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THE BEGINNING OF THE END: ARE U.S. NAVY HELICOPTERS STILL RELEVANT?

by

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THE BEGINNING OF THE END: ARE U.S. NAVY HELICOPTERS STILL RELEVANT?

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ABSTRACT

U.S. Navy helicopters emerged as an innovative concept during World War II and have been a major component of naval aviation for over 70 years. Despite consistent support and a surge of resources at the turn of the 21st century, new concepts—such as the "Carrier Air Wing of the Future," which reduces the helicopter footprint within the carrier air wing by over 30 percent—appear to signal that the Navy is moving on from helicopters. What explains the U.S. Navy's apparent deemphasis of the helicopter community? This thesis addresses and seeks to explain this apparent deemphasis by analyzing the Navy helicopter community through five models of military innovation studies. Ultimately, this thesis finds that no single model provides a sufficient explanation. Instead, the Navy's treatment of helicopters is a result of the combined dynamics and interaction of all five models. Finally, this thesis provides several recommendations for future Navy policy toward helicopters.

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TABLE OF CONTENTS

LIST OF TABLES

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LIST OF ACRONYMS AND ABBREVIATIONS

A2AD	anti-access/area-denial
ACE	aviation combat element
AEW	airborne early warning
ASuW	anti-surface warfare
ASW	anti-submarine warfare
BuAer	Bureau of Aeronautics
CAG	carrier air wing commander
CNA	Center for Naval Analyses
CONOP	concept of operations
CSAR	combat search and rescue
CSG	carrier strike group
CVN	aircraft carrier (nuclear)
CVW	carrier air wing
DASH	drone anti-submarine helicopter
DMO	distributed maritime operations
DOD	Department of Defense
ESB	expeditionary sea base
ESG	expeditionary strike group
FRS	fleet replacement squadron
FVL	future vertical lift
FVL-MS	future vertical lift maritime strike
GCE	ground combat element
GPC	great power competition
HADR	humanitarian assistance and disaster relief
HAL	helicopter assault light (squadron)
HC	helicopter combat support (squadron)
HCS	helicopter combat support special (squadron)
Helo	helicopter
HM	helicopter mine countermeasures (squadron)
HMP	Helicopter Master Plan

HS	helicopter anti-submarine (squadron)
HSC	helicopter sea combat (squadron)
HSM	helicopter maritime strike (squadron)
HUQ	unmanned helicopter reconnaissance (squadron)
ISR	intelligence, surveillance, reconnaissance
JAGM	joint air-to-ground missile
JPO	joint program office
LCS	littoral combat ship
LHA/D	large-deck amphibious ship
LRASM	long range anti-surface missile
MCM	mine countermeasures
MEDEVAC	medical evacuation
MEU	Marine expeditionary unit
MPRF	maritime patrol and reconnaissance forces
MSC	military sealift command
NAAD	Naval Air Ambulance Detachment
NDAA	National Defense Authorization Act
NSW	naval special warfare
OAMCM	organic airborne mine countermeasures
OASuW	offensive anti-surface warfare
OIC	officer-in-charge
PBR	river patrol boat
PGM	precision-guided munition
RESCAP	rescue combat air patrol
SAR	search and rescue
SOF	special operations forces
SST	social shaping of technology
STOVL	short takeoff and landing
TACAIR	tactical aircraft
UAS	unmanned aerial systems
USCG	United States Coast Guard
USN	United States Navy

VERTREP	vertical replenishment
VFA	strike fighter (Navy squadron)
VMFA	strike fighter (Marine squadron)
VRC	fleet logistics support (squadron)
VRM	fleet logistics multi-mission (squadron)
VUP	unmanned patrol (squadron)
VUQ	unmanned carrier launched multi-role (squadron)

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I. INTRODUCTION

A. THE CASE: NAVY HELICOPTERS AND MILITARY INNOVATION

This thesis addresses and seeks to explain why the Navy is deemphasizing the helicopter as an aviation platform after important service in myriad roles and missions for than 70 years. Helicopters have been a foundation of the Navy's capability throughout much of the post–World War II era. Today, the helicopter and its associated aviation community appear to be at the precipice of being phased out of service. What explains the United States Navy's apparent deemphasis of the helicopter community? This thesis explores the lifetime of this venerable platform and the reasons for its decline in the modern era.

The Navy began exploring the use of helicopters in the early 1940s and has used them operationally since 1946.[1] Despite contributing to the Navy's mission for over 70 years and accounting for 35 percent of all naval aviation as of 2020,[2] the community has struggled to gain an influential foothold within naval aviation and the wider Navy. Emerging technology, changing operational concepts, organizational preferences, and struggles with matching platforms to assigned missions have further contributed to the decline of helicopters and its associated aviation community within the Navy over the last decade. In 2020, Navy leadership approved the "Carrier Air Wing (CVW) of the Future" concept that, if realized, will remove four helicopters—three from HSC squadrons and one from HSM squadrons—thus reducing air wing helicopters by over 30 percent. The net effect of the new concept will be the removal of helicopters at the expense of new aviation technology—F-35s, unmanned aerial systems (UAS), CMV-22 *Ospreys*—and a reduced capacity to support legacy missions for the helicopters that remain onboard.

B. BACKGROUND

This thesis will fill gaps in the literature on naval aviation, which contains little treatment of Navy helicopters in the post–World War II era. Most literature regarding Navy

[1] Vincent Secades, *The Naval Helicopter: Highlights in Naval Helicopter History* (Naval Helicopter Association, 2012), 12.

[2] "PERS-43 Aviation Update" (presentation, Navy Personnel Command, August 2020).

helicopters is either technical in nature or a review of operational history, but there is a surprising lack of analysis as to why the Navy helicopter community has remained in a secondary role and is now in a further deemphasized role despite growing to a plurality of naval aviation officers over the last ten years.[3] This thesis will analyze the treatment of the helicopter community through the lens of theories of military innovation in order to provide explanatory logic and perspective on the historical, current, and future roles of Navy helicopters within the Navy and naval aviation.

The thesis is relevant to current and future Navy and naval aviation policy. The shift in aviation concept to the "CVW of the Future" has major implications for naval aviation's largest branch—helicopters. Other Navy operational concepts are shifting toward the focus on great power competition (GPC) and the fleet concept of distributed maritime operations (DMO). While DMO has spread from the surface community to aviation, there is minimal treatment of helicopters in this future vision. Additionally, since the early 2000s, the helicopter community has struggled with assigned mission areas, capabilities, and partner platforms (e.g., airborne mine countermeasures development, littoral combat ship deployments, MQ-8B/C *Fire Scout* integration). Research, analysis, and recommendations generated by this thesis have potential to explain these issues and affect future policy, doctrine, and operational use of helicopters.

The military innovation studies literature provides several theories that seek to explain the behavior of military organizations. This thesis will draw upon this literature to analyze the Navy's treatment of the helicopter. In "Military Innovation Studies: Interdisciplinary or Lacking Discipline?" Stuart Griffin describes the field of military innovation studies as one that leans heavily towards practitioners and academics who aim to provide pragmatic research and analysis.[4] My personal application of military innovation paradigms to Navy helicopters falls in line with military innovation studies as a field. As a

[3] "PERS-43 Aviation Update." The presentation from August 2020 lists helicopters at 35 percent (up from 30 percent in 2010) of naval aviation. Tactical Air (TACAIR) accounts for 34 percent (down from 41 percent in 2010). Maritime Patrol and Reconnaissance Forces (MPRF) accounts for 31 percent (up from 29 percent in 2010).

