NPS-AM-24-187

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The Bonhomme Richard Amphibious Assault Ship Fire: An Internal Control Analysis

June 2024

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Prepared for the Naval Postgraduate School, Monterey, CA 93943.

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The research presented in this report was supported by the Acquisition Research Program of the Department of Defense Management at the Naval Postgraduate School.

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ABSTRACT

The fire aboard the USS Bonhomme Richard (LHD 6), a catastrophic incident that occurred on July 12, 2020, has raised critical questions about the effectiveness of internal controls within naval operations. This capstone research study explores the events leading up to the fire, analyzing the various internal control factors that contributed to its escalation. This study primarily reviews the formal command investigation as well as the Major Fires Review associated with the investigation into the mishap. This research also incorporates information from the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Internal Control-Integrated Framework and the Government Accountability Office Green Book to identify actionable deficiencies. Five research questions regarding internal control factors that led to significant deficiencies and negative patterns in naval operations are addressed. An internal control analysis underscores the significance of robust internal controls in preventing and mitigating the impact of such disasters. This study enhances the Navy's understanding of internal controls within naval operations and provides operative observations for policy and training augmentation. By examining the USS Bonhomme Richard incident through the lens of internal controls, this study aims to guide future policies and practices to prevent similar disasters and enhance overall operational resilience.

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ABOUT THE AUTHOR

ENS Eric Poffenberger enlisted in the Navy in January 2016 and became a Navy Diver shortly after that. I did two deployments out of Hawaii and then worked at the Naval Academy before getting selected for the Seaman-to-Admiral-21 (STA-21) commissioning program in 2021. I received my undergraduate degree at Arizona State University in psychology, and I was commissioned in May 2023 as a Student Naval Aviator. Before commissioning, I was selected for the Early Ensign Education program, and after I was commissioned, the Navy sent me to Naval Postgraduate School for a master's degree en route to flight school. I will be attending flight school in Pensacola, FL upon graduation.

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ACKNOWLEDGMENTS

I would like to express my deepest gratitude to my advisors, Professor Juanita M. Rendon and Professor Rene G. Rendon, for their dedicated support, invaluable guidance, and insightful feedback throughout the entire process of researching and writing this thesis. Their expertise and commitment to serving me and helping me to succeed have been instrumental in shaping this work.

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LIST OF ACRONYMS AND ABBREVIATIONS

1MC	1 Main Circuit
AT	Auditability Theory
AU	Assessable Unit
BRFE	Bonhomme Richard Fire Event
CAP	Corrective Action Plan
CIC	Combat Information Center
CNO	Chief of Naval Operations
COSO	Committee of Sponsoring Organizations of the Treadway Commission
DC	Damage Control
DFAS	Defense Finance Accounting Service
DOD	Department of Defense
DOJ	Department of Justice
DON	Department of the Navy
DSRA	Dry-docking Selected Restricted Availability
EEBD	Emergency Escape Breathing Device
ERP	Enterprise Resource Planning
ERM	Enterprise Risk Management
FEDFIRE	Federal Fire Department
FMFIA	Federal Managers Financial Integrity Act of 1982
FOIA	Freedom of Information Act
FSO	Fire Safety Officer
FY	Fiscal Year
GAO	Government Accountability Office
GDMA	Glenn Defense Marine Asia
HYDRA	Hierarchical Yet Dynamically Reprogrammable Architecture
ICOR	Internal Controls Over Reporting

IEM	Inactive Equipment Maintenance
IET	In-Port Emergency Team
IRB	Institutional Review Board
IRM	Integrated Risk Management
LCPO	Lead Chief Petty Officer
LHD	Landing Helicopter Deck
MAA	Mutual Aid Agreement
MFR	Major Fires Review
MICP	Managers' Internal Control Program
NASA	National Aeronautic Space Administration
NAVSEA	Naval Sea Systems Command
NBSD	Naval Base San Diego
NPS	Naval Postgraduate School
OMB	Office of Management and Budget
OOD	Officer of the Deck
OPNAV	Office of the Chief of Naval Operations
PII	Personally Identifiable Information
SDFD	San Diego Fire Department
SEC	Securities and Exchange Commission
SOX	Sarbanes-Oxley Act
SRA	Selected Restricted Availability
SRB	Solid Rocket Booster
STEM	Science, Technology, Engineering, and Mathematics
SWRMC	Southwest Regional Maintenance Center
UIR	U.S. Pacific Fleet Command Investigation Recommendation
USD(C)/CFO	Under Secretary of Defense (Comptroller)/Chief Financial Officer
USMC	U.S. Marine Corps
USPACFLT	U.S. Pacific Fleet Command
USNI	U.S. Naval Institute

V/STOL	Vertical/Short Take-off and Landing
VCNO	Vice Chief of Naval Operations

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I. INTRODUCTION

A. BACKGROUND

Before July 12, 2020, the USS Bonhomme Richard (LHD 6) was a Wasp-class amphibious assault ship commissioned on August 15, 1988. Amphibious assault ships typically serve in support of the U.S. Marine Corps (USMC) by providing Marines with a platform for transportation, deployment, and sustainment on various missions. These ships are capable of carrying a combination of helicopters, MV-22 Osprey tiltrotor aircraft, and AV-8B Harrier II vertical/short takeoff and landing (V/STOL) aircraft. The large deck of these ships allows for the launch and recovery of various aircraft, facilitating air support for amphibious operations. Additionally, they can serve as a command-and-control center for amphibious task forces (U.S. Navy, 2021).

About 18 months before the event that would inevitably alter the course of the USS Bonhomme Richard forever, the ship was moored at Pier 2 on Naval Base San Diego for a drydocking selected restricted availability (DSRA), a contract worth $250 million (U.S. Carriers, 2021). Selected restricted availabilities (SRAs) are regular maintenance periods scheduled to accomplish both maintenance for the longevity of the ship and selected modernization. DSRAs are similar to SRAs except that the maintenance or modernization requires dry-docking (OPNAV, 2022, p. 10). Unfortunately, on July 12, 2020, everything changed when a fire ignited onboard the Bonhomme Richard and continued to torch the moored ship for more than 4 days, leaving the ship unrecoverable.

In November 2020, several months after the fire, then–Chief of Naval Operations (CNO) Mike Gilday decided to scrap the irreparable ship and harvest it for parts (Eckstein, 2020). However, before this decision was made and even after it took place, the Navy was directed by a convening order on August 4, 2020, to begin an investigation into what led to the fire onboard the USS Bonhomme Richard and how the fire destroyed the naval vessel. On April 5, 2021, the vice chief of naval operations (VCNO, 2021) released the final report on the fire that summarized the investigation's findings.

The exhaustive report details at length what went right and what went wrong before, during, and after the fire. Within all of these data collections lies a profitable lesson to be learned: a lesson on internal controls. Internal controls encompass the policies, procedures, and processes put in place to protect assets, ensure regulation compliance, and mitigate risks. Research that helps identify internal control successes and failures within Navy mishaps can inform Navy leadership and management personnel on preventive measures and measures that can be applied to alleviate or stop mishaps altogether. Applying the Committee of Sponsoring Organizations of the Treadway Commission (COSO) *Internal Control-Integrated Framework*, hereafter referred to as the COSO Framework, to the USS Bonhomme Richard fire mishap, as well as Navy mishaps in general, can help the Navy and its leaders achieve its objectives while sustaining and improving its performance (COSO, 2013, p. 1).

The Treadway Commission was formed in 1985, and the COSO Framework was ultimately developed in 1992 as a response to the Foreign Corrupt Practices Act (FCPA) of 1977, which aimed to crack down on financial fraud and included internal control requirements. In 2013, the COSO Framework was updated to its current iteration and comprises 17 principles that represent the five internal control components: control environment, risk assessment, control activities, information and communication, and monitoring activities (COSO, 2013, pp. 6–7). Additionally, in response to a multitude of financial scandals in the 2000s, the Sarbanes-Oxley Act (SOX) was passed in 2002 to fortify auditing and financial disclosure for publicly traded companies (Cornell Law School, 2021). The SOX required publicly traded companies to utilize structured internal control procedures, and it also placed the responsibility for the bookkeeping, accuracy, and compliance of the financial reports and internal controls over financial reporting squarely on the CEO and CFO (Cornell Law School, 2021).

Meanwhile, and in a similar fashion, the Government Accountability Office (GAO), an independent governmental agency within the legislative branch, sought to enhance U.S. financial integrity. The Federal Managers Financial Integrity Act of 1982 (FMFIA) required the GAO to create internal control standards, and in 1983, the GAO released the first version of the *Standards for Internal Control in the Federal Government*,

known as the Green Book, which presented internal control standards for federal agencies for financial and program management ("COSO and the GAO Green Book," 2021) ("COSO and the GAO Green Book," 2021; GAO, 2014). The Green Book and the COSO Framework were alike in many ways from their inception, but it was not until September 2014 (two iterations of the Green Book later) that the GAO reviewed and approved the use of the 2013 COSO Framework ("COSO and the GAO Green Book," 2021). This 2014 and most recent edition of the Green Book provides federal government agencies with an internal control framework to use in day-to-day operations. Effective internal controls contribute to the overall operational capabilities and functions of an organization, and the informed foundation used to address all of the research questions is provided by these internal control theories and frameworks.

The catastrophic fire aboard the USS Bonhomme Richard revealed many internal control failures in the way the Navy operated at the time. The incident raised questions about the effectiveness of safety protocols and fire prevention measures on the ship. The fire highlighted potential shortcomings in fire detection systems, emergency response procedures, and maintenance protocols aboard the vessel. Investigative efforts following the fire likely focused on assessing the adequacy of internal controls related to fire prevention, detection, and suppression, intending to identify weaknesses and implement corrective actions to prevent similar incidents in the future. An internal control analysis of the disastrous event may give the Navy further insight into the steps and actions it could and should take to prevent a scenario like this from happening again.

B. PURPOSE OF RESEARCH

The purpose of this research is to conduct an internal control analysis of the fire aboard the Bonhomme Richard amphibious assault ship. The analysis consists of identifying the critical events that contributed to the fire aboard the ship. The critical events are then aligned with the COSO Framework to determine which internal control components, if any, were deficient and may have contributed to the fire. Internal control lessons learned are identified, and recommendations for improving the Navy's internal controls program are presented.

C. RESEARCH QUESTIONS

Specifically, this research answers the following questions:

(1) What critical events contributed to the fire aboard the USS Bonhomme Richard?

(2) How do the critical events that contributed to the fire align with the COSO Framework?

(3) How do USPACFLT's recommendations align with the COSO Framework?

(4) How well does the COSO Framework alignment of critical events compare to the COSO Framework alignment of recommendations?

(5) Based on the internal control analysis, what patterns or trends of internal control deficiencies may have contributed to the fire?

D. METHODOLOGY

This research study reviews the Bonhomme Richard fire from an internal control framework perspective. This study seeks to analyze the effectiveness of internal controls present during the event as well as those internal controls that may not have been present. In particular, the variety and frequency of each internal control deficiency are examined in this study. Each event related to the fire will be aligned to the five components of the COSO Framework. This study also seeks to compare the internal control deficiency findings with the recommendations given in the formal investigation report in an attempt to align deficiencies with corrective actions. This methodology includes developing databases that consist of publicly available documents related to the Bonhomme Richard fire. The research conducted in this study was reviewed by the Office of Research and Innovation at Naval Postgraduate School (NPS), and the Institutional Review Board (IRB) determined it was not human subject research and a full IRB protocol was not warranted or required.

E. IMPORTANCE OF RESEARCH

An analysis of internal controls within the framework of the Bonhomme Richard fire may inform Navy leadership of potential points of failure and identify places, if any, where the Navy is doing well in mitigating risks and furthering its objectives. The importance of this research is its value in benefiting future operations of the Navy and its

fleet. This research can provide critical information relevant to risk management and risk reduction.

F. LIMITATIONS OF RESEARCH

This study has some limitations. One of these limitations is that the study was unable to verify whether or not the unimplemented recommendations within the formal command investigation report at the time of its release had been implemented. Many recommendations found within the report were implemented between the fire event and the release of the report; however, several recommendations were still in the process of being implemented or had not yet been reviewed and agreed upon.

Another limitation of this study is its subjectivity in relating specific events and processes to specific internal control deficiencies. While COSO lays out the characteristics of each internal control component, ascertaining which events correspond to which component can be biased. In every case, the internal control component or components identified were the ones to which the event was most closely related.

One final limitation of this study was the nature of the primary source of data used in this research study and its redactions. The U.S. Pacific Fleet Command (USPACFLT) Investigation document had extensive redactions, and one particular redaction involving a recommendation affected the overall data collection.

G. ORGANIZATION OF REPORT

This research paper is structured as follows: Chapter I provides an introduction to this research study. Chapter II incorporates a literature review on the history and background of auditability theory, the auditability triangle and its constituent elements, and the relationship between auditability theory and effective internal controls. The COSO Framework is paramount to the analysis conducted in this research study, so the literature review incorporates the background of the COSO Framework as well as a breakdown of its components. The application of the COSO Framework within the federal government and the Department of Defense (DOD) through programs such as Integrated Risk Management (IRM) and the Managers' Internal Control Program (MICP) are also

addressed, as these programs provide information pertinent to a more comprehensive look at the events that unfolded with the USS Bonhomme Richard fire mishap. The literature review concludes with an analysis of past research on DOD internal controls, with a detailed look at some of the DOD's more notable procurement frauds, failures, and deficiencies.

Following the literature review, Chapter III provides the methodology in which this study was performed and describes the development of two databases, one of fire-related events depicting internal control deficiencies and one of formal command recommendations related to improving internal controls. Chapter IV includes the findings, analysis, and implications of this research study, as well as provides further recommendations based on the findings to strengthen internal control deficiencies. Chapter IV encompasses a research findings database and a consolidated recommendation database; both databases are related to the internal control deficiencies within the mishap. Chapter V concludes this research with a summary and conclusion of this research study and provides areas for further research.

H. SUMMARY

This chapter served as an introduction and background to the Bonhomme Richard fire, internal controls, and the COSO Framework. It outlined the rationale for examining the Bonhomme Richard fire through the lens of the COSO Framework to generate recommendations aimed at enhancing the Navy's internal controls. Additionally, this chapter delineated the research questions to be explored in this study, presented the methodology employed, and discussed both the importance and limitations of this research. Finally, this chapter outlined the structure of the report. Subsequently, the following chapter discusses a literature review encompassing a background on auditability theory and internal controls, the federal government's application of the COSO Framework, and past research on DOD internal controls.

II. LITERATURE REVIEW

A. INTRODUCTION

The purpose of this chapter is to discuss the triad of auditability theory, internal controls, and both of their applications within the federal government and the DOD. This literature review aims to provide a comprehensive exploration of these interconnected pieces, offering some insight into the theoretical foundations of auditability, the evolving landscape of internal controls, and the nuanced application of the internal control framework within the unique context of the federal government and the DOD. The literature review begins with auditability theory and its three components, personnel, processes, and internal controls. The review then moves on to an in-depth analysis of internal controls and their five components and then expounds upon how the DOD applies the COSO framework. Finally, the review incorporates an examination of past research on internal control and auditability failures within the federal government and the DOD.

B. AUDITABILITY THEORY

1. Background on Auditability Theory

In his journal article, "Making Things Auditable," Michael Power (1996) ascertains that audit and auditability are not just the end result, but rather, they are also the active process of achieving the result or "making things auditable" (p. 289). Without diminishing the importance of an audit, Power simply states that creating and building up an organization that can be scrutinized in every facet and remain credible is just as important, if not more important, than the audit itself. Moreover, decision-making within any organization demands information that is "exhaustive, consistent, reliable, and credible," and the necessity of scrutinizing an organization's records comes into play only to ascertain the accuracy and reliability of the information (Olagunju & Owolabi, 2020). The audit is simply there to ensure the effectiveness of the process.

Power (1996) asserts that the concept of "making things auditable" has two components: a satisfactory knowledge foundation and the "creation of [an] environment which [is] receptive to this knowledge base" (p. 289). Developing an organization's

foundation and managing its knowledge and information are the first key steps in achieving auditability. The next step is instructing the organization's individuals on what is expected of them and why and instilling in them an openness to a new way of operating. This concept points to the importance and relevance of internal controls in an organization's auditability. Hamed (2023) argues that the effectiveness of internal control systems and procedures not only affects the risk of the organization based on their effectiveness, but also conditions the moral environment of the organization (p. 3). To accomplish auditability, an entity must have the proper controls in place.

Rendon and Rendon (2016) state that auditability theory emphasizes the importance of creating systems and processes that facilitate effective audits rather than merely conducting audits themselves. It involves establishing a robust knowledge management system that supports the governance of organizational practices and processes. According to Rendon and Rendon (2016), in order to make things auditable, an organization must start by institutionalizing procedures and routines to reflect the organization's public face of practice. This journey towards auditability necessitates organizational transformation, including the implementation of comprehensive data collection practices and documentation systems (Rendon & Rendon, 2016). The theory further explains that the journey involves enhancing the organization's internal controls, processes, and personnel competencies to ensure that all activities are auditable and compliant with governance standards (Rendon & Rendon, 2016). By adopting this approach, organizations can better deter and detect fraud, ensuring that government and public funds are used effectively and efficiently (Rendon & Rendon, 2016). Auditability theory underscores the transition from operational process focus to management process focus, highlighting the importance of internal controls, capable processes, and competent personnel in achieving auditability and mitigating fraud risks (Rendon & Rendon, 2016).

The theory further explains that the journey involves enhancing the organization's internal controls, processes, and personnel competencies to ensure that all activities are auditable and compliant with governance standards. By adopting this approach, organizations can better deter and detect fraud, ensuring that government and public funds are used effectively and efficiently.

The three defining elements of auditability theory, which are shown in Figure 1, are competent personnel who have a succinct understanding of the knowledge base, are trained with the most relevant information, and receive effective guidance; capable processes that perform to the specificity and do so consistently; and effective internal controls that are routinely enforced and observed (Rendon & Rendon, 2021, pp. 1300–1301).

