

# A TRIDENT SCHOLAR PROJECT REPORT

NO. 539

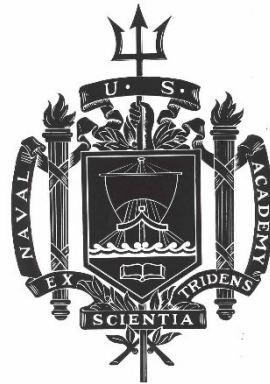
---

**Tracing Learning Through Historical Reports Using Digital Methods:  
The U.S. Navy Fleet Problems**

by

Midshipman 1/C Jen Sun, USN

---



UNITED STATES NAVAL ACADEMY  
ANNAPOLIS, MARYLAND

This document has been approved for public  
release and sale; its distribution is unlimited.

USNA-1531-2

# REPORT DOCUMENTATION PAGE

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

<b>1. REPORT DATE (DD-MM-YYYY)</b> 5-16-23		<b>2. REPORT TYPE</b>		<b>3. DATES COVERED (From - To)</b>	
<b>4. TITLE AND SUBTITLE</b> Tracing Learning Through Historical Reports Using Digital Methods: The U.S. Navy Fleet Problems				<b>5a. CONTRACT NUMBER</b>	
				<b>5b. GRANT NUMBER</b>	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b> Jen Sun				<b>5d. PROJECT NUMBER</b>	
				<b>5e. TASK NUMBER</b>	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b>				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> U.S. Naval Academy Annapolis, MD 21402				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b> Trident Scholar Report no. 539 (2023)	
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b>  This document has been approved for public release; its distribution is UNLIMITED.					
<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b> During the interwar years (1923-1940), the Navy ran a series of naval exercises that tested new technology and revised outdated doctrine in anticipation of the next large-scale conflict. Participants of the exercises recorded their lessons learned and insights gained in written documents. These documents now form the National Archives Publication M964. However, the institutional knowledge in these documents is difficult to access because there are over 34,000 records. Additionally, some knowledge, passed only from sailor to sailor, no longer exists. This project uses database design to address problems of information excess caused by the large number of documents the exercises produced. Furthermore, historical analysis bridges the gaps resulting from information loss. Finally, combining these approaches offers a new way to make historical documents more retrievable and valuable for the modern user.					
<b>15. SUBJECT TERMS</b> Navy Fleet Problems, Institutional learning, Database design, Historical analysis					
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>  27	<b>19a. NAME OF RESPONSIBLE PERSON</b>
<b>a. REPORT</b>	<b>b. ABSTRACT</b>	<b>c. THIS PAGE</b>			<b>19b. TELEPHONE NUMBER (include area code)</b>

U.S.N.A. --- Trident Scholar project report; no. 539 (2023)

**TRACING LEARNING THROUGH HISTORICAL REPORTS USING DIGITAL  
METHODS: THE U.S. NAVY FLEET PROBLEMS**

by

Midshipman 1/C Jen Sun, USN  
United States Naval Academy  
Annapolis, Maryland

---

Certification of Adviser(s) Approval

Professor Marcus O. Jones  
History Department

---

Associate Professor Brice M. Nguelifack  
Mathematics Department

---

Acceptance for the Trident Scholar Committee

Professor Maria J. Schroeder  
Associate Director of Midshipman Research

---

USNA-1531-2

## Abstract

The study of history preserves the lessons of the past for the benefit of the present. Times of conflict often force organizations like the Navy to learn these lessons, but usually at the cost of human life. However, from 1923 to 1940, the Navy ran a series of exercises, collectively called the Navy Fleet Problems, that provided opportunities to test new technology, revise outdated doctrine, prepare for future conflict, and advance a common understanding of naval operations. The fact that the Navy learned lessons in areas such as carrier aviation and submarine tactics with little danger to ships, resources, or personnel made the exercises noteworthy. The Fleet Problems represented a unique period when Admirals, those at the highest level of naval command, critiqued their commanders in an open forum to improve the fleet. Likewise, the commanders, motivated by the same reasons, also felt free to point out institutional deficiencies. The forum also provided junior officers the opportunity to present their lessons to all the officers in attendance. These forums produced the after-action reports on which this project focuses.

This project brought together concepts in database design, statistics, and historical research. Consequently, research and technology have become increasingly inextricable for modern history students. Whereas previous writers on the Fleet Problems scrolled through microfilms, current researchers can use the digitized versions of the reports that the National Archives published available online. Thus, digital means largely mitigate the problems of finding, accessing, and retrieving sources. This project deliberately designed a database informed by historical analysis to explore how participants reported their lessons learned across time, ships, and exercises. By paying attention to digital methods of making historical sources that store the learning of past generations more accessible, historians can better answer questions of institutional knowledge, naval doctrine, and the utility of fleet exercises.

Keywords: Navy Fleet Problems, institutional learning, database design, historical analysis

## Table of Contents

Abstract.....	1
Acknowledgments.....	3
Introduction.....	4
Naval Exercises and Institutional Learning.....	5
Database Characteristics.....	9
Methodology.....	13
Findings.....	14
Historiography and Discussion.....	19
Works Cited.....	25

**Acknowledgments**

*Thank you to my Trident advisors Dr. Marcus Jones and Dr. Brice Nguelifack without whom this project would not exist.*

## Introduction

How many pictures are in your camera roll? Hundreds? Thousands? I bought my phone in 2019, finally upgrading from a 64-gigabyte memory to a 256-gigabyte one. After eagerly transferring the old photos to the new phone, I set a goal of filling up this new storage. Previously, each camera click meant deleting another picture to make room. I no longer had that problem. My camera roll now contains 7,260 pictures. Two hundred eighty-eight of those are videos. There are 343 selfies, 822 live photos, and 606 screenshots. The other 5,201 must be some memory or another I thought important enough to capture. However, when a friend asked me to find our photos from a conference we attended in 2020, I could not find them even after what seemed like endless scrolling.

I kept a diary as a child too. It was bright green. In it, I wrote rubbish: a child's meandering and senseless sentences. Regardless of its literary value, it revealed what a younger version of myself thought was important. I recently found this diary. Flipping through it, I found an entry about how tedious it was to practice piano. The prompt for these thoughts was an article about a girl around my age who performed at Carnegie Hall for the first time. Her advice for other children wanting to improve their piano skills was simple: go practice. I ripped her page from its magazine home and ignominiously stashed it in the diary's sheets. Then, I scribbled my tirade against practicing puffed up with adolescent righteousness. Almost twelve years later, those thoughts seem silly to me. I tried to find the article that prompted this rant. However, the page had disappeared.

These two trite examples represent scenarios of information excess and information loss. When the camera roll contains too many photos, relevant photos become harder to find. There is too much information. I also value some photos more than others. However, I never used those values to create a method for organizing the photos. Neglecting the assignment of value also renders it nearly impossible to use photos for a specific purpose. The photos exist solely as a mix of digital data. It is incredibly time-consuming to evaluate each image for its usefulness when there are thousands of them. In contrast, information loss occurs when users lose information that boosts their understanding of the situation. While the value of the diary entry is clear in explaining my view on practice, I lost the original photo that prompted my childhood annoyance at practicing. Although I understand the context, a future reader may not. This is fine for my diary; I never intended for others to read it anyways. However, the omission of crucial information can skew the interpretation of documents for unaware readers.

These anecdotes reveal a far more insidious problem when applied to documents that affect people's lives. For the military, these documents can include service records, medical records, ship logs, and communication reports. For example, a veteran seeking to prove his disability occurred in the line of duty must produce the corresponding documents to receive any compensation from the government. In 2023, servicemembers will likely retain electronic copies of their important documents. However, those documents for a World War I veteran might exist solely in microfilm—a roll of tiny photographs that must be read using a special magnification machine. It may take a significant amount of time to locate the correct records. A servicemember's records may have already been lost for even older periods.

The problem expands even further when talking about matters related to the institution's foundations, such as its knowledge or its values. Information excess prevents the institution from finding documents of importance efficiently from collections of stored records. Information loss blocks the institution from achieving certainty in its understanding of past events. Experts in a variety of fields tackle the problem of the immensity of data. Institutions generally, the military, and the Navy specifically all dedicate brainpower to make the collected information useful. This project sought to explore these issues as well.

This project took an interdisciplinary approach to address the problems of information excess and information loss specifically for the historical documents relating to the U.S. Navy Fleet Problems (1923-1940). To find relevant documents more efficiently, a database was designed. Metadata—information about the documents—such as date, author, location, and title, were manually inputted into the database. Inputting this information allows the documents to be analyzed as a group rather than individually. This leads to new ways to present and summarize the data. Overall, this project found that a well-designed database facilitates historical research by evaluating primary sources in new ways.