[4] Stuart Griffin, "Military Innovation Studies: Interdisciplinary or Lacking Discipline?" *Journal of Strategic Studies* 40, no. 1–2 (2017): 201–2.

Navy helicopter pilot that has been selected to return to the Fleet as a helicopter squadron commanding officer, I am in a unique position to conduct academic research and discover explanations—then directly apply this knowledge in practice. With luck, knowledge gained from this thesis will also contribute to the field of military innovation studies.

C. LITERATURE REVIEW: MILITARY INNOVATION STUDIES

Adam Grissom's "The Future of Military Innovation Studies" serves as the organizing framework for the review of military innovation literature. In the article, Grissom explains military innovation as a function of three components: it must change the manner in which military organizations function operationally, be "significant in scope and impact," and result in "greater military effectiveness."[5] He compiles military innovation research into "four primary schools of thought," each of which serve as explanatory models to determine whether a military organization will innovate.[6] The four models are civil-military, inter-service, intra-service, and cultural. Military innovation scholars also often consider technology as the causal factor of innovation. While the explanatory power of technology as a unitary model is often contested, I believe it provides additional value in the analysis of this research question. Therefore, the following review of the military innovation literature is organized and separated according to Grissom's four schools of thought, with the addition of a technology model.

1. Civil-Military Model

Grissom summarizes the civil-military model by stating, "senior civilian decision-makers interpret the geopolitical context and impose innovation upon the military services with the help of maverick proxies within the service."[7] He names Barry Posen as the founder of military innovation studies and the developer of the civil-military model after the publishing of his book, *The Sources of Military Doctrine*.[8] In the book, Posen analyzes the

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[5] Adam Grissom, "The Future of Military Innovation Studies," *Journal of Strategic Studies* 29, no. 5 (2006): 907.

[6] Grissom, 908.

[7] Grissom, "The Future of Military Innovation Studies," 920.

[8] Grissom, 906.

interwar innovation of Britain, France, and Germany. His primary argument states "civilian intervention in military affairs is the key determinant of integration and innovation."[9] The assessment produces two primary explanations for military innovation—balance of power theory and organization theory—and also gives slight mention to technological and geographic determinism. With respect to innovation, balance of power theory asserts that a state will innovate in order to balance against a real or perceived threat to the state. Because military organizations are averse to "radical change,"[10] Posen asserts, "statesmen will intervene in the doctrines of their military organizations as part of an overall pattern of balancing behavior."[11] Organization theory provides "a good explanation for the operational preferences and behavior of military organization,"[12] but only predicts innovation to occur in the face of battlefield failure or civilian intervention. Military organizations inherently stifle bottom-up innovation due to their hierarchical structure.[13] Ultimately, Posen finds that balance of power theory holds the greatest explanatory power for why a military organization innovates.

2. Inter-service Model

The inter-service model of military innovation asserts that competition for resources between military bureaucracies within a state serves as the catalyst of innovation. While militaries will typically desire to maintain control of their traditional missions, new or reinvigorated old missions provide a new avenue for inter-service competition. Grissom asserts, "services will compete to develop capabilities to address these contested mission areas, believing that additional resources will accrue to the winner. The result is innovation."[14] Andrew Bacevich provides evidence of the model in *The Pentomic Era: The U.S. Army Between Korea and Vietnam*, his study of the competition between the U.S. Air

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[9] Barry R. Posen, *The Sources of Military Doctrine: France, Britain, and Germany Between the World Wars*, ed. Robert J. Art and Robert Jervis (Ithaca, NY: Cornell University Press, 1984), 233.

[10] Posen, 54.

[11] Posen, 233.

[12] Posen, 222.

[13] Posen, 224.

[14] Grissom, "The Future of Military Innovation Studies," 910–1.

Force and U.S. Army in the 1950s. The Eisenhower administration placed priority on nuclear warfare which stoked competition for resources between the services. In reaction to the Air Force's advances in nuclear capabilities, the Army reformed doctrine to fight on the nuclear battlefield resulting in the Pentomic Army.[15] Bacevich includes an illustrative quote from military historian S.L.A. Marshall that sums up nature of interservice competition: "There are other hungry services and some of their spokesmen might be rash enough to consider doing the job alone."[16] This hunger drives innovation.

3. Intra-service Model

The intra-service model of military innovation focuses on competition between communities within the same service.[17] Uniquely, this model treats a service as a collection of communities instead of a single, unitary actor. Innovation occurs in modern militaries when a community that embraces new capabilities emerges to challenge an established community.[18] Intra-service competition ultimately boils down to bureaucratic politics. In the model's preeminent work, *Winning the Next War*, Stephen Rosen asserts, "the problem of military innovation is bureaucratic innovation."[19] He conducted 21 case studies—including carrier aviation, helicopter air mobility, and submarine warfare—separated into categories designated as wartime, peacetime, and technological innovation. Rosen focuses on the interaction of communities within a single service and the dynamics that emerge during peacetime, which he describes as an "ideological struggle" over a new theory of war.[20] This new theory of war must be then codified into new missions and tasks, which constitutes innovation. The new way of warfare is ultimately cemented through the influence and control

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[15] A. J. Bacevich, *The Pentomic Era: The U.S. Army Between Korea and Vietnam (*Washington, DC: National Defense University Press, 1986).

[16] Bacevich, 132.

[17] Grissom, "The Future of Military Innovation Studies," 913.

[18] Grissom, 913.

[19] Stephen P. Rosen, *Winning the Next War: Innovation and the Modern Military*, ed. Robert J. Art and Robert Jervis (Ithaca, NY: Cornell University Press, 1991), 2.

[20] Rosen, *Winning the Next War*, 20.

over the promotion of newly indoctrinated officers. As time moves on, officers trained in the new theory of victory will promote and further legitimize the new community.[21]

4. Cultural Model

The cultural model of military innovation focuses on strategic and organizational culture as causal factors of military innovation. At the time of Grissom's writing, culture lacked equal standing with the other three major models. In "Military Innovation Studies: Multidisciplinary or Lacking Discipline?," Stuart Griffin updates Grissom's article and gives considerable attention to new literature and the rising importance of the cultural model in military innovation studies over the intervening decade. He states, "cultural studies have proved particularly adept at addressing some conspicuous gaps in our understanding of how militaries change,"[22] but still lack the explanatory power of the three traditional models.[23] Theo Farrell and Terry Terriff extol culture as a causal factor of military innovation in *The Sources of Military Change: Culture, Politics, Technology*. Farrell and Terriff describe cultural norms that influence how military organizations react to "strategic, political, and technological developments."[24] Dima Adamsky asserts culture is at least equally as important as access to technology in *Culture of Military Innovation* as a military's unique strategic culture explains why and how technological opportunities are leveraged.[25] Ultimately, technology only constitutes an innovation if an organization possesses the strategic and organizational culture to exploit it to improve military effectiveness.

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[21] Rosen, 20–21.

[22] Griffin, "Military Innovation Studies: Interdisciplinary or Lacking Discipline?" 200.

[23] Griffin, 206.

[24] Theo Farrell and Terry Terriff, "The Sources of Military Change," in *The Sources of Military Change: Culture, Politics, Technology*, ed. Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, Inc., 2002), 7.

