Center (HROC) as shown in Figure 4. The two HROCs will interact with the FSCs and NSIPS to complete pay and personnel transactions and provide customer support.

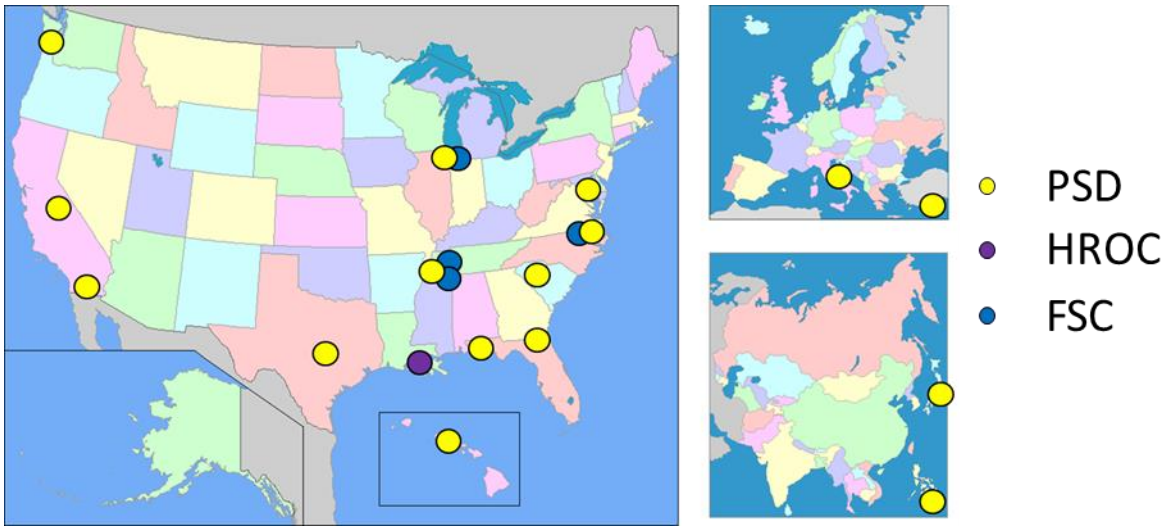


Figure 3. Transitional Model with PSD and FSC Location.
Source: Friloux (2017a, 3).

The new model will also grow the number of self-service options for the service member through My Navy Portal (MNP) (Friloux, 2017a). MNP is a single web-based portal that sailors will use to access personnel information; it aggregates multiple personnel, training, and education sources into one system (Navy Personnel Command,

2017). Any remaining transactions will continue through the CPPA and special functions within MNP (Friloux, 2017).

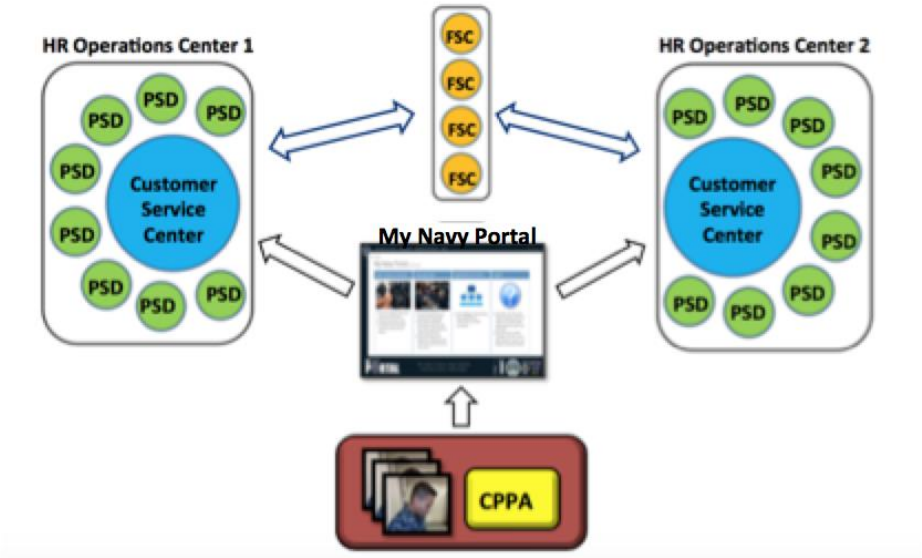


Figure 4. Conceptual Organization of Transitional Model.
Source: Friloux (2017a, 7).

3. Future Operating Model

The end goal for pay and personnel service delivery is a sailor focused self-service, centralized delivery model with a CSC component that utilizes new technology to enhance timeliness, accuracy, and improve operational effectiveness (Department of the Navy, 2010). The key to Personnel Service Delivery Transformation (PSDT) is a cascading and iterative solution that continues to meet the mission while still allowing the overall program to reach its target end state. The future model focuses on the sailor having twenty-four hour access to a tiered service delivery model through MNP, whether ashore or afloat, to perform a majority of HR functions. Figure 5 shows the CPPA and MNP focused model with CSC support. For any process requiring direct customer interaction, the CSC will be the primary interface to provide standardized processes, tracking, consistent and accurate information, and seamless customer relationship management (Department of the Navy, 2010). There will be field level support for when

face-to-face interactions are required. Figure 6 shows the progression of interactions with the strengths of a centralized pay and personnel model. This future design will move away from face-to-face transactions and utilize HR personnel in an advisory role to field activities and deployable units. Each command will maintain a CPPA, utilize MNP, and communicate with the HR Operation Centers. An integrated Pay and Personnel IT system will communicate with an MPT&E database to support MNP (Friloux, 2017a).

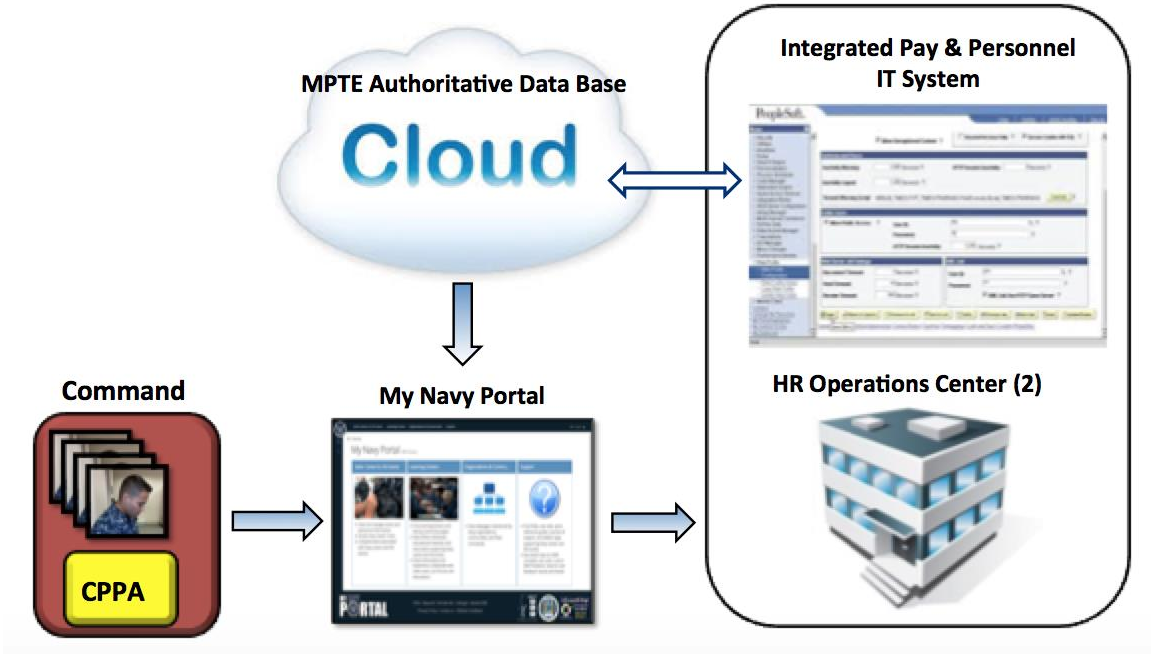


Figure 5. Future Model of Pay and Personnel Service Delivery.
Source: Friloux (2017a, 5).

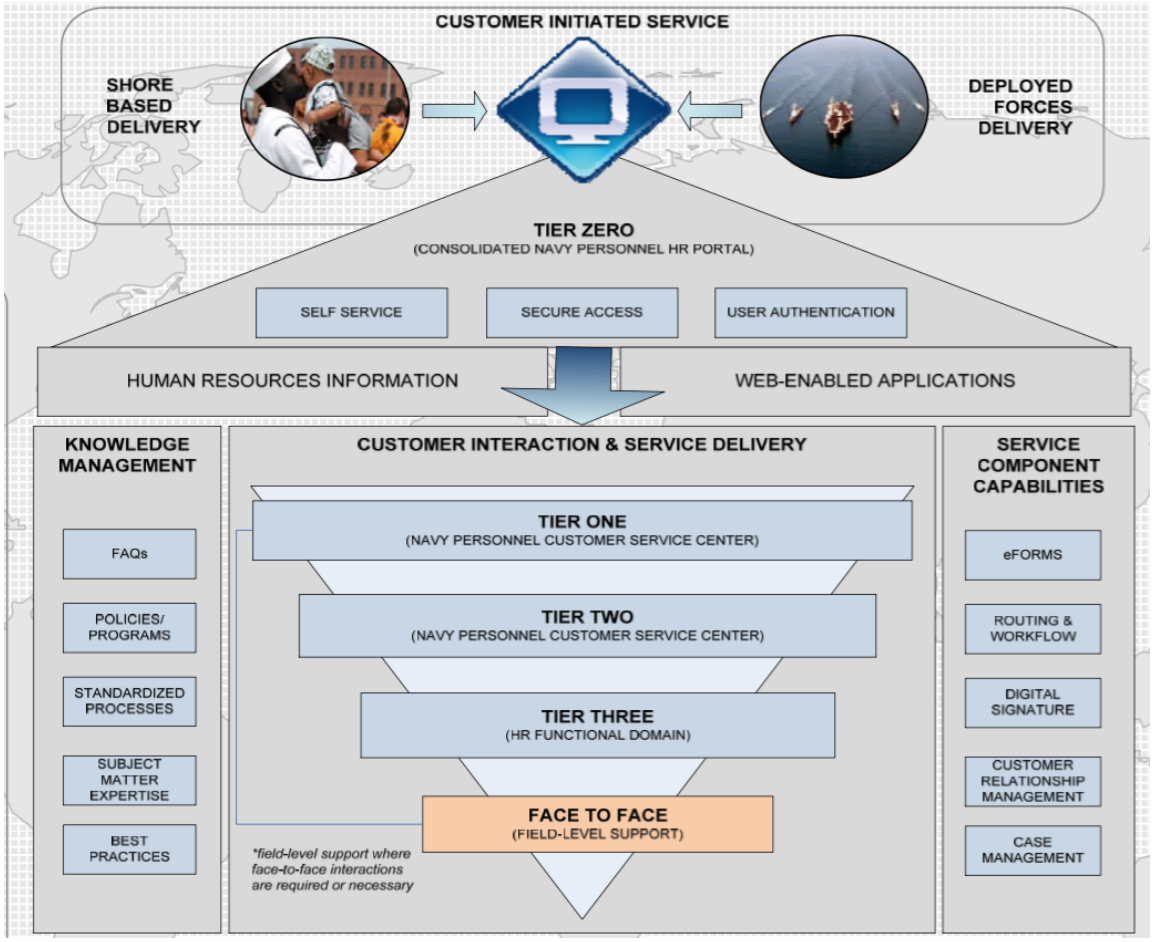


Figure 6. Tiered Pay and Personnel Service Delivery to Fleet.
Source: Department of the Navy (2010, 12).

D. RELATED PAY AND PERSONNEL SERVICE SYSTEMS

Since the cancellation of the DIMHRS, each service was required to develop a new solution for their pay and personnel service updates. The Army and Air Force have each made strides forward in their respective programs that the Navy can benefit from. The Navy intends to move to a primarily web-based self-service system. There are some civilian companies that already have this delivery model in place; a study of successful practices will be beneficial to all military services.

1. Army

The U.S. Army formed the Human Resources Command in October of 2003 as a consolidation effort of Army pay and personnel services. The command merged U.S. Total Army Personnel Command (PERSCOM) and the United States Army Reserve Personnel Command (AR-PERSCOM) to create a single organization to manage Active and Reserve soldier careers (United States Army Human Resources Command, 2017). The previous pay and personnel service model was similar to the Navy with HR offices at each U.S. Army post with changes made manually face-to-face. Current efforts are focused in developing the Integrated Personnel and Pay System-Army (IPPS-A), the Army specific solution to the canceled DIMHRS project in 2010 (Integrated Personnel and Pay System-Army, 2017). IPPS-A will be a web-based portal that will combine the 40 previous HR systems into one comprehensive system that will automatically trigger actions based on soldiers' personnel information changes. The DOD funded the program in December of 2014 and is deploying through a five-phased approach to reduce pay and personnel transition issues (Integrated Personnel and Pay System-Army, 2017). Each U.S. Army military member now has a Soldier Record Brief (SRB) that will follow them throughout their career and will serve as a comprehensive pay and personnel record. Deployment of the program began in 2015 with the establishment of a secure database and SRB creation and will continue to FY2020 as all HR programs for Active, Reserve, and National Guard units are shifted to IPPS-A. Data correctness as information transfers from the legacy system has been a focus with surveys sent to each soldier to verify SRB information with corrections done at the local command level (Revell, 2015). Once implemented, the IPPS-A will be the world's largest HR Enterprise Resource Planning (ERP) system serving more than 1.1 million personnel. As of March 2017, IPPS-A is on track with its strategy and deployment schedule (Harris et al., 2017).

2. Air Force

The United States Air Force is developing the Air Force Integrated Pay and Personnel System (AFIPPS) to replace 30 legacy HR systems with a single access commercial based ERP system (Cha et al., 2014). They intended to be the first service to

put an HR-IT focused solution in place with an initial capability delivery set for the summer of 2015 (Cha et al., 2014). The AFIPPS program relied on a commercial off-the-shelf ERP system to rapidly modernize; however, continued delays have changed the program with no current plan to create a one-system solution (Serbu, 2015a). Instead, the Air Force is implementing an AFIPPS strategy to streamline and simplify the HR system and to reduce manpower costs through technology and modernization. The most effective course of action was the successful testing and implantation of commercial cloud data storage for the Air Force's MyPers website, an online portal used to handle self-service transactions and questions that interact with other Air Force HR systems in July 2016 (Konkel, 2016). The Air Force led the transition and new security requirements for hosting sensitive data in a cloud service, which the DOD has been hesitant to try (Konkel, 2016). In 2015, the Defense Information Systems Agency (DISA) rewrote its cloud security requirements, which allowed component level chief information officers to decide if cloud storage was right for them (Serbu, 2015b). This change reorganized the previous six unclassified but sensitive data risk categories into four; primary HR data exists in DOD impact level 4 (highest category) (Konkel, 2016). Bill Marrion, Air Force Chief Information Officer, led the move of data to an off-premise civilian managed cloud service with great success; it has brought reliability, added security to the previous outdated systems, automated policy and security updates, and reduced Air Force manpower managing the data servers (Konkel, 2016). The Air Force hopes to continue the lead in DOD exploration of cloud-based data systems while improving its HR pay and personnel services delivery model.

3. United States Automobile Association (USAA)

The United States Automobile Association (USAA) is an insurance, banking, and investment financial services group available to those who are currently serving, have served, or dependents of those in the military (United States Automobile Association, 2017). It is a pioneer of direct marketing, self-service transactions, and online banking services with its patent on remote depositing (United States Automobile Association, 2017). In 1922, 25 U.S. Army officers started USAA when other insurance companies refused to insure them due to their current service in the military (United States

Automobile Association, 2017). Initially the company relied on conducting business through the mail, followed by the phone, and now on-line through its website; in 2016 only 2.1% of USAA's members visited one of its 21 financial centers (Danner, 2017). On April 28, 2017, USAA closed 17 of the 21 test financial centers due to decreased foot traffic leaving the remaining locations in the company hometown of San Antonio, Texas and the military service academies (Danner, 2017). USAA operates as one of the top Fortune 500 companies with a small physical footprint available to its 11.4 million members (as of 2015) (United States Automobile Association, 2017). Commanding officer, Navy Pay and Personnel Support Center (NPPSC), CAPT Steven Friloux has called USAA the gold standard to model on-line self-service transaction services (S. Friloux, personal communication, March 22, 2017).

E. SUMMARY

The people who experienced it retain most of the Pay and Personnel system history. It is important to summarize the changes and how the delivery model will move forward in parallel to the other services and how the civilian industry has overcome this problem.

III. DATA AND DATA PROCESSING

In this chapter, the multiple data sources are presented, followed by an overview of analysis techniques to be used. The Navy Standards and Metrics Branch (PERS-211) is the quantitative analysis group for PERS-2 and is the subject matter expert for these datasets.

A. TRANSACTION TYPE

1. Pay

The Navy operates under the DOD financial program with various pay and allowances that must be turned on or off through transactions based on career and life milestones and qualifications. All military pay is coordinated and controlled through Defense Finance and Accounting Services (DFAS) Cleveland branch as part of DOD policy (OPNAVINST 1000.23C, 2007). A Format Identifier (FID), a two-character name of letters, numbers, defines each pay transaction or both that marks the payment type with additional numbers that indicates a particular action such as start, stop, or change. There are 133 different FIDs that each PSD and CSD unit track and analyze. We removed follow-on action identifiers in the processed dataset since they are not relevant to the purpose and objective of this study.

2. Personnel

Military career milestones and transitions trigger personnel transactions. They are strength gains, activity gains, extensions, separations, and reenlistment transactions. PERS-211 analyzes personnel transaction data separately from pay transactions due to partial data unavailability and will therefore be analyzed separately in this study.

B. DATA REPORTS

All military services and DOD suffer from multiple legacy databases and systems that we must aggregate in order to access information. Often, the reports are premade from various commands so access to raw data is very difficult. The dataset for this study utilized four different monthly reports.

1. Timeliness

Each transaction is given a specified allowance of time from the customer initiation at the local PSD or service member's command to submission of the transaction to DFAS. It is a binary test with the transaction completed within the allowed time or not. The timer for each transaction stops after it has been accepted by DFAS. Pay timeliness data comes from the DFAS Navy Field report as shown in Figure 7 and is received from DFAS ePortal on the first of each month for the prior month. The data is based on the Month End Restructure (MER) date, which is eight to ten days before the calendar end of the month. Any transaction completed after the MER is included in the following month (Hacker, 2015). All pay transactions submitted within 30 days are considered timely and falls under DOD regulation. Timeliness Total accounts for all transactions completed during the MER period.