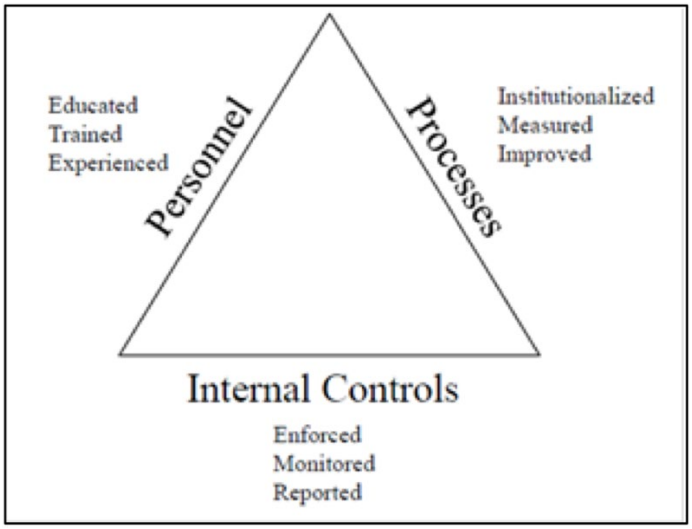

Figure 1. Auditability Triangle. Source: Rendon and Rendon (2015).

2. Auditability Theory Components

a) Competent Personnel

The first component of the Auditability Triangle is competent personnel (Rendon & Rendon, 2015). Competent personnel who are effectively trained and experienced in the organization's operations, processes, and standards are part of the first critical component of auditability. Effective internal controls do little to mitigate fraud and risk if an organization's personnel are not equipped to properly implement them (Candreva, 2006, p. 464). A proficient and qualified workforce is created by an enhanced level of commitment from senior management. The way management behaves and operates sets the standard for their personnel (Rendon & Rendon, 2015).

b) Capable Processes

The second component of the Auditability Triangle is capable processes (Rendon & Rendon, 2015). An organization's processes and procedures must involve robust mechanisms to guarantee the efficiency and effectiveness of operations. Li (2020) writes that an improvement in the efficacy of internal controls not only has a significant enhancing effect on performance but also safeguards the rights and interests of the organization's stakeholders. By implementing and maintaining capable processes, organizations can enhance accountability, safeguard assets, and mitigate risks, thereby improving overall governance and performance.

c) Effective Internal Controls

The third and final component of the Auditability Triangle is effective internal controls (Rendon & Rendon, 2015). Candreva (2006) states that "it is not enough for agencies to have internal controls over their critical process; the new standard … is to ensure that those controls are effective" (p. 463). For an organization to be properly auditable, the internal controls must be manageable and reviewable to determine their true effectiveness. It is the responsibility of the senior management of an organization to not only document but also assess internal control over reporting (Candreva, 2006, p. 463). In many instances, organizations create sound controls that, when performed effectively, align with and promote the organization's fundamental goals. However, whether or not the personnel within the organization succeed in appropriately implementing the internal controls is extremely important (Candreva, 2006, p. 465). Weak internal controls result in fraud vulnerabilities in organizations, and a succinct understanding of internal controls and how to effectively implement them is paramount to a company's success.

This section discussed the Auditability Triangle and its three components, competent personnel, capable people, and effective internal controls. It also explained why having all three components is important for the prevention of fraud. In the next section, a background of internal controls and their inception is discussed, and a detailed breakdown of all five components is provided.

C. INTERNAL CONTROLS

1. Background on COSO Framework

In 1977, Congress enacted the FCPA as a result of hundreds of U.S. corporations and businesses making numerous questionable or illegal payments to foreign entities for conducting business in their countries. In 1985, COSO was formed in response to the FCPA by five of the major accounting and auditing organizations at the time (the American Institute of Certified Public Accountants, the Institute of Internal Auditors, the Institute of Management Accountant, the Financial Executives International, and the American Accounting Association). COSO, first led by former Securities and Exchange Commission (SEC) Commissioner James C. Treadway, examined a plethora of cases involving fraud and made many recommendations to the public. These recommendations ultimately led to the 1992 issuance of the *Internal Control-Integrated Framework* report, which first defined the five components of internal controls: control environment, risk assessment, control activities, information and communication, and monitoring (Hoecker and Rymer, n.d., pp. 7–9). Since then, the internal controls framework has gained widespread traction as government organizations and civilian corporations alike try to prioritize their operational, reporting, and compliance objectives (COSO, 2013, p. 3).

2. COSO Components

a) Control Environment

The first component within the COSO Framework is the control environment, which encompasses the overall atmosphere, attitudes, and actions established by an organization's leadership and employees. COSO consistently refers to a concept labeled *tone at the top*, which simply states that senior management and leadership are the first to establish the importance of internal controls and expected standards. Senior management sets the tone for how internal controls are implemented and operated throughout the entire organization. The organization's commitment to ethical values and integrity is critical, and promoting a culture of honesty, fairness, and adherence to ethical principles is key to this commitment (COSO, 2013, p. 4). The control environment also directly influences hiring and training practices within organizations, as it shapes the atmosphere for ethical

behavior, competence, and accountability among employees, ensuring that individuals hired align with the organization's values and objectives (Knechel & Salterio, 2016).

A study by Knechel and Salterio (2016) highlights the importance of a strong control environment in mitigating fraud risks and enhancing the effectiveness of internal controls. They emphasize the role of management in fostering a culture of accountability and transparency, which is essential for promoting compliance with laws and regulations and safeguarding against fraudulent activities. By prioritizing the establishment of a robust control environment, federal agencies can lay the foundation for sound governance practices and strengthen their ability to manage risks and achieve mission success.

b) Risk Assessment

The second component within the COSO Framework is risk assessment. COSO (2013) defines risk as "the possibility that an event will occur and adversely affect the achievement of objectives" (p. 4). Risk assessment, therefore, is the process of systematically identifying and evaluating these potential risks or uncertainties. The goal of risk assessment is to be proactive, not reactive. Effective risk assessment prepares an organization for the worst and provides hope for the best. If an organization runs into a problem, proper risk assessment has already either prepared them with a course of action or has implemented the tools necessary to find a course of action.

Risk assessment plays a pivotal role in enhancing organizational resilience and adaptability in the face of uncertainty. By systematically assessing and quantifying risks, organizations can make informed decisions and implement control measures to mitigate potential threats and exploit favorable conditions (IFAC, 2012). Organizations also conduct fraud risk assessment, a critical component of an organization's overall risk management strategy. Fraud risk assessment is aimed at identifying and evaluating the risks associated with fraudulent activities that could impact the organization. This process involves analyzing the various ways fraud could occur, assessing the likelihood and potential impact of those scenarios, and implementing controls to detect, prevent, and minimize the effects of fraud. Integrating risk assessment into internal control frameworks empowers organizations to proactively address emerging risks and optimize their risk-

reward trade-offs, ultimately contributing to sustainable performance and value creation (IFAC, 2012).

c) Control Activities

The third component within the COSO Framework is control activities. After proper risk assessment, measures and directives are created by senior management to mitigate risks to organizational objectives, and these actions are referred to as control activities. Policies, procedures, and other specific actions are implemented by an organization to help ensure operations run effectively and efficiently. One of the most integral parts of control activities is the segregation of duties, a principle of internal control that involves distributing tasks and responsibilities among different individuals or departments to reduce the risk of errors, fraud, and/or inappropriate activities. The ultimate goal of an organization is to make a straight line toward its objectives, and control activities are set in place to mitigate or prevent obstacles from impeding that path (COSO, 2013, p. 4).

Control activities involve both preventative and detective controls. Preventive controls aim to prevent errors or irregularities from happening initially, whereas detective controls focus on identifying and rectifying them after they occur. Otoo et al. (2015) emphasize the importance of a balanced approach to control activities, integrating both preventive and detective controls to enhance the effectiveness of internal control systems. By implementing preventive controls such as segregation of duties, authorization procedures, and physical safeguards, organizations can proactively mitigate risks and prevent potential problems. Additionally, detective controls such as reconciliations, audits, and monitoring mechanisms serve as complementary measures to detect and address deviations from established policies and procedures. This comprehensive approach to control activities strengthens organizational resilience and fosters trust and transparency in business operations (Otoo et al., 2015).

d) Information and Communication

The fourth component within the COSO Framework is information and communication. COSO (2013) maintains that communication is a "continual, iterative

process" of not only sending out information but also receiving it (p. 5). Communication within organizations cannot be driven only in one direction; rather, it must "[flow] up, down, and across the entity" (COSO, 2013, p. 5). Information and communication specifically refer to the processes in which personnel are informed of the particular organization's control activities and responsibilities, as well as the necessity and importance of complying with these activities. COSO (2013) states that there are two types of communication: internal and external (p. 5). Internal communication is the aforementioned transmission of information flowing both upward and downward through the chain of command, and external communication works alongside internal communication by facilitating external news within the company while also relaying internal information to external groups (COSO, 2013, p. 5).

Information and communication controls play vital roles in supporting effective internal controls within organizations, facilitating the flow of relevant information, and ensuring clear communication channels. Information systems provide the data necessary for decision-making and monitoring activities, enabling management to assess risks and evaluate control effectiveness. Within the COSO Framework, information and communication are crucial components that are significantly influenced by accounting systems. Effective accounting systems ensure accurate and timely recording of financial transactions, which supports the COSO Framework's objective of reliable and transparent communication of financial information across an organization. Having too many accounting systems within an organization can lead to inconsistencies and complexities in financial data, negatively impacting the effectiveness of information and communication. Moreover, effective communication ensures that pertinent information regarding policies, procedures, and control responsibilities is disseminated throughout the organization. Lartey et al. (2022) highlight the significance of information and communication in enhancing internal control quality and reducing the likelihood of control failures. By promoting transparency and accountability, robust information and communication systems contribute to organizational resilience and facilitate compliance with regulatory requirements.

e) Monitoring Activities

The fifth and final component in the COSO Framework is the one that forms it into an effective and consistent system. Monitoring activities refer to the ongoing processes and procedures that an organization puts in place to assess the effectiveness of its internal control system. The effectiveness of an organization's internal control components is determined by two types of evaluations: ongoing and separate. Ongoing evaluations are regular and continuous assessments that provide real-time value, while separate evaluations are performed periodically and consist of a variety of measures. The findings of these evaluations and other monitoring activities are assessed and compared against established criteria and standards (COSO, 2013, p. 5).

Effective monitoring can contribute to continuous improvement by providing insights into areas where controls may be strengthened. Monitoring activities are also a critical element in ensuring the effectiveness and reliability of internal control systems. Davis et al. (2017) emphasize that effective monitoring involves continuous assessment and independent reviews to detect control deficiencies and ensure compliance with regulatory requirements. By implementing regular checks, organizations can proactively identify weaknesses and take corrective actions, thereby reducing the risk of fraud or error. The case study presented in the article demonstrates how ongoing monitoring contributes to a robust internal control environment, supporting organizational governance and risk management (Davis et al., 2017).

3. Limitations of Internal Controls

Internal controls serve as a crucial framework for safeguarding assets, ensuring compliance, and mitigating risks within organizations. However, they are not without their limitations. One significant constraint lies in the potential for human error. Despite the implementation of robust control procedures, individuals within the organization may inadvertently overlook control measures or make mistakes in their execution. As Arens et al. (2017) noted, the human element inherent in managing internal controls can introduce the risk of errors, potentially compromising their effectiveness (p. 60). This underscores

the importance of ongoing training and supervision to minimize the likelihood of human errors compromising the integrity of internal controls.

Moreover, internal controls may be susceptible to manipulation or circumvention by individuals with authority within the organization, posing a risk of management override. This means that those in positions of power could exploit their authority to bypass or alter control procedures for personal gain or to conceal fraudulent activities. Arens et al. (2017) emphasized this point, stating that "the auditor's ability to detect material misstatements arising from failure to comply with laws and regulations is impacted by…actions to conceal [noncompliance], such as…management override of controls" (p. 171). To address this limitation, organizations must implement mechanisms for oversight and accountability, such as regular independent audits and whistleblower hotlines, to detect and deter instances of management override.

In this section, the five components of internal controls were expanded upon, and their importance to organizational operations was addressed. This section also discussed the limitations of internal controls related to those who implement them and how they are implemented. The following section discusses the federal government/DOD application of the COSO Framework.

D. FEDERAL GOVERNMENT/DOD APPLICATION OF THE COSO FRAMEWORK

1. OMB Circular A-123

OMB Circular A-123 is a document that provides instruction and clarification to federal agencies for implementing internal control systems to manage risks, ensure efficient operations, and achieve compliance with laws and regulations (OMB, 2016). It outlines standards for internal control in government agencies, emphasizing the importance of effective management, risk assessment, and monitoring processes. The circular requires agencies to assess and document their internal control systems, identify areas of weakness or vulnerability, and implement corrective actions to address them (OMB, 2016). Furthermore, it mandates regular evaluations and reporting on the effectiveness of internal controls to provide accountability and transparency in government operations. OMB

Circular A-123 underscores the significance of internal controls in promoting the integrity and reliability of financial reporting and safeguarding assets within federal agencies (OMB, 2016).

2. GAO Green Book

The GAO Green Book, formally titled *Standards for Internal Control in the Federal Government*, serves as another key resource for federal agencies in establishing and maintaining effective internal control systems. It provides comprehensive guidance on the principles and standards of internal control, emphasizing their importance in achieving management objectives and ensuring accountability in government operations (GAO, 2014). Each component is further elaborated with principles and attributes to guide agencies in designing, implementing, and evaluating their internal control systems. By adhering to the principles outlined in the GAO Green Book, federal agencies can enhance their ability to manage risks, promote efficiency, and achieve their missions while complying with relevant laws and regulations.

In addition to guiding internal control principles, the GAO Green Book offers a framework for assessing the effectiveness of internal controls within federal agencies. It emphasizes the importance of ongoing monitoring and evaluation to ensure that control activities remain relevant and responsive to evolving risks and changes in the operating environment. The GAO Green Book encourages agencies to conduct periodic assessments of their internal control systems and to take corrective actions as necessary to address identified deficiencies (GAO, 2014). By promoting a culture of continuous improvement and accountability, the GAO Green Book serves as a valuable tool for federal agencies in enhancing their stewardship of public resources and in fulfilling their responsibilities to taxpayers and stakeholders.

3. DOD Managers' Internal Control Program

After Congress passed the Federal Managers Financial Integrity Act of 1982 (FMFIA), each executive agency within the government was required to establish internal accounting and administrative controls. The FMFIA further required the Office of Management and Budget (OMB), with GAO oversight, to publish standards for executive

agencies to use in creating, operating, and evaluating their internal control system. The executive agencies were also instructed to report these systems in an annual Statement of Assurance (SOA) to Congress and the president. To adhere to the FMFIA, the Under Secretary of Defense (Comptroller)/Chief Financial Officer (USD[C]/CFO) issued an instruction on May 30, 2013, for the DOD and Office of the Secretary of Defense (OSD) component heads to establish the Managers' Internal Control Program (MICP) (Naval Education and Training Command, 2020, p. 2; Office of the Under Secretary of Defense (Comptroller)/Chief Financial Officer [OUSD(C)/CFO], 2013, p. 1).

The DOD's MICP is a management-level process used to help an organization achieve "efficient and effective operations … reliable reporting for both internal or external use … and compliance with laws and regulations" (Speciale, 2019, p. 10). Specifically, it is the Navy's operative method for demonstrating and recording regulatory compliance with FMFIA (Naval Education and Training Command, 2020, p. 3). The head of a particular DOD organization first establishes the organization's MICP and then designates a MICP coordinator. The MICP coordinator manages the overall program, coordinates with senior leadership, monitors and assesses the corrective action plans (CAPs), and preserves documentation to support the annual SOA. Furthermore, one of the MICP coordinator's primary duties is to establish assessable units (AUs), which are individual groups based on coverage of a particular major function. The heads or managers of these AUs assess risks and identify, document, and test internal controls within their major programs. One part of monitoring and evaluating internal controls includes developing and monitoring the aforementioned CAPs to fix internal control deficiencies (Speciale, 2019, p. 11).

4. DOD Integrated Risk Management Program

In recent years, the DOD has begun to focus more and more on internal controls and risk management, and the organization at large has begun integrating its enterprise risk management (ERM) strategy through its integrated risk management (IRM) approach. The IRM outlines ERM requirements and internal controls over reporting (ICOR), a process consisting of procedures and policies that hold that the accuracy and fairness of information reported is more valued than the report itself (Naval Sea Systems Command [NAVSEA]

2021, p. 2-11). The IRM program is the evolution of the MICP, and it is designed to enable "efficient flow of risk management and internal control information through a unified technology platform" (NAVSEA, 2021, p. 2-11). Beginning in fiscal year (FY) 2022, the DOD began transitioning its MICP to the new IRM program (see Figure 2).

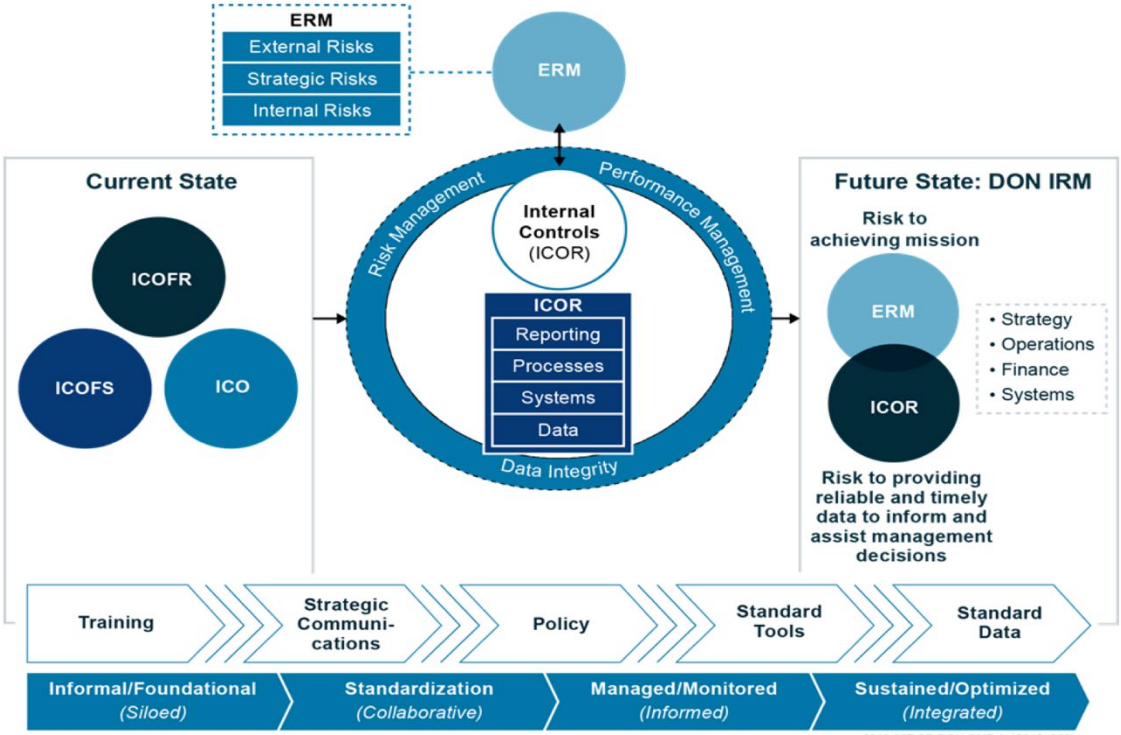

Figure 2. Overview of the Transition from MICP to IRM. Source: NAVSEA (2021).