[25] Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the U.S., and Israel* (Stanford: Stanford University Press, 2010), 5.

5. Technology Model

The technology model contends that changes in technology determine the course of innovation.[26] *The Future of War: Power, Technology, and American World Dominance in the Twenty-First Century*, written by George and Meredith Friedman, clearly lays out a case for the technology model. The Friedmans assert that precision-guided munitions (PGM) redefined the nature of warfare.[27] PGMs forced a shift from hundreds of years of total war centered around traditional munitions (i.e., guns, explosives) and whole-of-society mobilization to warfare based on humane and accurate weapons developed by small portions of society.[28] According to the Friedmans, technology's causal relationship with innovation is unequaled. Innovation caused by technology—in this case, PGMs—is so impactful as to "shape American power and culture."[29] Grissom asserts that the field of military innovation studies has largely critiqued and rejected the concept of this technological determinism.[30] In response, critics developed the concept of "Social Shaping of Technology" (SST), which views technology as an idea that becomes innovation as a result of competition between competing groups with differing visions of the technology's implementation.[31]

D. HYPOTHESES

There are several explanations and hypotheses that may explain the apparent deemphasis of the helicopter community by the Navy, but there is no evidence to suggest that an attempt has been made. This thesis will utilize the four major military innovation paradigms with an additional contested model—technology—to determine which has the best explanatory power. The following five hypotheses will be tested against empirical

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[26] Adam Grissom, Sarah Harting, Caitlin Lee, Karl P. Mueller, and Jerry Sollinger, *Innovation in the United States Air Force: Evidence from Six Cases*, PR-1450-AF (Santa Monica, CA: RAND Corporation, 2014), 8.

[27] George Friedman and Meredith Friedman, *The Future of Warfare: Power, Technology, and American World Dominance in the Twenty-First Century* (New York: St. Martin's Press, 1996), x.

[28] Friedman and Friedman, xi.

[29] Friedman and Friedman, 420.

[30] Grissom, "The Future of Military Innovation Studies," 908.

[31] Grissom, 926–7.

evidence found in historical and current accounts of the Navy's use of and policy towards helicopters. The five hypotheses are listed below, followed by potential explanations:

1. Civil-Military Model

H_1: Civilian interpretations of the geopolitical environment drive an intervention in Navy policy that caused the Navy to deemphasize the role of the helicopter community.

A potential explanation is the flagging support for aircraft carriers from civilian leaders. If civilian leaders determine that aircraft carriers have questionable relevance in the current and future environment, Navy leaders will innovate in order to protect a traditional platform and mission. This support may have influenced Navy leaders to approve the "CVW of the Future" concept, leading to the diminished role of helicopters in carrier aviation.

2. Inter-service Model

H_2: Inter-service competition for resources caused the Navy to deemphasize the role of the helicopter community.

A potential explanation is the persistent advancement of UAS in warfighting across the Department of Defense (DOD). Each service competes for resources by developing new and innovative UAS to conduct missions traditionally executed by manned aircraft. The Navy's use of resources to develop UAS (e.g., MQ-25 *Stingray*, MQ-8B/C *Fire Scout*, MQ-4C *Triton*) to compete with other services' UAS efforts could explain the deemphasis of helicopters as those resources are no longer allocated the helicopter community.

3. Intra-service Model

H_3: A new theory of victory and subsequent bureaucratic structure developed by senior Navy leaders caused the Navy to deemphasize the role of the helicopter community.

A potential explanation is the Navy's evolution of operational concepts. Each change in maritime strategy and operational concepts constitutes a new theory of victory. An analysis of historical theories of victory may show that other aircraft and capabilities were prioritized over helicopters, further supported by a bureaucratic structure that eschewed the helicopter community. Despite empirical evidence that a new theory of victory developed in the early

2000s (i.e., Helicopter Master Plan, Helo Concept of Operations 1.0) brought helicopters to the forefront, analysis may find that a promotion pathway was not created for officers from the helicopter community to rise to major operational command assignments.

4. Cultural Model

H_4: The Navy's unique strategic and organizational culture caused the Navy to deemphasize the role of the helicopter community.

A potential explanation is the historical focus of naval aviation's strategic culture on strike warfare. This strategic culture fosters an organizational culture based on aircraft carriers and carrier-based jet aircraft. Norms and values are based on officers that conform to the Navy's organizational preferences of being a pilot of a tactical, offensive, fixed wing, carrier-based platform. As a rotary wing platform that is largely used in support or defensive roles, helicopters may not be a fit for the Navy's strategic and organizational culture, further explaining the Navy's deemphasis of the community.

5. Technology Model

H_5: New advancements in technology and/or inherent limitations in helicopter technology caused the Navy to deemphasize the role of the helicopter community.

A potential explanation is the role of technology in determining the role of helicopters. Compared to primarily fixed wing platforms, Navy helicopters are inherently limited in speed, endurance, and weapons payload. Helicopter technology has not advanced at the same rate as fixed wing aircraft. This may explain that the Navy deemphasized helicopters due to their inherent lack of warfighting capability in comparison to more capable current (e.g., F/A-18E/F *Super Hornet*, P-8 *Poseidon*) and emerging (e.g., F-35 *Lightning II*, CMV-22B *Osprey*, MQ-25 *Stingray*) platforms.

E. METHODOLOGY

The basis of the thesis is a single case study of U.S. Navy helicopters. I have chosen this specific case study as I am a career helicopter pilot who will be returning to the Fleet as a squadron commanding officer. I am in a unique position to study my professional field in

an academic setting, then apply my gained knowledge to influence the helicopter community upon my return. In addition to personal and professional relevance, the case study selection provides for analysis of a major naval aviation branch with potential implications for future policy. The majority of materials used for the historical study of the Navy, naval aviation, and helicopters are primary sources from professional journals and some secondary historical sources. These sources will enable gathering of empirical evidence for comparative study.

Within the single case study, this thesis will use a comparative study of five models of military innovation studies. Four of the models are accepted as major paradigms of military innovation. I have chosen a fifth, more minor model as I believe it may have considerable explanatory power in support of the thesis. The thesis will apply each model separately to determine which military innovation paradigm best explains the deemphasis of Navy helicopters. A comparative approach allows for a thorough and broad analysis of causal explanations. Sources include literature from the field of military innovation studies.

F. THESIS OVERVIEW

The thesis is organized to provide context and empirical evidence via a historical survey of the Navy and helicopters, which will then be used to evaluate the hypotheses for causal explanations. Chapter I explains the problem, explores literature, and describes the hypotheses. Chapter II establishes a framework of the problem through a history of Navy helicopters from the early 1940s through 2021. The history will include a summary of technology and capabilities, missions, strategic and organizational culture, and strategic and operational concepts. Chapter III analyzes the Navy helicopter community through the lens of the five military innovation models to determine a causal explanation for the Navy's apparent deemphasis of helicopters. Chapter IV reviews the explanatory power of the five military innovation models with respect to the Navy helicopter community, highlights implications, and provides recommendations for future research in military innovation studies and Navy policy towards naval aviation and helicopters.