Personnel timeliness data is received from PERS-322 through NSIPS. CNP policy requires personnel transactions to be completed within zero to four working days. PERS-211 uses zero to nine calendar days for completion based on allowances for weekends, holidays, and alternate workweeks (Hacker, 2015).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		AC Navy Timeliness Ranking report (Field Only) for October, 2013				October		2013						
2	97.37%				checksum	TIMELINESS			651867	TOTALS			671081	
3		Total Timely		651867	SAT	NPPSC	186751	Information	5476	NPPSC	200524	Information	5476	
4		Grand Total		671081	SAT	NRL	38	NAV	6	NRL	38	NAV	8	
5	w/o Sys. Gen.		Timely	Volume		PER	3097	COM	545	PER	3370	COM	557	
6	94.18%	BUPERS	34694	37110		PSA	9875	CHU	16	PSA	10984	CHU	16	
7		Non-PASS	49790	51410		System	322581	BUPERS	34694	System	322603	BUPERS	37110	
8		PASS	199723	214878		Centralized	39603	BUMED	435	Centralized	39604	BUMED	447	
9		System Generated	367660	367683		US	48750	Blank	0	US	50344	Blank	0	
10						General	0	PCU	0	General	0	PCU	0	
11						Pre	0	OIC	0	Pre	0	OIC	0	
12	ADSN	Unit	FID	Action Indicator	Fid Description	Within 30 days	%	31-60	% 31-60	61-90	% 61-90	91-120	121-179	180+
13			Grand Total			651867	97.14%	10251	1.53%	3239	0.48%	1635	1846	2243
14	0019	USS EMORY S LAND	68	01	Basic Allowance for Housing (BAH	1	100%	0	0%	0	0%	0	0	0
15	0019	USS EMORY S LAND	68	04	Basic Allowance for Housing (BAH	0	0%	1	100%	0	0%	0	0	0
16	0027	USS NIMITZ	68	01	Basic Allowance for Housing (BAH	6	100%	0	0%	0	0%	0	0	0
17	0027	USS NIMITZ	68	03	Basic Allowance for Housing (BAH	0	0%	0	0%	0	0%	1	1	0
18	0027	USS NIMITZ	68	04	Basic Allowance for Housing (BAH	20	95.24%	1	4.76%	0	0%	0	0	0
19	0027	USS NIMITZ	68	05	Basic Allowance for Housing (BAH	0	0%	0	0%	0	0%	1	0	0
20	0028	USS DWIGHT D EISENHOWER	68	01	Basic Allowance for Housing (BAH	132	81.99%	16	9.94%	7	4.35%	6	0	0
21	0028	USS DWIGHT D EISENHOWER	68	03	Basic Allowance for Housing (BAH	0	0%	1	50%	0	0%	1	0	0
22	0028	USS DWIGHT D EISENHOWER	68	04	Basic Allowance for Housing (BAH	4	66.67%	1	16.67%	1	16.67%	0	0	0
23	0068	USS THEODORE ROOSEVELT	68	01	Basic Allowance for Housing (BAH	38	79.17%	7	14.58%	2	4.17%	1	0	0
24	0068	USS THEODORE ROOSEVELT	68	02	Basic Allowance for Housing (BAH	9	75%	1	8.33%	0	0%	0	0	2
25	0068	USS THEODORE ROOSEVELT	68	04	Basic Allowance for Housing (BAH	4	50%	1	12.5%	2	25%	1	0	0
26	0068	USS THEODORE ROOSEVELT	68	05	Basic Allowance for Housing (BAH	0	0%	0	0%	0	0%	1	0	0
27	0068	USS THEODORE ROOSEVELT	68	06	Basic Allowance for Housing (BAH	1	100%	0	0%	0	0%	0	0	0
28	0076	USS GEORGE WASHINGTON	68	01	Basic Allowance for Housing (BAH	14	82.35%	1	5.88%	0	0%	0	0	2
29	0076	USS GEORGE WASHINGTON	68	02	Basic Allowance for Housing (BAH	12	85.71%	1	7.14%	0	0%	0	0	1
30	0076	USS GEORGE WASHINGTON	68	03	Basic Allowance for Housing (BAH	328	98.8%	3	0.9%	1	0.3%	0	0	0
31	0076	USS GEORGE WASHINGTON	68	04	Basic Allowance for Housing (BAH	2	100%	0	0%	0	0%	0	0	0
32	0076	USS GEORGE WASHINGTON	68	05	Basic Allowance for Housing (BAH	21	95.45%	0	0%	0	0%	0	0	1
33	0095	USS JOHN C STENNIS	68	01	Basic Allowance for Housing (BAH	184	92%	5	2.5%	5	2.5%	3	3	0
34	0095	USS JOHN C STENNIS	68	02	Basic Allowance for Housing (BAH	3	75%	1	25%	0	0%	0	0	0
35	0095	USS JOHN C STENNIS	68	03	Basic Allowance for Housing (BAH	1	100%	0	0%	0	0%	0	0	0
36	0095	USS JOHN C STENNIS	68	04	Basic Allowance for Housing (BAH	74	94.87%	1	1.28%	1	1.28%	0	1	1
37	0095	USS JOHN C STENNIS	68	05	Basic Allowance for Housing (BAH	0	0%	0	0%	0	0%	0	1	1
38	0095	USS JOHN C STENNIS	68	06	Basic Allowance for Housing (BAH	70	46.05%	82	53.95%	0	0%	0	0	0
39	0097	USS ENTERPRISE	68	01	Basic Allowance for Housing (BAH	9	100%	0	0%	0	0%	0	0	0
40	0097	USS ENTERPRISE	68	04	Basic Allowance for Housing (BAH	2	50%	1	25%	1	25%	0	0	0
41	0098	USS HARRY S TRUMAN	68	01	Basic Allowance for Housing (BAH	10	52.63%	4	21.05%	1	5.26%	1	2	1

Figure 7. DFAS Navy Field Report

2. Acceptance

After each transaction is completed at the local level, it is submitted to DFAS for pay processing. Pay acceptance data is received from the monthly DFAS Rejects and Accepts report also known as the Accuracy report shown in Figure 8 (Hacker, 2015). When a transaction is accepted, it is found to be technically correct for system requirements to electronically process it. An area of contention is the misuse of acceptance versus accuracy in terms of audit readiness. An accepted report does not guarantee that the amount of payment is correct only that it contains the required information. If a transaction is rejected, it returns to the clerk for correction. The Acceptance Total in the dataset accounts for the number of successful transaction submissions and rejected submissions. For example, the same transaction may be rejected five times before being accepted; this accounts for six total submissions.

	AC Navy Rejects for Navy - NPPSC for October, 2013					
ADSN	COMMAND	FID	TOTAL INPUT	ACCEPTED	REJECTED	PCT ACCEPT
0637	NPPSC PSD AFLOAT ATLANTIC	0201	9	8	1	88.9%
0637	NPPSC PSD AFLOAT ATLANTIC	0202	12	11	1	91.7%
0637	NPPSC PSD AFLOAT ATLANTIC	0203	1	1	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	0204	5	4	1	80%
0637	NPPSC PSD AFLOAT ATLANTIC	0701	1	1	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1101	99	99	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1102	100	100	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1103	576	576	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1105	1	1	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1106	1	1	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1402	3	3	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	1405	1	0	1	0%
0637	NPPSC PSD AFLOAT ATLANTIC	2301	97	93	4	95.9%
0637	NPPSC PSD AFLOAT ATLANTIC	2302	37	34	3	91.9%
0637	NPPSC PSD AFLOAT ATLANTIC	2303	1146	1146	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	2503	4	4	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	2701	646	633	13	98%
0637	NPPSC PSD AFLOAT ATLANTIC	2702	174	162	12	93.1%
0637	NPPSC PSD AFLOAT ATLANTIC	2703	36	35	1	97.2%
0637	NPPSC PSD AFLOAT ATLANTIC	2705	4	4	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	2706	9	8	1	88.9%
0637	NPPSC PSD AFLOAT ATLANTIC	3501	20	14	6	70%
0637	NPPSC PSD AFLOAT ATLANTIC	3502	3	2	1	66.7%
0637	NPPSC PSD AFLOAT ATLANTIC	3503	11	9	2	81.8%
0637	NPPSC PSD AFLOAT ATLANTIC	3504	397	393	4	99%
0637	NPPSC PSD AFLOAT ATLANTIC	3505	14	12	2	85.7%
0637	NPPSC PSD AFLOAT ATLANTIC	3506	7	6	1	85.7%
0637	NPPSC PSD AFLOAT ATLANTIC	3601	5	4	1	80%
0637	NPPSC PSD AFLOAT ATLANTIC	3602	7	7	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	3603	3	2	1	66.7%
0637	NPPSC PSD AFLOAT ATLANTIC	3606	4	4	0	100%
0637	NPPSC PSD AFLOAT ATLANTIC	3701	208	201	7	96.6%

Figure 8. DFAS Rejects and Accepts Report or Accuracy Report

3. Manning Data

The Manning report is received from PERS-2S each month and is organized by UIC of Full Time Equivalent (FTE) employees. FTE is a standard government reporting measure for pay and personnel compensation. One FTE represents a single person

employed full time for a single fiscal year however it could also be two part time employees; it is based on total work requirements divided by available work hours (Naval Air Warfare Center Glossary of Financial Terms, 2017). Staffing standards are FTE requirements to carry out the work plus administrative and leadership positions. Normally, military are not considered toward the FTE total but because of the nature of the work, FTE is used to capture total number of personnel with the workforce composed of military, government service, and contractor. There are usually differences between staffing standards, billets authorized (BA), and Current on Board (COB); however they are often close together. Figure 9 shows the difference between the staffing standard (requirement) and the COB that is known as "readiness gap." The readiness gap is a result of a fiscally constrained environment, long production timelines, and other issues related to unexpected attrition.

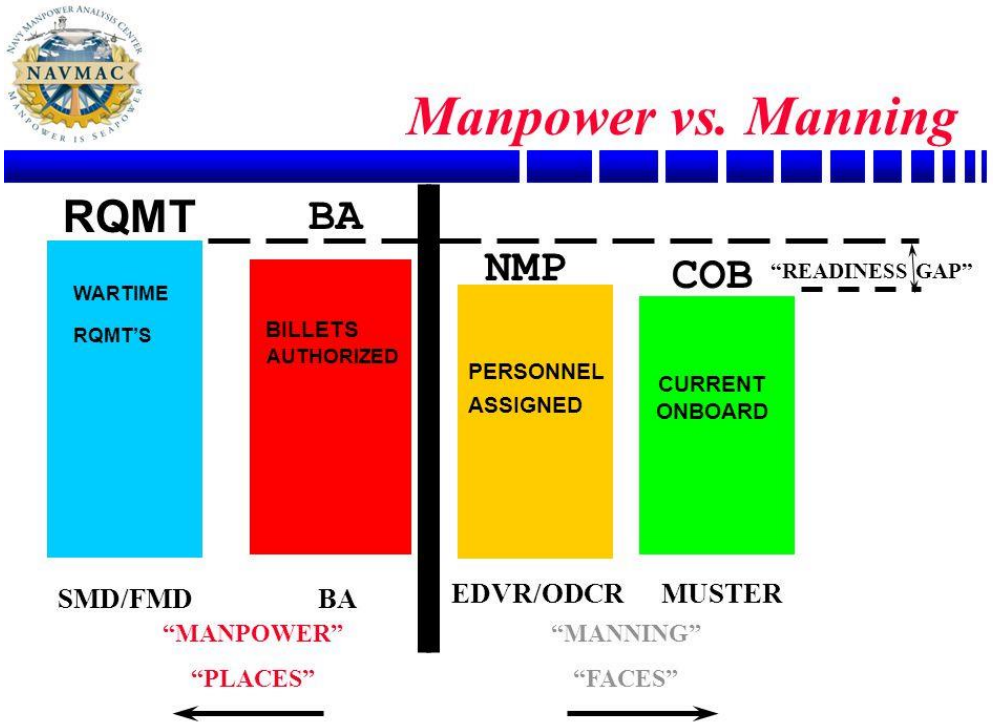
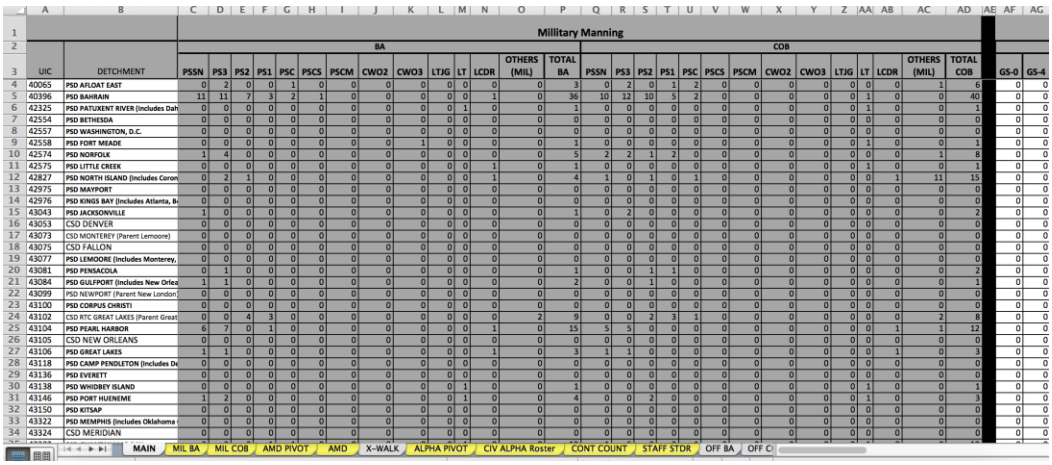


Figure 9. Manpower Requirements Design Compared to Manning Reality

Source: Navy Manpower Analysis Center Fleet Manpower Requirements: Introduction to Code 40 (2014, 3).

The Manning report shown in Figure 10 includes all pay rates for military personnel from E-4 to O-4, federal employees from General Schedule (GS) -0 to GS-13, and contractors. Each rate is broken down between BA and COB. BA are the funded requirements (manpower or "spaces") to accomplish the work as defined by each Activity Manning Document (AMD) while COB are the personnel actually assigned and present at the unit (manning or "faces").



Military Manning

			BA														COB															
	UIC	DETCHMENT	PSSN	PS3	PS2	PS1	PSC	PSCS	PSCM	CWO2	CWO3	LTJG	LT	LCDR	OTHERS (MIL)	TOTAL BA	PSSN	PS3	PS2	PS1	PSC	PSCS	PSCM	CWO2	CWO3	LTJG	LT	LCDR	OTHERS (MIL)	TOTAL COB	GS-0	GS-4
4	40065	PSD AFLOAT EAST	0	2	0	0	1	0	0	0	0	0	0	0	0	3	0	2	0	1	2	0	0	0	0	0	0	0	1	6	0	0
5	40396	PSD BAHRAIN	11	11	7	3	2	1	0	0	0	0	0	1	0	36	10	12	10	5	2	0	0	0	0	0	1	0	0	40	0	0
6	42325	PSD PATUXENT RIVER (Includes Dah	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
7	42554	PSD BETHESDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	42557	PSD WASHINGTON, D.C.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	42558	PSD FORT MEADE	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
10	42574	PSD NORFOLK	1	4	0	0	0	0	0	0	0	0	0	0	0	5	2	2	1	2	0	0	0	0	0	0	0	0	1	8	0	0
11	42575	PSD LITTLE CREEK	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
12	42827	PSD NORTH ISLAND (Includes Coron	0	2	1	0	0	0	0	0	0	0	0	1	0	4	1	0	1	0	1	0	0	0	0	0	0	1	11	15	0	0
13	42975	PSD MAYPORT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	42976	PSD KINGS BAY (Includes Atlanta, B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	43043	PSD JACKSONVILLE	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0
16	43053	CSD DENVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	43073	CSD MONTEREY (Parent Lemoore)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	43075	CSD FALLON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	43077	PSD LEMOORE (Includes Monterey,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	43081	PSD PENSACOLA	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	2	0	0
21	43084	PSD GULFPORT (Includes New Orlea	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
22	43099	PSD NEWPORT (Parent New London)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	43100	PSD CORPUS CHRISTI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	43102	CSD RTC GREAT LAKES (Parent Great	0	0	4	3	0	0	0	0	0	0	0	0	2	9	0	0	2	3	1	0	0	0	0	0	0	0	2	8	0	0
25	43104	PSD PEARL HARBOR	6	7	0	1	0	0	0	0	0	0	0	1	0	15	5	5	0	0	0	0	0	0	0	0	0	1	1	12	0	0
26	43105	CSD NEW ORLEANS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	43106	PSD GREAT LAKES	1	1	0	0	0	0	0	0	0	0	0	1	0	3	1	1	0	0	0	0	0	0	0	0	0	1	0	3	0	0
28	43118	PSD CAMP PENDLETON (Includes De	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	43136	PSD EVERETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	43138	PSD WHIDBEY ISLAND	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
31	43146	PSD PORT HUENEME	1	2	0	0	0	0	0	0	0	0	1	0	0	4	0	0	2	0	0	0	0	0	0	0	0	1	0	3	0	0
32	43150	PSD KITSAP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	43322	PSD MEMPHIS (Includes Oklahoma	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	43324	CSD MERIDIAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MAIN | MIL BA | MIL COB | AMD PIVOT | AMD | X-WALK | ALPHA PIVOT | CIV ALPHA Roster | CONT COUNT | STAFF STDR | OFF BA | OFF C

Figure 10. Monthly Manning Report

4. Heat Charts

The PERS-211 analysts create various tools and reports from these data sources to present to the commanding officer of NPPSC, each PSD/CSD unit, and DOD. In 2015, the heat chart shown in Figure 11 is a data visualization tool with each PSD or CSD unit ranked based on the performance metrics of timeliness and acceptance. The heat chart uses nine different DOD reports that are processed and aggregated through Microsoft Excel. It remains as the main month-to-month tool for NPPSC and the PASS network health determination (Hacker, 2015). The heat chart contains metrics and classifiers that were used as categorical variables in the dataset. It is important to the note the number of Excel worksheets at the bottom of Figure 11; a much more significant portion are not shown which can make the reports very complicated to read and process.

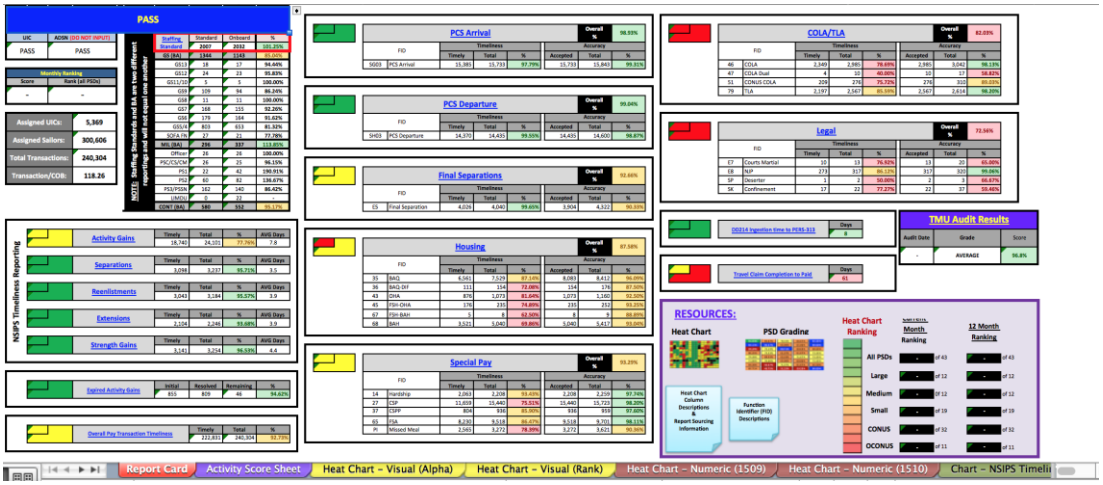


Figure 11. Heat Chart

C. ANNUAL TRANSACTION AND ACCEPTANCE ANALYSIS REPORT

The dataset for this study was built off of the PERS-211 Annual Transaction and Acceptance Analysis (ATAA) report shown in Figure 12. It shows a selected PSD's timeliness and acceptance totals and rates by FID for each month-year with time increasing by month to the right. On a separate worksheet, a report allows up to three PSD or CSD units to be compared by selecting different units from drop-down menus. The report uses monthly transaction volumes by FID as a percentage of all of PASS transactions and transaction volume within the unit. Monthly raw Field reports and Accuracy reports are stored as separate files and manually imported on separate worksheets to build the tables within the file. Again, all of the raw reports are stored within the Excel file on separate worksheets. This makes the file very large and slow to process.

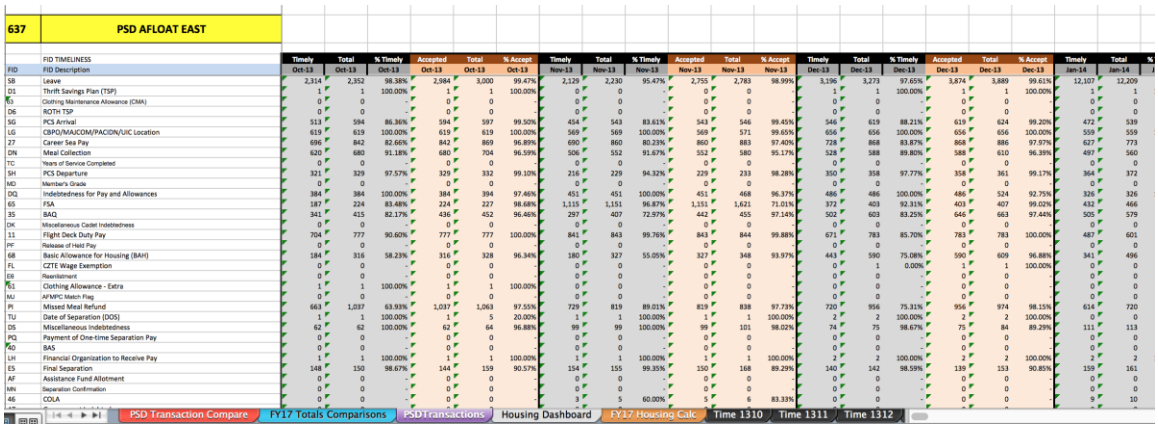


Figure 12. Annual Transaction and Acceptance Analysis (ATAA) Report

D. TIME PERIOD

This study analyzes monthly data from October 2013 to February 2017. The 2013 date is based the earliest data that was available from PERS-211. The end date was selected due to consolidation efforts already taking place within the PASS network. Some CSD units have begun to collapse into their parent PSD unit in March 2017; one goal for the research was to maintain data consistency for comparative purposes. This dataset yields 41 distinct month-year timeliness and acceptance observations for each PSD and CSD unit. Manning data was more difficult to obtain; only 17 of the 41 month-year observations were available.