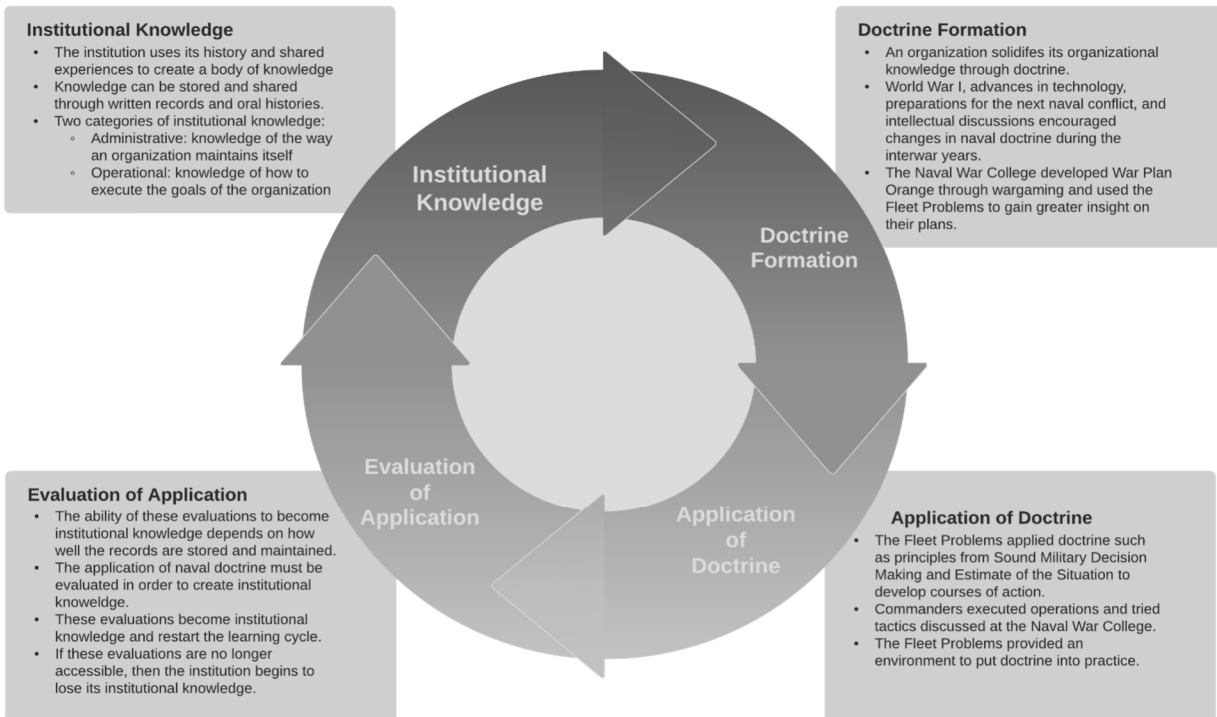
### **Naval Exercises and Institutional Learning**

From 1923 to 1940, the United States conducted 22 naval exercises collectively called the Fleet Problems. During these years, the Caribbean Sea and the Pacific Ocean were proving grounds for the cornerstones of Naval strategy in World War II, such as carrier aviation, refueling at sea, and submarine warfare. In most exercises, a BLUE force representing the United States Fleet faced off against an enemy BLACK force representing the Japanese. What made these exercises unique were the dynamic interactions between the two sides. Commanders decided how to advance their strategies and reacted to the movements of their adversaries. As a result, the Fleet Problems successfully progressed naval doctrine. Moreover, the lessons from the interwar years informed the decisions of admirals in World War II who benefited from these exercises.

Naval exercises train sailors for war. The Fleet Problems of the interwar years successfully imparted lessons on World War II's future admirals. These records included insightful critiques, communications, records of operations, and operation orders. In addition, officers gathered together after each Fleet Problem to share their lessons learned and honestly evaluate their own and others' performance. National Archives Microfilm Publication M964, Records Relating to United States Navy Fleet Problems I to XXII store the records from this exceptional period of growth. The digitization of these records presents a unique opportunity to analyze the reports in a new way. Examining the over 30,000 records would typically be an extremely tedious task. However, the evidence of institutional learning within these documents is a worthwhile prize.

Naval exercises were not the sole reason the Navy learned new lessons. The Navy engaged in other activities that facilitated institutional learning. I defined institutional learning in this project as the formation and application of institutional knowledge to form a shared understanding between multiple individuals in an institution. Additionally, I defined institutional knowledge as information an institution finds relevant to its operations. Although the definitions

are broad, they fulfill their purpose for this study. Figure 1 shows the cycle of institutional learning during the interwar years.



*Figure 1. Development of institutional knowledge as it applies to the Navy Fleet Problems*

The top right corner of Figure 1 describes the effect of the Naval War College (NWC) on doctrine formation during the interwar years. Briefly, NWC served as the intellectual center to teach and debate the subjects senior officers need to know. Those topics naturally included problem-solving and decision-making during war. The NWC ran 318 war games during the interwar years from 1919 to 1941.<sup>1</sup> War games allowed officers to practice strategy and tactics in a game-like format that modeled realistic wartime conditions. Doctrine, such as how to write an estimate of the situation, formed at the Naval War College. Although war games also provided the Navy a chance to apply the new doctrine, the Fleet Problems allowed officers to implement the doctrine. After each exercise, officers evaluated their own and each other's performances during the exercise. The officers then recorded their best practices for further analysis at the NWC or in places like the Office of the Chief of Naval Operations (OPNAV). The lessons learned would eventually be codified as new naval doctrine. This process happened cyclically over the interwar years. The following year's Fleet Problem would continue exploring questions from earlier Fleet Problems. In this way, the Navy created its institutional knowledge through interwar period naval exercises.

<sup>1</sup> *Interwar Wargaming at the Naval War College* by Pete Pellegrino, 2021.

<https://www.youtube.com/watch?v=PzwDWX8oQn8>. The information was found at approximately 43:35 of the video.

Learning is intrinsically tied to the purpose of a naval exercise. Initially, the records relating to the Navy Fleet Problems were selected because the entire collection was available online.<sup>2</sup> However, to capitalize on the potential usefulness of the historical records of the Fleet Problems, it seemed natural to design a database that makes evidence of learning more retrievable.

## Historical Context

This section provides a brief overview of the Fleet Problem documents and the state of the Navy during the interwar years. The terms “record” and “document” are used interchangeably.

### *Fleet Organization*

On December 8, 1922, the Navy consolidated its operating forces into the United States Fleet under General Order No. 94. The Commander in Chief of the U.S. Fleet (CINCUS) held direct command of the Battle Fleet in the Pacific and the Scouting Fleet in the Atlantic. The Pacific Submarine Divisions and the Fleet Base Force also reported to the CINCUS. The Chief of Naval Operations (CNO) controlled the Asiatic Fleet, the Special Service Squadron, the Control Force, and the Training Squadron. The Navy’s division of authority between the CNO and the CINCUS remained ambiguous. For the Fleet Problems, the CNO organized fleet operations, prepared plans for use in war, and directed the training of the fleet. For example, documents from Fleet Problem II revealed Admiral Eberle’s extensive involvement in planning for Fleet Problems II and IV in the fall of 1923. Despite the CNO’s responsibilities, CINCUS exercised administrative and tactical command of the U.S. Fleet. Also, in 1922, the Navy began a period of downsizing to fulfill the terms of the Washington Naval Treaty that limited the fleet sizes of its signatories. The treaty encouraged the Navy to be thoughtful and purposeful in the ships it built.

### *Trends of the Interwar Years*

Writing on the interwar years shows a Navy that focused on developing carrier aviation, exploring potential uses for submarines, improving the efficiency of maneuvers, and revising its doctrine. The priorities of a wartime fleet and a peacetime fleet changed. The Navy focused on raising the quality of its officers and sailors—a luxury it did not have during World War I.

The interwar years, and especially the Fleet Problems, also represented a period of open discussion about naval issues. For example, in the morning of the critique of Fleet Problem V, the Chief of Staff of the U.S. Fleet made clear his desire for “absolute frankness of speech.” Furthermore, he reassured the Flag Officers in attendance that “criticisms on the problem as laid down by the Commander in Chief” would not “arouse antagonism” when expressed during the open forum.<sup>3</sup> This invitation for frankness was clear from the start and was also extended to junior officers. Lieutenant E. Sparrow, Commanding Officer, USS O-2, candidly admitted that a continuous watch could not be stood due to having only one radio operator.<sup>4</sup> In contrast,

---

<sup>2</sup> Confirmed by Nathaniel Patch, Archivist at the National Archives at College Park, MD in email correspondence on January 26, 2023.

<sup>3</sup> Fleet Problem V, Roll 4, 220, W.C. Cole. This citation uses the database to determine the page number of the record. The citation uses the format: Fleet Problem #, Roll #, Microfilm page number, author.

<sup>4</sup> Fleet Problem I, Roll 1, 98, E. Sparrow.

Lieutenant I. Parker, Commanding Officer, USS O-3, reported “easily and speedily coded and decoded” messages onboard his submarine.<sup>5</sup> The variety of reports affords the reader additional confidence that what was written truly represented the lessons learned within them.