II. HISTORY OF THE U.S. NAVY AND HELICOPTERS

A. INTRODUCTION

For more than 70 years, the U.S. Navy's helicopter community has been an integral part of naval aviation during times of both peace and conflict. The community's inception and continued survival is due to the combination of civil-military, intra-service, inter-service, cultural, and technological dynamics. The following chapter will analyze the Navy's treatment of the helicopter community through hypotheses based on military innovation paradigms. However, it is first necessary to provide contextual understanding. This chapter will present empirical evidence through a historical survey of U.S. naval aviation, Navy helicopters, naval aviation culture, and Navy strategic thought.

B. EARLY U.S. NAVAL AVIATION HISTORY

Less than a decade after the Wright brothers pioneered power flight, U.S. naval aviation was born when Eugene Ely—a civilian—flew off the deck of an anchored U.S. Navy light cruiser on November 14, 1910.[32] After this ground-breaking event, leaders envisioned naval aviation forces to be comprised of dirigibles,[33] land-based aircraft, and ship-supported seaplanes.[34] Navy aircraft were to fulfill an auxiliary role as scouts for the fleet and gunnery spotters for the capital ship of the day—the battleship.[35] Growth was slow, as naval aviation only had eight aircraft and 13 officers—pilots—in 1913.[36] However, aviation advocates continued to push for increased funding and bureaucratic power. In April 1914, ship-based aircraft provided reconnaissance for ground forces during

[32] Brian Johnson, *Fly Navy: The History of Naval Aviation* (New York: William Morrow and Co., 1981), 11.

[33] Thomas C. Hone, Norman Friedman, and Mark D. Mandeles, *American & British Aircraft Carrier Development, 1919–1941* (Annapolis: Naval Institute Press, 1999), 14.

[34] Hone, Friedman, and Mandeles, 17–18.

[35] Hone, Friedman, and Mandeles, 19.

[36] Archibald D. Turnbull and Clifford L. Lord, *History of United States Naval Aviation* (New Haven: Yale University Press, 1949), 29.

the United States' intervention in Vera Cruz during the Mexican Civil War,[37] marking the first combat use of ship-based aircraft and providing evidence of naval applications for aircraft. As the U.S. entered World War I in 1917, naval aviation was comprised of 43 officers, 200 enlisted personnel, six flying boats, three land planes, two kite balloons, one "very unsatisfactory" dirigible, and 45 training seaplanes.[38] By war's end, the branch grew to 6,716 officers and 30,693 enlisted personnel[39] operating 2,107 aircraft.[40] During the war, Navy aircraft bombed enemy bases, patrolled for U-boats, and conducted several at-sea rescues of downed Allied pilots.[41] Despite post-war demobilization, leaders recognized the emerging capabilities of naval aviation, placing the branch in a relatively protected status.

The interwar period marked significant growth for naval aviation. In 1921, naval aviation was established organizationally with the creation of the Bureau of Aeronautics (BuAer),[42] cementing aviation as an integral—but still fledgling—component of the Navy. During this period, naval aviation leaders strived for a balance between complementing and challenging the established conception of the battleship of the center of the battle fleet. "Battleship admirals"[43] filled the senior ranks and thus had control over naval applications of aircraft, which were largely seen as auxiliary to the battleship. However, there were several battleship admirals that saw the potential of aviation. Arguably the most significant advancement of the period was the development of aircraft carriers, specialized carrier aircraft, and carrier tactics and doctrine. Naval aviation advocates successfully challenged the battleship paradigm during Fleet Problems IX (1929) and X (1930), when independently-steaming carriers launched strikes against land targets—"sinking" the

37 Turnbull and Lord, *History of United States Naval Aviation*, 42; Johnson, *Fly Navy*, 114–115.

38 Turnbull and Lord, 96.

39 Turnbull and Lord, 105.

40 Johnson, *Fly Navy*, 118–9.

41 Turnbull and Lord, *History of United States Naval Aviation*, 139–144.

42 Turnbull and Lord, 190.

43 Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development*, 3.

Panama Canal—and main battle forces comprised of battleships and other carriers.[44] These exercises showed the potential for Navy aircraft to operate as an independent striking force and project power at ranges not previously possible with a flexibility that enabled surprise. By 1939, the Navy had five carriers and 1,315 combat aircraft.[45] Despite the success and expansion, leaders' fear of carrier vulnerability and limited firepower due aircraft payload limitations kept aviation in an auxiliary role as the U.S. approached World War II.[46] The paradigm shifted from battleships to naval aviation—specifically, carrier aviation—after the Japanese attack on Pearl Harbor destroyed American battleships—a fate the carriers avoided by happenstance. Aviation's role as the premier branch of the Navy was further cemented with combat success in the Pacific during World War II, a position that has yet to be relinquished.

Entering World War II, naval aviation comprised a significant force that would grow further throughout the war. In 1940, the force was comprised of carrier-based fighters, dive-bombers, and torpedo planes; flying boats and land-based aircraft for patrol; spotter seaplanes launched from cruisers and battleships; various utility and transport aircraft; and several blimps.[47] While this inventory fulfilled a broad scope of missions, naval aviation did not possess a capability to counter the German U-boat threat to Allied shipping in the Atlantic. Leaders desired an aircraft that could operate from an escort ship and provide air coverage for the convoys once they exceeded the range of land-based aircraft. This is where the development of the helicopter for naval applications began.

C. HISTORY OF U.S. NAVY HELICOPTERS

The history of Navy helicopters begins with the Army, which led helicopter development until World War II. U.S. military helicopter development is characterized by early progress, failure, abandonment, adaptation, and eventual success and integration.

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[44] George W. Baer, *One Hundred Years of Sea Power: The U.S. Navy, 1890–1990* (Stanford: Stanford University Press, 1993), 141–142.

[45] Johnson, *Fly Navy*, 242.

[46] Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development*, 79–81.

[47] Turnbull and Lord, *History of United States Naval Aviation*, 113–4.

From the beginning, aviation advocates—both civilian and military—primarily focused on heavier-than-air aircraft due to their potential for practical applications. In contrast, a combination of limited technological advancements and negative perceptions dogged helicopter development. Frenchman Louis Breguet designed the first piloted helicopter to successfully fly in August 1907, but the aircraft was plagued by the lack of stability and controllability.[48] In January 1909, Wilbur Wright notably dismissed the helicopter as a practical machine by stating, "the helicopter is much easier to design than the aeroplane [sic] but it is worthless when done."[49] Despite this prevalent sentiment, there was still a significant movement behind developing helicopter technology.

The Navy's early treatment of helicopters was aspirational. As early as 1908, naval officers envisioned an aircraft "that could be stowed aboard ship and launched from a deck as an air scout…with the possibility of hovering."[50] Unfortunately, contemporary technology could not produce a helicopter at the time and the Navy's focus turned to the aforementioned ship-launched seaplanes for use as gunnery spotters. Over the ensuing three decades, the Navy stood by while the Army led helicopter development.

Since Breguet's helicopter took flight, minimal progress was achieved over the next decade until World War I created a demand by military leaders for "a machine capable of up-and-down flight and hence operations from restricted area…that could hover in the sky over the enemy and spot his movements."[51] During the war, balloons were used in this role, but were limited in maneuverability. With wartime experience providing practical applications, the Army began developing the helicopter in earnest. In June 1921, the Army contracted George de Bothezat—a Russian exile—to design and build the Army's first helicopter.[52] Despite a successful flight in December 1922, the Army's Chief of the Air

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[48] Hollingsworth Franklin Gregory, *The Helicopter* (New Jersey: A.S. Barnes and Co., Inc., 1976), 23–4.