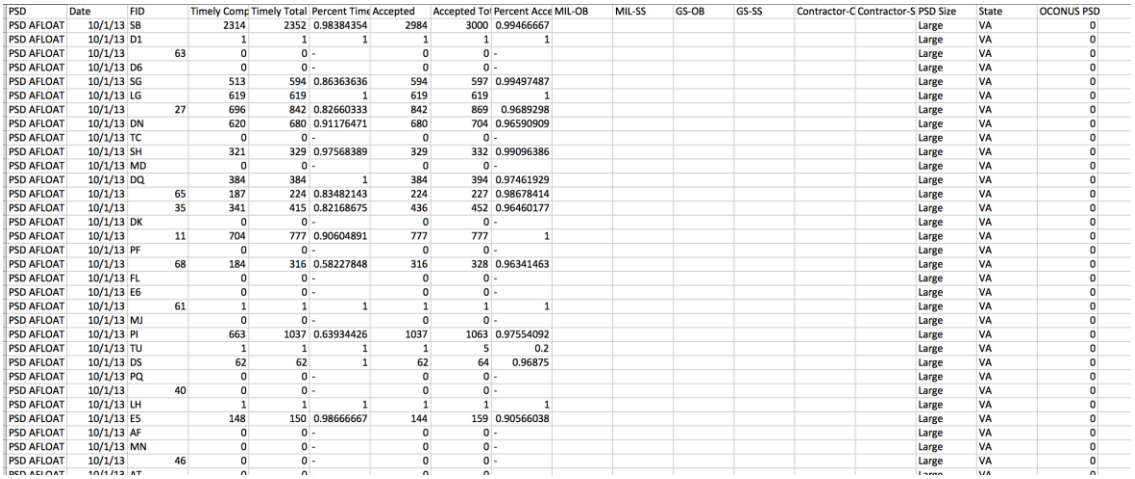
E. DATA COMPILATION

In order to perform any data analysis, the multiple data sources need to be combined and reformatted. This is a major problem with the current HR ERP system with many separate systems that do not communicate with each other.

1. Desired Data Format

The data requirement for this study is a single source comma-separated values (CSV) file with each row representing a single pay transaction type or FID during a specific month-year for a specific PSD or CSD unit as shown in Figure 13. Table 1 summarizes each column variable. Each row then contains timeliness and acceptance variables. Timeliness and acceptance variables are broken down into three columns each.

The first column, "Timely Completed," is the count of transactions that met the pay transaction requirement of zero to thirty days. The second column is the total number of transactions that were completed during the MER period, the difference between the Timely Completed and Timely Total are considered late transactions. The third column is a ratio of timely transactions over total and is reported as a percentage. The ratio is used as part of grading criteria for the PSD and CSD units as well as an equalizer of volume difference. Acceptance is similarly organized; column one is the number of successfully submitted transactions to DFAS while column two is the total number of submission attempts. Column three is also the ratio of successful submissions over total submissions and used in the unit grading criteria.



PSD	Date	FID	Timely Comp	Timely Total	Percent Time	Accepted	Accepted To	Percent Acce	MIL-OB	MIL-SS	GS-OB	GS-SS	Contractor-C	Contractor-S	PSD Size	State	OCONUS PSD
PSD AFLOAT	10/1/13	SB	2314	2352	0.98384354	2984	3000	0.99466667							Large	VA	0
PSD AFLOAT	10/1/13	D1	1	1	1	1	1	1							Large	VA	0
PSD AFLOAT	10/1/13	63	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	D6	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	SG	513	594	0.86363636	594	597	0.99497487							Large	VA	0
PSD AFLOAT	10/1/13	LG	619	619	1	619	619	1							Large	VA	0
PSD AFLOAT	10/1/13	27	696	842	0.82660333	842	869	0.9689298							Large	VA	0
PSD AFLOAT	10/1/13	DN	620	680	0.91176471	680	704	0.96590909							Large	VA	0
PSD AFLOAT	10/1/13	TC	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	SH	321	329	0.97568389	329	332	0.99096386							Large	VA	0
PSD AFLOAT	10/1/13	MD	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	DQ	384	384	1	384	394	0.97461929							Large	VA	0
PSD AFLOAT	10/1/13	65	187	224	0.83482143	224	227	0.98678414							Large	VA	0
PSD AFLOAT	10/1/13	35	341	415	0.82168675	436	452	0.96460177							Large	VA	0
PSD AFLOAT	10/1/13	DK	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	11	704	777	0.90604891	777	777	1							Large	VA	0
PSD AFLOAT	10/1/13	PF	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	68	184	316	0.58227848	316	328	0.96341463							Large	VA	0
PSD AFLOAT	10/1/13	FL	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	E6	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	61	1	1	1	1	1	1							Large	VA	0
PSD AFLOAT	10/1/13	MJ	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	PI	663	1037	0.63934426	1037	1063	0.97554092							Large	VA	0
PSD AFLOAT	10/1/13	TU	1	1	1	1	5	0.2							Large	VA	0
PSD AFLOAT	10/1/13	DS	62	62	1	62	64	0.96875							Large	VA	0
PSD AFLOAT	10/1/13	PQ	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	40	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	LH	1	1	1	1	1	1							Large	VA	0
PSD AFLOAT	10/1/13	E5	148	150	0.98666667	144	159	0.90566038							Large	VA	0
PSD AFLOAT	10/1/13	AF	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	MN	0	0	-	0	0	-							Large	VA	0
PSD AFLOAT	10/1/13	46	0	0	-	0	0	-							Large	VA	0

Figure 13. Final Dataset Format

Table 1. Final Dataset Column Names and Descriptions

Name	Data type	Description
PSD	categorical	Name of PSD or CSD unit.
Date	categorical	Month that data was recorded for unit. The value if either the first of the month or last depending on which analyst entered the data. Represented as mm/dd/yyyy.
FID	categorical	A two character identification of transaction type, either numerical, alphabetical characters, or both.
Timely_Completed	integer	Number of transactions by FID completed in a timely manner each month as defined by transaction type. Each transaction is either timely or not.
Timely_Total	integer	Number of total transactions by FID completed by a unit each month.
Percent_Timely	numerical	The result of Timely_Completed divided by Timely_Total, ranging from 0 to 1.0.
Accepted	integer	Number of transactions by FID successfully uploaded to the pay and personnel system.
Accepted_Total	integer	Number of total transaction upload attempts by FID to the pay and personnel system.
Percent_Accepted	numerical	The result of Accepted divided by Accepted_Total, ranging from 0 to 1.0.
MIL_OB	integer	Number of military personnel that are assigned to the unit.
MIL_SS	integer	Number of military personnel requirements needed to accomplish the workload.
GS_OB	integer	Number of federal civilian personnel that are assigned to the unit.
GS_SS	integer	Number of federal civilian personnel requirements needed to accomplish the workload.
Contractor_OB	integer	Number of civilian contracted personnel that are assigned to the unit.
Contractor_SS	integer	Number of civilian contracted personnel requirements needed to accomplish the workload.
PSD_Size	categorical	Descriptor of unit by total number of manning. Small, Medium, or Large.
State	categorical	Specifies what state unit is in if in U.S.
OCONUS_PSD	categorical	If unit is not in a U.S. state, variable is "1".

2. ATAA Report Modifications

The ATTA report utilizes a drop down menu on the PSD Transactions worksheet to manually change the unit cell. This updates the Timeliness and Acceptance values for each FID by month-year extending horizontally. Originally, the Annual Transaction and

Acceptance Analysis report only covered one fiscal year; the author manually extended the report within Excel to include the three fiscal years.

With a geographic model, each PSD or CSD unit serves its local customer base, which is often different from another. For example, the customer base at Naval Station Great Lakes is different from Naval Support Activity Bethesda in type of communities served, number of customers, military experience of the customer, and number of employees. Different communities often have different deployment schedules and needs that are unique; the PASS Management Manual (PASSMAN) specifically includes a separate support services section for submarines. In order to provide closer relative comparison, NPPSC uses categorical identifiers to better group the PSD and CSD units in the heat charts. PSDs were given a Large, Medium, or Small volume rating based on staffing standards. Large volumes units had staffing standards of 65 personnel or more, medium units had between 35 and 64 personnel, and small units had 34 or fewer personnel. In addition to volume, location of the PSD or CSD unit was compared particularly between CONUS and OCONUS. For the CONUS PSD and CSD units, a column for U.S. state was included. Each PSD and CSD unit was listed in a table within the ATAA report with size and location descriptors manually compiled by the author.

3. Formatting the Manning Reports

Many of the manning reports contained slightly different formats in their column setup and naming conventions. To facilitate easier looping, each report was modified to yield consistent cell references and naming conventions of the PSD and CSD units. From the manning report, only total BA and COB for military, government service, and contractor personnel were used. Military and government service are further broken down by paygrade however, this level of analysis was not part of the scope of the study. The final compiled database also does not include the actual Staffing Standards. The relationship between BA, COB, and staffing standards were analyzed separately. The file naming convention was also inconsistent; each file was renamed to aid referencing within the compilation code.

4. VBA Compilation Code

All of the data reports were received as Microsoft Excel files therefore Visual Basic for Applications (VBA) was the tool of choice to combine them as shown in Figure 14. Multiple loops were used, first to select the PSD or CSD unit from the drop down list in the ATAA report and then a loop through the month-years to extract the timeliness and acceptance data for each PSD or CSD unit. The categorical and manning data for each unit was then extracted from other sources and added to each relevant row. The final file was exported as a CSV for further analysis.

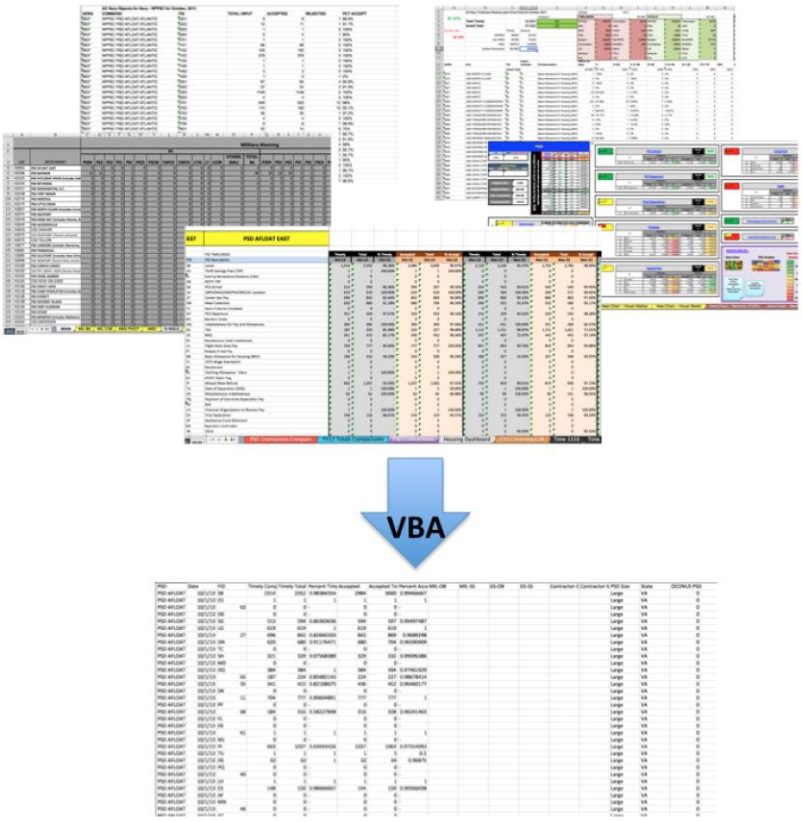


Figure 14. Conceptual Visualization of Data Compiling

F. DATA PREPARATION

In this section, we document the data cleaning methodology. The initial CSV file consists of 50 PSD/CSD units times 133 FIDs times 41 month-years, which lead to

272,650 rows of data with 18 columns. This initial dataset size is misleading because not all FID transactions occur at every PSD/CSD unit each month. The focus of the analysis is on timeliness and acceptance rate of FIDs by PSD/CSD unit over time; rate is defined as the number of successful transactions (where successful is defined by either timely or accepted) divided by total transactions for the month. This will allow PSD and CSD units with lower transaction volume to be comparable to those with higher transaction volume. We are looking for command and policy effectiveness not just the busiest PSD/CSD unit.

Initial inspection of the data showed significant spreading along the axes. For example, a data point could be high on the acceptance scale but miss the time requirement and will show a low or zero rate for timeliness. These vertical and horizontal lines show the need for including these special cases. By using conditional logic, only rows with zero in both Timeliness Total and Acceptance Total were removed. The removal of these unused transactions reduced the final dataset to 70,307 rows with only 86 of the 133 unique FIDs remaining.

Rates where the total is equal to zero will show as NA. NAs and zeros in the rate columns represent different outcomes; a zero rate represents poor performance against the PSD/CSD unit while a NA only indicates no transactions of that type. In manning data columns, NAs represent missing values.

The original date column was problematic for R and needed to be reformatted. A year-month variable was created and will be used for any time series analysis.

One PSD had such rare transactions that made it problematic compared to the others. Unit “NPPSC DLD WC SUPP DET BREMERTON WA” only had 15 transactions over three years; therefore, we removed it from the analysis with the view that it is a trivial outlier.

G. SUMMARY

This chapter summarizes the raw data reports and methods to create a dataset of mean timeliness, mean acceptance, and manning for analysis over time.

IV. ANALYSIS OF RESULTS

This thesis analyzes 49 PSD and CSD units with a focus on individual timeliness rates, acceptance rates, and manning rates over three fiscal years. The chapter begins with a gross overview of all units and FIDs where rates are averaged over time. Time is then included to see how performance changes with time. Data visualization is critical in identifying patterns in performance and manning rates. Last, regression analysis on timeliness and acceptance rates quantifies the strength of the relationships with key explanatory variables.

All analysis is performed in R version 3.3.1 (R Core Team, 2016) to organize, filter, and visualize the data.

A. STATISTICAL ANALYSIS

This section takes PSD/ CSD unit and FID performance and averages their rates over the three years to capture total performance of acceptance and timeliness. This gives a high-level look at PSD/CSD units and summarizes each unit as a single data point. It also gives some insight into performance of different classes of FIDs.

1. PSD and CSD Unit

Each PSD and CSD unit is responsible for carrying out any of 133 unique FID transactions and is graded based on the rate of Timely transactions completed and rate of Accepted transactions to DFAS. Not every FID transaction is completed each month while others are part of the daily routine as sailors PCS to new commands throughout the year. Figure 15 shows mean acceptance rates where acceptance rates are averaged over FIDs by month and unit and then averaged over the three years for each PSD and CSD unit. Figure 16 shows PSD and CSD mean timeliness rates over the three years for each unit computed similarly.

Mean acceptance rates are much less variable than timeliness rates over all PSD and CSD units with a maximum of 0.975 for CSD Great Lakes and a minimum of 0.854 for CSD Vaihingen. Mean timeliness rates range from 0.989 for CSD Great Lakes to

0.702 for PSD Pearl Harbor. CSD Great Lakes is .093 units higher than the next PSD, which is 31% of the performance range. In both Figures 15 and 16, the PSD and CSD units are ordered along the horizontal axis by total number of transactions with the highest volume unit on the left and smallest volume on the right. In Figures 15 and 16, there does not appear to be any relationship between the volume of transactions and mean acceptance or mean timeliness rates with the exception of CSD RTC Great Lakes where its timeliness rate is substantially higher than that of PSD Norfolk. The remaining units for both mean acceptance and timeliness rates are scattered with no significant pattern.

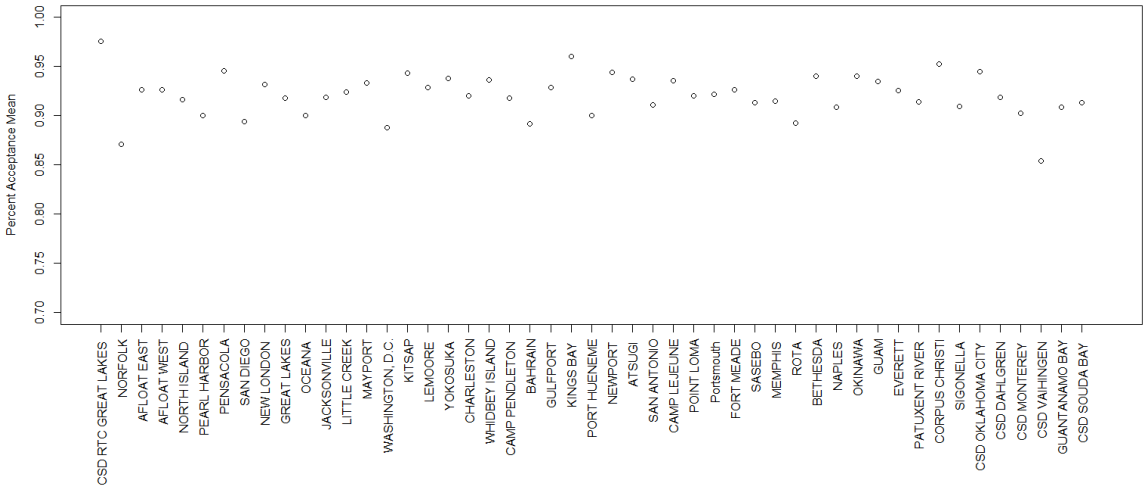


Figure 15. Mean Acceptance Rates for All PSD and CSD Units

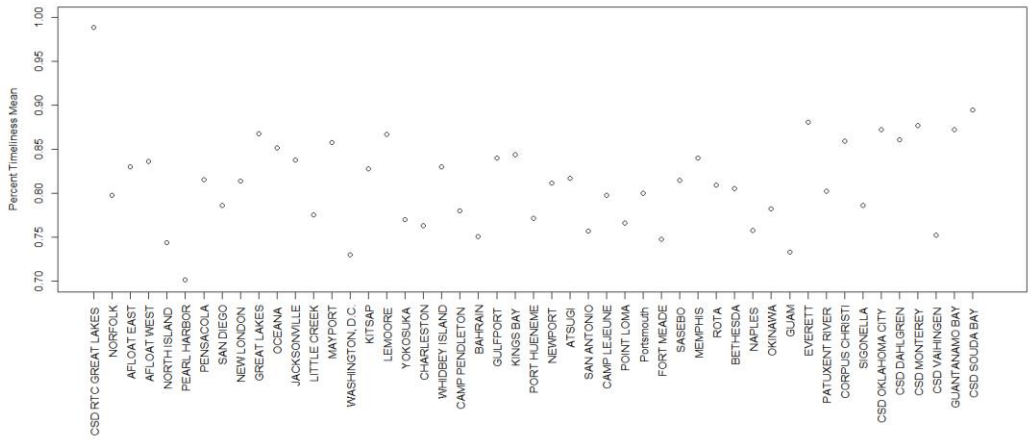


Figure 16. Mean Timeliness Rates for All PSD and CSD Units

Next, PSDs are aggregated into three categories by manning size in accordance with NPPSC metrics: large, medium, and small. Large units have greater than 64 personnel by staffing standards. Medium units have 35 to 64 personnel and small units have less than 34. Figures 17 and 18 show respectively the average mean timeliness rates and acceptance rates (with standard deviation bars) by manning size group. For both acceptance and timeliness, the means for each category are close together and do not indicate higher performance for larger units.