This section discussed the federal government's implementation of internal controls and internal control responsibilities through OMB Circular A-123 and the GAO Green Book. It also discussed the DOD's implementation of internal controls and responsibilities through the MICP and its new iteration, the IRM program. The next section will address the importance of internal controls.

E. IMPORTANCE OF INTERNAL CONTROLS

Internal controls are critical for organizations as they serve to protect assets while enhancing operational efficiency and ensure precision in financial reporting while

supporting adherence to laws and regulations (COSO, 2013). These controls play a crucial role in protecting an organization's assets from misappropriation, theft, or misuse by establishing measures such as segregation of duties, authorization procedures, and physical security controls (COSO, 2013). These controls also help in reducing the risk of fraud and ensuring that the organization's activities are aligned with legal and regulatory requirements (Su et al., 2022). Furthermore, internal controls play a significant role in fostering innovation within organizations by establishing a robust framework for managing and mitigating risks associated with new initiatives (Li, 2020).

Robust internal controls also enhance operational efficiency by improving process flows, minimizing mistakes and inefficiencies, and optimizing the distribution of resources (COSO, 2013). They ensure that operations are conducted consistently and efficiently, improving overall organizational performance and decision-making (COSO, 2013). In the context of nonprofit organizations, internal controls are particularly important for maintaining operational performance. Effective internal controls correlate with better financial health and resource utilization, which are critical for nonprofits that operate under tight budget constraints and heavy scrutiny from donors and regulators (Berglund & Sterin, 2021). Moreover, internal controls assist organizations in adhering to relevant laws, regulations, and industry standards, thereby reducing the legal and reputational risks linked to non-compliance (COSO, 2013). By establishing controls that address regulatory requirements and ethical standards, organizations demonstrate a commitment to sound governance practices and ethical conduct (COSO, 2013).

Furthermore, strong internal controls serve as a deterrent to fraudulent activities by creating barriers and detection mechanisms that make it difficult for individuals to engage in fraudulent behavior (COSO, 2013). Effective internal control practices, such as regular audits, risk assessments, and the segregation of duties, are pivotal in reducing opportunities for fraud. These practices help in creating a transparent environment where fraudulent activities are more likely to be detected and prevented (Blackburn & Schrag, 2017). Internal controls are essential for organizations to achieve their objectives, mitigate risks, and ensure accountability and transparency in their operations (COSO, 2013). By

establishing and maintaining effective internal controls, organizations can protect their assets, uphold their integrity, and sustain long-term success (COSO, 2013).

This section discussed the importance of having effective internal controls in any organization. The next section will address past research on the federal government/DOD internal controls, and it will explore important examples of internal control failures within the federal government and the DOD.

F. PAST RESEARCH ON FEDERAL GOVERNMENT/DOD INTERNAL CONTROLS

Internal control failures can create significant vulnerabilities that can be exploited for fraudulent activities or can be devastating to an organization and its assets. Tan (2013) argues that a reduction in the effectiveness of an organization's internal control measures undermines their effort to battle fraud (p. 82). The following sections encompass high-profile examples of mishaps within the federal government and the DOD. These sections briefly discuss the background of these mishaps and further address how internal control failures played a significant part in each of them.

1. Fat Leonard Procurement Fraud

a) Background

The "Fat Leonard" scandal was one of the most significant corruption cases in the history of the U.S. Navy, revolving around Leonard Glenn Francis, a Malaysian defense contractor, and his company, Glenn Defense Marine Asia (GDMA). The scandal unfolded over several years and involved a widespread bribery scheme that compromised the integrity of the Navy's procurement process and resulted in substantial financial losses. The scandal began to unravel in 2013 when Leonard Glenn Francis, nicknamed Fat Leonard due to his large size, was arrested by U.S. federal agents in San Diego, CA. He was charged with numerous counts of bribery, fraud, and conspiracy. Francis and his company, GDMA, provided lavish gifts, including cash, luxury travel, entertainment, and prostitutes, to numerous Navy officials in exchange for classified information about ship movements and contracts. This information gave GDMA a competitive edge in securing lucrative contracts for port services such as ship husbanding, fuel, and other logistical

support. The scandal implicated numerous high-ranking Navy officers, including commanders and admirals. These officers, entrusted with overseeing contracts and operations in the Pacific region, willingly accepted bribes from Francis in exchange for steering business to GDMA and allowing him to inflate invoices to overcharge the Navy. In total, the Fat Leonard scandal spanned over a decade, with fraudulent activities occurring as early as 2005. The widespread nature and duration of the corruption shocked many within the Navy and the broader defense community (Standifer, 2017).

Following Francis' arrest, a series of investigations were launched by various law enforcement agencies, including the Department of Justice (DOJ) and the Navy. Many Navy personnel were implicated, leading to numerous prosecutions, court-martials, and administrative actions. Several high-ranking officers pleaded guilty or were convicted of crimes related to the scandal (Standifer, 2017). By 2019, the six-year investigation by the DOJ had led to 33 federal indictments and 22 guilty pleas. Francis confessed that his company, GDMA, had overbilled the Navy by $35 million (LaGrone, 2019). The Fat Leonard scandal had far-reaching consequences and tarnished the reputation of the Navy, raising concerns about its integrity. The scandal also exposed systemic vulnerabilities within the Navy's contracting and procurement processes, highlighting the dangers of unchecked influence-peddling and corruption within the military-industrial complex. It prompted significant reforms within the Navy to strengthen oversight, enhance ethics training, and improve controls to prevent similar corruption in the future (LaGrone, 2019). The following section discusses some of the internal control failures related to the Fat Leonard scandal.

b) Fat Leonard Internal Control Failures

(1) Control Environment

All but one sailor indicted in the Fat Leonard scandal were Navy officers, a majority of whom were in the O-5 and above pay grades (Whiteley et al., 2017, p. 84). It was clear that naval officers were at the forefront of the bribery scandal, and they created a tone at the top of dishonesty and unaccountability. 7th fleet officials, high-ranking officers, and GDMA would also attempt to lure their replacements into the conspiracy through

extravagant dinners and parties (Whiteley et al., 2017, p. 85). Many senior Navy officers transferring into the 7th fleet at the time were entering into a control environment that was ripe with fraud and misconduct, and then-current 7th fleet officers did not just turn a blind eye, but also encouraged the disloyal and corrupt behavior.

(2) Risk Assessment

Whiteley et al. (2017), in their analysis of the risk assessment component of internal controls related to the Fat Leonard scandal, found that there were not any "primary internal control [deficiencies]" belonging to risk assessment; however, they noted that if effective risk assessment and management were in place, the Fat Leonard scandal may have been mitigated or prevented altogether (p. 86). Unfortunately, the Navy's significant deficiencies in the other components of internal controls were either not assessed or accounted for adequately enough or not at all accounted for throughout the procurement process.

(3) Control Activities

Within the control activities component of internal controls, as it relates to the Fat Leonard scandal, there were two types of discrepancies: a failure to execute proper control activities and a complete gap in a place where a control activity should have been. In many cases of fraud conducted throughout the Fat Leonard scandal, Navy officers improperly executed policies and procedures that were already in place to prevent fraud in the first place, such as recording valuable items into ship servicing invoices (Whiteley et al., 2017, p. 87). In one of the Fat Leonard incidents, control activities were not present at all, which led to vulnerabilities for contracting fraud many times and GDMA being able to win contract awards without mandated proper competition (Whiteley et al., 2017, p. 88).

(4) Information and Communication

One of the largest breakdowns in internal controls related to the Fat Leonard scandal came within its information and communications components. In any kind of bribery, there is an exchange of goods or services, and the Fat Leonard scandal was no different (Whiteley, 2017, p. 86). Fat Leonard was able to hold a monopoly over ship

servicing in the 7th fleet and consequently afford to bribe his Navy cohorts by obtaining classified information from officials and senior Navy officers. These senior management types would share with Francis classified information on things like ship schedules and competitor pricing (Whiteley, 2017, p. 86). Additionally, Francis was kept in the loop of investigations into his misdeeds by a Naval Criminal Investigative Service (NCIS) informant whom he was bribing. This allowed Francis to stay one step ahead of his investigators (Whiteley, 2017, p. 86).

(5) Monitoring Activities

Whiteley et al. (2017) state that the Navy lacked a proper evaluation system, including both ongoing and separate evaluations (p. 88). A lack of sound monitoring activities allowed Francis and GDMA to not only commit fraud but also commit it over a long period. Some examples of monitoring deficiencies that Whiteley et al. (2017) note were how GDMA created fraudulent shell companies that went unchecked and how the company fraudulently reported fuel sales (pp. 88–89). Many of these actions were explained away by lies and specifications that were never verified.

2. DOD Audit and Internal Controls: Defense Finance and Accounting Service

a) Background

Since the 1990s, government agencies have been required by law to produce financial statements; however, the DOD did not abide by this law until its first audit in September 2017. Since then, the DOD has yet to produce a clean audit report on a consistent annual basis, and it remains the only federal agency that has yet to achieve this feat (Chappell, 2017, para. 5–6). The Defense Finance and Accounting Service (DFAS) is a DOD agency charged with bookkeeping, maintaining, and combining financial reports. DFAS is the primary player when it comes to the DOD's accounting and auditing processes. DFAS provides a wide range of financial services, including payroll, accounting, budgeting, and financial reporting for military personnel, retirees, and other authorized customers. One of DFAS's main missions is to ensure the financial readiness of the armed forces by providing accurate and timely financial information and support to

decision-makers within the DOD (DFAS, 2022). According to Nugent (2021), who examined DFAS and its audit processes, the DOD has consistently struggled with negative patterns and inefficiencies that have plagued its auditability for many years, even before its first audit in 2017 (p. 1). Specifically, the DOD's ineffective internal controls are the cause of some of the department's biggest headaches (Nugent, 2021, p. 2).

b) DFAS Internal Control Failures

(1) Control Environment

While Nugent (2021) does not directly assess DFAS's control environment, he does touch on how recommendations and reports from the GAO and other entities have gone unanswered and been left open (p. 31). When DFAS's senior leadership does not take guidance on how to make their organization more effective and auditable, this inevitably sends the message down the chain of command that the organization itself takes material weaknesses lightly. Furthermore, Nugent (2021) notes that DFAS personnel's scope of responsibility is not clearly defined in the first place (p. 31). Language and wording within guiding instructions only imply that DFAS as a whole is responsible for remedying material weaknesses, and this could lead senior management to shift blame for financial failures to other personnel.

(2) Risk Assessment

Nugent (2021) does not directly mention DFAS's risk assessment; however, DFAS's lack of a risk assessment internal control component is apparent in the organization's inability to rectify existing risks within improper payments and financial misstatements. The DOD loses millions of dollars each year and spends nearly $1 billion annually in an attempt to fix discrepancies noted by the annual audit (Nugent, 2021, p. 2). DFAS has clearly shown a pattern of reacting to discrepancies as they appear instead of establishing a proactive pattern of assessing potential vulnerabilities before they turn into financial blunders.

(3) Control Activities

Nugent (2021) notes that the accounting processes and common practices within the DOD, and in particular DFAS, are "not effective at producing accurate financial information or reducing the risk of material misstatement" (p. 29). It is evident that within DFAS, there is both a lack of control activities in general and a lack of proper implementation of existing control activities. Nugent (2021) states that almost all material weaknesses and inefficiencies can be traced back to either inadequate procedures or insufficient documentation (p. 29). Without sufficient and effective control activities that can be properly implemented up and down the chain of command, DFAS cannot make meaningful progress toward auditability, and the DOD will continue to miss the mark with its audit reports.

(4) Information and Communication

One of the biggest gaps within DFAS comes from its information technology systems and its inability to achieve effective financial reporting (Nugent, 2021, p. 30). Without an integrated DOD financial system, DFAS cannot effectively communicate internal control efforts and corrective actions throughout the organization. The DOD hopes that its Enterprise Resource Planning (ERP) system, a set of integrated software applications designed to manage and automate various business processes, will alleviate this shortcoming. However, Nugent (2021) notes that DFAS lacks a comprehensive plan to effectively implement and communicate control activities and meet existing standards (p. 31).

(5) Monitoring Activities

In a similar fashion to his assessment of DFAS's control activities, Nugent (2021) states that, as indicated by the DOD FY20 audit, current monitoring activities within the DOD's financial sector do little to reduce material weaknesses (p. 30). One of DFAS's monitoring activities, the Post-Pay Review Team, missed every single improper payment that was documented by the inspector general (IG; Nugent, 2021, p. 30). Moreover, agencies such as the GAO and the IG have consistently given DFAS recommendations that would remedy many of DFAS's material weaknesses; however, many of these

recommendations have yet to be implemented. Nugent (2021) concludes that DFAS does not adhere to the standard required of them by OMB Circular 123-A regarding monitoring activities (p. 30).

3. Challenger STS-51L Accident

a) Background

The Challenger STS-51L accident, which occurred on January 28, 1986, was one of the most tragic events in NASA's history. 73 seconds after liftoff during ascent, the Space Shuttle Challenger suffered a catastrophic structural failure due to a leak in one of the solid rocket boosters (SRBs) (NASA, n.d.). The crew consisted of seven members, including Commander Francis R. Scobee, Pilot Michael J. Smith, Mission Specialists Ronald E. McNair, Ellison S. Onizuka, and Judith A. Resnik, Payload Specialist Gregory B. Jarvis, and Teacher-in-Space Sharon Christa McAuliffe (NASA, n.d.).

The Rogers Commission, established to investigate the accident, concluded that the primary cause of the failure was the breach of the primary and secondary O-ring seals on Challenger's right SRB. This breach allowed a fire to ignite the main liquid fuel tank, leading to the rapid disintegration of the shuttle due to the overwhelming aerodynamic forces during ascent (NASA, n.d.). Additionally, temperatures on the day of launch were lower than recommended for the shuttle's components, contributing to the accident (NASA, n.d.).

The accident had far-reaching consequences, prompting significant changes in NASA's safety protocols. NASA created the Office of Safety, Reliability, and Quality Assurance, redesigned the SRBs, and approved the construction of a new Space Shuttle orbiter, Endeavour, which first flew in 1992 (NASA, n.d.). Furthermore, the accident led to the Challenger Center for Space Science and Education's creation, dedicated to engaging students in science, technology, engineering, and mathematics (STEM) programs in honor of the Challenger crew's educational mission (NASA, n.d.).

b) Challenger Internal Control Failures

(1) Control Environment

The Challenger accident revealed several failures in the control environment, contributing to the tragic outcome. A significant control environment failure involved the decision to launch despite the low temperatures at Kennedy Space Center, which were well below the recommended limit for key components like the SRBs. Concerns raised by engineers about the effects of cold temperatures on the O-ring seals in the SRB segment joints were overruled, leading to a catastrophic failure during launch Risk Assessment (NASA, n.d.). These control environment failures exposed the need for a more robust safety culture at NASA, leading to significant changes in safety protocols and oversight.

(2) Risk Assessment

Risk assessment failures played a significant role in the disaster. Despite warnings from engineers about the effects of low temperatures on the integrity of the O-ring seals in SRBs, the launch was approved. These risk concerns were based on the predicted ambient temperature of 27°F, which was below the qualification limit for SRBs, only certified at temperatures above 39°F (NASA, n.d.). The failure to properly assess and mitigate the risk posed by the cold weather ultimately led to catastrophic structural failure during launch, causing the explosion of the external fuel tank (NASA, n.d.). The failure in risk assessment was one of the key factors identified by the Rogers Commission, which led them to recommend significant changes to NASA's safety protocols and decision-making processes to improve risk assessment (NASA, n.d.).

(3) Control Activities

A failure to enforce safety-related control activities, or a lack of control activities altogether, ultimately contributed to the Challenger accident. Even though engineers identified potential risks due to low temperatures on the O-ring seals, the launch was approved. There were few controls in place to ensure each member of NASA and their contractors knew the associated risks and those that were in place were ineffective in conveying risk (NASA, n.d.).

(4) Information and Communication

While information and communication controls may not have been directly involved in the accident, they certainly contributed to the Challenger catastrophe. Moore (1992) states that a Rockwell International manager, the prime contractor of the U.S. space shuttle program at the time, communicated to his employees to make NASA aware that the company thought the launch was unsafe. When these employees attempted to speak with NASA managers, they were dismissed and not taken seriously. The contracting managers at Rockwell did not do their due diligence in communicating directly with NASA, the Rockwell employees could not communicate effectively with NASA, and NASA did not receive communication well that did not align with their goals and initiatives (Moore, 1992).

(5) Monitoring Activities

One of the biggest internal control breakdowns within the Challenger accident came in the form of monitoring activities and quality assurance. Monitoring activities related to the Challenger accident were inadequate in detecting and addressing critical safety risks. These control failures go hand-in-hand with several other control failures related to risk assessment and control activities. Despite engineers expressing concerns about the effects of cold temperatures on the SRBs, these warnings were not sufficiently monitored or acted upon (NASA, n.d.). The lack of effective monitoring allowed the launch to proceed.