### *Composition of Sources*

In 1975, the General Services Administration of the National Archives and Records Service compiled sources from five series to form Publication M964, Records Relating to United States Navy Fleet Problems I to XXII. This project considered Fleet Problems I, II, III, V, and VI. Most of the records for these problems came from the following file designations of the Secret and Confidential Correspondence of the Office of the Secretary of the Navy, 1916-1926: 198-35:2 (Problem I), 162-78:4/1 (Problems II-IV), 198-35:35 (Problem V), and 162-78:13 (Problem VI).<sup>6</sup> Additional documentation came from the Confidential Reports of the Division of Fleet Training, Office of the Chief of Naval Operations, 1917-41.

Each series of documents related to a Fleet Problem usually contained the following: final reports; correspondence; statement of the problem, estimates of the situation, plans, orders, instructions; narratives of events; umpire reports; and documentation created at the post-problem critiques.<sup>7</sup> Timothy K. Nenner arranged for microfilming in 1975 and warned that the document collection was incomplete. Only 16 of 22 final reports of the Fleet Problems have been located, and several records are unreadable.<sup>8</sup> Although so many documents are in the collection, information loss can still pose a problem. Despite this, Publication M964 still provides comprehensive coverage of learning during the Fleet Problems.

### *Fleet Problems Analyzed*

The database includes documents from Fleet Problems I, II, III, V, and VI. I deliberately omitted Fleet Problem IV to use it to validate the database design. The five Fleet Problems are similar in terms of geographic location and purpose.

- *Fleet Problem I*  
Fleet Problem I took place in February of 1923. It involved 165 ships and nearly 40,000 men.<sup>9</sup> The problem explored the possibilities of a Japanese attack on the Panama Canal.
- *Fleet Problem II and Fleet Problem III*  
Fleet Problem II (January 2-15, 1924) was the movement of the Battle Fleet from the West Coast to Panama which simulated the initial phase of an advance across the Pacific from Hawaii. Fleet Problem III (January 4-18, 1924) was conducted in conjunction with Grand Joint Exercise No. 2, a movement of the Scouting Fleet from the East Coast to Panama and the seizure of an “advanced base.”<sup>10</sup>

---

<sup>5</sup> Fleet Problem I, Roll 1, 98, I. Parker.

<sup>6</sup> Timothy Nenner, “Introduction to Records Relating to United States Navy Fleet Problems I to XXII, 1975-1975” (National Archives Microfilm Publications, 1975), <https://catalog.archives.gov/id/177110626?objectPage=3>.

<sup>7</sup> Nenner, “Introduction to Records,” 5.

<sup>8</sup> Nenner, “Introduction to Records,” 3.

<sup>9</sup> Albert Nofi, *To Train the Fleet for War: The U.S. Navy Fleet Problems, 1923-1940* (Newport, RI: Naval War College Press, 2010), 51.

<sup>10</sup> Nofi, “To Train the Fleet,” 59.

- *Fleet Problem V*  
Fleet Problem V (February 23-March 12, 1925) occurred in the Pacific Ocean near Guadalupe Island. BLACK (Japan) launched a surprise offensive against BLUE using advanced bases. BLUE (United States) defended its position until reinforcements from the Atlantic could transit the Panama Canal and provide support.<sup>11</sup>
- *Fleet Problem VI*  
Fleet Problem VI (February 11-13, 1926) took place off the west coast of Central America. The shortest of all 21 problems, it was a tactical exercise on attacking and defending slow convoys, refueling at sea, scouting and evasion, and opposing entry into a friendly port.<sup>12</sup>

## Database Characteristics

The full database and detailed descriptions can be viewed online at <https://coda.io/@jen-sun/fleet-problems-database>.

Coda was originally a tool for product teams to share documents and track essential processes.<sup>13</sup> It is an extremely customizable method of displaying a database's information. It uses formulas to link data and make calculations, but it cannot be considered a programming language.<sup>14</sup> I repurposed it to create and present the database in an engaging and accessible way. The database can easily be used without an understanding of traditional database programs such as MySQL or Python. The database is also contained online, making it available to anyone with an internet connection.

### *Database Structure*

There are 567 documents in the database. Information about these documents is inputted in fifteen columns. Nine of those columns store metadata about the document that came directly from each primary source. The other six contain information determined after evaluating the documents. The primary identifier of the database is formed from the Fleet Problem, Roll Number, Microfilm Page Number, and the first two and last two letters of the document title. For a document from Fleet Problem I, on microfilm roll number 1, starting on page 127 (Microfilm Page Number), and the title "Campaign Order No. 1-23 and accompanying Letter of Instruction," the primary identifier is 01-01-127-caon. This creates a unique identifier for each of the documents. The following table contains the displayed columns on the final database. The columns with asterisks indicate that the column is filled for every document.

---

<sup>11</sup> Nofi, "To Train the Fleet," 73.

<sup>12</sup> Fleet Problem VI, Roll 7, 28-35, S.S. Robison.

<sup>13</sup> An explanation of the functionality Coda offers are available at the following webpage. However, that functionality is not particularly important to understanding this database selection process.  
<https://coda.io/blog/product-teams/3-reasons-product-teams-run-on-coda>

<sup>14</sup> The majority of the formulas included in the database simply connect the tables together. The formulas are not discussed in the paper but are available for review. Some of the formulas are explained on the database website. To access the formulas in their entirety, a copy of the website must be created. The general formula list is available on Coda's website via <https://coda.io/formulas>

### Columns from Primary Sources

- Fleet Problem\*
- Roll Number\*
- Microfilm Page Number\*
- End Page Location\*
- Title/Subject\*
- From (Author)
- To (Intended recipient)
- Location
- Date

### Columns from Historical Analysis

- Author Rank
- Author's billet/command
- Document Type\*
- Type (evaluative or descriptive)\*
- Number of pages in each document\*
- Warfare Area\*

*Table 1. Columns from the final database*

#### *Selected Column Descriptions*

- Type: documents were tagged as either descriptive or evaluative to determine whether the document contained learning
  - Descriptive documents contained reports of operations or unbiased observations that do not express the author's opinions
  - Evaluative documents expressed a preference for one method or state of being over another.
- Document Type: the shared format of communicating naval information
  - The three document types with the most associated records are remarks, war diaries, and estimates of the situation
  - A document may have multiple document types, but the majority only have one.
  - The Navy provided a standard template for some document types, such as operation orders and records of moves. Other document types, such as planning documents or remarks, were tentatively categorized. The categories were refined as more records were included in the database.
- Warfare Area: the main subjects of interest discussed within the reports
  - The three warfare areas with the greatest number of associated records are command, destroyer operations, and ship movement.
  - A document may contain multiple warfare areas.
  - The topics of the secondary sources informed the creation of warfare areas.

Figure 2 shows the relationships between the most relevant columns. The relationship cardinality is denoted using standardized symbology shown in Figure 3. Cardinality determines the number of times each entity in a table can connect with another entity. For example, each document only has one author, but an author can write multiple documents. Between author and document, there is a one-to-many relationship.