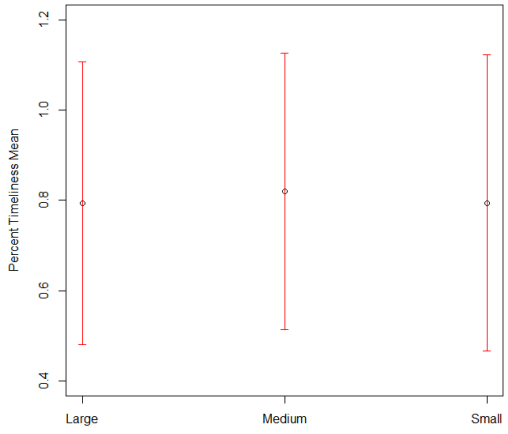


Figure 17. Average Mean Timeliness Rate with Standard Deviation Bars for PSD and CSD Units Aggregated by Manning Size

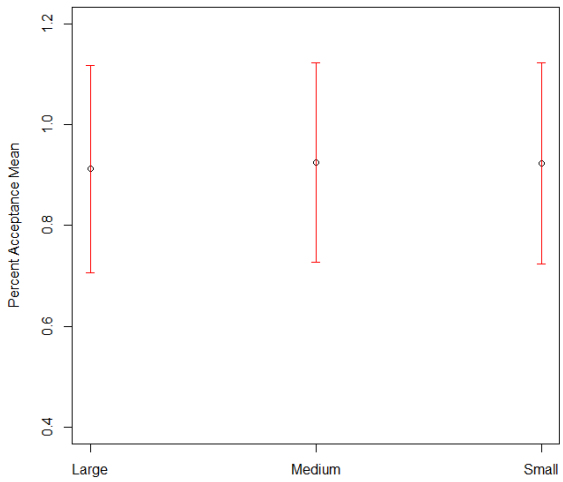


Figure 18. Average Mean Acceptance Rate with Standard Deviation Bars for PSD and CSD Units Aggregated by Manning Size

2. FID

We also aggregate performance rates over PSD/CSD units and time to capture transaction types regardless of where they occur. Mean FID timeliness and acceptance rates are found by averaging monthly FID timeliness and acceptance rates over PSD/CSD units and then over time. Figure 19 is the mean acceptance rate by FID with highest volume of transactions or most frequent transaction to the left. As transactions are initiated and completed less frequently, acceptance rates became more variable and performance tends to decrease as can be seen in Figure 19. This may indicate training deficiencies in system knowledge and application.

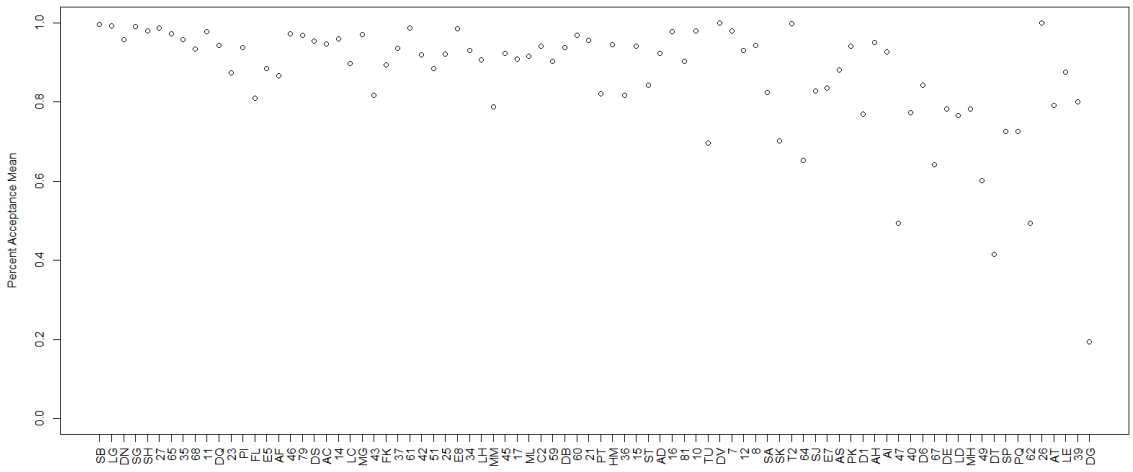


Figure 19. Mean Acceptance Rates by FID Transaction Type

Figure 20 shows the mean timeliness rate by FID with highest volume of transactions to the left. The relationship is less clear between volume of transactions and timeliness performance. There is more variability overall in mean timeliness rates than for mean acceptance rates.

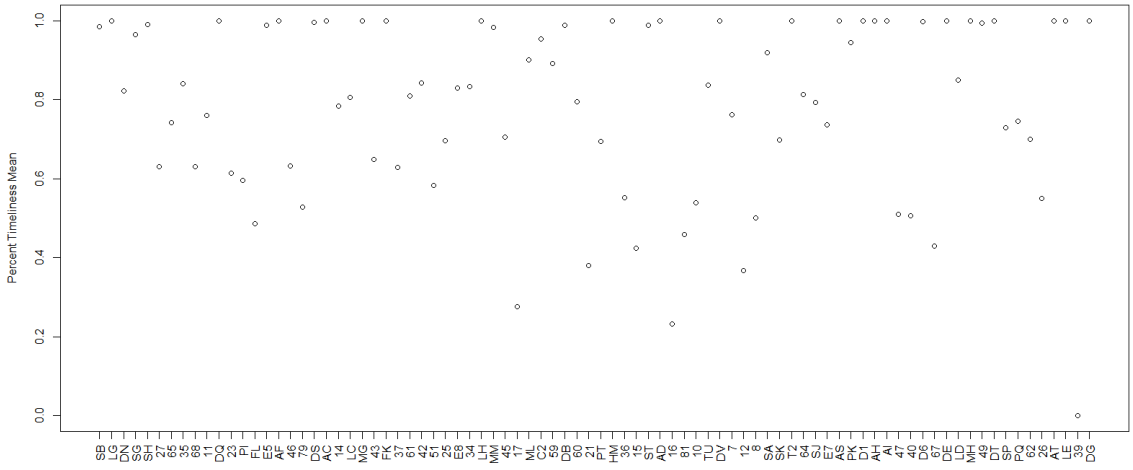


Figure 20. Mean Timeliness Rates by FID Transaction Type

B. PERFORMANCE OVER TIME

In this section, we do not aggregate performance rates over time; we study performance rates by month over the three-year period. This allows us to observe each

PSD/CSD unit's performance as it changes over time. We also study growth/losses in requirements and personnel over time. This allows us to look for seasonal effects that may appear with large PCS groups due to high school and college graduations.

1. PSD and CSD

Timeliness and acceptance are shown as rates to remove the differences in transaction volume.

In this section, monthly performance rates are averaged over FIDs for each PSD/ CSD unit. Figures 21–24 show all units' performance rates plotted in gray as a backdrop to the performance rates of a select PSD/CSD unit. The timeliness rates averaged over all FIDs for the selected unit is shown in red. The acceptance rate averaged over FIDs is shown in blue. Plots such as those displayed in Figure 21–24 are available in Appendix A for every PSD and CSD unit. A perfect performance score is 1.0 for both acceptance and timeliness, although some variability is expected even for a high performing unit. High levels of variability in the performance rates are possible signs of poor training, poor organization management, and lack of knowledge of the systems. Figure 21 shows two examples of unit performance for comparison. Figure 21 (a) is CSD RTC Great Lakes, an example of good performance. It shows high performance rates close to 1.0 for both timeliness and acceptance with low variability and no downward trends. PSD North Island (Figure 21(b)) has lower rates with much more variability and has a large gap between acceptance and timeliness rates. It also shows a downward trend in timeliness over the entire period. It is important to note, CSD RTC Great Lakes is the exception. In Figures 15 and 16, it has the highest performance rate with an average timeliness rate 30% greater than the next highest average timeliness rate. Figure 22 shows another example of highly variable unit performance.

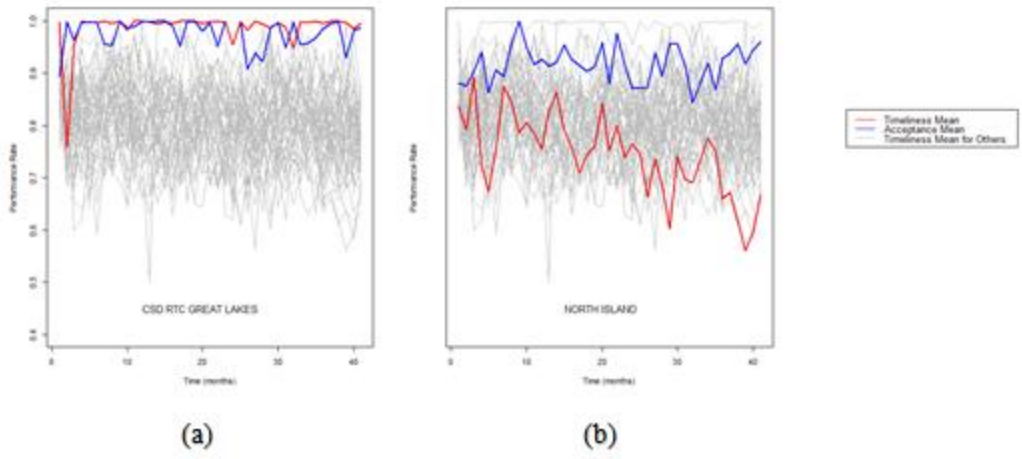


Figure 21. Illustrating Highly Variable Performance for (a) CSD RTC Great Lakes and (b) PSD North Island

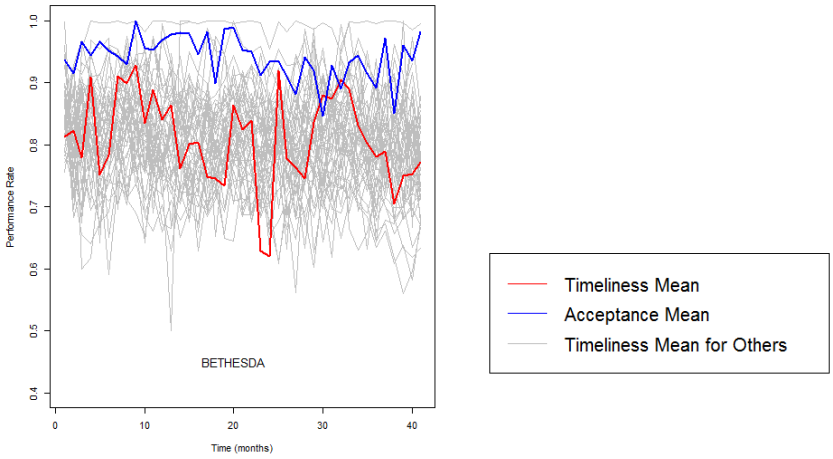


Figure 22. Highly Variable Unit Timeliness Rates for PSD Bethesda

Examining performance rate plots over time for all 49 PSD/CSD units suggests that the number of personnel assigned to each unit has little or no effect on performance. To illustrate this we select two middle range units in terms of performance, PSD San Antonio a small PSD with 14 personnel and PSD San Diego a large PSD with 86 personnel. Figure 23 shows both PSDs with similar mean timeliness and acceptance rates and variability even though the larger PSD has over six times more personnel than the smaller PSD.

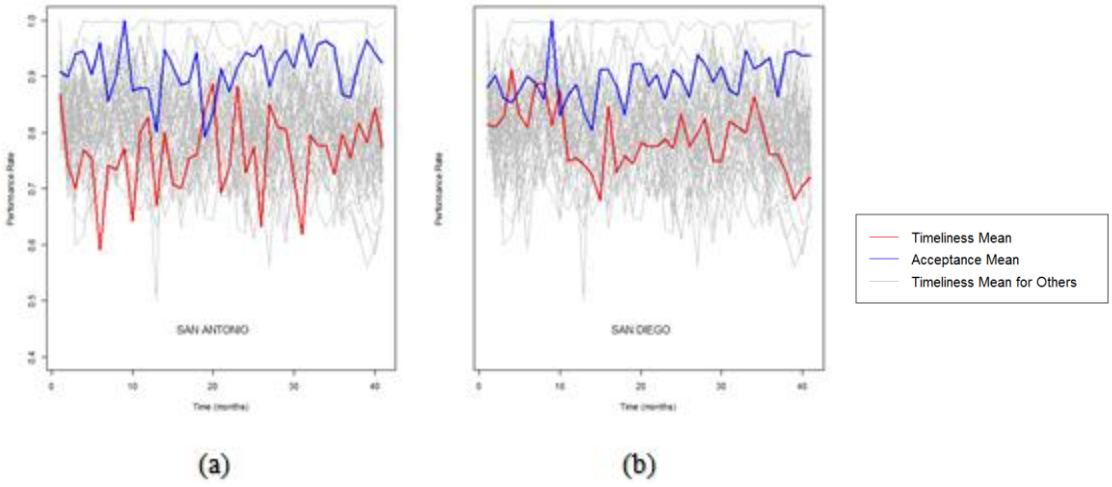


Figure 23. Performance Rates for (a) a Small PSD, San Antonio and (b) a Large PSD, PSD San Diego

It also appears that the location of PSD/CSD has little effect on performance as illustrated in Figure 24. PSD Sasebo in Japan and PSD Sigonella in Italy are located Outside Continental United States (OCONUS) and on different continents. PSD Washington, DC, and PSD Whidbey Island are Continental United States (CONUS) but on opposite coasts. All four PSDs are indistinguishable in terms of timeliness and acceptance rate trends and variability. It is also important to note that these four PSDs serve very different communities. Whidbey Island and Sigonella primarily serve aviation commands; Sasebo provides logistic support for forward deployed units; and Washington, DC, serves the Washington, DC, area and worldwide staffs including the Chief of Naval Operations (CNO), SECNAV, and Navy attaches. With such different customer bases, it is interesting to note that overall performance rates are relatively similar. This observation supports a consolidation effort since the work remains approximately the same despite unique circumstances.

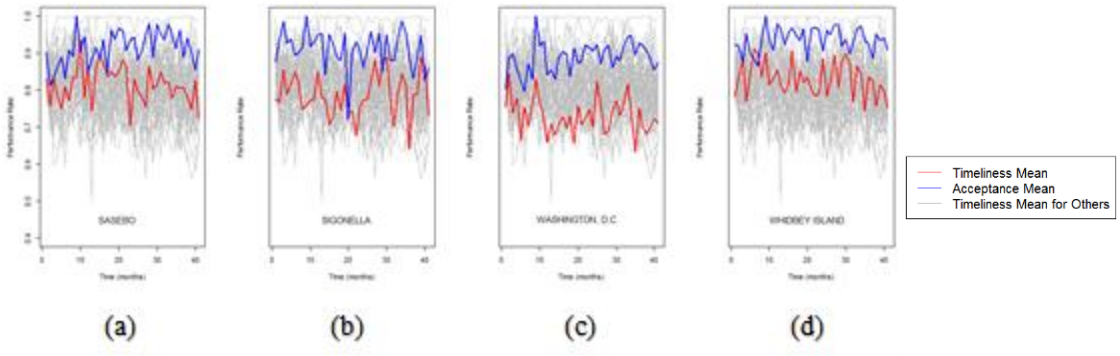


Figure 24. OCONUS versus CONUS PSD Performance Rates for (a) PSD Saesbo, (b) PSD Sigonella, (c) PSD Washington, D.C., and (d) PSD Whidbey Island

2. Manning

The ideal manning plan for a PSD or CSD unit would show constant BA and constant COB numbers over time. This describes a stable unit with no large personnel gaps both in manpower resources and staff on hand to accomplish the work. Constant COB and BA levels also may indicate low turnover and higher levels of experience within the staff. Figures 25–29 show all units' total onboard manning levels (COB) plotted in gray by month as a backdrop to the manning levels of a select PSD/CSD unit. For the specified unit, total on-board manning is plotted in red, numbers of military personnel is plotted in blue, numbers of federal civilians is plotted in green, and numbers of contractors is plotted in gold. Figure 25 shows two different PSDs with stable and unstable manning. PSD Mayport (Figure 25(a)) shows stables lines with no large gaps between BA and COB for all worker types. PSD Pearl Harbor (Figure 25(b)) shows large gaps with large fluctuations in COB.

Total manning (or COB) for each unit is a sum of the numbers of military personnel, federal employees, and government contractors. The ratio of each type of worker to the total COB is different for each unit. This is due to the local job market, location of the unit, and community they serve. Of the 49 PSD and CSD units, several manning patterns are apparent (see Appendix B).We illustrate the differences in CONUS

versus OCONUS, Afloat support to deployed commands, PSD Yokosuka, and CSD RTC Great Lakes.

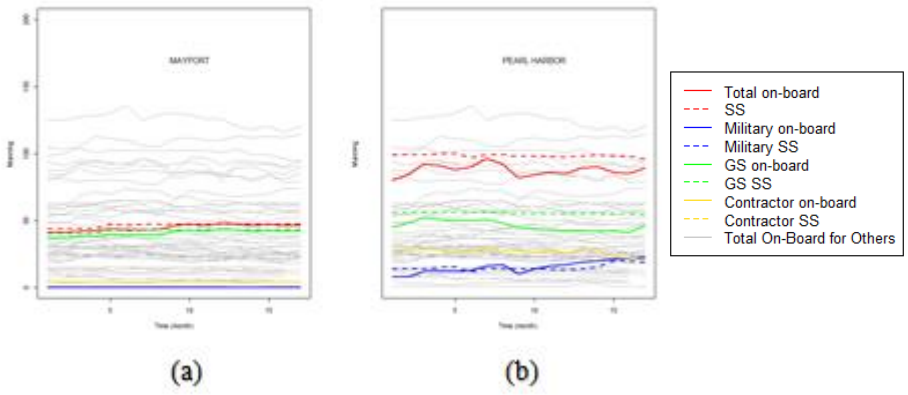


Figure 25. (a) Stable (PSD Mayport) versus (b) Unstable (PSD Pearl Harbor) Manning over Time

There are twelve OCONUS units. In each OCONUS unit, military personnel are the majority. All CONUS units except Afloat East and Afloat West have military personnel as the smallest portion of personnel on board. This is due to a requirement that military personnel will serve in the top leadership position as the Officer in Charge with a federal employee serving as the deputy. Figure 26 shows typical CONUS versus OCONUS PSD manning constructs. For all CONUS units, federal employees are the majority followed by contractors. The ratios of contractors vary across PSD and CSD units.

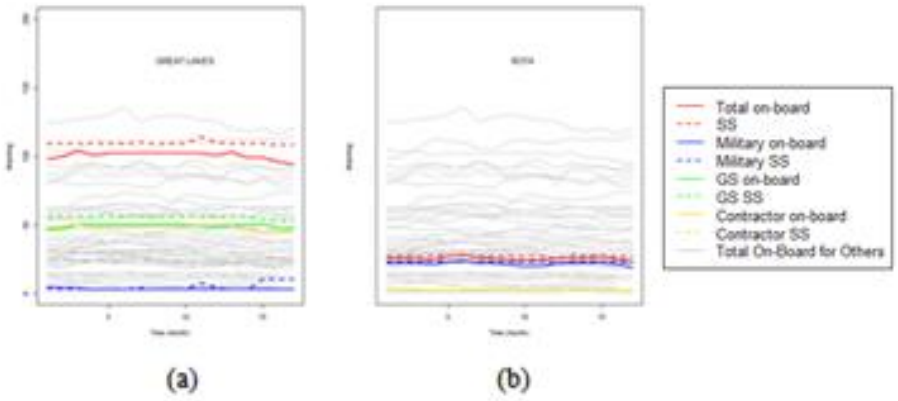


Figure 26. (a) CONUS (PSD Great Lakes) versus (b) OCONUS (PSD Rota) Manning over Time

In 2004, pay and personnel services were transferred from the ship to a shore based facility, which became PSD Afloat East and PSD Afloat West. They are responsible for handling all ships on the east and west coast. Initially when they were developed, they were staffed primarily with military personnel; however, the manning plans are now similar to other CONUS PSDs. Figure 27 shows the manning for both PSD Afloat East and PSD Afloat West. It is important to note that the ships they support do not operate on a traditional federal shore work schedule and continue to report to them when deployed. Military or contractor personnel are able to support ships outside the normal shore work hours.

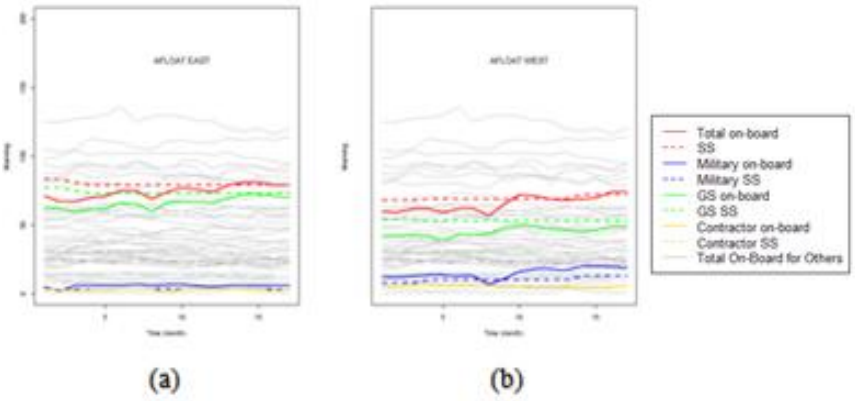


Figure 27. Manning over Time for (a) PSD Afloat East and (b) PSD Afloat West

Steady changes in personnel numbers may have an effect on performance. Figure 28(a) shows PSD Yokosuka with a steady decline in military manning towards the end of the observed. The manning plot covers the last 15 months of the performance plot (Figure 28(b)). The last seven months in both plots of Figure 28 show a decline in military manning (primary workforce in OCONUS units) and a similar decline in timeliness. The BA did not change, only the COB. Care should be taken to avoid steady losses in COB manning as they may affect overall performance metrics.