[49] Walter J. Boyne and Donald S. Lopez, *Vertical Flight: The Age of the Helicopter (*Washington, DC: Smithsonian Institution Press, 1984), 5.

[50] Turnbull and Lord, *History of United States Naval Aviation*, 5.

[51] Gregory, *The Helicopter*, 23–4.

[52] Gregory, 25.

Service ordered the program abandoned due to not meeting expectations of "stability and required performance."[53] This ushered in another era of minimal progress in helicopter development.

After the de Bothezat failure, the aviation industry and U.S. military pivoted toward developing a different type of rotary-wing aircraft. The autogiro—also known as the gyroplane—had the fuselage and front propellor of an airplane, suspended beneath rotating wings. Similar to a helicopter, autogiros were capable of slow flight that fixed-wing aircraft could not achieve but were unable to hover like a helicopter. A Spaniard—Juan de la Cierva— created the first autogiro to successfully fly in January 1923.[54] The autogiro proved to be more stable and controllable than helicopters of the period. Recognizing this, the Navy joined in development and testing. In January 1931, the Navy procured a Cierva autogiro built by an American manufacturer, the Pitcairn Aircraft Company.[55] The first rotary-wing landing and takeoff from an underway ship—the USS *Langley* (CV-1)—occurred on September 23, 1931.[56] The Navy evaluated autogiros until the late 1930s, but they were ultimately abandoned for not meeting performance expectations. Additionally, advancements in fixed-wing design allowed for airplanes to fly slower than autogiros,[57] while Igor Sikorsky's revolutionary single-main-rotor helicopter design[58] proved that vertical flight was possible—and practical for military use.

The true genesis of the Navy helicopter community began in the late 1930s and is intertwined with the Coast Guard. The Dorsey Act of 1938 earmarked $2 million for rotary-wing research and development, leading to the creation of an inter-agency board to administer the funds.[59] The Navy was indirectly represented by CDR William Kossler,

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53 Gregory, *The Helicopter*, 30–31.

54 Gregory, 34–35.

55 Secades, *The Naval Helicopter*, 4.

56 Secades, 4.

57 Gregory, *The Helicopter*, 36.

58 Gregory, 73–75.

59 Boyne and Lopez, *Vertical Flight: The Age of the Helicopter*, 18.

USCG, considered a founding father of helicopter naval aviation.[60] In 1941, the Coast Guard was transferred operationally to the Navy and tasked with overseeing helicopter test and development.[61] Despite the earlier unsuccessful attempts with autogiros, a small—but passionate—group of Coast Guard and Navy aviators pushed for the integration of helicopters for use in search and rescue (SAR) and antisubmarine warfare (ASW).[62] At the time, submarines posed a substantial threat to U.S. and Allied shipping in the Atlantic Ocean. The group of aviators, led by LCDR Frank Ericksen, USCG, persuaded the Commandant of the Coast Guard, Admiral Russell Waesche, of the viability of helicopters for naval applications by emphasizing ASW capabilities.[63] Ericksen was convinced that helicopters could be the extended "eyes and ears of the convoy escorts"[64] and eventually use radar and a dipping sonar for further submarine detection and convoy protection. Admiral Waesche convinced the Commander in Chief, U.S. Fleet, Admiral Ernest King, USN, of the military use of the emerging technology, who then directed a "joint board" comprised of the Navy, Coast Guard, British Admiralty, and Royal Air Force to evaluate the viability of ship-based ASW helicopters.[65] Demonstrations and tests proved the concept and Admiral King further directed the creation of a helicopter class desk within BuAer,[66] cementing the helicopter as a part of naval aviation. The Navy ordered several helicopters for ASW and rescue duty but World War II ended before the Navy took delivery.

The post-war period through the Korean War is characterized by continued development of technology, capabilities, and doctrine. Helicopters continued in the ASW role and began integrating with smaller ships. In 1949, the Chief of Naval Operations directed the conversion of cruisers and battleships for helicopters to replace seaplanes as

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60 Secades, *The Naval Helicopter*, 5.

61 Secades, 5.

62 Mark L. Evans and Roy A. Grossnick, *United States Naval Aviation: 1910–2010* (Washington, DC: Naval History and Heritage Command, 2015), 261.

63 Secades, *The Naval Helicopter*, 9–10.

64 Evans and Grossnick, *United States Naval Aviation*, 261.

65 Evans and Grossnick, 261.

66 Evans and Grossnick, 261.

gunnery spotters.[67] During this Korean War, helicopters also became integral to fleet logistics and provided a combat rescue capability for downed pilots along the coast of the Korean Peninsula.[68] In September 1950, during the amphibious landings at Wonsan, new capability was inadvertently discovered when a helicopter pilot sighted and photographed two moored mines while conducting a rescue.[69] This action set the foundation for a new helicopter mission—airborne mine countermeasures (MCM)—and technological developments that still remain a part of naval aviation.

During the Vietnam War and the Cold War, the Navy found new uses—and created new missions—for helicopters. More advanced helicopters emerged, extending missions to anti-surface warfare (ASuW),[70] humanitarian assistance and disaster relief (HADR),[71] vertical replenishment (VERTREP),[72] combat search and rescue (CSAR),[73] and furthered airborne MCM.[74] A niche mission emerged during the Vietnam War—naval special warfare (NSW) support. From 1967 through 1972, the Helicopter Attack Squadron Light THREE (HAL-3) *Seawolves* provided air coverage for Navy SEALs and River Patrol Boats (PBR).[75] Although the *Seawolves* were disestablished before departing Vietnam, Navy helicopters have provided continuous NSW support in subsequent conflicts with the legacy remaining today, primarily with the HSC-85 *Firehawks*, currently the Navy's only special operations support squadron. The expansion in missions also had effects on the bureaucracy. With more missions, came more platforms that needed more pilots and crew to operate and maintenance personnel to keep flying. This led to the creation of several

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67 Evans and Grossnick, *United States Naval Aviation*, 247.

68 Edward L. Barker, "The Helicopter in Combat," *Proceedings* 77, no. 11 (Nov 1951): 585. https://www.usni.org/magazines/proceedings/1951/november/helicopter-combat.

69 Otto Kreisher, "Rise of the Helicopter During the Korean War," *Aviation History (*January 2007), https://www.historynet.com/the-rise-of-the-helicopter-during-the-korean-war.htm.

70 Evans and Grossnick, *United States Naval Aviation*, 287.

71 Evans and Grossnick, 283, 287.

72 Roy A. Grossnick, *United States Naval Aviation: 1910–1995* (Washington, DC: Naval Historical Center, 1997), 253–4.

73 Grossnick, 297.

74 Grossnick, 262.

75 Philip D. Chinnery, *Vietnam: The Helicopter War (*Annapolis: Naval Institute Press, 1991), 72–3.

helicopter type wings[76] (O-6 commands) and the Chief of Naval Operations opening a transition pipeline for Fleet aviators to become helicopter pilots.[77] The type wings put helicopters on equal standing—at least, bureaucratically—with the other naval aviation communities and marked the beginning of an expansion that continued through the late 2000s.