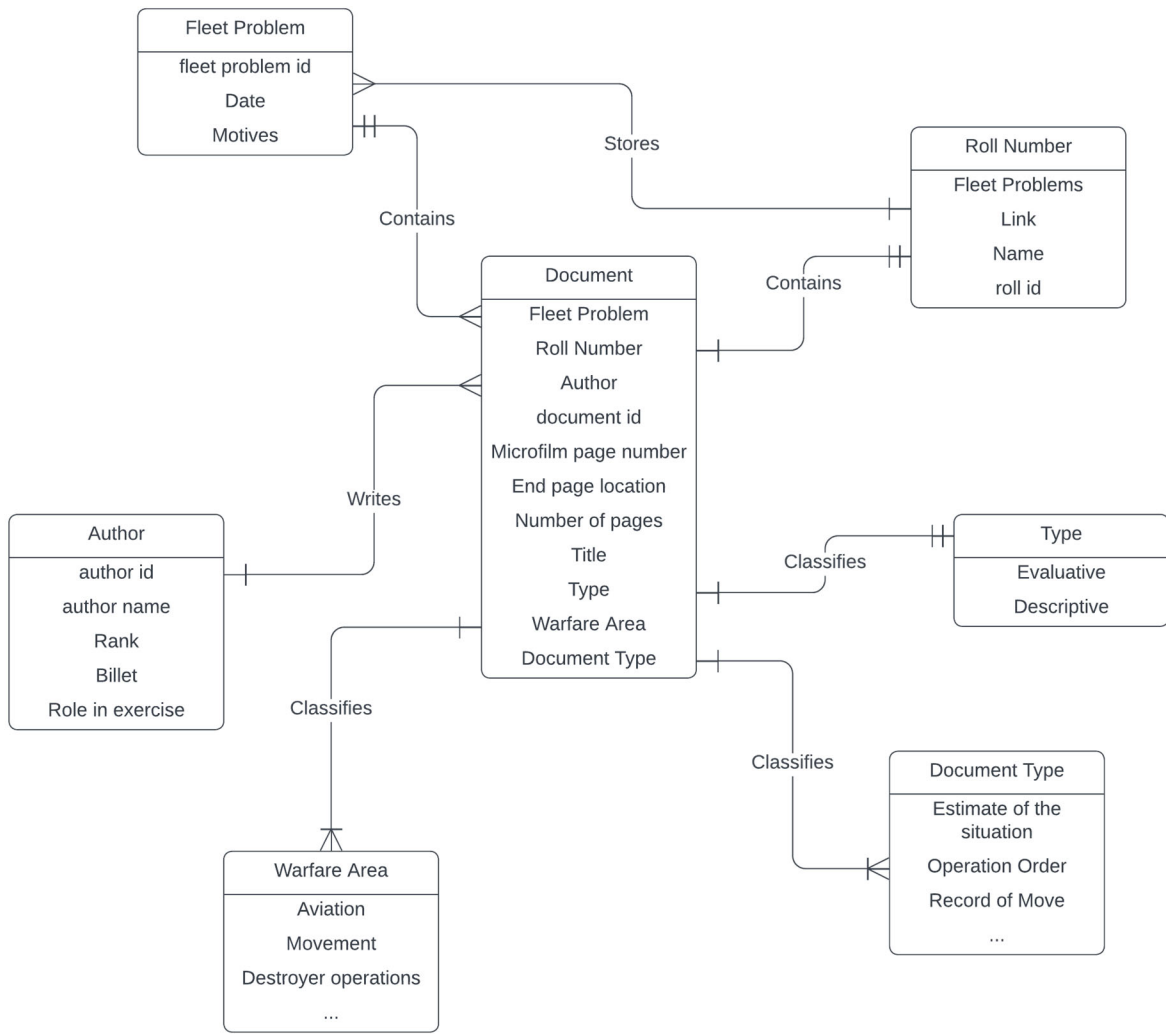


Figure 2. Simplified entity relationship diagram for the database

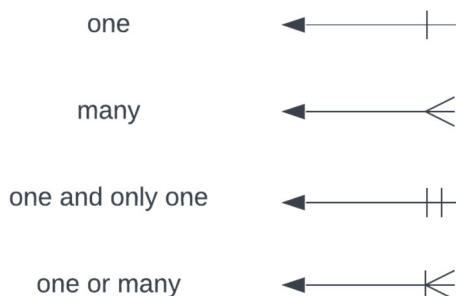


Figure 3. Cardinality relationship symbols for entity relationship diagram

### Capabilities

Figure 4 is a screenshot of one record in the database titled “Diary, notes, comments and etc. on Panama Problem.” Rather than appear as a traditional row with columns, Coda allows the information to be displayed in a more readable way. Related information is grouped, and columns are clearly labeled. This presentation makes it easier for users to view the information from one specific document. The complete database in table format can be viewed on the website.<sup>15</sup>

TITLE/SUBJECT

## Diary, notes, comments and etc. on Panama Problem

DOCUMENT ID	FLEET PROBLEMS	ROLL NUMBER
01-01-270-diem	01	01
MICROFILM PAGE NUMBER	END PAGE LOCATION	NUMBER OF PAGES
270	271	2
TYPE		
Evaluative		
FROM (CLEAN NAME)	TO	
O.P. Jackson	Commander in Chief, Battle Fleet	
LOCATION	DATE	
Balboa, Canal Zone	2/28/1923	
DOCUMENT TYPE	WARFARE AREA	
War Diary	Battleship Operations	
CONDITIONS/CONTEXT		
T		

Figure 4. Detail view of “Diary, notes, comments and etc. on Panama Problem”

<sup>15</sup> For the readability of this report, the full database is not provided as it does not add any new information. The entire database can be viewed using the link. <https://coda.io/@jen-sun/fleet-problems-database/full-database-15>

A user can find sources using a search bar and other filters. The information stored in the columns from primary sources can all be used to help find a specific source. Once the relevant source is found, the database provides the roll number and the page number. The user can then find the original document with this information through the National Archives website.<sup>16</sup> These functions are built into Coda and do not require additional code. The following sections will discuss how I created the database, the historical analysis made possible by the database, the database's applications to the problems of information excess and information loss, and the database's relationship with learning.

## Methodology

Information excess and information loss present issues that require solutions from multiple disciplines. Creating a usable database implies that information excess in historical research can be successfully mitigated using a digital method. Computers excel at managing and presenting large quantities of data. However, a strictly digital approach fails to address the problems caused by information loss. For example, imputation is a process in which a program assigns a value to an entity when the value is unavailable based on the dataset's characteristics. However, for historical research that often deals with specific instances in time, the accuracy of a date is crucial to forming a convincing conclusion. The assumed date cannot simply be statistically derived based on the dates surrounding the document. For instance, an archivist who intended to file documents chronologically may have mistakenly placed a document out of order. Thus, historical analysis is still required to verify the information. As such, this project needed a methodology that could accommodate different disciplinary approaches.

### *Grounded Theory*

Glaser and Strauss first developed grounded theory after doubting the ethicality of using the scientific method to examine the experience of terminally ill patients.<sup>17</sup> Rather than assume that some true experience of patients existed, Glaser and Strauss used a constant comparative method to organize data on how patients and healthcare staff confronted the knowledge of death. Their work offered a methodology to test theory from data inductively.<sup>18</sup> Grounded theory has been used in nursing,<sup>19</sup> international business theory,<sup>20</sup> and software engineering research.<sup>21</sup> The benefits of grounded theory are numerous. Researchers develop theories based on the data rather than directly collecting data to test a hypothesis. The iterative process of data collection, concept formation, categorization of the concepts, and identification of relationships within the categories

<sup>16</sup> General Services Administration. "Records Relating to United States Navy Fleet Problems I to XXII, 1975–1975." National Archives Catalog, 1975. <https://catalog.archives.gov/id/176561618>.

<sup>17</sup> Ylona Chun Tie, Melanie Birks, and Karen Francis, "Grounded Theory Research: A Design Framework for Novice Researchers," *SAGE Open Medicine* 7 (January 2, 2019): 2050312118822927, <https://doi.org/10.1177/2050312118822927>.

<sup>18</sup> Chun Tie, et al., "Grounded Theory Research," 4.

<sup>19</sup> Rita Sara Schreiber Dns and Dns Phyllis Noerager Stern Faan, Nap, *Using Grounded Theory In Nursing* (New York: Springer Publishing Company, 2001).

<sup>20</sup> David M Gligor, Carol L Esmark, and Ismail Gölgeci, "Building International Business Theory: A Grounded Theory Approach," *Journal of International Business Studies* 47, no. 1 (2016): 93–111.

<sup>21</sup> Klaas-Jan Stol, Paul Ralph, and Brian Fitzgerald, "Grounded Theory in Software Engineering Research: A Critical Review and Guidelines," in *2016 IEEE/ACM 38th International Conference on Software Engineering (ICSE)*, 2016, 120–31, <https://doi.org/10.1145/2884781.2884833>.

helps synthesize numerous specific instances into generalizations. The iterative process concludes upon reaching theoretical saturation—the point at which adding new data does not affect the theory. Figure 5 shows the iterative grounded theory process.

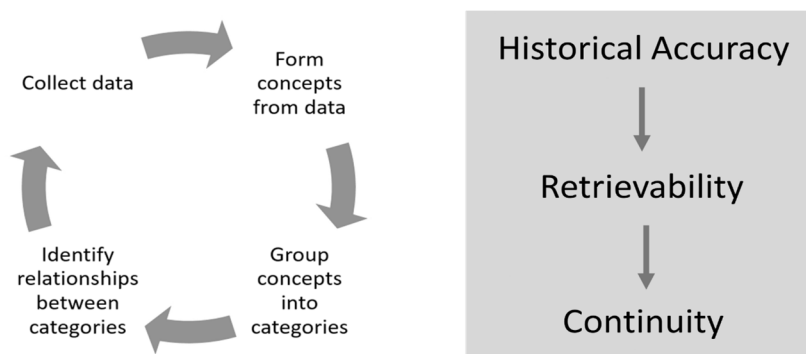


Figure 5. Grounded theory and database design principles<sup>22</sup>

The primary purpose of this database is to find a way to extract insight from large numbers of historical documents. To do this, the database must first allow a user to find a desired document. I can find certain photos using metadata such as the location where the photo was taken, the time it was taken, and even whether I used the front or back camera. I can “like” images to partition them from the rest of the unsorted body. Second, the database must be able to assign value to documents based on their ability to record the learning of participants. Graduating from the Naval Academy will be a precious moment for me, and I plan to take many photos. Placing those photos in an album—separating them from the larger mass—indicates that I value being able to view them. Printing and putting the photos in a scrapbook further indicates their higher value. Similarly, the Rotunda for the Charters of Freedom in Washington, D.C. houses the Constitution, the Declaration of Independence, and the Bill of Rights. These three documents form the foundation of the United States. They are sealed inside “the most scientifically advanced housing that preservation technology can provide.”<sup>23</sup> The Rotunda remains cool and dark all year round to prolong the life of the documents. Even without knowing the contents of the documents stored within the Rotunda, one could infer from their careful preservation and dignified storage that the stewards of these documents valued them greatly. It took multiple attempts to impart these characteristics onto the database.