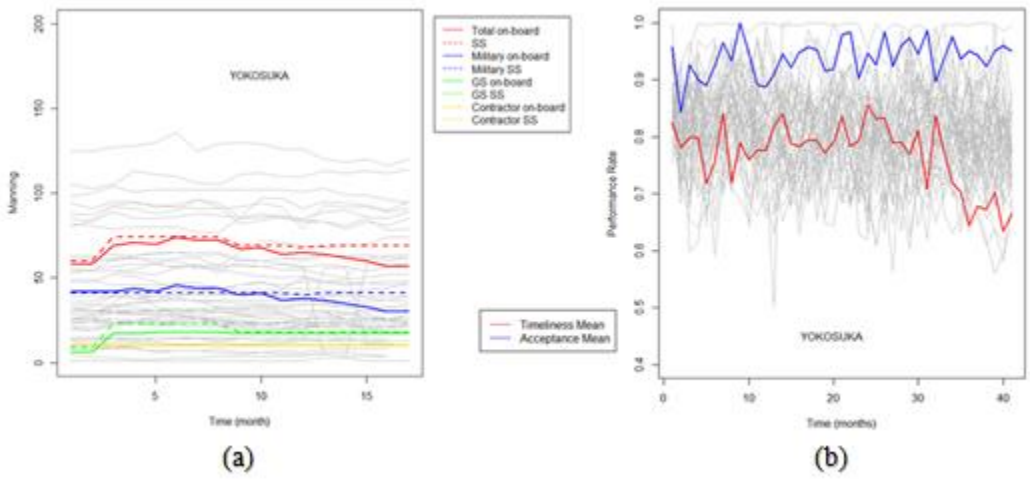


Figure 28. Effects of (a) Manning on (b) Performance for PSD Yokosuka

From a mission and manning perspective, CSD RTC Great Lakes is unique from all of the other units. CSD RTC Great Lakes manages all enlisted accessions into the Unites States Navy Boot Camp. It is the only one with contractors as the significant majority in the work force; contractors outnumber military and federal civilians 3 to 1. Contractors, through a single contract, accomplish the main work with few military personnel and federal civilians in place for leadership and audit/government oversight. This observation is significant because of CSD RTC Great Lakes overall performance relative to the other PSD and CSD units. Figure 29 shows manning levels and performance of CSD RTC Great Lakes. As stated earlier, CSD RTC Great Lakes

outperforms all other units. Additional research should be done to learn how CSD RTC Great Lakes manages their workload.

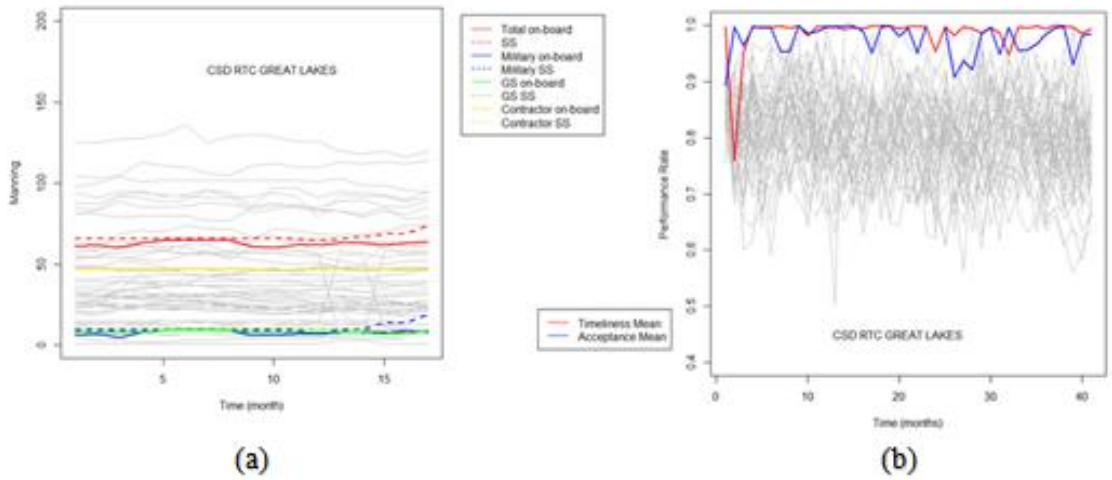


Figure 29. CSD RTC Great Lakes (a) Manning and (b) Performance

3. FID

There are 133 different transactions, which are separated into sixteen classes based on the first letter in the FID; they include Allotment, Payment, Entitlement, Taxes, etc. Of the 133 only 86 were performed over the observed time with some transactions not completed across all months, which created gaps in the plots over time. Ideal transaction performance is very similar to ideal PSD/CSD unit performance over time. Timeliness and acceptance rates are plotted over time by FID; high levels in both metrics, with low variability, and no downward trends are desirable. Figures 30–33 show all FIDs' performance plotted in gray as a backdrop to the performance rates of a select FID. Mean timeliness averaged over all PSD/CSD units for the select FID is plotted in red and mean acceptance, computed similarly, and is plotted in blue. Figure 30 shows two FID performance rates over time, Figure 30(a) shows high quality performance while Figure 30(b) is much more variable with a downward trend in timeliness towards the end of the time period. Both FIDs are from the Status class of transactions, which includes leave (SB) and confinement (SK). The most important difference between these transactions is

volume. SB transactions account for the most transactions performed over three years while SK is ranked number 62 of 86. A general trend across all transactions is that as number of transactions or frequency of the transaction decreases, so does performance. FID performance becomes more variable and lower in both timeliness and acceptance rate. This suggests that transactions that are more frequent lead to a more experienced workforce and improved performance. Concentrating the workload to a few operation centers (with appropriate manning) would increase the frequency of transaction type per workers and may lead to improved performance based on observed trends.

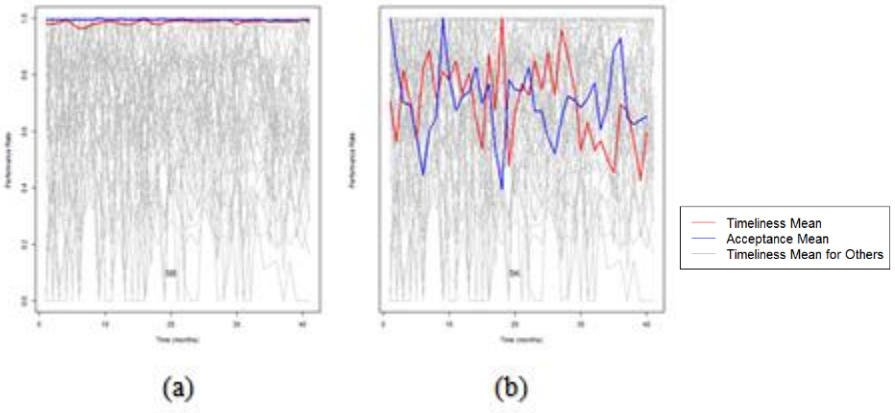


Figure 30. (a) High Volume (SB) versus (b) Low Volume (SK) Transactions

Some transaction classes have identifiable characteristics regardless of volume. Figure 31 shows nine examples of entitlement transactions with the highest volume in the top left (Figure 31(a)) and lowest in bottom right (Figure 31(h)). Each plot over time maintains a gap between acceptance and timeliness rates with acceptance rates being the greater of the two. Timeliness rates are more variable and much lower than acceptance rates. This pattern maintained for 29 of the 37 entitlement transactions; higher volume of transaction appears to be related to a smaller gap between acceptance and timeliness rates over time.

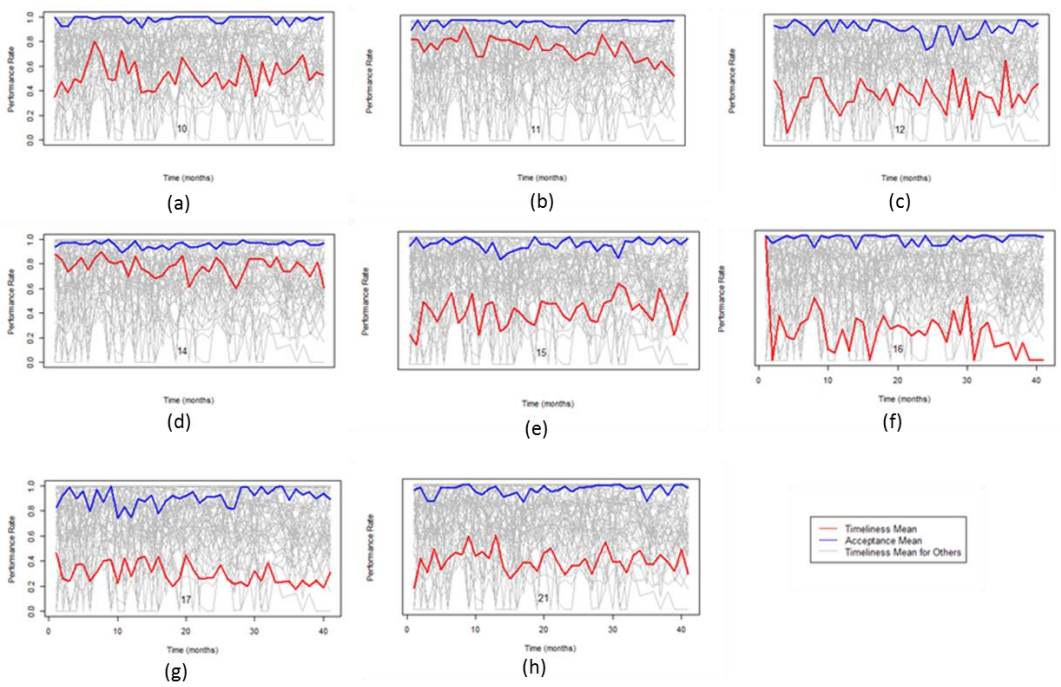


Figure 31. Examples of Entitlement Transactions for (a) 10, (b) 11, (c) 12, (d) 14, (e) 15, (f) 16, (g) 17, and (h) 21

FIDs in the Allotment class also exhibit similar characteristics. Figure 32 shows three Allotment transaction performance rates with varying transaction volumes. All seven Allotment transactions showed perfect (1.0) timeliness rates with slightly lower acceptance rates with small variability. This was the only FID class that maintained perfect timeliness rates across all of the observed transactions. Allotments are one pay transaction that service members can set up themselves through DFAS. This may indicate potential success for continued self-service capabilities.

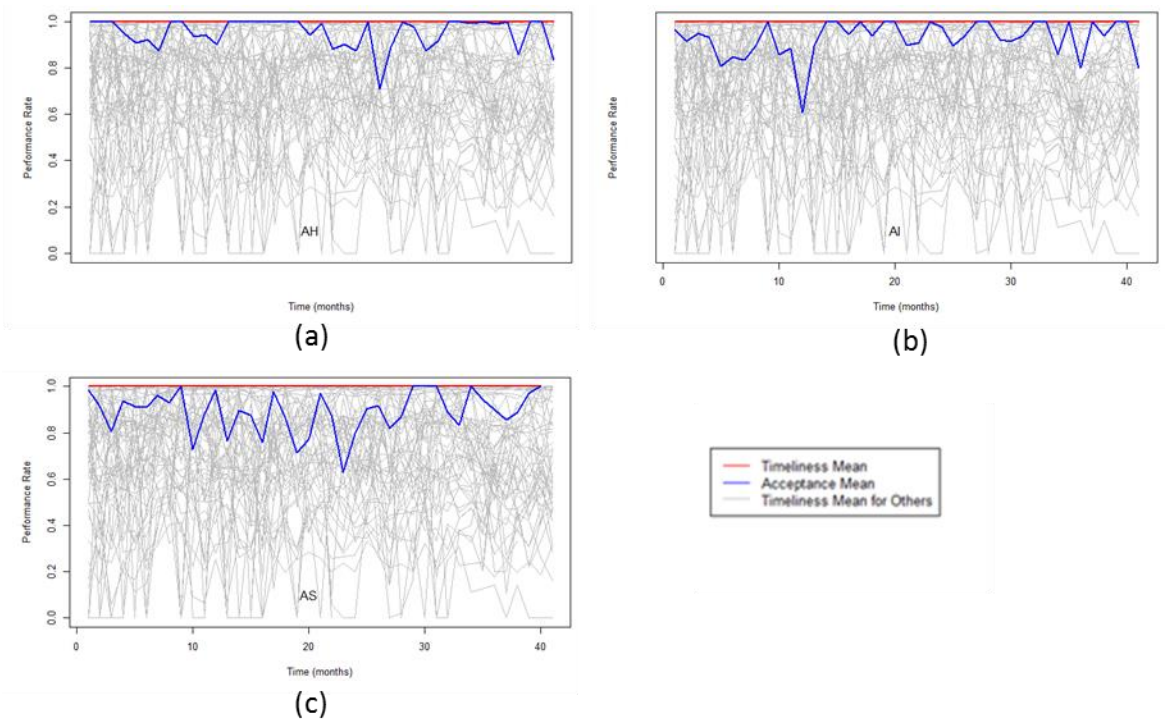


Figure 32. Allotment Transactions Shows Perfect Timeliness but Lower Acceptance for (a) AH, (b) AI, and (c) AS

In all PSD and CSD unit performance rate plots, acceptance rates were equal to or greater than timeliness rates however when partitioned by FID, 22 of 86 FIDs have lower acceptance than timeliness rates. Figure 33 shows the Deductions class of transactions where four of the five plots have acceptance rates less than timeliness rates. This may be related to the high timeliness rates similar to those of Allotments (self-service/automatic) for each transaction however, acceptance rates are still quite variable over time. This could indicate a training issue where clerks are risking mistakes to get higher timeliness rates. They may not understand the system fully and continue to resubmit transactions causing acceptance rates to decrease.

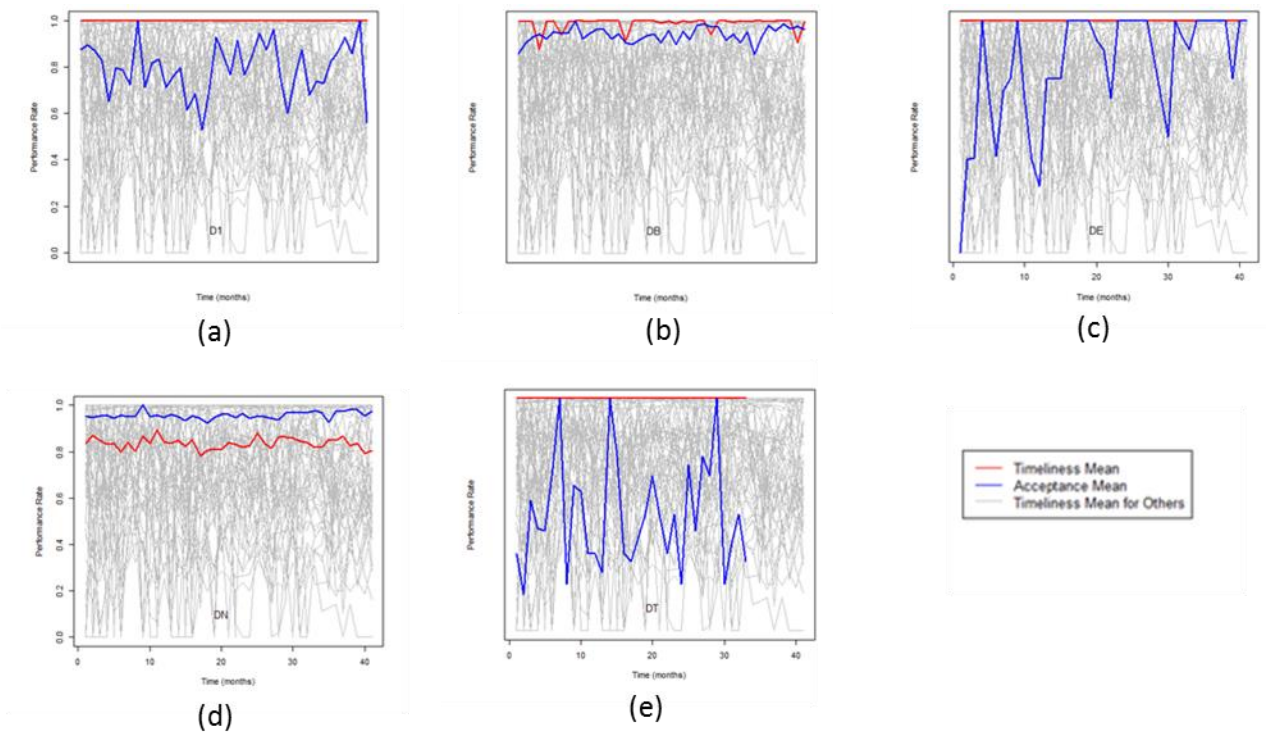


Figure 33. Examples of Deduction Transactions with Lower and Highly Variable Acceptance

Overall, one FID transaction class does not stand out as having the best performing transactions or having transactions with the highest volume. Entitlement transactions make up the majority transactions accounting for 43% of all transactions. Other large classes were Status with 9%, Deductions with 12%, and Allotment with 8% of transactions.

C. REGRESSION ANALYSIS FOR PSD AND CSD UNIT TIMELINESS

This section focuses on the modeling of mean timeliness as the response variable of a multiple linear regression where timeliness rates are averaged over FIDs for each month. Mean timeliness values range from 0% transactions completed in a timely manner to 100% of the monthly transactions completed in a timely manner. We fit two models. The first aggregates timeliness rates over time with each unit's timeliness rate averaged over all FIDs and then averaged over time. The second model uses PSD timeliness rate by month is averaged over all FIDs so we can see timeliness trends over time.

The dataset for timeliness rates aggregated over time consists of 49 rows of timeliness performance rates averaged over 133 FIDs with each FID holding equal weight and then averaged over 17 months (only 17 months of manning data were available). Table 2 describes predictor variables in the first model. TotalTransactionVolume is the sum of all transactions by the unit over the time period; it is an indicator of how active the unit is. Manning numbers are calculated by dividing the number of personnel by type (e.g., total number of military personnel) by the total number of personnel at each unit. In order to capture variability with such a small number of rows, VariabilitySS and VariabilityOB are the difference between the global maximum number of personnel from the 17-month period minus the global minimum number of personnel for another month from the 17-month period for a specific unit. They are the only factors that are not averaged over time.

Table 2. Predictor Variables for Timeliness Rate Model 1

Name	Type	Description
TotalTransactionVolume	numerical	Total number of completed transactions for each unit
MilPercent	numerical	Percent of staff that is military averaged over time
GSPercent	numerical	Percent of staff that is a civilian contracted employee averaged over time
ContractorPercent	numerical	Percent of staff that is a civilian federal employee averaged over time
VariabilityBA	numerical	Variability in billets authorized by unit, the difference between the maximum and minimum over time
VariabilityOB	numerical	Variability in personnel on-board by unit, the difference between the maximum and minimum over time
OCONUS	categorical	PSD/CSD units that are not in a U.S. state receive a "1"

We start by fitting a regression model with all predictor variables listed in Table 2, but find MILPercent and ContractorPercent to be the only variables that contribute to the regression model. Further, we find that the expected timeliness rate is nonlinear in

both of these variables. We approximate the nonlinearities in these two variables with a broken stick regression broken at 0.4 for both variables (Faraway, 2015). The left-hand side portion of the broken stick is denoted by LHS in Table 3 and the right-hand side is denoted by RHS in Table 3.

In Table 3, we give the estimates of the coefficients, their standard errors, the t-value test statistic that tests the null hypothesis that the corresponding coefficient is zero, and its two-sided p-value. Our final model has an adjusted R-squared value of 0.4047.

Table 3. Timeliness Rate Model 1 Fit

Coefficients	Estimate	Standard Error	t-value	p-value
Intercept	0.646	0.034	18.847	0.000
LHS.MilPercent	0.336	0.086	3.911	0.000
RHS.MilPercent	0.157	0.073	2.137	0.038
LHS.ContractorPercent	0.234	0.075	3.110	0.003
RHS.ContractorPercent	0.417	0.091	4.581	0.000

Model diagnostic plots are shown in Figure 34 with residual versus fitted values in (a), a normal quantile-quantile plot in (b), and residuals versus leverage in (c). These plots and additional partial residual plots (Figure 35) suggest the usual linear modeling assumptions are met (Faraway, 2015).