After the end of the Cold War, Navy helicopters had considerable momentum as a part of the Navy's emphasis on asymmetric threats and the transition to littoral warfare. Experience in the Persian Gulf during Desert Storm proved the utility of helicopters against smaller surface combatants.[78] Naval strategy focused on the coasts called for increased use of smaller ships—frigates, destroyers, cruisers—at the expense of blue water aircraft carriers. Strategists called for helicopters embarked on the smaller ships to become the center piece of the air domain due to their unique capabilities. Helicopters had carried torpedoes and antisurface missiles for some time, but calls were made to leverage emerging technology and further increase helicopter armament— with missiles, machine guns, and rockets—for surface threats in the congested coastal areas.[79] This flood of support for the increased naval use of helicopters continued through the turn of the millennium.

In the early 2000s, Navy leadership introduced a new acquisition strategy and force structure that renewed enthusiasm for the future of helicopter community. The budget-friendly plan—called the Helicopter Master Plan (HMP)—aimed to reduce the number of fleet helicopter types from seven specialized airframes to two multi-mission helicopters based on the ubiquitous H-60—the MH-60R *Seahawk* and MH-60S *Knighthawk*.[80] Concurrently, a new Helicopter Concept of Operations (now referred to as Helo CONOPs

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[76] Grossnick, *United States Naval Aviation*, 303.

[77] Grossnick, 254.

[78] Department of the Navy, "Thunder and Lighting: The War with Iraq," in *The United States Navy in "Desert Shield" / "Desert Storm"* (Washington, DC: Office of the Chief of Naval Operations, 1991).

[79] Ray Walsh and Brian V. Buzzell, "Helicopters Meet Surface Littoral Warfare Challenge," *Proceedings* 122, no. 9 (Sep 1996): 123. https://www.usni.org/magazines/proceedings/1996/september/helicopters-meet-surface-littoral-warfare-challenge.

[80] Joseph Bauknecht, "Helo CONOPs, Organizing for 21st Century Warfare," *Wings of Gold* 35, no. 2 (Summer 2010): 18, ProQuest.

1.0) redesigned the rotary wing force structure and planned to streamline four legacy communities to two based on the capabilities of the new platforms.[81] Helo CONOPs 1.0 doubled the number of helicopters onboard the aircraft carrier, potentially facilitating increased influence within carrier aviation. The *Seahawks* were organized in maritime strike squadrons (HSM) and deployed on aircraft carriers and smaller surface combatants with a focus on ASW and ASuW. The *Knighthawks* were organized into sea combat squadrons (HSC) and primarily deployed on aircraft carriers, large amphibious assault ships, and Military Sealift Command (MSC) ships with a focus on ASuW, SAR, logistics, and NSW support.[82] The Navy also intended for the *Knighthawk* and HSC to take over the organic airborne mine countermeasures (OAMCM) mission but experienced delays in achieving initial operational capability and has yet to deploy in support of the mission (as of 2021). As a result, a legacy platform—the MH-53E *Sea Dragon*—and squadron type—mine countermeasures (HM)—remains in the Navy's rotary wing inventory. In 2008, the HMP and Helo CONOPs 1.0 debuted operationally when both an HSC and HSM squadron made their maiden deployment as part of a CVW.[83] Another defining characteristic of the HMP and Helo CONOPs was the inclusion and integration of rotary-wing UAS—the MQ-8B/C *Fire Scout*—in the helicopter force structure.

In 2020, the Commander, Naval Air Forces, Vice Admiral Dewolfe Miller, USN, approved a new direction for the future of naval aviation. The concept—named the "CVW of the Future"—emphasizes the importance and integration of emerging platforms—the F-35 *Lightning II*, CMV-22B *Osprey*, MQ-25 *Stingray*—while subsequently reducing the number of helicopters within the CVW by over 30 percent.[84] In reaction, the Center for Naval Analyses (CNA) and helicopter community leaders began developing Helo CONOPs 2.0, which aims to assess the current and future capabilities of the Navy

[81] Richard Burgess, "Navy Maps Out Transition Plan for New Helicopters," *Sea Power* 46, no. 11 (November 2003): 33, ProQuest.

[82] Jeffrey Dodge et al., "Adapting Helo Missions for the Future," *Proceedings* 136, no. 4 (April 2010): 80, ProQuest.

[83] Bauknecht, "Helo CONOPs," 18.

[84] CDR Frank Loforti, Commander, Naval Air Forces, HSC Readiness Officer, personal communication, May 24, 2020.

helicopter community in a high-end fight against near-peer adversaries.[85] As of this writing, the results of the study have not been released, but there will be an undeniable impact on the helicopter community that ranges beyond the already published reduction of helicopters within the air wing.

D. THE CULTURE OF NAVAL AVIATION

Culture is a product of history, motivations, and preferences that, in turn, shapes the behavior of an organization.[86] Within the DOD, the Navy has a culture that is distinct from the other services that explains its unique strategic and organizational behavior. This behavior is evident in which platforms are funded[87] and who gets promoted, among others. Even further—within the Navy—naval aviation has a distinct sub-culture that informs the treatment of the helicopter community throughout its history. This section will provide a brief overview of the culture of naval aviation since its inception, providing context for the following chapter's analysis of how this culture has affected the Navy helicopter community.

Before aviation integrated into naval warfare, surface warfare officers dominated the Navy and set its culture. Until the beginning of World War II, these officers created a battle force centered around capital ships that controlled the seas and projected offensive power far away from American shores. This culture of the offensive was conveyed by capital ships: the Great White Fleet, World War I era dreadnoughts, and interwar battleships.[88] After the destruction of the Pacific Fleet battleships at Pearl Harbor, the offensive culture almost seamlessly transitioned from the surface fleet to aviation. Luckily, naval aviators took advantage of the limited opportunities provided in the interwar period to develop carrier strike tactics, which eased the transition from auxiliary to the primary

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[85] Mike Weaver and Chris Richard, "Navy Helicopters are Changing Course," *Proceedings 146,* no. 9 (Sep 2020). https://www.usni.org/magazines/proceedings/2020/september/navy-helicopters-are-changing-course.

[86] Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: The Johns Hopkins University Press, 1989), 6–10.

[87] Builder, 5.

[88] Builder, 21.

striking force. It is also important to note that many of the commanders famous for revolutionizing carrier aviation in the interwar years and leading the Navy to victory in the Pacific began their careers as surface officers. Regardless, naval aviation proved an optimal embodiment to continue the Navy's offensive culture.

After achieving intra-service primacy in World War II, aviators—specifically, carrier-based tail-hook pilots—ascended to the top of the Navy's hierarchy.[89] While losing some ground at higher ranks within the larger Navy to submarine officers since then,[90] carrier-based, fixed-wing aviators remain the pinnacle of naval aviation, filling 57 percent of aviation major command billets—air wings, carriers, large amphibious ships, bases—and 71 percent of aviation flag ranks.[91] Direct combat experience only reinforces this position, as the majority of combat hours since World War II have been flown by these aviators. This is especially important as the conventional Navy has minimal direct combat experience in the wars in Iraq and Afghanistan.[92] These factors combined create a culture that values combat-experienced, carrier-based pilots that conduct offensive strike missions—a small and very specific group of officers. As these officers embody the culture of naval aviation and the larger Navy, they promote to higher ranks and fill influential positions. The structure of Navy promotion allows warfare communities to select their own officers for promotion up through the rank of captain (O-6). In these higher roles, senior officers on promotion boards frequently select officers with similar records,[93] reinforcing and perpetuating the culture and preferences. As the polar opposite, helicopters pilots historically struggle to compete for promotion and influence against these cultural preferences. The transition in focus to asymmetric threats in the 2000s provided a prime arena for helicopters to gain potential combat experience and, hence, cultural influence,

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89 Builder, *The Masks of War*, 25.