4. USS Fitzgerald Collision

a) Background

The USS Fitzgerald accident, which occurred on June 17, 2017, was a tragic collision involving the U.S. Navy destroyer and the Philippine-flagged container ship ACX Crystal in the busy waters of Sagami Nada off Japan's Honshu Island. The destroyer, which had 315 crew members on board, was on a transit route from its homeport in Yokosuka, Japan, heading southbound at about 22 knots. At the same time, the container ship was traveling east-northeast at about 18.5 knots toward Tokyo. As the two ships moved closer,

neither radioed the other, and last-minute maneuvers to avoid the collision were too late, leading to the crash that claimed seven lives and injured three others (LaGrone, 2020).

The impact was devastating for the USS Fitzgerald, causing extensive damage to the forward starboard side and creating a 13-by-17-foot hole below the waterline, which flooded an enlisted berthing area. The ACX Crystal, with 21 crew members on board, sustained damage to its bow, but no injuries were reported among its crew. This incident was one of two tragic collisions involving U.S. Navy ships in 2017, raising significant concerns about naval safety, operations, and oversight (Keller, 2017; NTSB, 2020).

Investigations following the accident revealed that the primary cause of the collision was the Fitzgerald's bridge team's failure to act decisively and early enough to avoid the crash (NTSB, 2020). Poor teamwork and communication among the Fitzgerald crew, insufficient coordination between the Combat Information Center (CIC) and the bridge, and inadequate preparation by the commanding officer for transit risks were identified as contributing factors. Additionally, the broader issue of the U.S. Navy's ineffective oversight in scheduling operations, training crews, and mitigating fatigue was highlighted (NTSB, 2020). In response to the accident, the U.S. Navy reevaluated and reformed its safety protocols, watchstanding practices, and training programs to prevent similar incidents in the future (NAVINFO, 2017).

b) USS Fitzgerald Internal Control Failures

(1) Control Environment

The USS Fitzgerald collision highlighted significant control environment failures that contributed to the tragic incident. Key failures were observed in the areas of crew communication, coordination, and command structure. The bridge team on the Fitzgerald did not communicate effectively with the Combat Information Center (CIC), leading to confusion and delayed responses during the critical moments before the collision (LaGrone, 2020). Additionally, the commanding officer's planning and oversight were found to be inadequate, as there was insufficient risk assessment and hazard identification during the ship's transit route. This lack of preparation was compounded by the broader

issues of operations scheduling and crew fatigue, which were indicative of deeper control environment problems within the Navy (NTSB, 2020).

The ineffective control environment and flawed oversight by the Navy led to a lack of appropriate training and inadequate qualification of watchstanders, ultimately resulting in the fatal collision. These failures underscored the need for robust internal controls, rigorous training, and better communication to ensure safety and prevent similar incidents (NAVINFO, 2017).

(2) Risk Assessment

Risk assessment failures were a critical factor in the USS Fitzgerald collision. One of the primary factors that led to the collision was the inability of the bridge team to effectively identify and respond to hazards. The crew failed to assess the risks associated with navigating through busy shipping lanes in Sagami Nada, Japan, leading to a lack of effective communication and decision-making on the bridge. This misjudgment led to inadequate avoidance maneuvers that came too late to prevent the collision with the container ship ACX Crystal (NTSB, 2020).

Moreover, the Fitzgerald's commanding officer did not adequately plan the ship's transit route, nor did he ensure sufficient watchstanding personnel or appropriate risk assessment procedures. In relation to the control environment, the commanding officer's lack of preparation contributed to an environment where risk assessment was not performed with the rigor needed for a ship operating in a complex maritime setting (LaGrone, 2020). The Navy's inadequate supervision in areas like operational scheduling, fatigue management, and crew training further exacerbated these risk assessment failures, highlighting the need for a comprehensive review of safety protocols and risk management practices (NTSB, 2020). These failures in risk assessment and response underscore the importance of thorough risk evaluation in maritime operations. Effective risk assessment requires robust planning, clear communication, and a solid understanding of navigational hazards to ensure the safety of all crew members and the integrity of the vessel (NTSB, 2020).

(3) Control Activities

Failures in control activities within the USS Fitzgerald collision contributed to the tragic accident by allowing critical lapses in safety protocols and decision-making. A primary failure was the ineffective communication and coordination among the bridge team and the CIC. The Fitzgerald's officer of the deck (OOD) displayed a lack of familiarity with navigational rules and did not follow the commanding officer's orders, leading to confusion and delayed responses in critical moments before the collision (LaGrone, 2020). The command structure failed to verify that watchstanders were adequately trained and qualified. This lack of effective control activities meant that fundamental safety practices were not followed, resulting in a failure to avoid the collision with the ACX Crystal. These failures underline the importance of rigorous safety protocols, consistent training, and effective communication in preventing accidents (NTSB, 2020).

(4) Information and Communication

The USS Fitzgerald collision highlighted significant failures in information and communication internal controls, which were instrumental in the tragic event. A critical lapse in communication occurred among the bridge team and between the bridge and the CIC. The lack of effective communication caused confusion and delayed responses during the critical moments leading up to the collision with the ACX Crystal (LaGrone, 2020). This internal control failure was compounded by the bridge team's inadequate use of navigational tools and failure to follow standard watchstanding principles, resulting in the crew's inability to take early and decisive action to avoid the collision (NTSB, 2020).

Furthermore, there was insufficient communication with other vessels in the area, as neither ship radioed the other to indicate their intended course of action or to warn of the impending collision (NTSB, 2020). The failure to communicate effectively not only compromised the safety of the USS Fitzgerald's crew but also contributed to a breakdown in fundamental control activities. These communication failures underscored the importance of clear, consistent information flow within the ship's command structure and with other vessels in the surrounding area (NTSB, 2020). The incident has prompted

significant reforms in the Navy's communication practices and internal controls to prevent similar tragedies in the future (NAVINFO, 2017).

(5) Monitoring Activities

Internal control failures related to monitoring activities played a critical role in the USS Fitzgerald collision by allowing significant lapses in safety oversight and response. The lack of effective monitoring meant that key safety protocols, such as proper use of navigational tools and compliance with rules of the road, were not followed. This breakdown in monitoring activities resulted in the inability to detect and respond to risks promptly, leading to the tragic loss of seven crew members and extensive damage to the USS Fitzgerald (NTSB, 2020). The failure to maintain rigorous monitoring practices underscored the need for robust internal controls and continuous assessment to ensure safety and compliance in naval operations (NAVINFO, 2017).

5. T-45 Goshawk Groundings

a) Background

The McDonnell Douglas T-45 Goshawk is a jet trainer aircraft designed for the U.S. Navy and Marine Corps. Its purpose is to train naval aviators in carrier-based operations, including catapult launches and arrested landings, which are critical skills for naval aviation (Military Factory, 2019). The T-45 Goshawk is derived from the British Aerospace Hawk, tailored to meet the unique demands of naval training. It took its first flight in April 1988 and became operational in 1991, providing a critical training platform for future Navy and Marine Corps pilots (Military Factory, 2019).

The T-45 Goshawk has faced challenges related to groundings and internal controls. In 2017, the fleet was grounded after reports of hypoxia-like symptoms among pilots, leading to safety concerns. This grounding came after more than 100 instructor pilots refused to fly the aircraft due to incidents of physiological episodes believed to be caused by problems with the oxygen system. The grounding led to significant disruptions in the pilot training program, as the Navy and its industry partners worked to identify and correct the issues causing the symptoms (Williams, 2023).

In October 2022, another grounding occurred due to an engine blade fault discovered during a pre-flight check. This grounding affected the entire T-45C fleet, resulting in a two-week pause in training operations. The Navy and Rolls Royce conducted extensive engineering analysis to determine the root cause and ensure the safety of the aircraft before resuming operations. These grounding incidents demonstrate the importance of rigorous internal controls and safety checks to maintain the fleet's operational readiness and ensure pilot safety (LaGrone, 2022a). Additionally, on April 15th, 2024, the U.S. Navy's T-45C Goshawk fleet was put on an operational pause following an inflight engine mishap over Mississippi. A Goshawk from Training Air Wing One suffered an engine malfunction, leading to a precautionary landing at Hesler-Noble Field in Laurel, Mississippi. The crew escaped injury, although the aircraft's engine sustained damage. As a precaution, the Chief of Naval Air Training halted operations to evaluate the fleet's readiness to continue safe flying (LaGrone, 2024).

b) T-45 Internal Control Failures

(1) Control Environment

Control environment failures within the context of the T-45 Goshawk groundings are significant due to the broader impact on pilot training and safety. The key failures of the T-45's engine blade, the adverse physiological episodes experienced in-flight, and the in-flight engine mishap all raise concerns about the controls that are or are not in place and how senior management is tackling issues with the aircraft. While the groundings have been implemented out of caution to protect the pilots and aircraft from further risk, the control environment surrounding the T-45 Goshawk is sufficiently lacking proper implementation of internal controls as evidenced by the continuation of mishaps and groundings. This issue underscores the importance of ensuring safe and reliable control systems in training aircraft, and although these incidents were addressed, they exposed vulnerabilities in the control environment that required immediate attention to avoid endangering the safety and training of Navy and Marine Corps pilots (LaGrone, 2022a; Williams, 2023, Ziezulewicz, 2022).

(2) Risk Assessment

Risk assessment failures within all of the mishaps related to the T-45 Goshawk reveal deficiencies in identifying and mitigating potential hazards. One significant risk assessment failure pertains to the engine issues that led to the initial grounding of the T-45 fleet. The grounding, prompted by an engine blade failure, indicated that risk assessments might have inadequately addressed potential mechanical failures (Ziezulewicz, 2022). Another area where risk assessment failures regarding internal controls are evident is in the oxygen system malfunctions that led to the grounding of T-45 Goshawks in 2017. These oxygen system issues caused adverse physiological episodes among pilots, leading to safety concerns that resulted in training disruptions. The failure to properly assess the risks associated with the oxygen system posed significant risks to pilot health and safety (Williams, 2023). Both of these mishaps underscored the importance of rigorous risk assessments in aircraft. Despite safety investigations, this incident highlighted the need for comprehensive risk assessments to identify and address internal control failures before they cause significant disruptions and safety issues.

(3) Control Activities

Control activity failures within the context of the T-45 Goshawk mishaps and groundings highlight deficiencies in implementing operational safety and quality assurance protocols. Notable control activity failures are exemplified in both the engine blade fault that prompted the grounding of the T-45 fleet in 2022 and the oxygen system issues that led to the grounding of the fleet in 2017. These failures indicated that existing quality control processes failed to detect and address these issues earlier. They also indicated that safety and maintenance protocols might not have been adequately followed or enforced. These incidents revealed a need for enhanced internal controls to ensure the structural integrity of aircraft components, emphasizing the role of effective control activities in preventing safety hazards (LaGrone, 2022a; Ziezulewicz, 2022). The incidents also suggest that control activities like regular system checks and maintenance need more stringent implementation in the T-45 program (Williams, 2023).

(4) Information and Communication

Information and communication failures within the context of the T-45 Goshawk groundings indicate lapses in effectively conveying critical safety-related information within internal controls. The fact that the engine blade failure in 2022 occurred suggests a breakdown in communication systems responsible for monitoring and reporting aircraft component issues. This type of failure could stem from inadequacies in how information about aircraft health is transmitted to maintenance and safety teams, resulting in delayed responses to potential hazards (LaGrone, 2022a; Ziezulewicz, 2022). The oxygen system malfunctions in the T-45 Goshawk fleet that led to grounding in 2017 further demonstrate failures in information and communication within internal controls. The lack of clear communication and feedback regarding these safety concerns contributed to the grounding, indicating that the internal control mechanisms for reporting and addressing such issues were insufficient. This points to the need for robust information and communication systems to ensure that safety-related incidents are promptly identified, reported, and resolved (Williams, 2023).

(5) Monitoring Activities

Monitoring activity failures are evident in the continuous failure of components in the T-45 platform. These component failures raise concerns about the effectiveness of the monitoring systems used to track the health and safety of aircraft components, indicating a need for improved internal controls to prevent such faults from escaping early detection (LaGrone, 2022a). Additionally, the ongoing investigation into the engine issue that caused the groundings in 2022 and 2024 reveals gaps in the Navy's monitoring activities. This type of internal control failure can hinder swift responses to critical issues and affect the training of Navy and Marine Corps pilots (Ziezulewicz, 2022).

This section discussed past research on internal control failures within the federal government and the DOD. It explained how a combination of deficiencies within all five internal control components contributed to either massive fraud and waste in the cases of Fat Leonard and DFAS, massive disasters in the cases of the Challenger and the USS

Fitzgerald, or ongoing issues plaguing programs such as the T-45 Goshawk. The next section briefly summarizes the chapter.

G. SUMMARY

This chapter presented a review of the literature on auditability theory and internal controls. It explored key concepts related to the COSO Framework's application in the federal government and the Department of Defense (DOD). It also discussed the importance of internal controls in maintaining accountability, ensuring compliance, and reducing risks. The chapter examined how internal controls play a vital role in supporting auditability in complex organizations like the DOD, and it reviewed past research on internal controls, highlighting the challenges in federal and defense contexts. The next chapter outlines the methodology employed to research the USS Bonhomme Richard fire.

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III. METHODOLOGY

A. INTRODUCTION

This chapter delineates the methodology employed in conducting this research. It first explains how two databases were developed, one database to record all publicly known events related to the Bonhomme Richard fire and the other database to record all recommendations given by the USPACFLT Investigation Report related to the Bonhomme Richard fire. Following this, the chapter then explains how the two databases are compared and contrasted. The origins of the data utilized to populate the database, both the sources and search terms, are examined as well. The chapter discusses and explains how each event and recommendation was aligned with a primary and secondary internal control component. This chapter concludes with a discussion of the compositions of the databases. The subsequent section delves into the processes by which the Bonhomme Richard Fire Event (BRFE) Database and the USPACFLT Investigation Recommendation (UIR) Database were formulated.

B. DEVELOPMENT OF THE BONHOMME RICHARD FIRE EVENT DATABASE

The process for database development began with an IRB determination request with the Office of Research and Innovation at NPS. This research study did not conduct any interviews or studies with any human subjects and did not collect any personally identifiable information (PII), therefore the Office of Research and Innovation deemed this project as not human subject research, so it did not require a full IRB protocol. Once the IRB determination was given, the data collection process began by accessing the USPACFLT Investigation results and the Major Fires Review (MFR). Other publicly available sources were utilized as well and are further discussed in the Sources section. All of these documents and data sources provided specific events, people, or processes that were influential in the fire mishap. Following a review of the available documents related to the Bonhomme Richard fire, a database was developed to showcase each event, the player or person involved if applicable, their position or title if applicable, and the related primary and secondary internal control component. In each instance, the internal control

component that was deemed the most representative of the situation was designated as primary, and the component that was next greatest in its representation of the situation was designated as secondary. The next section explains the development of the UIR Database.

C. DEVELOPMENT OF THE U.S. PACIFIC FLEET COMMAND INVESTIGATION RECOMMENDATION DATABASE

The UIR Database was developed similarly to the BRFE Database. However, particular attention was given to the USPACFLT Investigation results, as this document laid out specific recommendations for changes to be implemented post-fire. The MFR and other publicly available sources were secondarily utilized as well. Following a review of these sources concerning the Bonhomme Richard fire event, a database was created to delineate each recommendation and its associated internal control components. In each instance, the internal control component that was deemed the most representative of the purpose of the recommendation was designated as primary, and the component that was next greatest in its representation of the purpose of the recommendation was designated as secondary. The subsequent section explains the comparative process of the BRFE Database and the UIR Database.

D. COMPARISON OF DATABASES

The BRFE Database and the UIR Database were compared against each other to see how well they corresponded. The number of times each internal control component, both primary and secondary, was assessed within each database was annotated, and this number relative to all components was calculated as a percentage for all five components within both databases for both primary and secondary selections. The percentages within the BRFE Database were then compared with the percentages within the UIR Database to ascertain how well the internal control deficiencies or failures corresponded to the recommendations. The following section clarifies the origins of the data that was input into the database.

1. Sources

The secretary of the Navy (SECNAV) website, specifically its Freedom of Information Act (FOIA) Reading Room, was used as the primary source for data collection. Within the FOIA Reading Room, there were two reports directly related to the Bonhomme Richard fire: the USPACFLT Investigation results and the MFR, a report commissioned by the VCNO that reviewed all major fires in the Navy over 12 years. The SECNAV's website is publicly accessible.

The ProPublica website (https://www.propublica.org) was used to retrieve Department of Navy (DON) documents and articles related to the Bonhomme Richard fire. The ProPublica website is publicly accessible, and each article is free of charge.

The U.S. Naval Institute (USNI) News website (https://www.news.usni.org) was also used to retrieve DON documents and articles related to the Bonhomme Richard fire. The USNI News website is publicly accessible, and each article is free of charge.

2. Search Terms

Search terms were employed to investigate the websites mentioned in the previous sections. Specific names of those directly involved with the Bonhomme Richard fire event were some of the terms encompassed in the search. Search terms also included "Bonhomme Richard Fire," "Bonhomme Richard Investigation," "Bonhomme Richard Internal Controls," "Bonhomme Richard Findings," and "Bonhomme Richard Failures." The following section describes how each person, event, or process was coordinated with primary and secondary internal control components and how each recommendation was coordinated with primary and secondary internal control components.

E. ALIGNMENT TO FRAMEWORKS

1. Event Alignment to Internal Control Components

The COSO Framework was used as the basis for aligning people, processes, and events with primary and secondary internal control components. Each item was matched with its respective components by ascertaining which internal control component deficiency or failure contributed most to the operational gap in question or which internal

control component failure was most closely related to the operational gap in question. This internal control component was designated as primary. The internal control component failure that was next greatest in its contribution to each particular event was designated as secondary. The next section discusses how each recommendation was aligned with an internal control component.

2. Recommendation Alignment to Internal Control Components

The COSO Framework was additionally used as the basis for the recommendation alignment. Coordinating each recommendation with a primary and secondary internal control component was performed by deciding which component related most closely to the purpose of the recommendation, and which component had the next greatest relation to the purpose of the recommendation. These components were designated primary and secondary, respectively. The subsequent section discusses the outcomes derived from the data compiled within the BRFE Database and the UIR Database and the outcomes derived from the comparison of the two databases.