## Findings

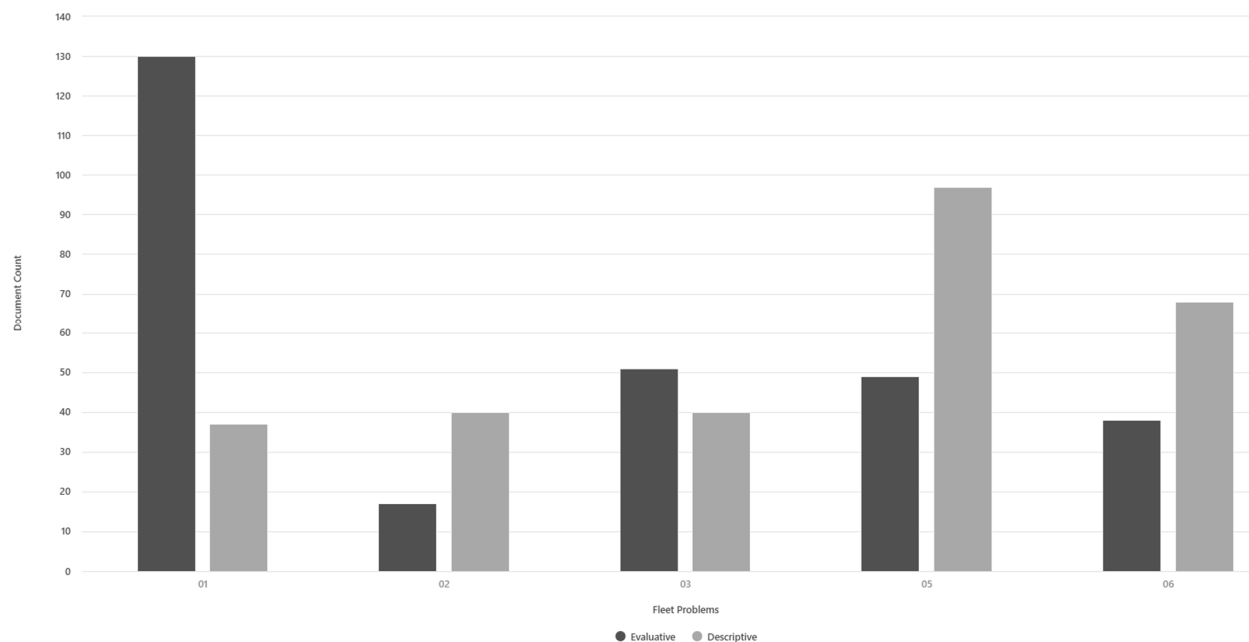
Graphs help users evaluate the extent to which the database fulfills its second charge: the appraisal of a document’s value in preserving a participant’s learning or insight gained from a Fleet Problem. The database used various columns to generate the following graphs. The graphs offer new ways to consider the documents of the Fleet Problems. Additionally, the selected graphs relate to learning in some way. Along with each graph is a brief explanation of the data

<sup>22</sup> “Grounded Theory - Qualitative Study Design - LibGuides at Deakin University.” Accessed April 10, 2023. <https://deakin.libguides.com/qualitative-study-designs/grounded-theory>.

<sup>23</sup> National Archives Museum. “Founding Documents in the Rotunda for the Charters of Freedom.” National Archives Museum. Accessed March 11, 2023. <https://museum.archives.gov/founding-documents>.

used to create it. An interactive version of these graphs can be accessed through the database website.

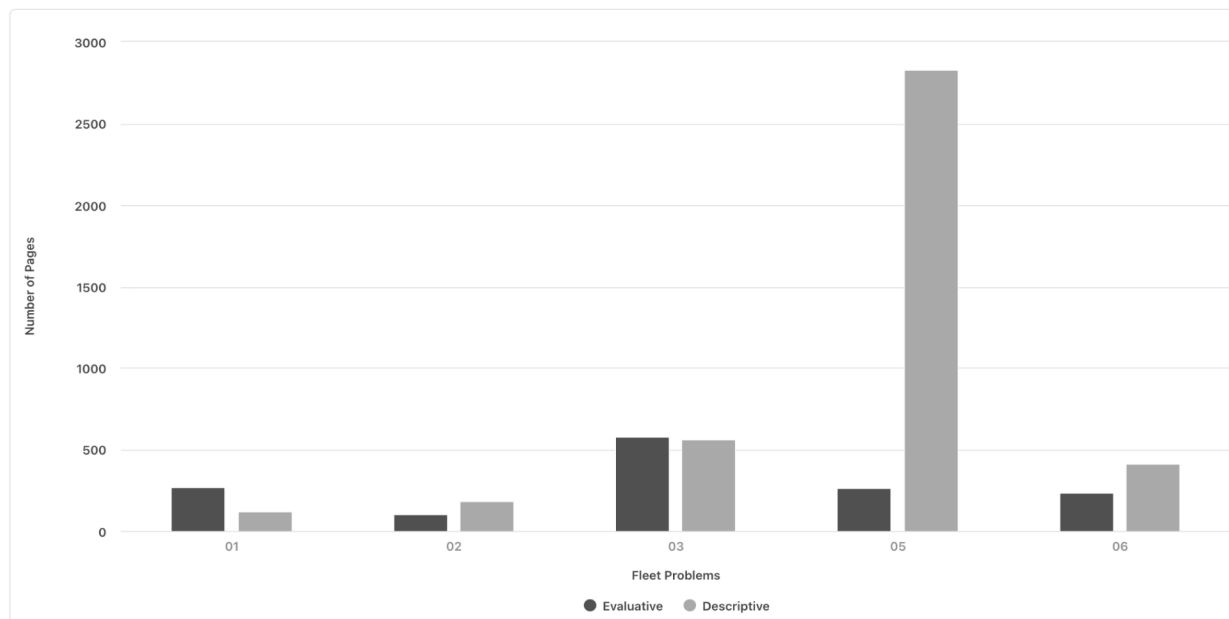
Evaluative documents reveal an individual’s preference for one state of being, method of operation, or condition. Evaluative documents help solidify institutional knowledge as well as preserve it for posterity. Across all five Fleet Problems, 49.91% of the documents included some analysis from the author. However, Figure 6 shows that the total number of evaluative and descriptive documents is not evenly split for each Fleet Problem.



*Figure 6. Count of evaluative and descriptive documents across Fleet Problems as a bar graph*

Figure 6 shows the number of documents tagged as descriptive or evaluative within the “type” column for each Fleet Problem. To find the number of evaluative documents in Fleet Problem I, the database counted the number of times the “evaluative” tag appeared for documents included in Fleet Problem I. Since every document was assigned a “type” tag, the number of descriptive documents is the total number of documents in a Fleet Problem subtracted by the number of evaluative documents. The “type” tag was manually assigned. The other bars of the graph are calculated in the same way.

The figure reveals the change across Fleet Problems in the number of evaluative and descriptive documents. Fleet Problem I contains the most evaluative documents (131). Fleet Problem II contains the fewest evaluative documents (16). Fleet Problem V contains the most descriptive documents (97), and Fleet Problem I contains the fewest descriptive documents (37). The exact document count numbers are not pictured on the graph but are available on the database website.



*Figure 7. Total number of pages of evaluative and descriptive documents across Fleet Problems as a bar graph*

Figure 7 shows the total number of pages tagged as descriptive or evaluative. Each document has a “Number of Pages” column that is automatically calculated as the sum of one and the difference between the start and end microfilm page numbers. A document’s number of pages is not manually input into the database. To find the number of evaluative pages for Fleet Problem I, the database summed the number of pages of each document tagged as “evaluative.” This means that every page in the document was considered “evaluative,” regardless of if an evaluative statement appeared on each page.

Fleet Problem III contains the highest number of evaluative pages (578). Fleet Problem II contains the lowest number of evaluative pages (109). Fleet Problem V contains the highest number of descriptive pages (2829), and Fleet Problem I contains the least (118). Fleet Problem III contains an almost even number of evaluative (578) and descriptive (558) pages.

When considered together with Figure 6, the graphs reveal that the number of evaluative documents does not correspond to a higher number of evaluative pages. For example, the graphs suggest that Fleet Problem I contained many short, evaluative reports based on its high evaluative document count and low total number of evaluative pages. In contrast, Fleet Problem V contained many pages of many descriptive reports.