90 Kimberly Jackson, Katherine L. Kidder, Sean Mann, William H. Waggy, Natasha Lander, and S. Rebecca Zimmerman, *Raising the Flag: Implications of U.S. Military Approaches to General and Flag Officer Development* (Santa Monica, CA: RAND Corporation, 2020), 91.

91 Promotion data derived from Fiscal Year 2022 aviation major command screen board results (air wings, carriers, large amphibious ships, bases) and Fiscal Year 2021 PERS-43 aviation lists (flag). Additional breakdown explained in Chapter III.

92 Jackson et. al., *Raising the Flag*, 99–100.

93 Jackson et. al., 186.

but few real opportunities arose. Furthermore, the GPC era appears to shift favor back toward carrier aviation. The emergence of UAS may be the ultimate causal factor in changing the culture of naval aviation, but that will take decades to come to fruition.

E. NAVY STRATEGY, OPERATIONAL CONCEPTS, AND HELICOPTERS

Since the inception of helicopters, the strategic thought of naval leaders—and the operational concepts that support it—has both benefited and hindered the helicopter community. Due to classification levels, specifics about the Navy's strategy and operational concepts throughout history is difficult to fully explain. Further difficulty emerges from whittling down the broad maritime strategic thought due to the Navy's institutional tendency of not relying on a single strategy.[94] However, persistent themes—power projection, sea control, and adaptations to new threats—emerge to shed light on the treatment of helicopters. This section will provide a historical survey of Navy strategy and operational concepts, and the helicopter community's contributions to each.

Maritime strategy in World War II centered primarily on sea control and power projection. As the reality of a two-ocean war emerged, American leaders created a "Europe first"[95] strategy that prioritized the Atlantic theater over the Pacific. In the Atlantic, materiel was transported to Britain for the war effort against Germany under the Lend-Lease Act, starting in early 1941. In September 1941, President Roosevelt expanded the commitment by providing convoy escorts for British ships enroute to Iceland, making the U.S. a cobelligerent with Britain against Germany.[96] Almost immediately, German U-boats began engaging American ships, which had no aerial coverage once outside the range of shore-based aircraft. Gaining sea control in the North Atlantic became the strategic imperative for the Navy. Controlling the seas meant neutralizing—or at least deterring—the U-boat threat in order to keep supplies flowing to the Allies and keep the war away from mainland America. In attempt to contribute to this strategy and gain further support for development, helicopter pioneers from the Coast Guard and Navy shifted the mission

94 Builder, *The Masks of War*, 79.

95 Baer, *One Hundred Years of Sea Power*, 156.

96 Baer, 162.

focus of helicopters from rescue to ASW.[97] Ship-based helicopters would provide aerial ASW (and, secondarily, rescue) for the convoys, facilitating local sea control and supporting the strategic effort. Unfortunately for the fledgling helicopter community, the U-boat threat diminished, and the Navy did not take delivery of helicopters in time to affect the war effort. In the Pacific, a progressive leapfrog of power projection and offensive sea control—led by naval aviation and carriers—characterized maritime strategy that led to victory against Japan.[98] If helicopters had been available for the Pacific theater, they likely would have been used to defend surface ships from Japanese submarines. Although never seeing combat, World War II set the stage for ASW to be the Navy helicopter's lasting impact on maritime strategy.

The Cold War era was the proving ground for Navy helicopters. Navy strategic thought primarily focused on deterrence, both conventional and nuclear, which prioritized nuclear submarines and supercarriers.[99] Sea control and power projection were still foundationally important, but the post-war demobilization and competition for resources forced the Navy to adapt strategy.[100] During this period, helicopters indirectly facilitated strategy through defensive and supporting concepts of ASW, logistics, MCM, gunnery spotting, NSW support, and CSAR. ASW technology continued to improve with the development of dipping sonar, extending helicopter capabilities by enabling detection of submerged enemy submarines.[101] Beginning in 1946, these aircraft were organized into squadrons—eventually called anti-submarine squadrons (HS)—that deployed on carriers and other large ships.[102] As the Cold War continued, ASW helicopters received significant technology upgrades and were eventually outfitted with a torpedo, giving an offensive edge for helicopters to support the Navy's defense-in-depth concept.[103] By late 1949,

97 Secades, *The Naval Helicopter*, 6.

98 Baer, *One Hundred Years of Sea Power*, 243–245, 248–251.

99 Baer, 282–284.

100 Baer, 275–280.

101 Michael Taylor, *Naval Air Power* (New York: Hamlyn Publishing, 1986), 50.

102 Secades, *The Naval Helicopter*, 12.

103 Boyne and Lopez, *Vertical Flight*, 99.

helicopters replaced seaplanes onboard large surface ships[104] and provided ASW, MCM, SAR, and spotting for naval gunfire during the Korean War.[105]

A lack of naval threats characterized the Vietnam War. As a result, the helicopter community adapted to support operational imperatives. During the conflict, carriers launched daily alpha strikes against targets in North Vietnam, leading to significant numbers of aircraft shootdowns. In response, a large portion of helicopters onboard carriers were stripped of ASW gear, painted camouflage, and tasked with a new concept—dedicated CSAR of downed aviators.[106] Doctrine was created that included overhead fixed-wing defensive support—rescue combat air patrol (RESCAP)[107]—and a "lily pad" network of cruisers and destroyers to provide fuel and navigational guidance, extending the rescue helicopters' range and allowing for inland rescues.[108] This adaptation led to the creation of a new squadron type in 1967—helicopter combat support (HC).[109] The lack of naval threats also pushed ships closer to the coast and into inland waterways. As previously mentioned, the HAL-3 *Seawolves* supported the "brown water" Navy through operations with SEALs and PBRs.[110] From February to July 1973, MCM helicopters cleared mines by towing a magnetic hydrofoil, a new technology that allowed access to Haiphong Harbor during *Operation Endsweep*.[111] During both the Korean and Vietnam wars, helicopters conducted ship-to-ship and ship-to-shore logistics that enabled carriers and surface combatants to remain at sea. While not the face of deterrence in the Cold War, the helicopter community mastered these auxiliary concepts and missions that underwrote maritime strategy.

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104 "Helicopters," Naval History and Heritage Command, accessed February 25, 2021, https://www.history.navy.mil/research/histories/naval-aviation-history/naval-aircraft/helicopters.html.