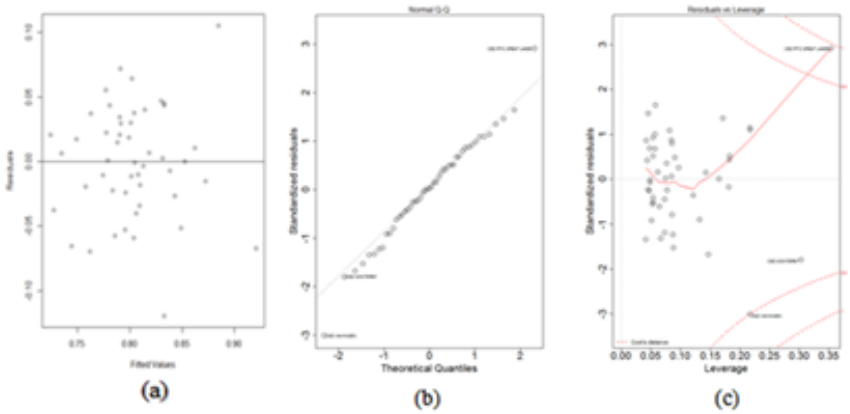


Figure 34. Residual Plots for Timeliness Rate Model 1 Fit

Figure 35 shows the partial residuals for each predictor variable while all other variables are held constant. Figure 35(a) and 35(b) shows a negative slope for the partial fit of MilPercent at low values less than 0.4 and a positive slope for values greater than 0.4. Low MilPercent values correspond to units whose military personnel are only required leadership while high values correspond to units with military serving as clerks. As the percentage of military clerks increases, mean timeliness rates increase with a rate of 0.157. The same relationship exists with ContractorPercent. At low values, mean timeliness performance decrease and then increases at an estimated rate of 0.417. Often times, contractor personnel are retired military who specialized in their system. The contracting system is also very responsive to poor performance and requires quality performance to maintain their employment status. In both situations where military and contractor personnel percentages are low, this means civilian federal employees maintained the majority. GSPercent is not statistically significant therefore, a positive or negative effect cannot be determined.

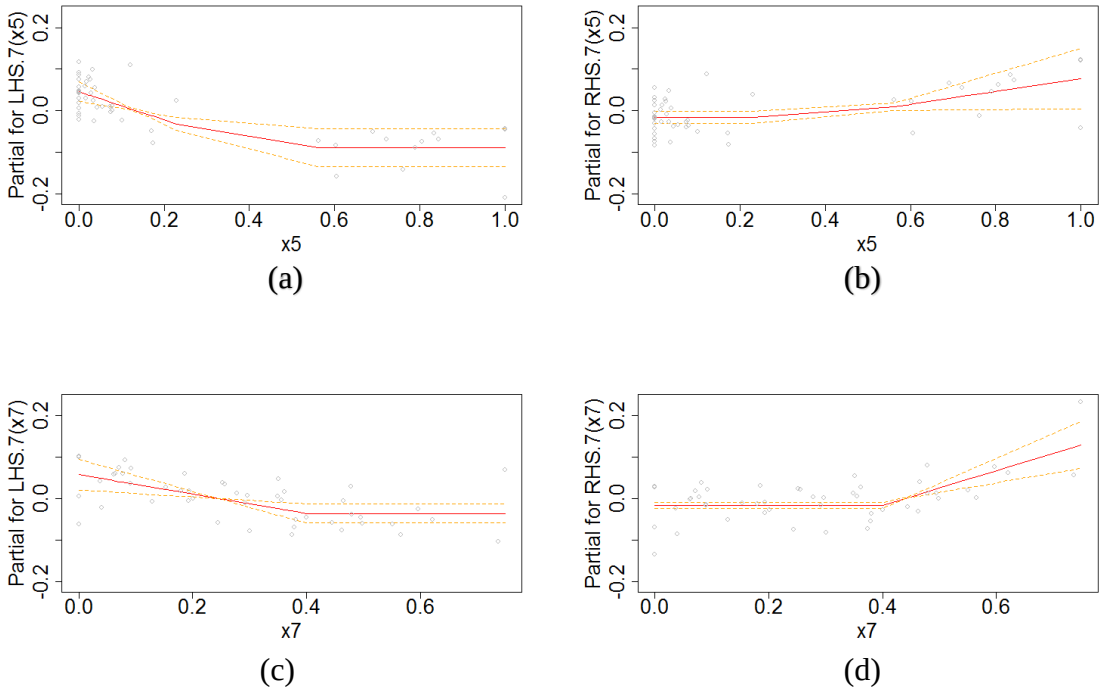


Figure 35. Partial Residual Plots for Timeliness Rate Model 1 Fit

1. Include Time as Variable

The dataset for timeliness performance over time consists of 824 rows with 17 months of manning data for 49 PSD and CSD units. Timeliness rates are averaged over 133 FIDs with each FID holding equal weight. Table 4 describes predictor variables used in the model over time. PSD, YearMonth effects, and their interaction are added to capture trends over time.

Table 4. Predictor Variables for Timeliness Rate Model 2

Name	Type	Description
TotalTransactionVolume	numerical	Total number of completed transactions by unit each month
MilPercent	numerical	Percent of staff that are military averaged over time
GSPercent	numerical	Percent of staff that are civilian contracted employees averaged over time
ContractorPercent	numerical	Percent of staff that are civilian federal employees averaged over time
OCONUS	categorical	If PSD/CSD unit is not in a U.S. state, variable is "1"
PSD	categorical	Name of a PSD or CSD unit
YearMonth	integer	Unique year and month combination ordered from 1 to 17
SummerMonth	categorical	If YearMonth occurred in June, July, or August, variable is "1"

We started with all of these variables but find that only MILPercent, ContractorPercent, YearMonth, SummerMonth, PSD, YearMonth, and the PSD:YearMonth (PSD and YearMonth interaction) variables are significant. The expected timeliness rate is nonlinear in both MILPercent and ContractorPercent. We approximate the nonlinearities in these two variables with broken stick regression broken at 0.4. The left-hand side portion of the broken stick is denoted by LHS in Table 5 and the right-hand side is denoted by RHS in Table 5.

In Table 5, we give the estimates of the coefficients, their standard errors, the t-value test statistic that tests the null hypothesis that the corresponding coefficient is zero,

and its two-sided p-value. Coefficient values for the categorical variable PSD and the interaction PSD:YearMonth are listed in Appendix D. Our final model has an adjusted R-squared value of 0.5674.

Table 5. Timeliness Rate Model 2 Fit

Coefficient	Estimate	Standard Error	t-value	p-value
Intercept	0.871	0.026	33.009	0.000
RHS.MilPercent	0.142	0.116	-1.223	0.222
RHS. ContractorPercent	0.209	0.111	-1.885	0.060
SummerMonth	0.026	0.005	5.484	0.000
YearMonth	-0.005	0.003	-1.945	0.052
PSD:YearMonth	See Appendix D			

Model diagnostic plots are shown in Figure 36 with residual versus fitted values in (a), a normal Q-Q plot in (b), and residuals versus leverage in (c). Figure 37 shows model residuals over time. These plots suggest that the linear model assumptions are reasonable.

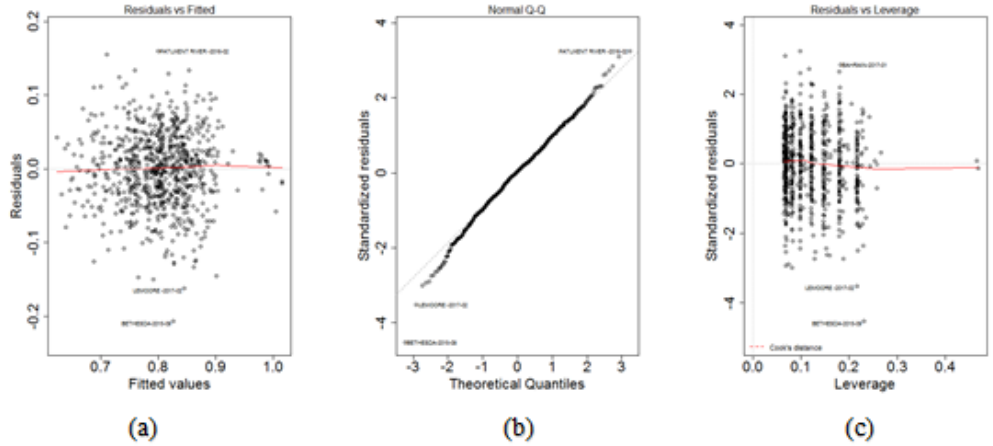


Figure 36. Timeliness Rate Model 2 Residual Plots

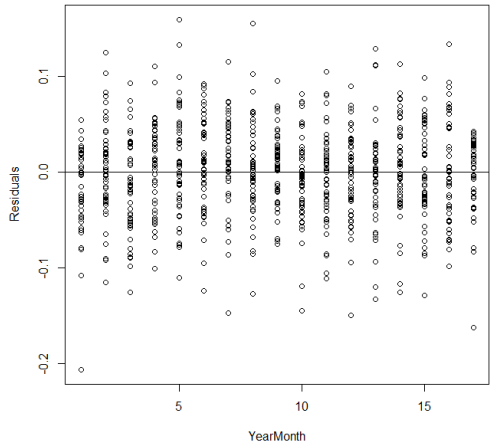


Figure 37. Mean Timeliness Model Residuals over Time.

Figure 38 shows the partial residuals for each predictor variable while all other variables are held constant. Mean timeliness performance behaves similarly to the aggregated model as shown in Figure 38a and 38b with both high military and high contractor staff percentages yielding higher expected mean timeliness. With the addition of time, we see an increase in performance over the months June, July, and August, which coincide with high school and college graduation. Many military members PCS during this timeframe so there will be an increase in transaction volume.

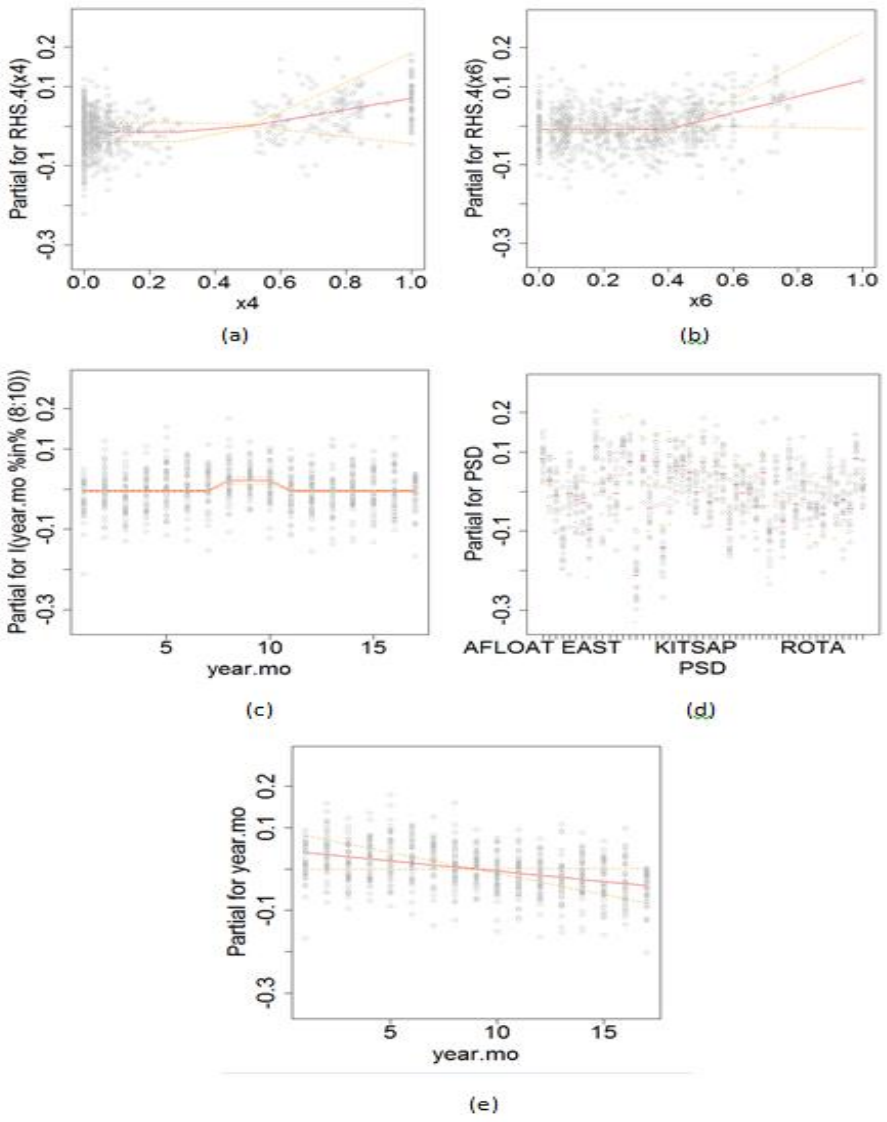


Figure 38. Timeliness Rate Model 2 Partial Residual Plots

D. REGRESSION ANALYSIS FOR PSD AND CSD UNIT ACCEPTANCE RATES

This section focuses on the modeling of mean acceptance rates as the response variable of a multiple linear regression where acceptance rates are averaged over FIDs by month. Acceptance rate is the number of accepted transactions divided by the total number of transaction upload attempts by FID each month. Mean acceptance values range from 0% successful uploads to 100% of the monthly uploads successful (meet all

electronic document requirements). As in the previous section, we fit two models: a model where acceptance is aggregated over time and a model for which the response variable is PSD/CSD monthly acceptance rate.

1. Aggregated over Time

For the first model, we again use the same predictor variables shown in Table 2. Each unit is subject to the same predictors that effect both timeliness and acceptance rates however they affect them in different ways.

We start with all of these variables but find only TotalTransactionVolume and MILPercent to be significant. The expected timeliness rate is nonlinear in both of these variables. We approximate the nonlinearities in these two variables with broken stick regression broken at 40 and 0.4, respectively but where the left-hand side of each broken stick is constant (Faraway, 2015). The right-hand side portion of the broken stick is denoted by RHS in Table 6.

In Table 6, we give the estimates of the coefficients, their standard errors, the t-value test statistic that tests the null hypothesis that the corresponding coefficient is zero, and its two-sided p-value. Our final model has an adjusted R-squared value of 0.1454. Overall, acceptance rates are much more variable that timeliness rates and more difficult to model.

Table 6. Acceptance Model 1 Fit

Coefficients	Estimate	Standard Error	t-value	p-value
Intercept	0.935	0.005	198.638	0.000
RHS.TotalOnBoard	0.000	0.000	-2.213	0.032
RHS.MilPercent	-0.054	0.019	-2.871	0.006

The model diagnostic plots for the acceptance rate model 1 fit are similar to those of the timeliness rate model 1 fit, indicating that the linear model assumptions are reasonable, and we do not display them here.

We do however show in Figure 39 the partial residual plots for each predictor variable while all others are held constant. Mean acceptance rates aggregated over time behave differently than mean timeliness rate aggregated over time. First, both statistically significant variables (Table 6) have a negative coefficient. Figure 39 shows that as TotalOnBoard and MilPercent increase mean acceptance performance decreases. Poor acceptance rates could be related to poor training and lack of knowledge in submitting transactions into the system. Military are often the most transient between the three personnel types and may support the lack of experience/training observation. Often times the local experts to military administrative systems are the local contractors and federal civilian employees.

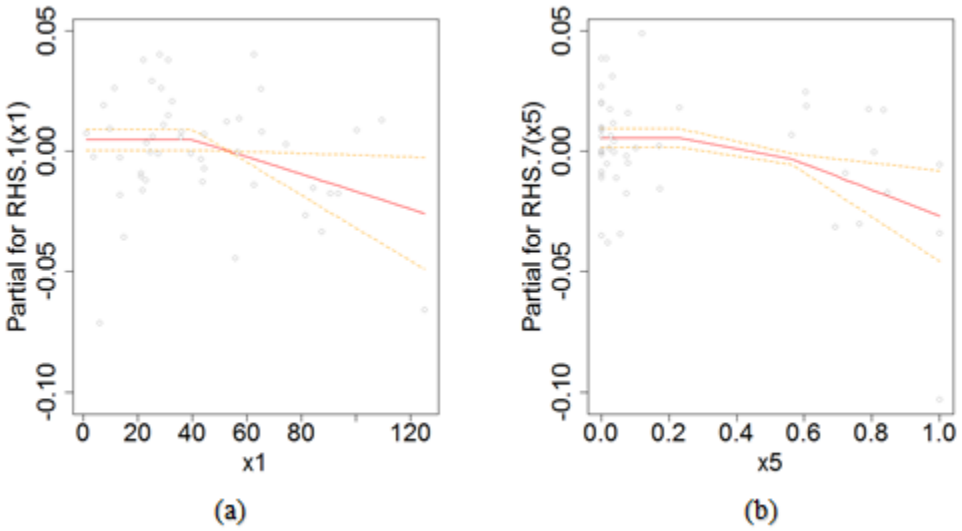


Figure 39. Acceptance Rate Model 1 Partial Residual Plots

2. Include Time as Variable

The dataset for acceptance performance is the same as timeliness over time and consists of 824 rows with 17 months of manning data for 49 PSD and CSD units. Acceptance rates are averaged over 133 FIDs with each FID having equal weight. Table 4 describes predictor variables used in the model over time.

We started with all of the variables in Table 4 and the PSD:YearMonth interaction variables but find MILPercent, ContractorPercent, YearMonth, SummerMonth, PSD, and PSD:YearMonth variables are significant. The expected timeliness rate is nonlinear in both MILPercent and ContractorPercent. We approximate the nonlinearities in these two variables again with broken stick regression broken at 0.4 (Faraway, 2015). The left-hand side portion of the broken stick is denoted by LHS in Table 7 and the right-hand side is denoted by RHS in Table 7.

In Table 7, we give the estimates of the coefficients, their standard errors, the t-value test statistic that tests the null hypothesis that the corresponding coefficient is zero, and its two-sided p-value. Our final model has an adjusted R-squared value of 0.3626.

Table 7. Linear Model of PSD and CSD Unit Acceptance over Time.

Coefficient	Estimate	Standard Error	t-value	p-value
Intercept	1.079	0.042	25.481	0.000
LHS.MilPercent	-0.420	0.120	3.487	0.001
RHS.MilPercent	-0.158	0.086	1.842	0.066
RHS. ContractorPercent	0.162	0.085	-1.920	0.055
SummerMonth	0.011	0.003	3.798	0.000
YearMonth	0.001	0.002	-0.904	0.367
PSD:YearMonth	See Appendix E			

Model diagnostic residual plots (not shown) for the acceptance rate model 2 fit corresponding to those of the timeliness rate model 2 fit (Figures 36 and 37) indicate that linear model assumptions for model 2 are reasonable.

Figure 40 shows the partial residuals for each predictor variable while all other variables are held constant. Figure 40a suggests that as military leadership increases, mean acceptance rates increase. This may suggest leadership responsiveness in meeting training requirements for systems; however, a negative trend is visible for higher levels of military like in the aggregated model. A positive coefficient is present as the percentage of contractors increase. A similar though lower increase in performance over the summer months is present with a slightly less negative trend throughout the year.