F. DATABASE COMPOSITION

As mentioned in the preceding section, each person, process, or event contained within the BRFE Database and the UIR Database was aligned with an internal control component. The total number of internal control failures or deficiencies within the BRFE Database amounted to 207, and the total number of recommendations within the UIR Database amounted to 134. One recommendation was redacted within the USPACFLT Investigation Report, and therefore the total number of recommendations that could be analyzed amounted to 133.

Within the BRFE, out of the internal control components designated primary, there were 13 Control Environment deficiencies, 17 Risk Assessment deficiencies, 113 Control Activity deficiencies, 17 Information and Communication deficiencies, and 47 Monitoring Activity deficiencies. Out of the internal control components designated secondary, there were 14 Control Environment deficiencies, 30 Risk Assessment deficiencies, 67 Control Activity deficiencies, 35 Information and Communication deficiencies, and 61 Monitoring Activity deficiencies.

Within the UIR, out of the internal control components designated primary, there were 54 Control Environment deficiencies, 8 Risk Assessment deficiencies, 30 Control Activity deficiencies, 8 Information and Communication deficiencies, and 33 Monitoring Activity deficiencies. Out of the internal control components designated secondary, there were 29 Control Environment deficiencies, 12 Risk Assessment deficiencies, 30 Control Activity deficiencies, 20 Information and Communication deficiencies, and 42 Monitoring Activity deficiencies. The total differences (a cumulation of primary and secondary in correlation between the two databases was as follows: control environment deficiencies were different by 24.68% (6.52% BRFE, 31.20% UIR), risk assessment deficiencies were different by 3.83% (11.35% BRFE, 7.52% UIR), control activities deficiencies were different by 20.92% (43.48% BRFE, 22.56% UIR), information and communication deficiencies were different by 2.03% (12.56% BRFE, 10.53% UIR), and monitoring activities deficiencies were different by 2.10% (26.09% BRFE, 28.19% UIR).

G. SUMMARY

This chapter outlined the methodology of this research, including a discussion of the literature review comprising publicly available documents pertinent to internal controls. It explained the sources of utilized data and delineated the researcher's development of dedicated research databases. Moreover, this chapter examined the alignment of both events and recommendations to internal control components, and it provided a methodology for comparing the two to see how well the events corresponded with the proposed changes. An overview of the database composition was also included in this chapter. The ensuing chapter delves into research findings, analysis, and implications, proposing recommendations for strengthening internal controls within the Navy and its fleet.

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IV. FINDINGS, ANALYSIS, IMPLICATIONS, AND RECOMMENDATIONS

A. INTRODUCTION

This chapter discusses a detailed analysis, key findings, implications, and practical recommendations derived from the research study. The chapter begins with a discussion of the significant findings of this study, followed by an analysis of the databases created for this study, specifically the BRFE database and the UIR database, and what they indicate about the Bonhomme Richard fire. The chapter also analyzes each internal control component relative to the fire events and highlights some of the significant failures within each component. Then, the chapter discusses the implications of these results, considering their impact on the Navy and its internal controls. Finally, recommendations are proposed to address the issues uncovered through the analysis.

B. FINDINGS

1. BRFE Database

This researcher created the BRFE Database, which contained 207 events that corresponded with the Bonhomme Richard fire. The series of incidents and evaluations related to the fire aboard the USS Bonhomme Richard were catalogued. The BRFE Database includes brief summaries of each event leading up to, during, and following the fire, including the initial ignition sources, the spread of the fire, the response actions taken, and the ultimate outcomes. The Database also focuses on the effectiveness of internal controls and risk mitigation strategies, documenting which two internal control components from the COSO Framework were most closely related to the event. The internal control component that had the greatest association with the event was designated as primary, and the internal control component that had the second greatest association with the event was designated as secondary.

2. UIR Database

The UIR Database, also created by this researcher, contains 134 recommendations that were provided in the USPACFLT Investigation report. 133 of these recommendations were made publicly available, while one recommendation in the USPACFLT Investigation was redacted, and so the total recommendations utilized was 133. Similarly to the BRFE Database, the UIR linked each recommendation to two internal control components from the COSO Framework which were most closely related to the purpose of the recommendation. The internal control component that had the greatest association with the recommendation's purpose was designated as primary, and the internal control component that had the second greatest association with the recommendation was designated as secondary.

The tables and figures presented in this chapter illustrate the analysis of both the BRFE Database and the UIR Database. These two databases drew heavily from the USPACFLT Investigation as a primary source.

3. Internal Control Failures

a) BRFE Database

In the BRFE Database, each event leading up to, during, and following the fire was aligned to two internal control components, designated primary and secondary. Table 1 shows the distribution of internal control failures across the total number of events related to the Bonhomme Richard fire.

Table 1. BRFE Allocation of Internal Control Failures Across Events

INTERNAL CONTROL	NUMBER OF PRIMARY EVENT DESIGNATIONS	NUMBER OF SECONDARY EVENT DESIGNATIONS	TOTAL EVENT DESIGNATIONS
CONTROL ENVIRONMENT	13	14	27
RISK ASSESSMENT	17	30	47
CONTROL ACTIVITIES	113	67	180
INFORMATION AND COMMUNICATION	17	35	52
MONITORING ACTIVITIES	47	61	108
TOTAL INTERNAL CONTROL FAILURE EVENT DESIGNATIONS	207	207	414

Table 1 presents a breakdown of internal control failures across different categories, both for primary and secondary events. It shows that control activities had the highest number of primary event failures (113), as well as the highest number of secondary event failures (67), which could indicate a major area of concern that requires more stringent controls and oversight. Table 1 also indicates that monitoring activities failures were also significant (108 total). Both the risk assessment and information and communication internal control components were relatively low in comparison to other components with 47 and 52 total internal control failure events between primary and secondary designations, respectively. Figure 3 and Figure 4 depict the distribution of primary and secondary internal control failures in events across the five internal control components. From the charts, it is evident that control activities failures represent the largest portion of both primary failures (55%) and secondary failures (32%). Risk assessment and information and communication failures are much more present in secondary failures (15% and 17%, respectively) than primary failures (8% for both), while control environment failures stayed relatively the same across primary and secondary failures (6% and 7%, respectively).

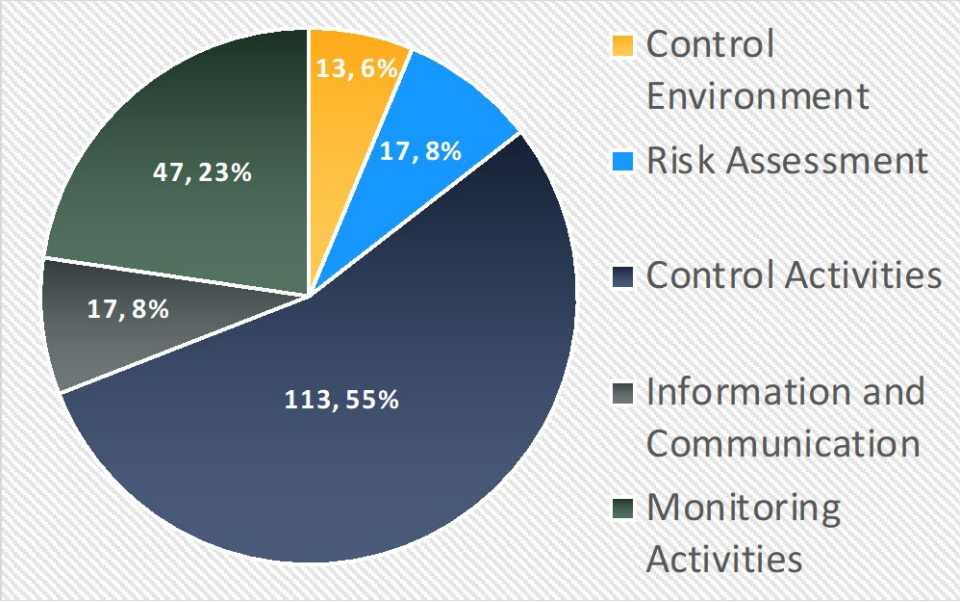

Figure 3. BRFE Database Percent of Primary Event Internal Control Failures

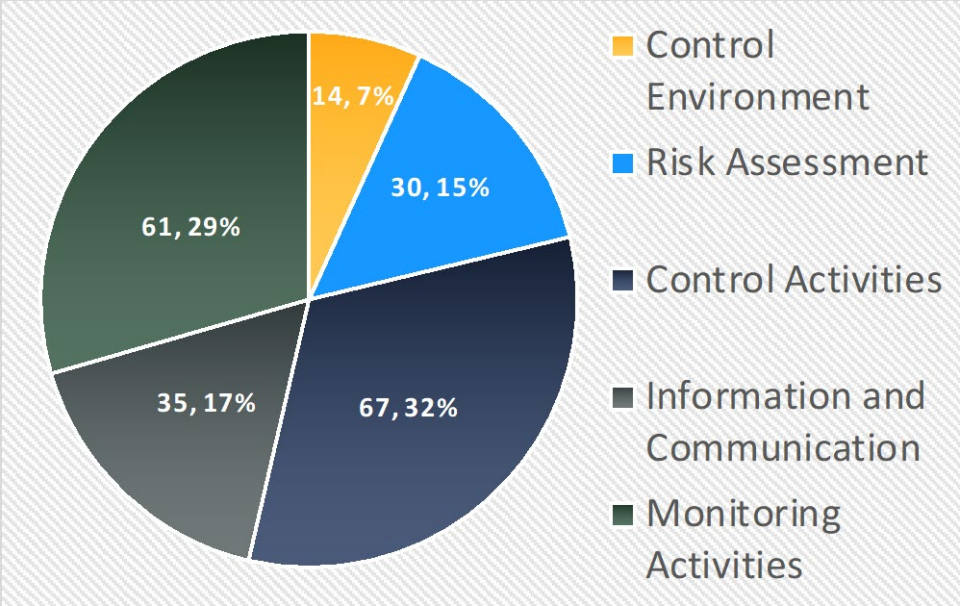

Figure 4. BRFE Database Percent of Secondary Event Internal Control Failures

b) UIR Database

In the UIR Database, each USPACFLT Investigation recommendation, with the exception of one redacted recommendation, was aligned to two internal control components, designated primary and secondary. Table 2 shows the distribution of internal control failures across the total number of USPACFLT Investigation recommendations.

Table 2. UIR Allocation of Internal Control Failures Across Recommendations

INTERNAL CONTROL	NUMBER OF PRIMARY RECOMMENDATION DESIGNATIONS	NUMBER OF SECONDARY RECOMMENDATION DESIGNATIONS	TOTAL RECOMMENDATION DESIGNATIONS
CONTROL ENVIRONMENT	54	29	83
RISK ASSESSMENT	8	12	20
CONTROL ACTIVITIES	30	30	60
INFORMATION AND COMMUNICATION	8	20	28
MONITORING ACTIVITIES	33	42	75
TOTAL RECOMMENDATION DESIGNATIONS	133	133	266

Table 2 presents a breakdown of internal control failures across different categories, both for primary and secondary recommendations. It shows that the USPACFLT Investigation's recommendations primarily focused on control environment failures (83 total). Monitoring activities was the Investigation's next biggest focus, with a total of 75 recommendations (33 primary, 42 secondary). Table 2 also indicates that improving risk assessment and information and communication failures were the lowest priority for USPACFLT, as both internal control components had a relatively low number of recommendations (20 total and 28 total, respectively). Figure 5 and Figure 6 show the percentage breakdowns of each internal control component relative to the number of

recommendations. Figure 5 and Figure 6 depict the distribution of primary and secondary internal control failures related to recommendations across the five internal control components. Figure 5 shows that control environment failures account for the majority of primary failure designations (41%), while Figure 6 shows that monitoring activities account for the majority of secondary failure designations (32%). Recommendations that were related to risk assessment failures were significantly more uncommon across both primary failure designations (6%) and secondary failure designations (9%).

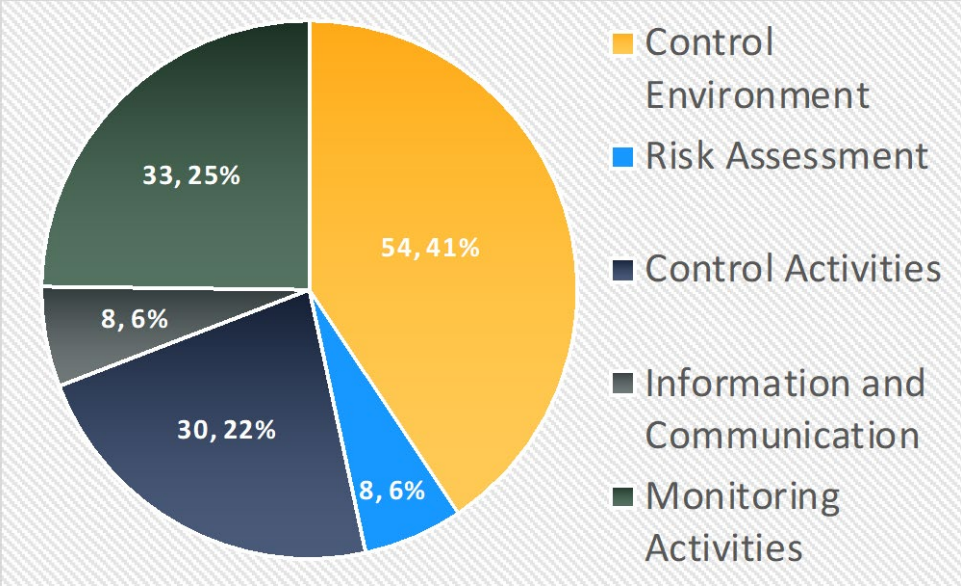

Figure 5. UIR Database Percent of Primary Internal Control Failures Corresponding to Recommendations

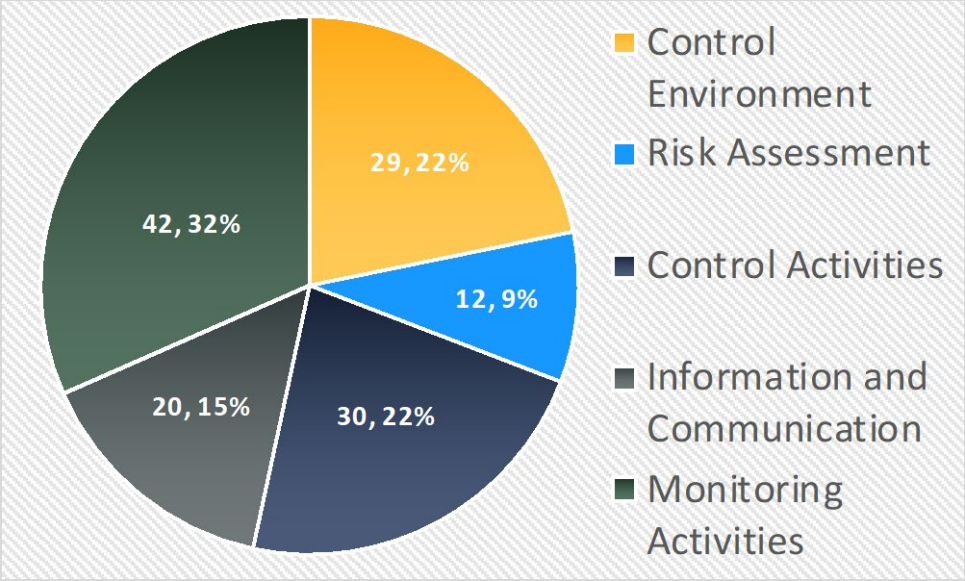

Figure 6. UIR Database Percent of Secondary Internal Control Failures Corresponding to Recommendations

c) Comparison of the BRFE Database and the UIR Database

A comparison of the BRFE Database and the UIR Database reveals both small and large differences between the percentage breakdowns of individual internal control component designations. Table 3 shows the difference between the percentage of individual internal control failures, both primary and secondary designations, related to fire events and the percentage of individual internal control component failures, both primary and secondary, related to the USPACFLT Investigation recommendations.

Table 3. Comparison of Internal Control Component Percentages Between Events and Recommendations

INTERNAL CONTROL	PERCENTAGE OUT OF TOTAL EVENT DESIGNATIONS	PERCENTAGE OUT OF TOTAL RECOMMENDATION DESIGNATIONS	DIFFERENCE
CONTROL ENVIRONMENT	27/6.52%	83/31.20%	24.68%
RISK ASSESSMENT	47/11.35%	20/7.52%	3.83%
CONTROL ACTIVITIES	180/43.48%	60/22.56%	20.92%
INFORMATION AND COMMUNICATION	52/12.56%	28/10.53%	2.03%
MONITORING ACTIVITIES	108/26.09%	75/28.20%	2.11%
TOTAL	414/100%	266/100%	148

Table 3 shows the comparison of internal control component percentages between fire events and recommendations from the BRFE and UIR Databases, and it reveals significant discrepancies. The most notable difference is in the control environment component, where recommendations emphasize it heavily at 31.20%, compared to only 6.52% in fire events, showing a substantial 24.68% gap. This suggests a critical focus by USPACFLT on strengthening the control environment in response to identified issues. Control activities also show a large disparity, comprising 43.48% of fire events but only 22.56% of recommendations, indicating a 20.92% difference. Conversely, the differences in risk assessment, information and communication, and monitoring activities are relatively minor, with variations of 3.83%, 2.03%, and 2.11% respectively, suggesting more alignment between events and recommendations in these areas. Moreover, the total number of events (207) significantly exceeds the total number of recommendations (133) by 74. A side-by-side comparison of the BRFE Database and the UIR Database, highlighting the total number of events and recommendations, is shown in Figure 7. Figure 7 emphasizes the data shown in Table 3. It shows a substantial discrepancy in control activities failures,

(180 events, 60 recommendations) and a substantial discrepancy in control environment failures (27 events, 83 recommendations).