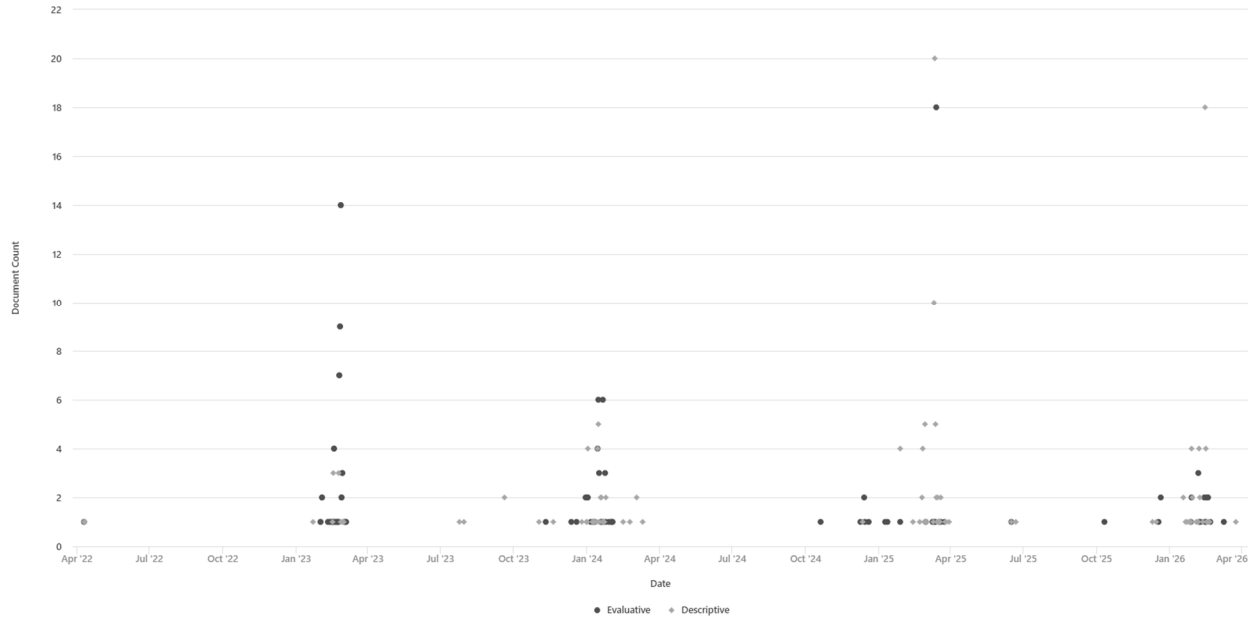


Figure 8. Count of evaluative and descriptive reports by date of the report as a scatterplot

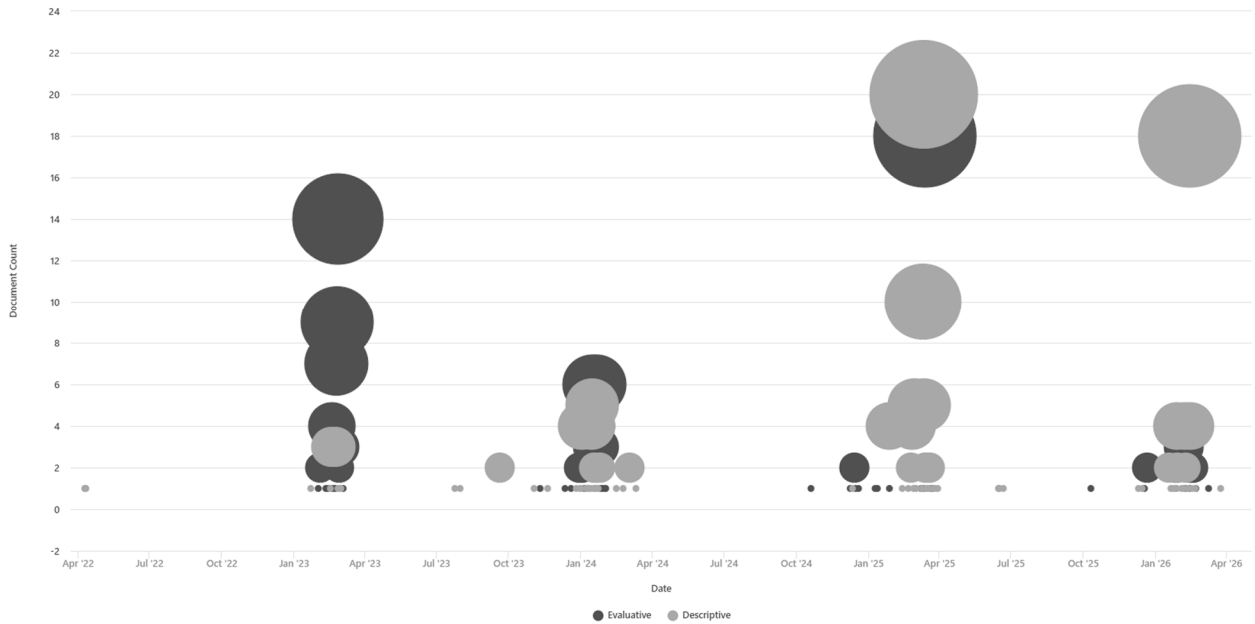


Figure 9. Count of evaluative and descriptive reports by date of the report as a bubble chart

Figures 8 and 9 contain the same data but are visualized differently. The y-axis for both figures is the number of documents. The x-axis is the date on the document. The documents are segmented into evaluative and descriptive types. Figure 8 is a scatterplot of document count as a function of date. In Figure 9, the size of the dot corresponds to the value of the document count. Higher document counts are represented as larger dots in Figure 9. Although the graphs display



## Historiography and Discussion

This section reviews patterns of the records of the Fleet Problems that are made possible by using digital methods. The discussion and historiography sections are combined because new presentations of primary sources provide new perspectives on previous analyses. Historiography involves the study of historical writing and the methods historians use to construct historical narratives. This section also includes commentary on the effects of information excess and information loss on these historical narratives.

Secondary sources on the Fleet Problems wrote extensively on the interwar year trends. This is no surprise since the Fleet Problems enabled the Navy to develop itself. For instance, Craig Felker argued that the Fleet Problems allowed the Navy to explore different tactics rather than stubbornly adhere to battleship-centric approaches.<sup>24</sup> Interwar year trends included major revisions of naval doctrine. Trent Hone detailed the creation of publications such as *Formations and Maneuvers of the Battle Line* (1922)<sup>25</sup> and *War Instructions* (1923)<sup>26</sup> that promoted standardized coordinated movements and coordinated indoctrination of sailors, respectively.<sup>27</sup> In 1938, the Naval War College published *Sound Military Decision Including the Estimate of the Situation and Formulation of Directions*.<sup>28</sup> The book offered a standardized way for an officer to frame how he communicated his plans to others. In the Fleet Problem critiques, the commanders always began with an “estimate of the situation,” stating the scenarios their fleets faced. These manuals created a common framework for officers to discuss naval issues.

The most comprehensive discussion of the Fleet Problems occurs in Albert Nofi’s book *To Train the Fleet for War: The U.S. Navy Fleet Problems, 1923-1940*, already cited extensively in this paper. The book provided excellent background and analysis of all the Fleet Problems. In fact, during database creation, information from Nofi’s book helped fill in various details that the records themselves did not include. Additionally, Nofi cited extensively from the primary source material and included additional context. For example, in Fleet Problem VI, Nofi registered his surprise that “none of the documents examined commented on McKean’s decision to remain with the flagship, particularly since it was by no means clear that her overhaul would be completed in time for her to take part in the problem.”<sup>29</sup> Nofi used the primary source to inform his analysis. However, it is still possible that other documents from the Fleet Problems did comment on McKean’s decision. Perhaps the Admiral’s critics simply had better sense than to record their admonishments of their boss. In this case, the problem of information loss prevents current historians from knowing fully the thoughts of those officers.

Nofi’s book set the foundation for more contemporary writings on the Fleet Problems. Kostecka argued that Fleet Problem IX is still “instruction for naval strategists, tacticians, and

---

<sup>24</sup> Felker, “Simulation and Sea Power.”

<sup>25</sup> W.L. 4, *Formations and Maneuvers of the Battle Line*, United States Navy, 1922 (Box 4, Strategic Plans Division Records, RG38, NA), 4.

<sup>26</sup> W.L 7, *War Instructions*, United States Navy, 1923 (Box 5, Strategic Plans Division Records, RG38, NA), 90.

<sup>27</sup> Trent Hone, “Building a Doctrine: U. S. Naval Tactics and Battle Plans in the Interwar Period,” *International Journal of Naval History* 1, no. 2 (February 2, 2012): 2-8.

<sup>28</sup> Naval War College, *Sound Military Decision Including the Estimate of the Situation and Formulation of Directives* (Newport, RI: Naval War College Press, 1938).