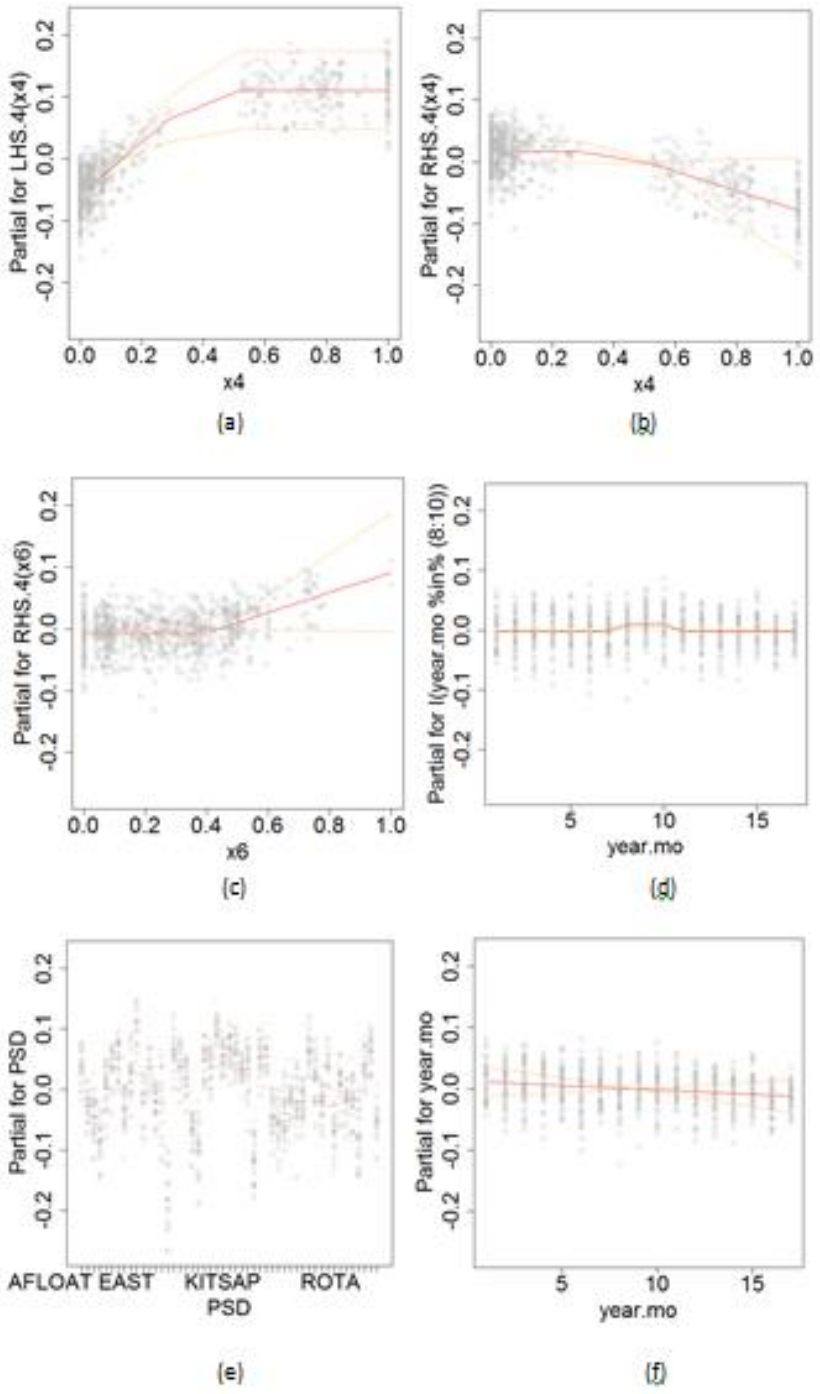


Figure 40. Partial Residuals of PSD and CSD Unit Acceptance over Time Model.

V. CONCLUSIONS AND RECOMMENDATIONS

Through exploratory data analysis and multiple regression, this thesis provides insight about the current Navy pay and personnel services delivery model and what policies to implement in the new service model. Based on the findings of this study, each research question from Chapter I is answered. Recommendations for future work are also presented.

A. RESEARCH QUESTION 1

Do larger PSD and CSD units perform significantly better than smaller PSD and CSD units and support the reduction policy.

NPPSC determines the size of the unit based on manning levels with the classifications as small, medium, and large. Size of the unit does not appear to affect overall performance with small, medium, and large PSD and CSD units having similar performance metrics in both timeliness and acceptance rates when averaged over all FIDs.

It is noted that larger PSD and CSD units experience higher transaction volumes and therefore when viewed by FIDs, higher volume FIDs are more likely to have higher timeliness and acceptance rates. FIDs with higher transaction volumes also have less variability over time. While size does not appear to affect performance, volume or frequency of transactions does appear to have an effect. This suggests that a service consolidation effort may increase the number transactions of each type a clerk will perform and therefore increase timeliness and acceptance rates.

B. RESEARCH QUESTION 2

What variables/factors affect PSD and CSD unit performance?

Several factors repeatedly show up in the final regression models. They include volume of transactions, the percentage of military personnel, the percentage of contractor personnel, and what time of the year the transactions occurred. The regression models also identify differences among significant PSD and CSD units in Appendix D and E

(both positive and negative performers) that provide a focus for future study. These PSD and CSD units should be reviewed to identify what they are doing right or wrong that may be implemented fleet wide. Continued measurement and consistent feedback, both up and down the chain of command, will improve the entire program.

C. RESEARCH QUESTION 3

How variable are PSD and CSD unit services between function and geographic location?

There are 49 PSD and CSD units included in this study and when time is held constant, only 10 are statistically different from the reference PSD. Size of unit (TotalOnBoard) and transaction volume are not consistently significant through all four regression models. There is some evidence that units differ slightly but additional data is required to capture community effects. Overall, all functions are capable of being carried out through few operation centers.

D. RESEARCH QUESTION 4

Does military, civilian, and contractor workforce mix effect timeliness and accuracy?

In the multiple final regression model fits, the percent military factor and the percent contractor factor were statically significant at the 0.1 and 0.05 levels, so we reject the null hypothesis that their effect is zero. For timeliness and acceptance rates, the expected rate was nonlinear with a breakpoint at 0.4. In all models, mean timeliness performance increases as percent military and percent contractors increase. Percent acceptance increases as military leadership increases but decreased with higher percentages of military clerks.

E. FUTURE WORK

In the course of this study, several questions arose that the data collected could not answer. The following areas will provide additional insight in pay and personnel

services but would require new efforts in data collection and analysis that are not available for this study.

1. Function Based Analysis

Are the Functional Service Centers and function-focused transactions centers the best route for improving timeliness and accuracy than traditional multi-function PSD and CSD units?

A FID focused analysis may be conducted on the original dataset and may yield additional insight. Only data visualization techniques were briefly utilized and suggest a consolidation effort of function based service could be beneficial.

At the time of this study, data from the FSCs were not available for analysis. Travel Service Center Memphis was the first FSC in place with services still being consolidated. Once all commands are fully brought into Travel Service Center (TSC) Memphis and adequate data is collected, a new analysis should be conducted. A new compilation of travel data must be obtained since the same issues in data collection remain. FSC Great Lakes should also be studied; however, care should be taken to ensure all processes that FSC Great Lakes oversee are captured in the new dataset.

2. Community Effects Analysis

Do the communities each PSD and CSD unit serves affect performance metrics?

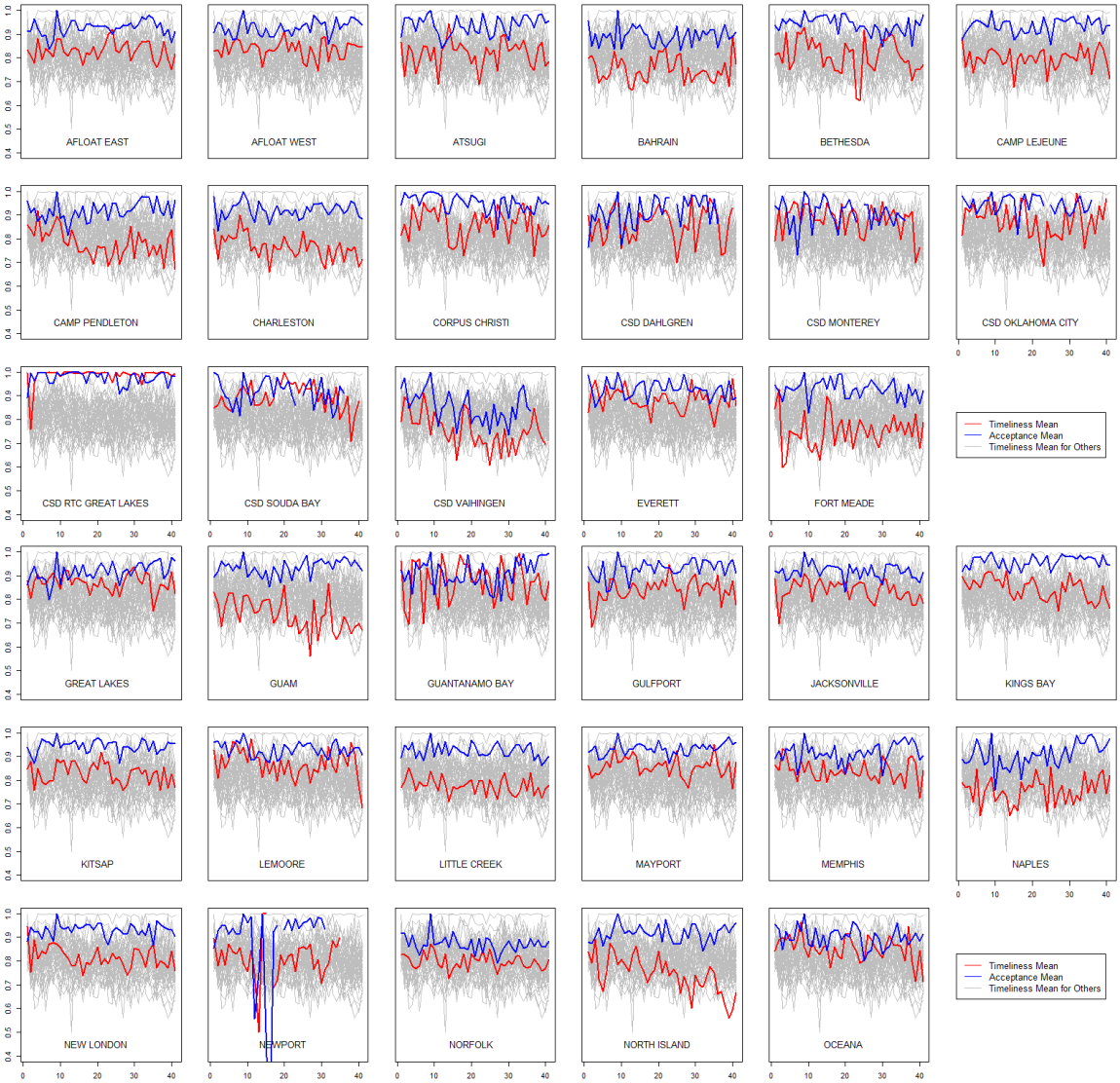
During this study, initial attempts were made to cluster PSDs and CSDs by certain transactions in order to capture community effects. Entitlement pay like career sea pay, submarine pay, parachute pay, and flight pay were used to represent the surface warfare, submarine, Special Forces, and aviation communities. However, the large volume of career sea pay transactions overwhelmed any other community effects. Each community has unique requirements and operational schedules, additional analysis into community effects may yield critical insight in providing tailored support to the various Navy communities.

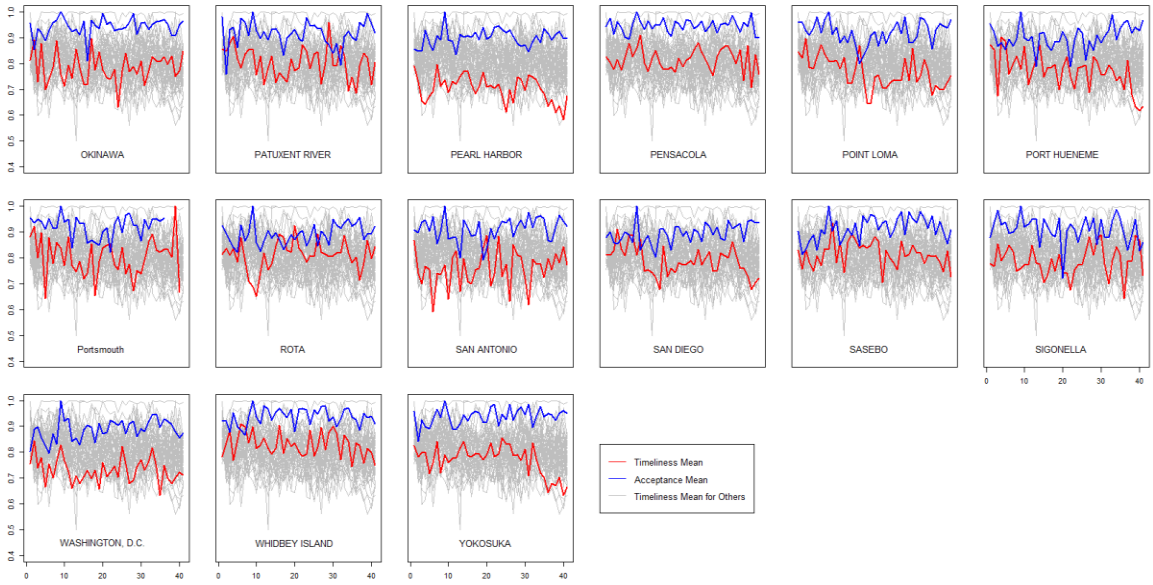
3. Afloat versus Ashore Differences

How is the afloat pay and personnel support model different from the shore based model and how can they be improved?

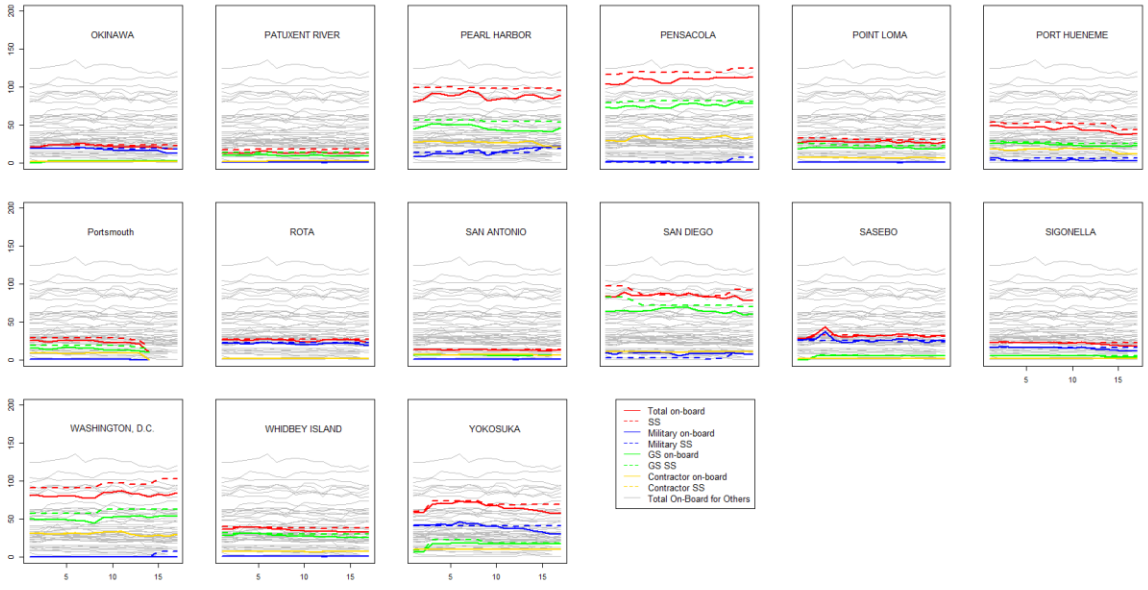
Shore PSD and CSD units primarily support the shore military personnel with PSD Afloat East and PSD Afloat West supporting deployable assets. Some afloat assets have their own pay and personnel services onboard. A similar dataset can be collected and analysis performed for afloat assets and compared to the shore model. Afloat assets still rely on some shore capabilities so any limitations may be identified to improve both shore and sea capabilities. Overall, any improvement to either system would improve the overall Navy system and be beneficial to all.

APPENDIX A. PSD AND CSD UNIT PERFORMANCE OVER TIME




OKINAWA
PATUXENT RIVER
PEARL HARBOR
PENSACOLA
POINT LOMA
PORT HUENEME
Portsmouth
ROTA
SAN ANTONIO
SAN DIEGO
SASEBO
SIGONELLA
WASHINGTON, D.C.
WHIDBEY ISLAND
YOKOSUKA
Timeliness Mean
Acceptance Mean
Timeliness Mean for Others

APPENDIX B. PSD AND CSD UNIT MANNING OVER TIME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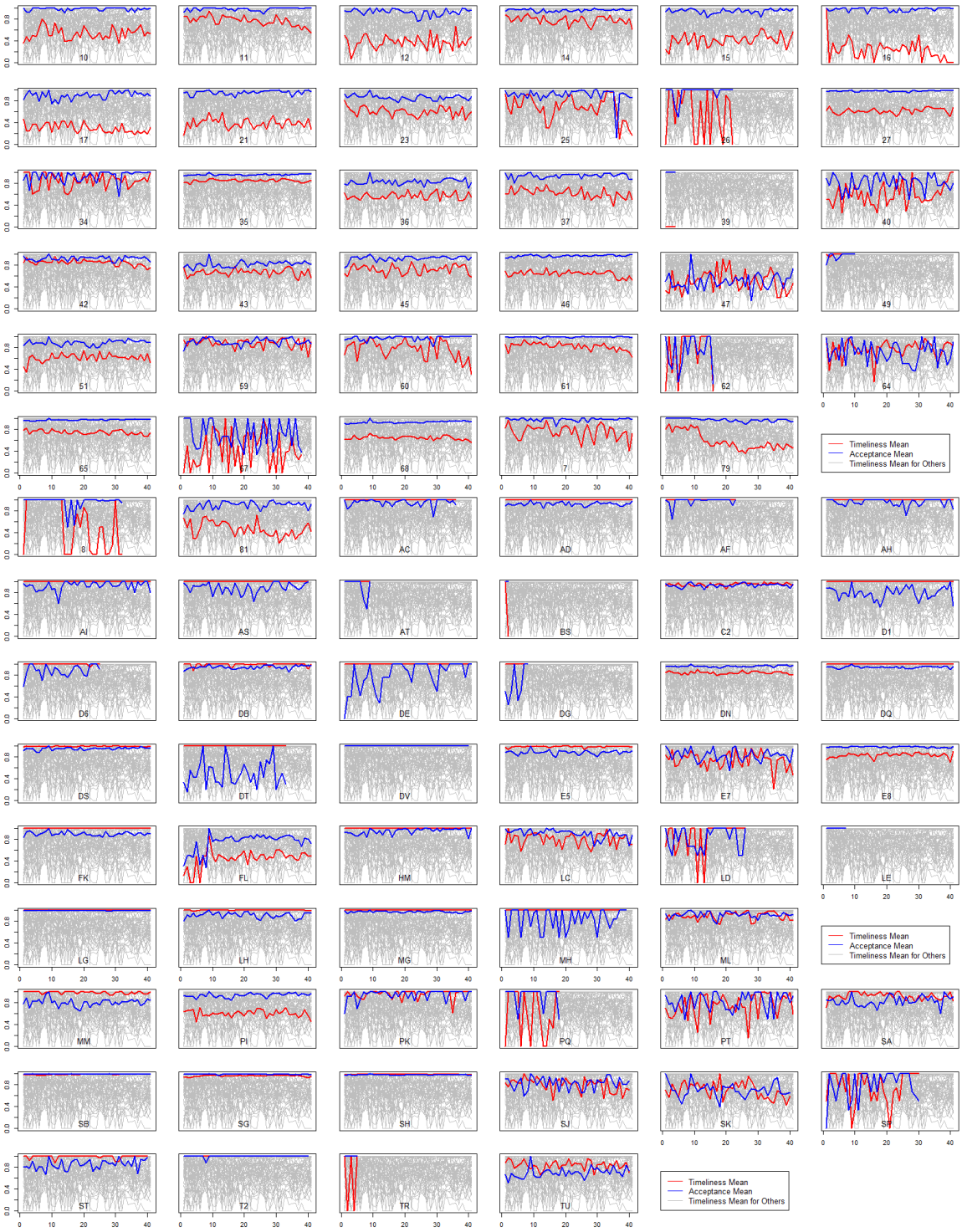
PATUXENT RIVER
PEARL HARBOR
PENSACOLA
POINT LOMA
PORT HUENEME
Portsmouth
ROTA
SAN ANTONIO
SAN DIEGO
SASEBO
SIGONELLA
WASHINGTON, D.C.
WHIDBEY ISLAND
YOKOSUKA
Total on-board
SS
Military on-board
Military SS
GS on-board
GS SS
Contractor on-board
Contractor SS
Total On-Board for Others