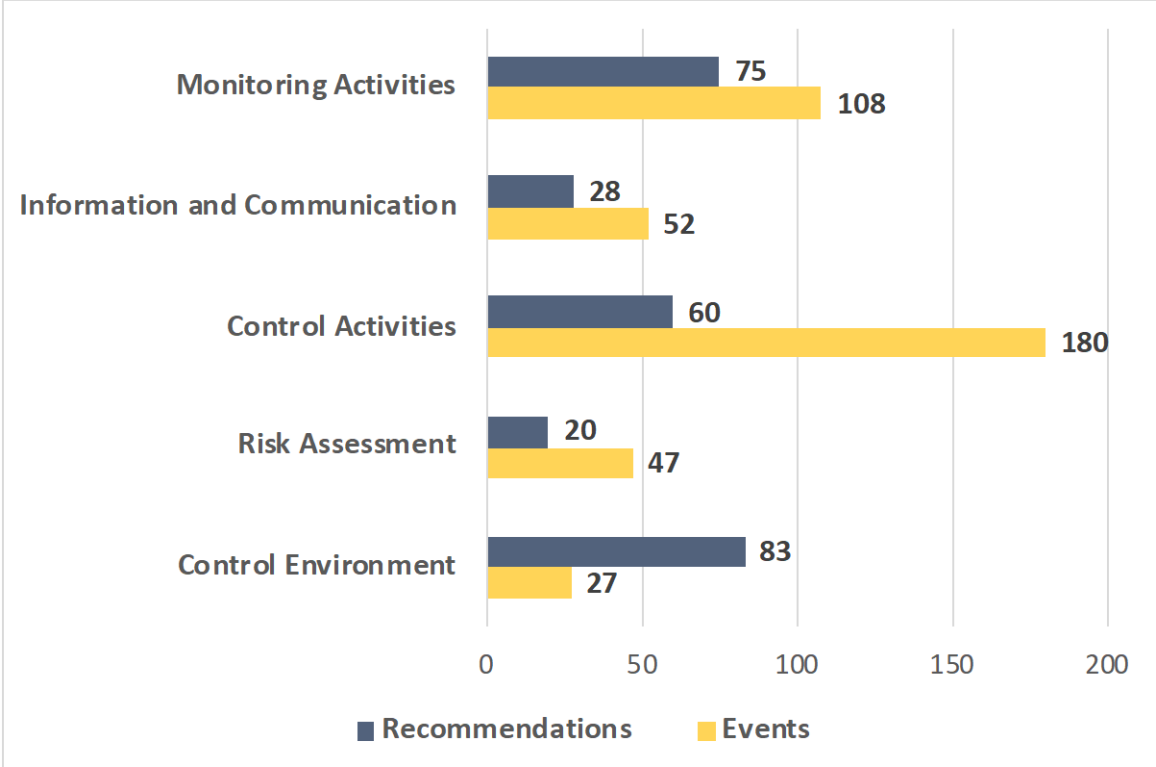

Figure 7. Comparison of the Total Number of Primary and Secondary Events and Recommendations Failures in the BRFE and UIR Databases

This section outlined the research results and findings. The next section discusses an analysis of the findings presented in this section, and it examines the data to identify patterns and implications.

C. ANALYSIS

1. BRFE Database Analysis

This BRFE Database highlighted a plethora of vulnerabilities in things such as ship design, material storage, and crew readiness. The dataset from the BRFE Database meticulously records various incidents and control failures associated with the catastrophic fire on the Bonhomme Richard. Each entry details a specific event and its link to particular

components of internal controls as outlined by the COSO Framework. Notably, the data demonstrates a recurrent theme of inadequacy in several areas: the lack of proper storage conditions exacerbated by arson, the inoperability of firefighting stations, and the crew's unfamiliarity with crucial firefighting systems such as the AFFF system. This theme of inadequacy underscores the massive control activities failures which plagued the Bonhomme Richard. As shown in Table 1, the database categorized 180 incidents specifically under control activities, representing the largest subset of events recorded. This significant number highlights the prevalent inadequacies in implementing essential safety measures. Additionally, the data lists 47 events (Table 1) tied directly to risk assessment failures, demonstrating a systemic oversight in identifying and evaluating potential hazards that could escalate into more severe situations. The information and communication component is directly associated with 42 recorded events (Table 1), indicating lapses in ensuring that critical information about safety protocols and emergency procedures was adequately disseminated and understood by the crew. This shortfall in communication is critical, as effective information flow is essential for operational readiness and emergency response. Furthermore, monitoring activity failures include 47 entries (Table 1), pointing to a frequent failure in overseeing and evaluating the effectiveness of the internal controls in place. These numbers not only quantify the breakdowns in each area of the COSO Framework but also highlight the critical areas where improvements are urgently needed.

A deeper analysis of these entries suggests systemic failings across multiple dimensions of the COSO Framework. For example, several incidents underline significant gaps in risk assessment and control activities, where potential hazards were not effectively identified or mitigated. Moreover, the documented inadequacy in information and communication and monitoring activities, such as the inoperability of essential firefighting equipment and the lack of effective training for AFFF system usage, points to severe lapses in maintaining operational readiness and responding to emergency conditions. These insights offer critical lessons on the importance of robust internal controls and the need for continual monitoring and updating of these controls to safeguard against and manage catastrophic events effectively. Further scrutiny of the BRFE Database reveals that many of the recorded events expose not only operational failures but also organizational and

leadership weaknesses within the control environment. For instance, several entries indicate a failure to enforce policies which ensure the physical security and proper maintenance of equipment, which are fundamental to the control environment. This includes incidents where necessary firefighting equipment was not accessible or operational at critical times. These instances reflect a broader issue of non-compliance with established safety standards and protocols, which is crucial for setting the tone at the top and embedding a culture of safety and risk management across the organization.

Moreover, the aggregation of data pertaining to control activities suggests a pattern of reactive rather than proactive management in handling risks associated with ship safety and emergency preparedness. The high number of primary and secondary events linked to control activities, where preventive measures could have been implemented, underscores a lack of effective implementation and enforcement of control procedures. This analysis implicates a significant disconnect between the designed internal controls and their practical application, highlighting an area for potential improvement. By intensifying training, improving communication channels, and ensuring that all safety measures are not only available but also understood and actionable by all crew members, the likelihood and impact of such disastrous events can be substantially reduced.

2. UIR Database Analysis

The UIR Database integrates the recommendations given in the USPACFLT Investigation report with internal controls aimed at enhancing accountability and oversight. These recommendations within the USPACFLT Investigation are structured organizationally, linking to specific focus areas such as material condition, training and readiness, shore establishment support, and oversight to facilitate effective action and clear task ownership (VCNO, 2021). The recommendations suggest systematic changes to ensure that similar failures do not recur, advocating for streamlined and simplified directives, policies, and programs. This approach highlights a concerted effort to align and codify responsibilities to prevent another catastrophic outcome, ensuring that internal controls are robust and reflective of the lessons learned from the incident.

The UIR Database highlights a broad range of recommendations for strengthening internal controls, particularly in response to vulnerabilities in ship design, crew readiness, and material storage as identified from the analysis of the catastrophic fire on the Bonhomme Richard. This dataset records a series of recommendations and links each to specific components of the COSO Framework, underlining systemic issues and proposing actionable solutions to address them. For instance, as shown in Table 2, the largest number of primary and secondary designations (83) focus on the control environment, indicating USPACFLT's need for stronger leadership and enforcement of policies that ensure the physical security and proper maintenance of equipment. The data also suggests substantial emphasis on monitoring activities (75 total primary and secondary designations) (Table 2), with recommendations aimed at evaluating of the effectiveness of internal controls. The entries linked to information and communication (28 total designations) (Table 2) and risk assessment (20 total designations) (Table 2) highlight USPACFLT's need for improved communication channels and continuous evaluation of the effectiveness of internal controls. A focus on proactive management rather than reactive responses to ship safety and emergency preparedness is a recurring theme in the database. The dataset underlines the importance of having not only well-designed internal controls but also ensuring that they are effectively implemented and consistently enforced. By intensifying training, enhancing communication, and enforcing compliance with established safety standards, the likelihood and impact of such disastrous events can be substantially reduced; thus, fostering a culture of safety and risk management across the organization.

3. Comparative Analysis of the BRFE and UIR Databases

The BRFE Database and the UIR Database have both similarities and differences in terms of their distributions of internal control failure designations. Beginning with the main similarity, both the BRFE Database and UIR Database identified risk assessment, information and communication, and monitoring activities failures in relatively the same amounts. As shown in Table 3, this is evidenced by the databases' small differences in identified risk assessment failures (3.83%), information and communication failures (2.03%), and monitoring activities failures (2.11%). These small differences show that in the case of these three internal control components, USPACFLT made an amount of

recommendations suitable for the amount of internal control component failures associated with the fire events. This indicates that USPACFLT took a step in the right direction with its prioritization of these three components. Moreover, it indicates that USPACFLT recognized the need for continual evaluation of control effectiveness from its assessment of the events that took place.

The greatest difference between the BRFE Database and the UIR Database is their respective control environment and the control activities distributions. As shown in Table 3, the BRFE Database documented a high incidence (43.48%) versus the UIR Database's lower focus on improving control activities (22.56%), reflecting a difference of 20.92%. This gap suggests that while control failures were frequent during the incident, USPACFLT's recommendations prioritize them less compared to other areas. However, this could be possibly due to USPACFLT's perceived need for stronger foundational changes in leadership and oversight in an effort to get to the root of the control activities failures. This is evident in the UIR Database's emphasis on control environment deficiencies and failures in the recommendations (31.20%) (Table 3) compared to the control environment's actual failure rate (6.52%) (Table 3). This 24.68% gap (Table 3) underscores USPACFLT's strategic shift towards strengthening leadership and governance structures to influence all other areas of internal controls. A comparison of the BRFE Database and the UIR Database indicates that USPACFLT has opted to take a long-term approach to prevent future incidents by establishing a robust internal control system that operates under effective leadership and continuous management.

4. Internal Control Failures

The following section provides a further breakdown of each internal control component and their associated control failures within each component relative to the Bonhomme Richard fire and the information provided in the USPACFLT Investigation report.

a) Control Environment

According to the COSO Framework, the control environment encompasses the foundational standards, procedures, and frameworks that support the implementation of

internal controls within an organization (COSO, 2013). This includes the integrity, ethical values, and skills of the organization's personnel, the management's philosophy and operational approach, and the methods by which management allocates authority, responsibility, and nurtures its workforce (COSO, 2013). In the case of the USS Bonhomme Richard, several critical failures in the control environment component contributed to the severity of the fire incident.

One significant failure in the control environment was the lack of accountability and responsibility at various levels of command. The investigation revealed that there was an absence of clear roles and responsibilities, which led to ineffective oversight and inadequate preparation for fire emergencies. Senior leadership failed to ensure that fire safety protocols were rigorously followed, and there was a general disregard for the maintenance of essential firefighting equipment. This negligence is evidenced by the fact that 87% of the ship's fire stations were inactive, significantly impairing the ship's ability to respond to the fire (VCNO, 2021). The integrity and ethical values of the organization were also compromised, as evidenced by the failure to adhere to established fire safety procedures and training protocols. The crew's training and readiness were marked by repeated failures in drills and a lack of basic firefighting knowledge in an industrial environment. This indicates a systemic issue where the importance of compliance with safety standards was not adequately emphasized or enforced by the command structure. The investigation noted that the crew failed to meet the time standard for applying firefighting agent on 14 consecutive occasions leading up to the incident, reflecting a significant breakdown in the control environment (VCNO, 2021).

There was an evident and sever lack of routine and periodic inspections to ensure compliance with fire safety requirements. This failure extended to the administrative and operational chains of command, resulting in inconsistent interpretation, implementation, and adherence to fire safety measures across the ship, shipyard, and contractors. Specifically, the oversight of hot work—a known high-risk activity—was insufficient. There were also competing priorities between safety preparedness, maintenance production, and off-ship training, which compounded the risk of fire, particularly during transitions between operations and maintenance (USPACFLT, 2021). Moreover, the

oversight by higher echelons of command was ineffective, contributing to the deteriorating control environment. The Southwest Regional Maintenance Center (SWRMC) did not fulfill its fire safety responsibilities, and Naval Base San Diego (NBSD) failed to ensure that its civilian firefighters were adequately trained and familiar with Navy vessels (VCNO, 2021). This lack of coordination and proper oversight created a fragmented and inefficient response during the fire, as external firefighting teams operated independently due to the absence of clear guidance from the ship's command (VCNO, 2021). The organizational structure and the assignment of authority and responsibility were also flawed. The investigation highlighted that there was a significant delay in the initial response to the fire due to poor communication and a lack of urgency. The duty section primarily used personal cell phones to communicate because they lacked functional radios, and the OOD directed further investigation of the smoke before taking action, losing precious early minutes that could have mitigated the spread of the fire (VCNO, 2021). These failures in the control environment illustrate a pervasive issue within the organizational culture and management practices aboard the USS Bonhomme Richard at the time. The lack of a robust control environment facilitated conditions where critical risks were not effectively managed, leading to catastrophic consequences.

b) Risk Assessment

The risk assessment component of the COSO Framework entails a continuous and evolving procedure for recognizing and evaluating risks to meet the organization's goals (COSO, 2013). This process lays the groundwork for deciding on the appropriate strategies for risk management (COSO, 2013). In the case of the USS Bonhomme Richard fire, multiple risk assessment failures were evident, and one of the most important points to note is that a failure of risk assessment is apparent in every event that led to the fire. One critical failure in risk assessment was the inadequate evaluation and management of fire hazards associated with the ship's maintenance availability. The ship was particularly vulnerable due to ongoing maintenance, the presence of scaffolding, and the significant accumulation of combustible materials such as the ship's gear, equipment, flammables, and other hazardous materials (VCNO, 2021). The investigation revealed that the material condition of the ship on the day of the fire, including the mass storage of materials in tri-wall boxes

and fueled vehicles in the Lower Vehicle Stowage Area, created an ideal environment for the fire to develop and spread. This lack of adequate hazard identification and risk management directly contributed to the intensity and spread of the fire (VCNO, 2021).

Another significant risk assessment failure was the lack of preparedness for emergency response. The investigation highlighted that the ship's leadership failed to recognize and address the risk posed by inadequate firefighting training and readiness. Despite repeated failures during fire drills, where the crew did not meet the time standards for applying firefighting agents, there was no comprehensive strategy to improve training and readiness. This inadequate preparation left the crew ill-equipped to respond effectively to the fire, further exacerbating the situation (VCNO, 2021). Additionally, the failure to assess and mitigate the risk of poor communication systems was evident. The investigation found that the crew relied on personal cell phones due to the unavailability of functional radios and critical communication systems like the Hierarchical Yet Dynamically Reprogrammable Architecture (HYDRA) or 1 Main Circuit (1MC) being degraded or inoperable. This reliance on ad hoc communication methods hindered the coordination and effectiveness of the firefighting efforts. Proper risk assessment should have identified the critical need for reliable communication systems and ensured their operability to facilitate a coordinated response during emergencies (VCNO, 2021).

The Navy's existing risk assessment policies failed to effectively address the unique challenges posed by the ship's maintenance environment. For instance, despite previous incidents of shipboard fires during maintenance availabilities, there was insufficient integration of lessons learned from these incidents into the risk management strategies for the Bonhomme Richard. The Navy's own documentation indicates that many recommendations from the MIAMI Fire Review Panel were not fully implemented or were inconsistently applied across different vessels and facilities. This lack of consistency and lack of follow-through in implementing fire safety protocols and training contributed to the vulnerabilities that allowed the fire to escalate uncontrollably (USPACFLT, 2021). Moreover, the Navy's risk assessment procedures did not adequately consider the compounded risks during maintenance periods, where normal operational controls are often degraded or non-functional. The fire safety assessment program, which was intended

to drive compliance and improve understanding of fire risks, identified several deficiencies such as unqualified fire marshals, inadequate fire watch training, and poor housekeeping practices on ships undergoing maintenance (USPACFLT, 2021). These findings underscore a systemic failure to prioritize and enforce rigorous risk assessment and mitigation measures, which are critical to preventing and responding to such catastrophic events effectively.

The investigation also pointed out the failure to assess the risk posed by the degraded condition of critical firefighting systems. The AFFF system was not properly maintained, and the crew lacked familiarity with its capabilities and availability. Despite its partial availability, the crew did not use the AFFF system during the firefighting efforts, indicating a significant oversight in risk assessment related to the maintenance and readiness of firefighting systems. This failure to ensure the operational readiness of critical systems further underscores the inadequate risk management practices (VCNO, 2021). Lastly, the normalization of deviations from safety standards by the ship's Damage Control (DC) leadership reflects a systemic failure in risk assessment. The acceptance that fire stations in Inactive Equipment Maintenance (IEM) could still be employed in emergencies illustrates a willingness to accept significant risks without proper readiness, further exacerbating the situation during the fire (VCNO, 2021).

c) Control Activities

The control activities component of the COSO Framework encompasses the actions taken to mitigate risks and ensure directives are carried out effectively (COSO, 2013). The control activities component encompasses the vast majority of the Bonhomme Richard events that contributed to the fire. A primary failure was the inadequate training and preparedness of the ship's crew. The investigation noted that DC training rarely included senior leadership involvement, resulting in subpar training quality and a lack of effective action to resolve identified problems. This lack of engagement from senior officers constituted an abdication of their responsibilities as DC leaders (VCNO, 2021). The emphasis on physical observation of casualties before announcing them over the 1MC

delayed the crew's response to the fire, demonstrating flawed training practices that did not prepare the crew for actual emergencies (VCNO, 2021).