<sup>29</sup> Nofi, “To Train the Fleet,” 88.

planners today” concerning multi-layered anti-access and area denial (A2/AD) systems.<sup>30</sup> CAPT Rielage advocated for the recreation of approaches that included “[accepting] implications of events” and “[demanding] immediate and honest critiques.”<sup>31</sup> Mills compared the current Navy’s efforts to “reimagine itself and operationalize new technology and new concepts” to the efforts of the interwar year Navy.<sup>32</sup> Although all three articles are well-researched and persuasive, they lack support from primary sources.

The decision to omit primary sources can happen for a variety of reasons. The Fleet Problem records were only recently digitized. Researchers physically went to a library or archives to access the microfilms. Even after accessing the microfilms, finding relevant documents within the roll presented a burdensome task. Mills wrote: “Some of the early lessons were the inability of legacy submarines to keep up with the battle line – leading to the development of faster and larger ‘fleet’ submarines.”<sup>33</sup> A properly coded database allows a researcher to quickly find sources related to submarine operations, such as the remarks from Commander, Control Force on January 21, 1924. He wrote: “No submarines have been authorized since 1916-17 and the present boats are the result of such authorization. But little advance has been made over previous boats and information later available was not fully utilized in the completion of boats under construction. They are years behind in design.”<sup>34</sup> Accessing relevant primary sources presents an opportunity for a more comprehensive historical analysis. Ultimately, the database improves a user’s ability to retrieve those relevant sources.

It also convincingly enhances claims that the Fleet Problems influenced the development of doctrine. For example, authors such as Mark Campbell, Ryan Wadle, and James Grimes examined the impacts of Fleet Problems on aviation development.<sup>35</sup> Figure 11 reveals that 36 documents directly related to discussions on aviation. Additional documents related to screening (5 occurrences), scouting (6 occurrences), coastal bombardment (7 occurrences), and command (140 occurrences) might contain insightful reports about lessons learned related to aviation development.

## Limitations and Future Study

Unfortunately, the database is not perfect. Retrieval based on certain criteria may not be possible due to missing information or improperly tagged documents. Value—a subjective evaluation by whoever entered the information—can also vary depending on the database designer. For example, I used a very generous definition of evaluative documents. The document

<sup>30</sup> Daniel Kostecka, “Fleet Problem IX and Enduring Lessons for the Anti-Access Dilemma,” *Center for International Maritime Security*, August 5, 2021, <https://cimsec.org/fleet-problem-ix-and-enduring-lessons-for-the-anti-access-dilemma/>.

<sup>31</sup> Dale Rielage, “Bring Back Fleet Battle Problems,” *U.S. Naval Institute* 143, no. 6 (June 2017), <https://www.usni.org/magazines/proceedings/2017/june/bring-back-fleet-battle-problems>.

<sup>32</sup> Walker Mills, “The Fleet Problem Exercises: An Investment in the Future,” *Center for International Maritime Security* (blog), September 4, 2019, <https://cimsec.org/the-fleet-problem-exercises-an-investment-in-the-future/>.

<sup>33</sup> Mills, “The Fleet Problem Exercises.”

<sup>34</sup> Fleet Problem III, Roll 2, 696, “Remarks-Commander, Control Force-At Conference 21 Jan.1924.”

<sup>35</sup> See Campbell, Mark Allen, “The Influence of Air Power Upon the Evolution of Battle Doctrine in the U.S. Navy, 1922-1941,” (Master’s thesis, University of Massachusetts at Boston, 1922). See Wadle, Ryan David, “United States Fleet Problems and the Development of Carrier Aviation, 1929-1933,” (Master’s thesis, Texas A&M University, 2005). See Grimes, James M., *Aviation in the Fleet Exercises, 1911-1939*, U.S. Naval Administrative Histories of World War II, Vol. 16 (Washington: United States Navy, n.d.).

simply had to indicate a preference for a method of operation, and I tagged the entire document as evaluative.

### *Validating the database*

Originally, Fleet Problem IV was supposed to be used to confirm that the database had reached a point of theoretical saturation. If the database no longer needed to change to accommodate additional data, then the database design achieved its goals. For randomly selected Fleet Problems, the database design did not change. New documents could be integrated smoothly into the existing database. This represented that the database could handle documents from before and after Fleet Problem VI without losing functionality. However, this is not a comprehensive determination of the utility of the database as a tool to retrieve documents and assign them value for their ability to store learning.

Other methods of database validation include allowing users to input their queries and provide feedback on whether or not they found the desired source. Other historians can evaluate the accuracy of my “document type” classifications. Other users can also classify documents as evaluative or descriptive, and the classifications can be aggregated and compared. As long as the rationale for making a classification decision is documented, the variation between the results of the coding can be evaluated as well. Then, the most useful coding scheme can be determined through statistical analysis. Finally, the database must be finished to achieve its purpose. Information from seventeen Fleet Problems is lost when attempting to access records using solely the database. In its current form, the database exacerbates problems related to information loss.

### *Problems with Prediction Using Statistical Analysis*

The storage of data affects the statistical analysis. I used R and RStudio to evaluate the predictive capability of certain columns to answer questions related to learning. I wanted to know whether flag officers wrote more or fewer pages than non-flag officers. The number of pages informs historians about what perspectives are stored in the records relating to the Fleet Problems.

To explore this question, I imported the following dataset into RStudio. I categorized each rank as a flag rank ( $isFlag=1$ ) or a non-flag rank ( $isFlag=0$ ). A flag officer is an officer of rank O-7 or higher. Flag officers make decisions that affect multiple types of units. They oversee entire operations and task military assets with accomplishing goals. This table also contains information from Marine Corps and Army officers.

Rank	Document.Count	Pages.Written	isFlag
Admiral	32	201	1
Vice Admiral	12	33	1
Rear Admiral	29	177	1
Captain	40	149	0
Commander	26	591	0
Lieutenant Commander	45	207	0
Lieutenant	37	551	0
Lieutenant Junior Grade	4	222	0
Ensign	1	2	0
Major General	1	7	1
Brigadier General	7	93	1
Major	2	69	0
Lieutenant Colonel	1	2	0

*Table 2. Number of documents and number of pages attributed to authors of different rank*

The following comparative boxplot shows the difference in the distribution of pages written based on whether the author is or is not a flag officer. The boxplot confirms the summary statistics. Non-flag officers have a higher average number of pages written than flag officers. There may be various reasons for this.

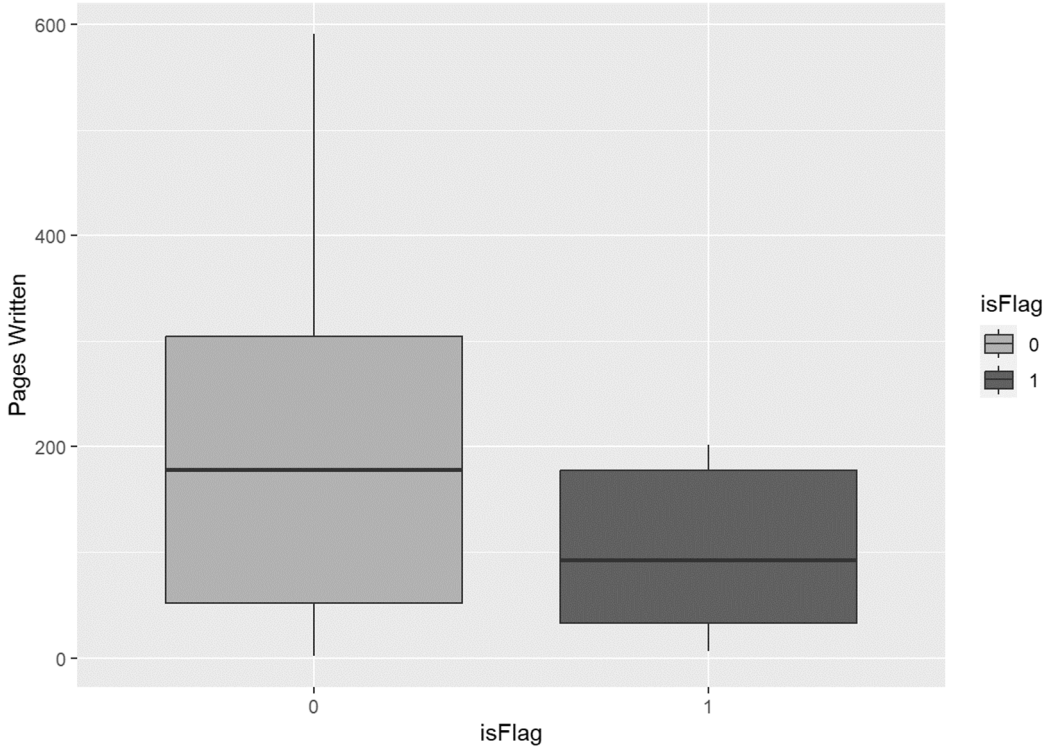


Figure 12. Comparative boxplot of the number of pages written based on whether or not the author is a flag officer