APPENDIX C. MEAN FID PERFORMANCE OVER TIME



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APPENDIX D. PSD AND CSD UNIT MEAN TIMELINESS OVER TIME MODEL

```
Model:
Timeliness_Mean ~ RHS.4(x4) + RHS.4(x6) + I(year.mo %in% (8:10)) +
    PSD * year.mo
                      Df Sum of Sq    RSS     AIC F value    Pr(>F)
<none>                             1.9530 -4778.9
RHS.4(x4)              1  0.004043 1.9570 -4779.2  1.4967 0.2215729
RHS.4(x6)              1  0.009594 1.9626 -4776.9  3.5516 0.0598875 .
I(year.mo %in% (8:10))  1  0.081240 2.0342 -4747.4 30.0754 5.748e-08
PSD:year.mo            48  0.256799 2.2098 -4773.1  1.9806 0.0001335
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

                                Estimate Std. Error t-value  P-value
(Intercept)                        0.871      0.026  33.009 0.00000
RHS.4(x4)                         -0.142      0.116  -1.223 0.22157
RHS.4(x6)                         -0.209      0.111  -1.885 0.05989
I(year.mo %in% (8:10))TRUE         0.026      0.005   5.484 0.00000
PSDAFLOAT WEST                    -0.055      0.037  -1.485 0.13786
PSDATSUGI                         -0.094      0.067  -1.389 0.16521
PSDBAHRAIN                        -0.205      0.057  -3.586 0.00036
PSDBETHESDA                       -0.088      0.041  -2.125 0.03394
PSDCAMP LEJEUNE                   -0.104      0.038  -2.730 0.00648
PSDCAMP PENDLETON                 -0.110      0.038  -2.885 0.00403
PSDCHARLESTON                     -0.180      0.080  -2.243 0.02520
PSDCORPUS CHRISTI                  0.030      0.037   0.812 0.41704
PSDCSD DAHLGREN                   -0.083      0.042  -1.969 0.04928
PSDCSD MONTEREY                   -0.051      0.052  -0.966 0.33414
PSDCSD OKLAHOMA CITY              -0.087      0.043  -2.005 0.04537
PSDCSD RTC GREAT LAKES             0.033      0.054   0.601 0.54792
PSDCSD SOUDA BAY                  -0.008      0.079  -0.106 0.91540
PSDCSD VAIHINGEN                  -0.295      0.079  -3.725 0.00021
PSDEVERETT                        -0.006      0.037  -0.149 0.88140
PSDFORT MEADE                     -0.124      0.038  -3.306 0.00099
PSDGREAT LAKES                    -0.008      0.039  -0.211 0.83295
PSDGUAM                           -0.225      0.047  -4.779 0.00000
PSDGUANTANAMO BAY                 -0.048      0.079  -0.611 0.54135
PSDGULFPORT                       -0.018      0.037  -0.492 0.62322
PSDJACKSONVILLE                   -0.018      0.037  -0.476 0.63411
PSDKINGS BAY                      -0.035      0.037  -0.928 0.35371
PSDKITSAP                         -0.084      0.039  -2.180 0.02961
PSDLEMOORE                        -0.010      0.037  -0.262 0.79364
PSDLITTLE CREEK                   -0.110      0.037  -2.941 0.00338
PSDMAYPORT                        -0.021      0.037  -0.553 0.58074
PSDMEMPHIS                        -0.037      0.037  -1.003 0.31609
PSDNAPLES                         -0.178      0.044  -4.026 0.00006
PSDNEW LONDON                     -0.066      0.037  -1.757 0.07931
PSDNEWPORT                        -0.086      0.039  -2.235 0.02572
PSDNORFOLK                        -0.074      0.037  -1.998 0.04609
PSDNORTH ISLAND                   -0.121      0.037  -3.250 0.00121
PSDOCEANA                         -0.036      0.039  -0.910 0.36287
```

PSDOKINAWA	-0.209	0.065	-3.198	0.00144
PSDPATUXENT RIVER	-0.058	0.037	-1.545	0.12267
PSDPEARL HARBOR	-0.159	0.037	-4.272	0.00002
PSDPENSACOLA	-0.026	0.037	-0.688	0.49162
PSDPOINT LOMA	-0.115	0.037	-3.097	0.00203
PSDPORT HUENEME	-0.057	0.037	-1.519	0.12909
PSDPortsmouth	-0.123	0.039	-3.120	0.00188
PSDROTA	-0.124	0.064	-1.936	0.05324
PSDSAN ANTONIO	-0.140	0.039	-3.572	0.00038
PSDSAN DIEGO	-0.047	0.037	-1.262	0.20723
PSDSASEBO	-0.111	0.065	-1.709	0.08781
PSDSIGONELLA	-0.104	0.052	-2.006	0.04523
PSDWASHINGTON, D.C.	-0.126	0.037	-3.371	0.00079
PSDWHIDBEY ISLAND	0.000	0.037	0.003	0.99775
PSDYOKOSUKA	-0.066	0.050	-1.315	0.18889
year.mo	-0.005	0.003	-1.945	0.05214
PSDAFLOAT WEST:year.mo	0.006	0.004	1.774	0.07644
PSDATSUGI :year.mo	0.003	0.004	0.806	0.42026
PSDBAHRAIN:year.mo	0.007	0.004	2.056	0.04009
PSDBETHESDA:year.mo	0.003	0.004	0.712	0.47664
PSDCAMP LEJEUNE:year.mo	0.006	0.004	1.568	0.11730
PSDCAMP PENDLETON :year.mo	0.004	0.004	0.975	0.32999
PSDCHARLESTON:year.mo	0.001	0.004	0.141	0.88772
PSDCORPUS CHRISTI:year.mo	0.001	0.004	0.163	0.87036
PSDCSD DAHLGREN :year.mo	0.007	0.004	1.837	0.06669
PSDCSD MONTEREY :year.mo	0.001	0.004	0.232	0.81682
PSDCSD OKLAHOMA CITY :year.mo	0.010	0.004	2.613	0.00917
PSDCSD RTC GREAT LAKES :year.mo	0.006	0.004	1.652	0.09893
PSDCSD SOUDA BAY :year.mo	-0.004	0.004	-0.996	0.31980
PSDCSD VAIHINGEN :year.mo	0.011	0.004	2.859	0.00437
PSDEVERETT:year.mo	0.006	0.004	1.607	0.10856
PSDFORT MEADE:year.mo	0.005	0.004	1.367	0.17212
PSDGREAT LAKES:year.mo	0.003	0.004	0.887	0.37563
PSDGUAM:year.mo	0.006	0.004	1.692	0.09111
PSDGUANTANAMO BAY:year.mo	0.001	0.004	0.338	0.73572
PSDGULFPORT :year.mo	0.003	0.004	0.946	0.34470
PSDJACKSONVILLE:year.mo	0.001	0.004	0.376	0.70723
PSDKINGS BAY :year.mo	0.003	0.004	0.765	0.44449
PSDKITSAP:year.mo	0.005	0.004	1.436	0.15136
PSDLEMOORE :year.mo	0.004	0.004	1.114	0.26565
PSDLITTLE CREEK:year.mo	0.005	0.004	1.318	0.18803
PSDMAYPORT:year.mo	0.005	0.004	1.283	0.20004
PSDMEMPHIS :year.mo	0.004	0.004	1.222	0.22229
PSDNAPLES :year.mo	0.010	0.004	2.737	0.00636
PSDNEW LONDON :year.mo	0.004	0.004	1.220	0.22281
PSDNEWPORT :year.mo	0.005	0.004	1.158	0.24739
PSDNORFOLK:year.mo	0.004	0.004	1.074	0.28309
PSDNORTH ISLAND :year.mo	-0.002	0.004	-0.660	0.50936
PSDOCEANA :year.mo	0.003	0.004	0.733	0.46351
PSDOKINAWA:year.mo	0.012	0.004	3.092	0.00206
PSDPATUXENT RIVER :year.mo	0.002	0.004	0.631	0.52797
PSDPEARL HARBOR:year.mo	0.001	0.004	0.251	0.80208
PSDPENSACOLA:year.mo	0.001	0.004	0.385	0.70036
PSDPOINT LOMA:year.mo	0.003	0.004	0.907	0.36491
PSDPORT HUENEME:year.mo	-0.004	0.004	-1.128	0.25963

PSDPortsmouth :year.mo	0.011	0.004	2.583	0.00998
PSDROTA :year.mo	0.005	0.004	1.297	0.19517
PSDSAN ANTONIO:year.mo	0.007	0.004	1.909	0.05666
PSDSAN DIEGO:year.mo	-0.001	0.004	-0.236	0.81353
PSDSASEBO :year.mo	0.003	0.004	0.780	0.43564
PSDSIGONELLA :year.mo	0.004	0.004	1.029	0.30378
PSDWASHINGTON, D.C.:year.mo	0.003	0.004	0.689	0.49093
PSDWHIDBEY ISLAND:year.mo	-0.001	0.004	-0.161	0.87193
PSDYOKOSUKA :year.mo	-0.006	0.004	-1.550	0.12157

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APPENDIX E. PSD AND CSD UNIT MEAN ACCEPTANCE OVER TIME MODEL

```
Model:
Acceptance_Mean ~ LHS.4(x4) + RHS.4(x4) + RHS.4(x6) + I(year.mo %in%
    (8:10)) + PSD * year.mo
                        Df Sum of Sq     RSS     AIC F value    Pr(>F)
<none>                               0.72447 -5337.5
LHS.4(x4)                1  0.012768 0.73724 -5325.7 12.1605 0.0005191
***
RHS.4(x4)                1  0.003561 0.72803 -5335.6  3.3917 0.0659556 .
RHS.4(x6)                1  0.003870 0.72834 -5335.3  3.6862 0.0552749 .
I(year.mo %in% (8:10))   1  0.015148 0.73962 -5323.1 14.4271 0.0001585
***
PSD:year.mo             48  0.111092 0.83557 -5320.5  2.2043 1.007e-05
***
                                Estimate Std. Error t value  P-value
(Intercept)                        1.079      0.042  25.481 0.00000
LHS.4(x4)                          0.420      0.120   3.487 0.00052
RHS.4(x4)                          0.158      0.086   1.842 0.06596
RHS.4(x6)                         -0.162      0.085  -1.920 0.05527
I(year.mo %in% (8:10))TRUE         0.011      0.003   3.798 0.00016
PSDAFLOAT WEST                    -0.065      0.027  -2.440 0.01494
PSDATSUGI                         -0.083      0.049  -1.704 0.08887
PSDBAHRAIN                        -0.123      0.045  -2.745 0.00621
PSDBETHESDA                       -0.036      0.026  -1.355 0.17587
PSDCAMP LEJEUNE                    0.000      0.024   0.014 0.98845
PSDCAMP PENDLETON                  0.013      0.025   0.526 0.59872
PSDCHARLESTON                     -0.067      0.055  -1.216 0.22447
PSDCORPUS CHRISTI                 -0.007      0.025  -0.274 0.78428
PSDCSD DAHLGREN                    0.059      0.031   1.900 0.05783
PSDCSD MONTEREY                   -0.057      0.039  -1.483 0.13859
PSDCSD OKLAHOMA CITY              -0.002      0.032  -0.074 0.94114
PSDCSD RTC GREAT LAKES            -0.057      0.040  -1.411 0.15856
PSDCSD SOUDA BAY                  -0.061      0.057  -1.067 0.28649
PSDCSD VAIHINGEN                  -0.219      0.056  -3.940 0.00009
PSDEVERETT                         0.027      0.025   1.090 0.27629
PSDFORT MEADE                      0.000      0.024  -0.011 0.99107
PSDGREAT LAKES                    -0.019      0.024  -0.788 0.43108
PSDGUAM                           -0.104      0.042  -2.457 0.01426
PSDGUANTANAMO BAY                 -0.140      0.055  -2.563 0.01059
PSDGULFPORT                        0.010      0.024   0.416 0.67756
PSDJACKSONVILLE                   -0.001      0.024  -0.052 0.95878
PSDKINGS BAY                       0.061      0.025   2.452 0.01445
PSDKITSAP                          0.019      0.025   0.751 0.45297
PSDLEMOORE                         0.029      0.025   1.159 0.24687
PSDLITTLE CREEK                    0.018      0.024   0.750 0.45351
PSDMAYPORT                        -0.005      0.025  -0.204 0.83839
PSDMEMPHIS                        -0.003      0.025  -0.140 0.88857
PSDNAPLES                         -0.156      0.042  -3.705 0.00023
PSDNEW LONDON                      0.015      0.025   0.587 0.55743
PSDNEWPORT                         0.017      0.030   0.570 0.56882
PSDNORFOLK                        -0.079      0.023  -3.385 0.00075
```

PSDNORTH ISLAND	-0.095	0.026	-3.698	0.00023
PSDOCEANA	-0.077	0.025	-3.098	0.00203
PSDOKINAWA	-0.057	0.048	-1.198	0.23149
PSDPATUXENT RIVER	-0.058	0.023	-2.489	0.01304
PSDPEARL HARBOR	-0.059	0.023	-2.521	0.01193
PSDPENSACOLA	0.026	0.024	1.071	0.28444
PSDPOINT LOMA	-0.018	0.024	-0.766	0.44378
PSDPORT HUENEME	-0.057	0.023	-2.453	0.01442
PSDPortsmouth	0.000	0.026	-0.013	0.98995
PSDROTA	-0.107	0.047	-2.253	0.02458
PSDSAN ANTONIO	-0.029	0.025	-1.177	0.23977
PSDSAN DIEGO	-0.060	0.024	-2.528	0.01170
PSDSASEBO	-0.055	0.048	-1.145	0.25276
PSDSIGONELLA	-0.116	0.043	-2.680	0.00753
PSDWASHINGTON, D.C.	0.003	0.025	0.106	0.91553
PSDWHIDBEY ISLAND	0.026	0.024	1.070	0.28500
PSDYOKOSUKA	-0.092	0.043	-2.153	0.03168
year.mo	-0.001	0.002	-0.904	0.36651
PSDAFLOAT WEST:year.mo	0.001	0.002	0.392	0.69520
PSDATSUGI :year.mo	0.003	0.002	1.497	0.13482
PSDBAHRAIN:year.mo	0.001	0.002	0.505	0.61368
PSDBETHESDA:year.mo	0.003	0.002	1.439	0.15047
PSDCAMP LEJEUNE:year.mo	0.001	0.002	0.582	0.56059
PSDCAMP PENDLETON :year.mo	0.002	0.002	0.740	0.45937
PSDCHARLESTON:year.mo	0.001	0.002	0.579	0.56298
PSDCORPUS CHRISTI:year.mo	0.004	0.002	1.877	0.06095
PSDCSD DAHLGREN :year.mo	-0.008	0.004	-2.093	0.03674
PSDCSD MONTEREY :year.mo	-0.001	0.003	-0.299	0.76532
PSDCSD OKLAHOMA CITY :year.mo	0.001	0.003	0.174	0.86221
PSDCSD RTC GREAT LAKES :year.mo	0.002	0.002	0.919	0.35827
PSDCSD SOUDA BAY :year.mo	-0.002	0.003	-0.683	0.49506
PSDCSD VAIHINGEN :year.mo	0.011	0.003	3.360	0.00082
PSDEVERETT:year.mo	-0.001	0.002	-0.316	0.75236
PSDFORT MEADE:year.mo	-0.001	0.002	-0.363	0.71658
PSDGREAT LAKES:year.mo	0.003	0.002	1.510	0.13155
PSDGUAM:year.mo	0.002	0.002	0.760	0.44755
PSDGUANTANAMO BAY:year.mo	0.010	0.002	4.616	0.00000
PSDGULFPORT :year.mo	0.002	0.002	1.067	0.28625
PSDJACKSONVILLE:year.mo	0.001	0.002	0.249	0.80306
PSDKINGS BAY :year.mo	0.001	0.002	0.348	0.72810
PSDKITSAP:year.mo	0.001	0.002	0.622	0.53413
PSDLEMOORE :year.mo	0.000	0.002	0.044	0.96516
PSDLITTLE CREEK:year.mo	-0.001	0.002	-0.417	0.67670
PSDMAYPORT:year.mo	0.005	0.002	2.111	0.03509
PSDMEMPHIS :year.mo	0.004	0.002	1.587	0.11294
PSDNAPLES :year.mo	0.006	0.002	2.429	0.01540
PSDNEW LONDON :year.mo	0.002	0.002	0.728	0.46696
PSDNEWPORT :year.mo	0.002	0.004	0.582	0.56058
PSDNORFOLK:year.mo	0.002	0.002	1.035	0.30108
PSDNORTH ISLAND :year.mo	0.004	0.002	1.865	0.06254
PSDOCEANA :year.mo	0.005	0.002	2.124	0.03399
PSDOKINAWA:year.mo	0.000	0.002	-0.063	0.94955
PSDPATUXENT RIVER :year.mo	0.004	0.002	1.833	0.06728
PSDPEARL HARBOR:year.mo	-0.002	0.003	-0.720	0.47185
PSDPENSACOLA:year.mo	0.001	0.002	0.605	0.54521

PSDPOINT LOMA:year.mo	0.004	0.002	1.569	0.11710
PSDPORT HUENEME:year.mo	0.005	0.002	2.339	0.01961
PSDPortsmouth :year.mo	0.002	0.003	0.604	0.54617
PSDROTA :year.mo	0.002	0.002	1.050	0.29431
PSDSAN ANTONIO:year.mo	0.001	0.002	0.538	0.59084
PSDSAN DIEGO:year.mo	0.004	0.002	1.588	0.11274
PSDSASEBO :year.mo	-0.002	0.002	-0.910	0.36300
PSDSIGONELLA :year.mo	-0.001	0.002	-0.232	0.81694
PSDWASHINGTON, D.C.:year.mo	0.000	0.002	0.040	0.96843
PSDWHIDBEY ISLAND:year.mo	0.000	0.002	-0.023	0.98157
PSDYOKOSUKA :year.mo	0.000	0.002	0.106	0.91582

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APPENDIX F. FORMAT IDENTIFIERS (FIDS)

FID (Format Identifiers) DESCRIPTIONS CURRENTLY USED BY AT PSD/CSD

ENTITLEMENTS		ALLOTMENTS		LOCATION	
7	Command Responsibility Pay	AC	Charity Allotment (CFC)	LC	Servicing ADSN
8	Nuclear Bonus	AD	Discretionary Allotment	LD	TDY ADSN
10	Demolition Duty Pay	AF	Assistance Fund Allotment	LE	Duty Country/Non-CONUS
11	Flight Deck Duty Pay	AH	Mortgage Payment Allotment	LG	CBPO/MAJCOM/PACIDN/UIC Location
12	Flying Duty Pay	AI	Commercial Insurance	LH	Financial Organization to Receive Pay
14	**Hardship Duty Pay**	AS	Individual Bank Account Savings		
15	Parachute Jump Pay	AT	Government Indebtedness	IDENTIFICATION	
16	Stress/Toxic Fuels/Pesticide Duty Pay			MG	Taxing Authority-City/State
17	Submarine Duty Pay	LEAVE		MH	Resident of Country or Non-CONUS State
21	Diving Duty Pay	BS	HFP/CZ Leave Balance	ML	Officer Confirmation of Accession
23	Hostile Fire Pay/Imminent Danger Pay			MM	Enlisted Confirmation of Accession
25	Medical/Dental/Nurse Bonuses	COLLECTIONS			
26	Registered Nurse/Dental Officer Accession Bonus	C2	Cash Collection-Member's Indebtedness	PAYMENT	
27	**Career Sea Pay**			**PI**	**Missed Meal Refund**
34	Selective Enlistment Bonus (SEB)	DEDUCTIONS		PK	Partial Payment
35	**BAQ**	D1	Thrift Savings Plan (TSP)	PQ	Payment of One-time Separation Pay
36	**BAQ Diff**	D6	ROTH TSP	PT	CMAI and/or CMA Allowances
37	**Career Sea Pay Premium**	DB	SGLI		
39	Prorated or Supplemental BAS	DE	Montgomery GI Bill	STATUS	
40	BAS	DG	Indebtedness-GPLD or Report of Survey	SA	On Station Status
42	Housing Allowance - Move-In (MIHA)	DN	Meal Collection	SB	Leave
43	**Housing Allowance - Overseas (OHA)**	DQ	Indebtedness for Pay and Allowances	**SG**	**PCS Arrival**
45	**Family Separation Housing - Overseas Housing Allowance (FSH-OHA)**	DS	Miscellaneous Indebtedness	**SH**	**PCS Departure**
46	**COLA**	DT	Indebtedness Repayment Schedule	SJ	AWOL
47	**COLA - Dual**	DV	Repay Advance Pay	**SK**	**Confinement: Civilian/Military**
49	COLA - Prorated			**SP**	**Deserter Status**
51	**CONUS COLA**	EVENTS		ST	Suspended (Dual Status)
59	Uniform & Equipment Allowance Initial	**E5**	**Final Separation**		
60	Uniform & Equipment Allowance Additional	**E7**	**Court Martial Sentence**	SERVICE DATES	
61	Clothing Allowance - Extra	**E8**	**Non-Judicial Punishment**	T2	Sea Duty Counter
62	Clothing Allowance - Special Initial			TR	Special Compensation Position
64	Clothing Allowance - Initial - Monetary	TAXES		TU	Date of Separation (DOS)
65	**FSA**	FK	State Wage and Tax Adjustment		
67	**Family Separation Housing - Basic Allowance for Housing (FSH-BAH)**	FL	CZTE Wage Exemption		
68	**Basic Allowance for Housing (BAH)**				
79	**Temporary Lodging Allowance**	HELD PAY			
81	Initial Civilian Clothing Allowance	HM	Split Pay Option		

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