Furthermore, the ship's drills and training lacked sufficient variety and rigor. The crew's inability to rapidly put on DC gear, establish effective fire and smoke boundaries, and maintain communications during the fire highlighted this deficiency. The lack of realistic drills and integration with the Federal Fire Department (FEDFIRE) meant the crew was unprepared to respond effectively to the fire, significantly hampering firefighting efforts (VCNO, 2021). The failure to simulate the use of the AFFF system during drills further contributed to the crew's inability to employ it effectively during the fire, as there was little common understanding among the crew regarding its operation (VCNO, 2021). Additionally, the ship's control activities failed to ensure the proper maintenance and readiness of firefighting equipment. The AFFF system, crucial for fire suppression, was in a degraded state due to poor maintenance and falsely certified checks (VCNO, 2021). The lack of clear understanding and training regarding the system's status and operation left the crew ill-equipped to use it during the fire, exacerbating the situation (VCNO, 2021). The oversight of material storage was also deficient, as the Deck Department Head and the lead chief petty officer (LCPO) did not exercise control over the storage of combustible materials, further contributing to the spread and intensity of the fire (VCNO, 2021). Moreover, the mishandling and improper stowage of hazardous and combustible materials significantly contributed to the fire's outbreak and severity. USPACFLT (2021) found that in 60 percent of the fires reviewed, including the Bonhomme Richard, improper material handling was a causal or contributing factor. This was exacerbated by declining standards in watchstanding, poor log-keeping, and procedural noncompliance. The Bonhomme Richard's crew was unprepared for an in-port fire, particularly with only the duty section onboard, and integrated training was insufficient (VCNO, 2021).

d) Information and Communication

The information and communication component of the COSO Framework encompasses the processes and systems used to ensure that relevant, accurate, and timely information is identified, captured, and communicated to enable all employees to fulfill

their responsibilities effectively (COSO, 2013). The Bonhomme Richard fire highlights significant failures in the information and communication component of internal controls. There was a significant lack of clarity in the roles and responsibilities among the various stakeholders involved in fire prevention and response. The FEDFIRE Metro Area model, while designed to enhance efficiency, resulted in confusion due to insufficient guidance on roles and responsibilities. The Metro Area construct placed considerable responsibility on a single FEDFIRE chief accountable to multiple installations, which limited the visibility and control of supported installation commanding officers over FEDFIRE personnel. This ambiguity contributed to a lack of proper oversight, training, and tasking of FEDFIRE personnel, as evidenced by their inconsistent understanding of command-and-control relationships during fire incidents (VCNO, 2021).

Additionally, the communication of training requirements and standards was ineffective. FEDFIRE personnel were not adequately informed or trained on the specific requirements for shipboard firefighting. Training records were poorly maintained, preventing effective oversight of training progress and compliance (VCNO, 2021). The investigation revealed that FEDFIRE leadership was largely unaware of CNIC's annual shipboard training requirements, and many FEDFIRE personnel did not meet these requirements (VCNO, 2021). This gap in training and communication severely hampered the effectiveness of FEDFIRE's response to the fire. The integration of various firefighting entities was also problematic due to poor communication and coordination. FEDFIRE's training did not ensure an integrated response with ship's force, which is critical for effective firefighting. The lack of integrated training exercises and the misunderstanding of integration requirements resulted in uncoordinated firefighting efforts during the initial hours of the fire. It was only after several hours that a truly integrated response was established, highlighting the need for repeated and integrated training to develop this capability (VCNO, 2021).

Another significant communication failure was the inadequate review and updating of mutual aid agreements (MAAs). FEDFIRE did not ensure that NBSD's MAA with the San Diego Fire Department (SDFD) was periodically reviewed and updated, as required by OPNAVINST 11320.23G (VCNO, 2021). This failure contributed to a lack of

understanding of SDFD's capabilities and limitations, particularly their policy limiting intervention in shipboard fires when there was no risk to life. This limitation should have been factored into FEDFIRE's response plans and practiced accordingly, but it was not, leading to gaps in the firefighting efforts during the Bonhomme Richard fire (VCNO, 2021). Lack of effective communication and coordination among various entities involved in the firefighting efforts also played a large part. SWRMC's interoperability radio communication plan proved inadequate, leading to delays in establishing effective communication channels during the fire. This inadequacy was partly due to the reliance on physically transferring radios to the scene of the fire, which was not promptly executed. Furthermore, the failure to implement the 8010 Manual's requirements for radio communication and the lack of a formal waiver for these requirements exacerbated the communication challenges during the fire incident (VCNO, 2021).

Furthermore, the inadequacies in training and information dissemination were significantly high. The record-keeping practices aboard the Bonhomme Richard did not conform to expected standards, making it difficult to determine the ship's configuration and available systems during the fire (VCNO, 2021). This poor record-keeping practice contributed to numerous challenges during the initial firefighting efforts. Furthermore, there was a systemic failure to ensure that crew members were properly trained and aware of their roles. The flawed duty section turnover process left many Sailors unaware of or unqualified for their roles, leading to an uncoordinated response during the crucial initial hours of the fire (VCNO, 2021).

USPACFLT (2021) found that one of the critical issues related to an information and communication breakdown was the failure to ensure that members of the In-Port Emergency Team (IET) were properly aware of and qualified for their roles. This lack of awareness and qualification directly contributed to an uncoordinated response during the initial critical hours of the fire. The engineering department's practice of assigning IET personnel to other watch stations heightened these deficiencies, leading to confusion and inefficiency during the emergency response (USPACFLT, 2021). Another failure found was the inadequate dissemination of the ship's system statuses. The engineering department routinely did not communicate the status of ship systems to departmental

personnel, duty section personnel, or leadership, which resulted in a general lack of awareness about the ship's configuration and operational capabilities (USPACFLT, 2021). This ignorance significantly hindered the crew's ability to effectively combat the fire. Additionally, critical damage control communication systems were degraded or inoperable, forcing the crew to rely on personal cell phones or point-to-point communications instead of the installed ship systems (USPACFLT, 2021). This improvisation in communication methods further impeded coordinated firefighting efforts and highlighted the disconnect between the ship's leadership policies and the actual communication practices on board.

e) Monitoring Activities

Monitoring activities within the COSO Framework are essential for assessing the effectiveness of internal controls over time and ensuring that deficiencies are identified and addressed promptly. The Bonhomme Richard fire highlights significant failures in monitoring activities that compromised the ship's preparedness and response capabilities. One notable failure was the ship's force's insufficient vigilance and enforcement of proper storage practices for hazardous materials. Despite regular fire safety walkthroughs, significant quantities of combustible materials were allowed to accumulate unchecked in various spaces throughout the ship, such as the storage of flammable materials in the vehicle and medical spaces. This failure to monitor and address fire hazards directly contributed to the fire's magnitude and severity (USPACFLT, 2021). Furthermore, SWRMC did not exercise proper oversight over the Fire Safety Officers (FSOs) and their execution of safety walkthroughs. The inadequate management of FSOs allowed numerous fire risks to go unaddressed, as discrepancies noted during walkthroughs were not formally reviewed or analyzed for performance trends. This lack of monitoring and corrective action enabled unsafe operations to persist. Additionally, the failure to ensure that only qualified individuals conducted FSO duties, and the lack of formal government review of walkthrough findings further exacerbated the ship's vulnerability to fire hazards (USPACFLT, 2021).

Another one of the critical failures in monitoring activities was the inadequate oversight of the ship's firefighting systems. The USPACFLT Investigation report indicates that a substantial number of the ship's firefighting stations were in an IEM status, and despite this, they were erroneously considered fully operational by the leadership (VCNO, 2021). This misjudgment points to a severe deficiency in ongoing monitoring and assessment of these critical systems. Effective monitoring should have included regular and thorough inspections, testing, and maintenance to ensure the firefighting systems were operational. The lack of proper monitoring led to a situation where, during the fire, many firefighting stations were found inoperable or improperly maintained, significantly hindering the initial firefighting response (VCNO, 2021). Furthermore, the inadequate training and preparation of the crew for emergency responses reveal a broader failure in monitoring the effectiveness of training programs and readiness drills. VCNO (2021) highlights that the crew was not adequately trained to utilize emergency equipment, such as the AFFF system and Emergency Escape Breathing Devices (EEBDs), both of which are key internal controls, and lacked the necessary knowledge and preparedness to effectively respond to the fire. Effective monitoring would have included regular evaluations of training programs, drills, and the crew's readiness to respond to emergencies, identifying gaps in knowledge and preparedness that needed to be addressed (VCNO, 2021).

Table 4 provides a summary of failures within each internal control component. Table 5 provides a summary of key recommendations made by the USPACFLT Investigation report.

Table 4. Summary of Key Internal Control Failures

INTERNAL CONTROL COMPONENT (WITH TOTAL # OF CONTROL FAILURES)	KEY INTERNAL CONTROL FAILURES
CONTROL ENVIRONMENT (27)	• Absence of clear roles/responsibilities • Compromised integrity and ethical values of the organization • Lack of basic firefighting knowledge
RISK ASSESSMENT (47)	• Poor storage conditions and lack of risk consideration • Premature evacuation and securing of power left firefighting methods and systems vulnerable • Inadequate and degraded systems were left as is
CONTROL ACTIVITIES (180)	• Ship's readiness was inadequate to quickly respond • Unawareness and inoperability of AFFF prevented its use during the fire • Non-simulated use of AFFF in drills failed to prepare crew for its operation during the fire
INFORMATION AND COMMUNICATION (52)	• Misdirected entry efforts by FEDFIRE wasted resource and delayed firefighting • Integration of external firefighting teams into the firefighting effort was poor • Reliance on non-standard communication methods
MONITORING ACTIVITIES (108)	• Inadequate SCBA resources from the start of the fire necessitated premature evacuation • Ineffective tracking of ship stability • Inadequate training record maintenance

Table 5. Summary of Key Recommendations

INTERNAL CONTROL COMPONENT (WITH TOTAL # OF RECOMMENDATION DESIGNATIONS)	KEY RECOMMENDATIONS
CONTROL ENVIRONMENT (83)	• Evaluate and develop firefighting plans and instructions • Review and develop training and qualification requirements • Coordinate joint firefighting oversight
RISK ASSESSMENT (20)	• Evaluate and assess shipboard fire risk • Perform risk assessments on hazardous material storage • Review and assess safety risks associated with firefighting measures
CONTROL ACTIVITIES (60)	• Create additional billets and roles for firefighting • Require working equipment and systems • Conduct scheduled joint firefighting trainings
INFORMATION AND COMMUNICATION (28)	• Communicate training requirements and standards • Communicate roles and responsibilities of people involved in firefighting efforts • Improve joint communications between ship's crew and civilian entities
MONITORING ACTIVITIES (75)	• Track shipboard readiness to fight fires • Perform compliance assessments • Review process adequacy

This section presented an analysis of the BRFE and UIR databases, as well as an analysis of internal control components relative to the Bonhomme Richard fire. The next section expands upon the implications of this research study's results.

D. IMPLICATIONS OF RESULTS

The USS Bonhomme Richard fire underlines profound deficiencies within the control environment. The lack of accountability, unclear roles, and poor oversight highlighted systemic failures that escalated the fire's severity. This neglect, particularly in the management of essential fire safety protocols and equipment, demonstrates a significantly great deviation from the principles outlined by the COSO Framework, which emphasize the importance of integrity, ethical values, and competence (COSO, 2013). The incident shows that a weak control environment can significantly undermine the organization's ability to manage risks effectively, leading to catastrophic outcomes. Addressing these issues requires a comprehensive overhaul of the organizational culture and leadership approaches to ensure strict adherence to safety protocols and clear delineation of responsibilities.

The Bonhomme Richard's tragedy was significantly worsened by multiple failures in risk assessment processes. The ship's vulnerabilities during maintenance were not adequately addressed, nor were the risks of inadequate firefighting training and readiness. This oversight in identifying and managing risks associated with high-risk activities like hot work and material storage significantly contributed to the fire's spread and intensity. For future operations, there is a critical need to enhance risk assessment strategies, ensuring they are dynamic and include thorough evaluations of operational environments and readiness levels, which are essential for mitigating potential hazards.

The failures in control activities were evident in the lack of effective training, poor maintenance of critical firefighting equipment, and inadequate management of combustible materials. The incident underscores the necessity of robust control activities that are effectively executed and monitored. Strengthening these activities involves enhancing training programs, ensuring proper equipment maintenance, and rigorously enforcing

safety standards. These measures are vital for building a resilient operational stance capable of preventing and effectively responding to emergency situations.

The Bonhomme Richard fire incident also brought to light significant deficiencies in the information and communication frameworks. The lack of clarity in roles, ineffective communication of safety protocols, and poor integration of emergency response efforts hampered effective and prompt action during the crisis. To rectify these issues, organizations must focus on establishing clear communication channels and ensuring that all personnel are fully aware of and capable of executing their responsibilities. Furthermore, routine updates and training on emergency response protocols are necessary to maintain a high level of preparedness.

Furthermore, the fire revealed critical gaps in monitoring activities, particularly in the oversight of fire safety protocols and the maintenance of firefighting systems. These failures demonstrate a lack of effective mechanisms to ensure ongoing compliance with safety standards and operational readiness. Enhancing monitoring activities will require organizations to implement more rigorous oversight procedures and regular audits to identify and rectify non-compliance and operational deficiencies promptly.

This section discussed further implications related to internal control failures with the Bonhomme Richard event. The next section provides recommendations arising from this research study's findings.

E. RECOMMENDATIONS BASED ON RESEARCH FINDINGS

Based on the research findings and analysis, five key recommendations have been identified to enhance internal controls and overall safety aboard naval vessels. These recommendations address critical areas such as crew training, internal control training, assessment, and review, and the implementation of upgraded systems and technology.

1. Create and Mandate Internal Control Training for All Personnel

Based on the research findings and analysis, the control environment was found to be the lowest internal control component with the lowest number of primary and secondary events (27/6.52%) (Table 3). However, the establishment of effective internal controls

starts at the top of an organization, and the effective and proficient training of personnel is one of the key components of an effective internal control environment.

To improve emergency preparedness and response capabilities across all naval personnel, it is crucial to implement a robust training program focused on internal controls, particularly concerning fire safety and equipment operations. A detailed training curriculum should be developed that encompasses both theoretical and practical components, covering all critical internal control systems aboard a given naval vessel with an emphasis on fire prevention, detection, and suppression systems. The curriculum should detail specific roles and responsibilities for each crew member during emergencies.

Mandatory participation in this training for all naval personnel, regardless of rank or role, would be essential, with specialized modules designed for specific responsibilities. This training should be integrated into the onboarding process for new crew members and include periodic refresher courses to maintain proficiency. Practical drills and simulations that mimic emergency scenarios should be regularly conducted, focusing on the activation and operation of systems like fire suppression equipment. These practical exercises will help test decision-making and operational skills in real-time, providing immediate feedback to reinforce learning and improve response actions.

Additionally, this training program should be closely integrated with existing safety protocols and drills to foster a comprehensive safety culture aboard ships. It is crucial to ensure that all safety and emergency response training is interconnected, promoting a holistic understanding of how internal controls fit within broader safety measures. Regular evaluations of the training program's effectiveness through assessments and feedback mechanisms are necessary, with adjustments made based on technological advancements, new safety requirements, or lessons learned from past incidents. Maintaining detailed records of training participation and performance for all crew members will help track progress and identify areas needing improvement. Easy access to training materials and operational manuals for all internal control systems aboard the ship, available both digitally and in physical formats, will ensure that crew members can quickly refer to them during emergencies. By taking these steps, the Navy can significantly enhance the readiness and capability of its personnel to manage emergencies effectively; thereby, improving safety

aboard naval vessels and building a strong culture of preparedness and accountability among all crew members.

2. Place More Focus on Control Activities Failures

Based on the research findings and analysis, control activities was found to be one of the top three internal control components with a high number of primary and secondary events (180/43.48%) (Table 3). Control Activities was also one of the top two internal control components with significant difference between the USPACFLT Investigation report recommendations and the actual fire events (20.92% difference) (Table 3).

To address the deficiencies in control activities revealed by the Bonhomme Richard fire, it is essential not to just strengthen the control environment but also to fortify the control activities themselves, particularly during high-risk periods such as maintenance or deployment preparations. Enhancing oversight and standardizing procedures for the maintenance of critical firefighting systems are crucial steps. Regular audits should be mandated to ensure adherence to maintenance protocols, with commanding officers reviewing results frequently to maintain stringent oversight. Developing and enforcing standardized procedures across all naval ships will provide uniform guidelines that include specifications for daily checks, routine maintenance, and emergency operations of firefighting equipment. Furthermore, implementing comprehensive training programs focused on control activities related to fire safety is vital. These programs should not only provide theoretical knowledge but also practical training on the operation of firefighting systems and emergency response tactics. Incorporating these training aspects into regular drills that simulate real-life fire scenarios will ensure crew readiness and procedural adherence in real emergencies.

Integrating control activities into the daily operational checks aboard ships can enhance the continuous monitoring and maintenance of firefighting systems, making it a routine aspect of ship operations. Establishing clear accountability measures for maintaining and operating these systems is also imperative. A transparent accountability system should be put in place where individuals and departments are held responsible for their roles in maintaining readiness, with defined consequences for lapses in responsibility.

Lastly, establishing a feedback loop that includes debriefs from training, drills, and actual fire incidents will facilitate continuous improvement of control activities. This feedback mechanism should focus on analyzing the effectiveness of implemented control measures and updating training and maintenance protocols based on these evaluations. By adopting these measures, the Navy can significantly enhance its fire response capabilities and ensure the readiness and effectiveness of its firefighting systems and personnel aboard naval vessels. This approach requires a commitment to rigorous training, meticulous maintenance, and robust accountability to safeguard against the recurrence of catastrophic incidents.

3. Implement Integrated Firefighting Drills Involving All Response Teams

Based on the research findings and analysis, some of the main factors that contributed to the firefighting disaster after the Bonhomme Richard fire started were severe deficiencies in communication and joint firefighting between the response teams. The research findings showed that 12.56% (Table 3) of the total fire event deficiencies were related to the information and communication internal control component.

To enhance the operational effectiveness of fire response and improve coordination between ship's crews and civilian firefighting teams such as FEDFIRE and SDFD, it is essential to develop comprehensive joint firefighting protocols. These protocols should detail roles, responsibilities, and actions for each team during different fire response stages, including standardized communication, command transfer, and operational tactics. Regular integrated drills involving both naval personnel and civilian firefighters should be conducted to simulate various fire scenarios aboard ships. These drills must create realistic conditions, including smoke-filled environments and non-operational ship systems, to prepare all teams for actual fire emergencies.

Cross-training workshops are also crucial, where naval and civilian firefighters can familiarize themselves with each other's equipment, techniques, and operational limitations. Practical applications such as operating different firefighting equipment, understanding the layout of different classes of ships, and effective usage of naval

firefighting systems by civilian teams should be emphasized. Additionally, communication systems used by both naval and civilian teams need to be tested and integrated to ensure effectiveness during emergencies. A common communication plan should be developed, including protocols for scenarios where standard communication systems may fail.