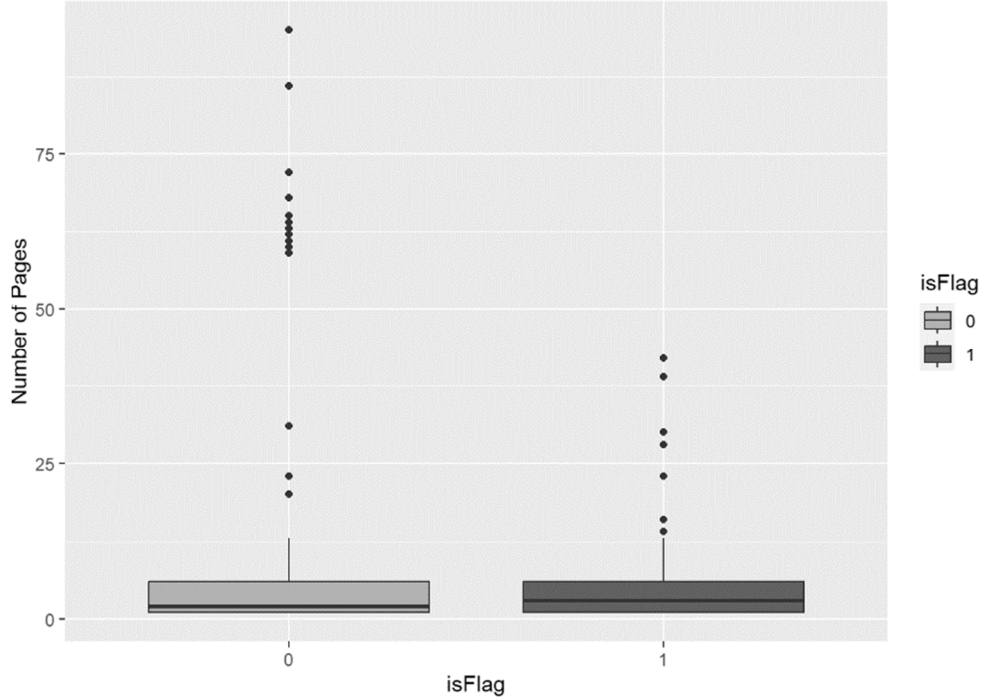


Figure 13. Another comparative boxplot of the number of pages written based on whether or not the author is a flag officer

Figure 13 is another comparative boxplot of the number of pages written by flag and non-flag officers. However, Figure 13 came from a table containing every document and its flag or non-flag tag rather than an aggregated summary of the officer ranks. The existence of outliers (points way outside of the boxplot) in Figure 13 shows that many officers wrote pages significantly longer than the average. There were more outliers for non-flag officers. However, the average number of pages written for a flag officer in Figure 13 is actually higher than the average number of pages written for a non-flag officer.

I also conducted an ANOVA test to determine whether the average number of documents written by flag officers is the same as the average number of documents written by non-flag officers. I ran the test twice using both datasets. In both cases, the models were trash. None of the assumptions to run the ANOVA test were met by the linear regression model that was created using R. I will not comment on the results since they are insignificant, but this shows that running statistical analysis on the database is possible and has the potential to be meaningful.

## Conclusions

Although this project warrants future study, digital methods presented a new way to view historical documents that were impossible with undigitized sources. This project presented a database prototype designed specifically to extract learning from naval documents. At the same time, the database offers researchers on the Fleet Problems a tool to quickly retrieve useful sources.

While the Fleet Problems contributed to victory at sea in World War II, the lessons contained within them seem far away from the contemporary Navy. Current naval exercises such as Rim of the Pacific (RIMPAC), conducted every two years, and Large Scale Exercise (LSE), conducted every three years, are greater in magnitude but have arguably contributed less to the development of naval doctrine. LSE 2021, for example, included about 25,000 personnel split between the Navy and the Marine Corps. The participants tested concepts such as “distributed operations; expeditionary advanced-base operations; littoral operations in a contested environment; and command and control in a contested environment.”<sup>36</sup> However, LSE 2021 acted more like a live-fire exercise in which there was “one scenario for everybody... simulated differently.”<sup>37</sup> Logistically, two free-thinking adversaries would have been difficult to track and manage. A scenario-driven exercise, which RIMPAC has been for the last twenty years, removes the need for umpires to adjudicate participant decisions. Additionally, the statistics produced by a scripted exercise, such as the number of participating personnel, number of foreign nations involved, or amounts of ordnance detonated, offered an attractive, albeit useless, measurement of the exercise’s impact on learning. However, analyzing the reports created by the exercises present a potential way to ensure the lessons learned become a useful part of the Navy’s institutional knowledge.

---

<sup>36</sup> Sam LaGrone, “Large Scale Exercise 2021 Tests How Navy, Marines Could Fight a Future Global Battle,” *USNI News* (blog), August 10, 2021, <https://news.usni.org/2021/08/09/large-scale-exercise-2021-tests-how-navy-marines-could-fight-a-future-global-battle>.

<sup>37</sup> Lagrone, “Large Scale Exercise.”

## Works Cited

- Campbell, Mark Allen, “The Influence of Air Power Upon the Evolution of Battle Doctrine in the U.S. Navy, 1922-1941,” (Master’s thesis, University of Massachusetts at Boston, 1922).
- Chun Tie, Ylona, Melanie Birks, and Karen Francis. “Grounded Theory Research: A Design Framework for Novice Researchers.” *SAGE Open Medicine* 7 (January 2, 2019): 2050312118822927. <https://doi.org/10.1177/2050312118822927>.
- Felker, Craig C. “Simulation and Sea Power : the U.S. Navy Fleet Problems, 1923-1940”. Thesis (Ph. D.)--Duke University, 2004., 2004.
- Friedman, Norman. *Winning a Future War: War Gaming and Victory in the Pacific War*. Washington, DC: Naval History and Heritage Command, Department of the Navy, 2017.
- Gligor, David M, Carol L Esmark, and Ismail Gölgeci. “Building International Business Theory: A Grounded Theory Approach.” *Journal of International Business Studies* 47, no. 1 (2016): 93–111.
- Grimes, James M., *Aviation in the Fleet Exercises, 1911-1939*, U.S. Naval Administrative Histories of World War II, Vol. 16 (Washington: United States Navy, n.d.).
- Hone, Trent. “Building a Doctrine: U. S. Naval Tactics and Battle Plans in the Interwar Period,” 2002.
- Kostecka, Daniel. “Fleet Problem IX and Enduring Lessons for the Anti-Access Dilemma.” *Center for International Maritime Security*, August 5, 2021. <https://cimsec.org/fleet-problem-ix-and-enduring-lessons-for-the-anti-access-dilemma/>.

LaGrone, Sam. "Large Scale Exercise 2021 Tests How Navy, Marines Could Fight a Future Global Battle." *USNI News* (blog), August 10, 2021.

<https://news.usni.org/2021/08/09/large-scale-exercise-2021-tests-how-navy-marines-could-fight-a-future-global-battle>.

Lehner, William D. "An Analysis of Naval Officer Accession Programs." Master's Thesis, Naval Postgraduate School, 2008. Calhoun. <https://www.thenavycwo.com/the-archives/send/6-the-archives/289-an-analysis-of-naval-officer-accession-programs>.

Mills, Walker. "The Fleet Problem Exercises: An Investment in the Future." *Center for International Maritime Security* (blog), September 4, 2019. <https://cimsec.org/the-fleet-problem-exercises-an-investment-in-the-future/>.

Naval War College. *Sound Military Decision Including the Estimate of the Situation and Formulation of Directives*. Newport, RI: Naval War College Press, 1938.

Nenninger, Timothy. "Introduction to Records Relating to United States Navy Fleet Problems I to XXII, 1975-1975." National Archives Microfilm Publications, 1975. <https://catalog.archives.gov/id/177110626?objectPage=3>.

Nofi, Albert. *To Train the Fleet for War: The U.S. Navy Fleet Problems, 1923-1940*. Newport, RI: Naval War College Press, 2010.

Rielage, Dale. "Bring Back Fleet Battle Problems." *U.S. Naval Institute* 143, no. 6 (June 2017). <https://www.usni.org/magazines/proceedings/2017/june/bring-back-fleet-battle-problems>.

Rita Sara Schreiber, Rn, Dns, and Dns Phyllis Noerager Stern Faan, Nap. *Using Grounded Theory In Nursing*. New York: Springer Publishing Company, 2001.

<https://search.ebscohost.com/login.aspx?direct=true&db=e000xna&AN=246152&site=ehost-live>.

Stol, Klaas-Jan, Paul Ralph, and Brian Fitzgerald. "Grounded Theory in Software Engineering Research: A Critical Review and Guidelines." In *2016 IEEE/ACM 38th International Conference on Software Engineering (ICSE)*, 120–31, 2016.

<https://doi.org/10.1145/2884781.2884833>.

Wadle, Ryan David, "United States Fleet Problems and the Development of Carrier Aviation, 1929-1933," (Master's thesis, Texas A&M University, 2005).