Following each drill should be conducted thorough debriefings to discuss successes and areas for improvement. Training and protocols should be adjusted based on feedback from these sessions and simulations should be used to track response times, decision-making effectiveness, and overall drill outcomes. All protocols and training materials should be easily accessible to both naval personnel and civilian firefighting teams and regularly updated to reflect changes in ship design, firefighting technology, or lessons learned from past incidents. This integrated approach will build a foundation of mutual understanding and operational readiness, which is critical for effective emergency response aboard naval vessels.

4. Implement Advanced Fire Detection and Alarm Systems

Based on the research findings and analysis, one of the greatest reasons for why the fire was able to spread throughout the ship without being contained was that personnel were unaware of a fire to begin with, and the personnel responsible for combatting a shipboard fire were not informed until long after the fire started.

To effectively enhance fire detection capabilities aboard naval ships, particularly during high-risk periods such as maintenance, it is crucial to implement advanced fire detection and alarm systems. These systems should include state-of-the-art smoke, heat, and flame detectors with improved sensitivity and faster response times, capable of differentiating between different types of fires and environmental conditions to reduce false alarms. Alongside enhanced detection, these systems should be capable of localizing fires accurately within the ship and integrating automated response mechanisms such as automatic door closures and fire suppression activations. This automation is critical, especially if key parts of the ship's power or command systems are compromised.

Integration of these advanced systems into the ship's existing control systems allows for central monitoring and control, providing real-time data to ship's officers and

firefighting teams during a fire event. To ensure reliability, these systems require regular testing and maintenance, with a strict adherence to the maintenance schedule and immediate attention to any discrepancies found during checks. Regular training sessions for crew members are also essential, focusing on operating the new fire detection systems through simulations of fire scenarios. This training is vital for familiarizing the crew with system operations and ensuring they are prepared to take immediate action during an actual fire.

Furthermore, establishing a feedback loop from drills and actual incident responses is crucial for continually improving the detection and response systems. Analyzing the effectiveness of the systems and protocols in every drill or fire incident and making necessary adjustments ensures that the fire detection and response systems evolve in line with new challenges and technological advances. By taking these steps, the Navy can significantly enhance its ability to detect and respond to fires aboard ships, safeguarding lives, protecting naval assets, and ensuring operational readiness and safety in all conditions.

5. Conduct a Comprehensive Review of MAAs and Update Accordingly

Based on the research findings and analysis, monitoring activities had the second highest number of primary and secondary events (108/26.09%) (Table 3). The failures in existing protocols and policies highlight the need to have better review systems in place.

To enhance the efficacy of responses to shipboard emergencies, it is essential to comprehensively review and update MAAs, especially in light of lessons learned from the Bonhomme Richard fire. This incident underscored significant coordination challenges between Navy and civilian firefighting resources, highlighting the need for clear and actionable mutual aid agreements. A thorough analysis of existing agreements is required to identify gaps, particularly in coordination, communication protocols, and resource sharing. Involving all relevant stakeholders—including naval base commanders, ship captains, regional emergency management authorities, and civilian emergency response team leaders—in the revision process is crucial. Workshops and meetings should be facilitated to gather input and agree on protocols that address identified gaps.

The MAAs should clearly define and standardize communication channels and command structures for use during joint emergency responses. This includes designating primary and secondary points of contact and establishing common communication platforms that are regularly tested. Developing a standardized incident command system that integrates naval and civilian response structures efficiently during emergencies will also be pivotal. Implementing regular joint training sessions and drills that simulate various emergency scenarios is necessary to practice the execution of these agreements. These drills should include scenarios that test the practical aspects of communication, resource allocation, and command transitions.

Regular updates to the MAAs should reflect changes in personnel, technology, and protocols, ensuring that all modifications are well-documented and distributed to all parties involved. The agreements should be easily accessible and incorporated into the standard operating procedures on ships and at naval installations. Establishing a monitoring system to evaluate the effectiveness of mutual aid during actual events and drills will provide feedback for continuous improvement of the agreements and training programs. An annual review of the mutual aid agreements should also be scheduled to adapt to new challenges, changes in operational capabilities, or lessons learned from recent incidents. By taking these steps, the Navy can ensure that both naval personnel and civilian emergency teams are better prepared and coordinated; thereby, enhancing operational readiness, improving safety outcomes, and ensuring optimal utilization of resources during critical situations.

F. SUMMARY

This chapter provided a thorough analysis, key findings, implications, and practical recommendations derived from a detailed study of the Bonhomme Richard fire. It started with a review of the BRFE and UIR databases specifically created for this study, focusing on their role in cataloging events and recommendations linked to the fire. The chapter then discussed significant findings from these databases, which revealed a pattern of internal control failures, especially within control activities, that critically impacted the ship's fire response capabilities. The implications of these findings suggested systemic issues in the Navy's internal control frameworks, particularly in the enforcement and monitoring of fire

safety protocols and equipment maintenance. To address these systemic issues, the chapter proposed actionable recommendations aimed at enhancing internal control training, focusing on control activities failures, implementing integrated firefighting drills, and advancing fire detection systems. These recommendations were designed to bolster the Navy's preparedness and response to fire emergencies, ensuring that such devastating incidents are mitigated or prevented in the future. The chapter underscored the need for an ongoing review of internal controls and collaborative efforts between naval personnel and civilian firefighting teams to enhance safety measures aboard naval vessels.

The following chapter provides a summary, conclusions, and areas for further study.

V. SUMMARY, CONCLUSIONS, AND AREAS FOR FURTHER RESEARCH

A. SUMMARY

On July 12th, 2020, a fire blazed through the USS Bonhomme Richard, leading to significant damage to the naval vessel over several days and the ultimate decommissioning of the ship. A formal command investigation revealed systemic failures in all facets of internal controls, highlighting the need for stringent improvements in naval safety protocols and training.

The purpose of this research was to analyze the Bonhomme Richard fire through the lens of internal controls, applying the Committee of Sponsoring Organizations of the Treadway Commission (COSO) Internal Control-Integrated Framework. This research analyzed each critical failure in the Bonhomme Richard fire incident as well as recommendations set forth by the formal U.S. Pacific Fleet Command (USPACFLT) Investigation and designated each critical failure or recommendation as a primary internal control component failure and a secondary internal control component failure, based on the nature of the event or the purpose of the recommendation. These designations were compiled into two databases, the Bonhomme Richard Fire Event (BRFE) Database and the USPACFLT Investigation Recommendation (UIR) Database.

This research study used auditability theory, which includes the auditability triangle, effective internal controls, competent personnel, and efficient processes, in understanding the dynamic interactions of an internal control framework within the Navy. The focus of this research was on the internal control component of the auditability triangle. Applying the COSO Framework to the Bonhomme Richard fire provided essential insights into creating internal control systems that promote accountability and transparency.

This research uncovered severe shortcomings regarding the Bonhomme Richard fire and the Navy's internal controls. Internal controls were devastatingly deficient, failing to meet fire safety standards and effectively integrate civilian firefighters. These issues revealed broader problems in the Navy's oversight and management practices, particularly

in maintaining fire preparedness and safety compliance. Based on the findings, recommendations were provided to the Navy to enhance their internal controls and fire preparedness procedures.

B. CONCLUSIONS

This research primarily focused on five research questions, for which the answers are presented next.

1. What critical events contributed to the fire aboard the USS Bonhomme Richard?

As shown in Table 1, there were 207 events that contributed to the Bonhomme Richard fire, and it was a culmination of all these events that made it so disastrous. However, there were a few critical events that stand out. On the morning of July 12, 2020, the ship was in a vulnerable state due to its ongoing maintenance availability, which involved significant amounts of scaffolding, contractor equipment, and combustible materials distributed throughout the vessel. Specifically, the storage of oil drums, gas cylinders, and other flammable materials in the Lower Vehicle Stowage Area (Lower V) and Upper Vehicle Stowage Area (Upper V) created an ideal environment for the fire to ignite and spread rapidly (VCNO, 2021).

The initial response to the fire was hindered by several factors, including the inadequate training and preparedness of the ship's crew, and the insufficient coordination with civilian firefighters. Communication failures, such as the reliance on personal cell phones due to inoperative installed systems, and a delayed casualty call, significantly impaired the crew's ability to coordinate an effective and prompt firefighting effort. Moreover, the majority of the ship's fire stations were in an inactive maintenance status, which meant that critical firefighting equipment was either unavailable or not operational. This lack of readiness, combined with the crew's unfamiliarity with the ship's firefighting systems and poor material condition, allowed the fire to grow uncontrollably and ultimately resulted in the complete evacuation of the ship (VCNO, 2021).

2 How do the critical events that contributed to the fire align with the COSO Framework?

Table 1 shows the numerical breakdown of each event into its corresponding primary and secondary internal control failures, and Figure 3 and Figure 4 reflect a percentage breakdown of the primary and secondary internal control failure designations given to each of the 207 events that contributed to the Bonhomme Richard fire, respectively. The critical events that contributed to the fire aboard the Bonhomme Richard aligned with multiple failures across the COSO Framework's components.

Firstly, Control activities were also insufficient or not properly enforced (180 total control failure designations) (Table 1). The inactive status of fire stations, failure to maintain firefighting systems, and lack of effective response protocols highlight significant deficiencies in control activities. The crew's inability to quickly and effectively respond to the fire underscores the failure to implement proper control measures, which allowed the fire to grow uncontrollably.

Secondly, there was a lack of effective monitoring activities (108 total control failure designations) (Table 1). The ship's leadership did not adequately oversee the maintenance and readiness of firefighting systems or ensure that fire safety protocols were followed. Additionally, the failure to integrate and support the ship's crew with shore-based fire safety measures reflects deficiencies in monitoring activities at higher command levels. This lack of oversight allowed the issues to persist and ultimately contributed to the severity of the fire.

Thirdly, there were critical failures in information and communication (52 total control failure designations) (Table 1). The use of personal cell phones instead of installed communication systems and the lack of urgent communication regarding the fire's outbreak and spread severely hindered the coordination and execution of a timely and effective firefighting response. These communication breakdowns contributed to the chaos and inefficiency of the initial response efforts.

Fourthly, there were significant lapses in risk assessment (47 total control failure designations) (Table 1). The risks associated with the maintenance environment were not

adequately identified, assessed, or mitigated. The accumulation of flammable materials, inactive firefighting systems, and lack of comprehensive fire safety measures indicate that the ship's command did not effectively evaluate the potential hazards of the ongoing maintenance activities and failed to implement necessary preventive measures. This poor risk assessment left the ship vulnerable to fire.

Lastly, the control environment (27 total control failure designations) (Table 1) on the Bonhomme Richard was weak, as evidenced by the degraded material condition and inadequate training and readiness of the crew. The ship's leadership failed to establish a culture of safety and compliance, which is reflected in the repeated failures in drills, lack of knowledge about firefighting in an industrial environment, and poor maintenance of critical firefighting equipment. This weak control environment set the stage for the subsequent failures.

3. How do USPACFLT's recommendations align with the COSO Framework?

Table 2 shows the numerical breakdown of each USPACFLT recommendation into its corresponding primary and secondary internal control failures, and Figure 5 and Figure 6 reflect a percentage breakdown of the primary and secondary internal control failure designations given to each of the 133 recommendations (Table 2). The recommendations from USPACFLT align closely with the COSO Framework.

Firstly, the recommendations also enhance the control environment (83 total recommendation designations) (Table 2) by reinforcing leadership accountability and promoting a culture of safety and vigilance. The emphasis on the responsibility and accountability of the ship's commanding officer and other senior leaders reflects the COSO principle that management's philosophy and operating style significantly influence the control environment (COSO, 2013). By ensuring that senior leadership is actively engaged in damage control training and readiness initiatives, USPACFLT aims to create a disciplined and structured foundation for effective internal control.

Secondly, the recommendations reflect a strong focus on monitoring activities (75 total recommendation designations) (Table 2). USPACFLT's directive to implement and evaluate periodic drills and assessments, such as the periodic review of damage control

requirements and practices, aligns with COSO's principle of conducting ongoing and separate evaluations to ascertain whether each of the five components of internal control, including control activities, is present and functioning (COSO, 2013; VCNO, 2021). This proactive monitoring helps identify areas for improvement and ensures continuous enhancement of fire safety measures.

Thirdly, the recommendations focus on enhancing control activities (60 total recommendation designations) (Table 2) through rigorous training and readiness initiatives. For instance, the modification of the firefighting school curriculum to emphasize industrial shipboard firefighting and integration with external firefighting forces ensures that personnel are well-prepared for emergency situations. Additionally, the evaluation of Damage Control Assistant School for Chief Engineers underscores the importance of role-specific training to maintain effective internal controls within the organization (VCNO, 2021).

Fourthly, the recommendations emphasize the importance of effective information and communication channels (28 total recommendation designations) (Table 2). For example, the requirement for command investigations into shipboard fires to be routed to relevant authorities ensures that vital information is communicated and shared for oversight and preventive measures (VCNO, 2021). This aligns with COSO's principle of using relevant and quality information to support the functioning of other internal control components (COSO, 2013).

Finally, the recommendations incorporate risk assessment (20 total recommendation designations) (Table 2) by requiring thorough reviews and updates to existing policies and procedures. The alignment and streamlining of guidance documents like the S0570-AC-CCM-010/8010 Manual and COMUSFLTFORCOMINST 4790.3 aim to close any gaps in guidance and ensure clear direction and accountability, directly addressing COSO's components of risk assessment and control activities (COSO, 2013; VCNO, 2021). This systematic approach to risk assessment helps in identifying and managing potential risks associated with shipboard operations and maintenance.

4. How well does the COSO Framework alignment of critical events compare to the COSO Framework alignment of recommendations?

As shown in Table 3, the alignment of critical events to USPACFLT's recommendations compared fairly well with the risk assessment, information and communication, and monitoring activities internal control components, with differences of 3.83%, 2.03%, 2.11%, respectively. However, significant differences between the two alignments were found in the control environment and control activities components. The control environment component showed a difference of 24.68% (Table 3), where the percentage out of total recommendation designations (31.20%) (Table 3) was substantially higher than the percentage out of total event designations (6.52%) (Table 3), indicates a strong emphasis on improving leadership accountability and organizational culture in the recommendations. Conversely, the control activities component showed a notable difference of 20.92% (Table 3) between 43.48% (Table 3) of total event designations and 22.56% (Table 3) of total recommendation designations, suggesting that while many events were related to control activities, the recommendations prioritize addressing other areas other than control activities.

5. Based on the internal control analysis, what patterns or trends of internal control deficiencies may have contributed to the fire?

Based on the internal control analysis, several patterns and trends of deficiencies in all internal control components likely contributed to the fire aboard the Bonhomme Richard. Firstly, there was a significant deficiency in the control environment. As shown in Table 3, the low percentage of events (6.52%) related to this component compared to the high percentage of recommendations (31.20%), with a difference of 24.68%, suggests that the leadership did not establish a culture of safety, accountability, and compliance. The poor material condition of the ship, inadequate training, and readiness of the crew reflect a lack of oversight and engagement from the ship's leadership, creating an environment susceptible to failures.

Control activities also showed notable deficiencies, with a difference of 20.92% (Table 3) between total events (43.48%) (Table 3) and total recommendations (22.56%)

(Table 3). The high number of events attributed to control activities failures indicates that many events were due to the failure or absence of proper control measures. The inoperative firefighting systems, improper storage of combustible materials, and inadequate maintenance protocols exemplify significant lapses in control activities, leading to the inability to prevent or mitigate the fire effectively.

Risk assessment was another area of concern. As shown in Table 3, the slight difference of 3.83% in the percentage between events (11.35%) and recommendations (7.52%) suggests that risks were not adequately identified, assessed, or mitigated. The storage of flammable materials and the lack of comprehensive fire safety measures indicate that the potential hazards were underestimated or overlooked, leaving the ship vulnerable.

Additionally, while monitoring activities had a relatively low percentage difference between events and recommendations (2.11%) (Table 3), the percentages were quite large (26.09% and 28.20%, respectively), and the deficiencies in this area certainly contributed to the fire's severity. The failure to maintain and test firefighting systems, lack of effective oversight, and inadequate fire safety protocols indicate poor monitoring practices, preventing timely identification and correction of control weaknesses.

Lastly, deficiencies in information and communication were also apparent, with a slight difference of 2.03% (Table 3) between total events (12.56%) (Table 3) and total recommendations (10.53%) (Table 3). The reliance on personal cell phones due to inoperative installed communication systems and delays in reporting the fire highlight significant communication breakdowns. Although the percentage differences between events and recommendations are minor, the impact of these deficiencies was substantial, hampering the coordination and effectiveness of the initial response.

Even though the percentages differences were low for risk assessment, monitoring activities, and information and communication, the impact of the control issues within these internal control components was significant. The following section discusses areas for further research.

C. AREAS FOR FURTHER RESEARCH

Several areas for further research are recommended.

1. Comprehensive Training Program

One area for further research is to explore the development and implementation of comprehensive training programs that integrate advanced firefighting techniques, industrial hazard recognition, and coordinated response strategies with external firefighting units. This research could investigate the effectiveness of various training methodologies and technologies, such as virtual reality simulations, in enhancing crew readiness and response capabilities.

2. Risk Assessment Framework

Another area for further research is the creation of effective risk assessment frameworks tailored to the unique environments and challenges faced by naval vessels during maintenance and operational phases. Research should focus on studying the impact of various risk factors and developing predictive models to identify potential hazards before they escalate into critical incidents.

3. Shipboard Communication Systems

Furthermore, improved communication systems and protocols are essential. Research should evaluate and enhance shipboard communication systems to ensure they are resilient and reliable under adverse conditions. This could involve investigating advanced communication technologies, such as redundant wireless systems and automated alert mechanisms, to improve situational awareness and coordination.

4. Policy and Regulatory Frameworks

Finally, evaluating and enhancing policy and regulatory frameworks governing shipboard safety and maintenance practices is necessary. Research should analyze the effectiveness of current regulations, identify gaps, and propose comprehensive policy recommendations to strengthen oversight and compliance. Comparative studies of safety regulations across different naval forces and commercial shipping industries could help identify best practices and areas for harmonization.

By addressing these areas, significant improvements can be made to internal control frameworks and overall safety protocols aboard naval vessels, reducing the likelihood of future incidents and enhancing the resilience and preparedness of naval forces.

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