105 Gregory, *The Helicopter*, 172.

106 Chinnery, *Vietnam: The Helicopter War*, 46–47.

107 Chinnery, 90–91.

108 Chinnery, 46–47.

109 Chinnery, 90.

110 Chinnery, 71–2.

111 Chinnery, 169.

The end of the Cold War thrust the Navy into a new period of strategic thought. Historically, the Navy has invested in broadly diversified forces.[112] This is no more evident than in the creation of the HMP and Helo CONOPs 1.0 in the early 2000s, which called for diverse and expanded mission sets for the helicopter community. A broad scope of missions—coupled with advancements in technology—led to an unprecedented investment by the Navy in multi-mission helicopters over specialization. While the HMP was more of an acquisition strategy and force structure realignment, the operational and tactical concepts within Helo CONOPs 1.0 emphasized the use of the newly armed helicopters to support the shift to asymmetric warfare in the post-Cold War era. Experience with small Iraqi surface boats in Desert Storm[113]—and Iranian forces since—reinforced the shift away from a naval peer adversary. With two squadrons on the carrier (instead of one), helicopter aviators created a "hunter-killer"[114] concept that leveraged the strengths of both helicopter types to combat smaller surface threats to the carrier strike group (CSG). However, multi-mission capabilities have again taken a subordinate role to specialization. Recently, the "jack-of-all-trades, master-of-none" syndrome nurtured by the wide scope of missions conducted by multi-mission helicopters has affected a large portion of the helicopter community—specifically, HSC squadrons—as the preference of naval aviation leaders appears to pivot back toward higher-technology, more specialized aircraft. This is embodied in the aforementioned "CVW of the Future" concept, where utility-based MH-60S helicopters found in HSC squadrons have been reduced by 50 percent on the carrier, compared to 14 percent of the more-specialized MH-60R helicopter found in HSM squadrons.[115]

Despite an emphasis on countering asymmetric threats, the Navy continued to prioritize power projection throughout the Global War on Terror. In addition to traditional missions, the power projection umbrella extended to include missions that were previously

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[112] Builder, *The Masks of War*, 79.

[113] Department of the Navy, "Thunder and Lighting: The War with Iraq."

[114] Weaver and Richard, "Navy Helicopters are Changing Course."

[115] CDR Frank Loforti, personal communication, May 24, 2020.

lesser emphasized, including special operations and rescue.[116] Navy helicopters provided capabilities for these specific missions during the Iraq War in the form of NSW support and medical evacuation (MEDEVAC). Extending the lineage of the HAL-3 *Seawolves* in Vietnam, HCS-4 and HCS-5—later redesignated HSC-84 and HSC-85—conducted combat missions in Iraq in support of Navy SEALs and other special operators from 2003 until 2011.[117] In 2006, the helicopter community created a new concept to fulfill a need for MEDEVAC capabilities at the request of the Army. Personnel and aircraft from two squadrons and two different locations—HSC-25 from Guam and HS-15 from Jacksonville, Florida—combined to make the 2515th Navy Air Ambulance Detachment (NAAD).[118] Based in both Kuwait and Basra, Iraq, the detachment conducted MEDEVACs in support of ground operations and provided support for ships in the Persian Gulf. During the same timeframe, MH-53E helicopters from HC-4—normally tasked with ship-to-shore heavy lift support—conducted combat logistics missions throughout southern Iraq.[119] All told, Navy helicopter crews flew over 3,500 combat hours in support of NSW and conducted MEDEVACs for over 2,200 personnel during the Iraq War.[120]

The era of GPC has ushered in a new operational concept of DMO. The essence of DMO calls for a distribution of firepower across a wide area and multiple domains in order to both overwhelm an adversary and decrease vulnerability by dispersing friendly forces.[121] The surface community originally conceived the concept—coined distributed

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116 Dmitry Filipoff, "How the Fleet Forgot to Fight," (presentation, Naval Warfare Studies Institute, Naval Postgraduate School, Monterey, CA, February 17, 2021).

117 Skip Robinson, "Special Seahawks," *Vertical Magazine*, last modified May 30, 2019, https://verticalmag.com/features/special-seahawks.

118 Skip Robinson, "Special Seahawks."

119 Sarah Scully, "Sky Sailors: Navy Pilots Based in Kuwait Contribute to OIF Aviation Missions," *DVIDS*, last modified January 3, 2007, https://www.dvidshub.net/news/8726/sky-sailors-navy-pilots-based-kuwait-contribute-oif-aviation-missions.

120 "A Medical History: Departing Naval Detachment Treated Thousands," *DVIDS*, June 26, 2021, https://www.dvidshub.net/news/90638/medical-history-departing-naval-detachment-treated-thousands.

121 Edward Lundquist, "DMO is Navy's Operational Approach to Winning the High-End Fight at Sea," *Seapower*, last modified February 2, 2021, https://seapowermagazine.org/dmo-is-navys-operational-approach-to-winning-the-high-end-fight-at-sea.

lethality—as a return to sea control[122] and the larger Navy is exploring strategic and force structure implications for the entire fleet for high-end conflict against Russia or China. In the aforementioned Helo CONOPs 2.0, leaders are developing a future for the helicopter community with DMO as a primary consideration.[123] However the current force structure may still facilitate support for DMO. The "CVW of the Future" concept, in many ways also a reaction to GPC, may benefit the helicopter community by releasing four helicopters from the current air wing. These extra helicopters and their broad capabilities could be shifted to shore-base at geographic choke points[124] or embark on traditional surface combatants (e.g., cruisers, destroyers, amphibious ships), and non-traditional ships (e.g., expeditionary sea base ships), distributing helicopter lethality further across the fleet. As Helo CONOPs 2.0 development is on-going as of 2021, it remains to be seen how the helicopter community will adapt to support DMO. Another aspect yet to be published is the role that next manned helicopter—the Future Vertical Lift Maritime Strike (FVL-MS)—and rotary UAS will play in Helo CONOPs 2.0 and DMO.

F. CONCLUSION

This chapter's purpose is to provide a historical understanding of the Navy, naval aviation, the helicopter community, and naval strategy. The following chapter will analyze the empirical evidence to test the hypotheses and explain the Navy's treatment of helicopters. Why did the Navy pursue helicopters and continue to fund their existence? What explains the limited role and lack of investment in advanced technology compared to other naval aviation communities? Is this even the case? And, ultimately, what explains the current perceived deemphasis of Navy helicopters? The next chapter will apply the military innovation paradigms in an attempt to answer these questions.

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[122] Kevin Eyer and Steve McJessy, "Operationalizing Distributed Maritime Operations," *Center for International Maritime Security*, last modified March 5, 2019, https://cimsec.org/operationalizing-distributed-maritime-operations.

[123] Weaver and Richard, "Navy Helicopters are Changing Course."

[124] Professor Jeffrey Kline, Naval Postgraduate School, personal communication, February 22, 2021.

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III. U.S. NAVY HELICOPTERS: A MILITARY INNOVATION CASE STUDY

A. INTRODUCTION

Since 1938, a combination of civil-military, inter-service, intra-service, cultural and technological dynamics guided the inception, development, and continued existence of helicopters within the U.S. Navy. This chapter's purpose is to analyze empirical evidence from this period through the lens of military innovation paradigms to explain the Navy's treatment of helicopters. Evidence is compiled and examined within five military innovation models: civil-military, inter-service, intra-service, cultural, and technology.

In the end, the strongest explanatory power is found in the combination and ever-shifting interaction between the five models. However, evidence suggests that each model contributes differing levels of impact. Individually, intra-service, cultural, and technology dynamics seem to each offer a compelling model to understand the helicopter community's standing within the Navy. Aspects of the inter-service model are also valid, but more indirectly. Civil-military dynamics appear to have minimal influence. Ultimately, this chapter's goal is to present the empirical evidence to establish if and why the Navy is deemphasizing the helicopter community.

B. CIVIL-MILITARY MODEL

Direct civilian intervention with respect to the Navy helicopter community has been minimal. Intervention that did occur was largely felt indirectly—both through greater changes in Navy doctrine and a notable lack of intervention in the face of other Navy and naval aviation platforms. In the lead-up to World War II, President Roosevelt touted a policy of "Europe first" that centered around U.S. aid to the Allies via the Lend-Lease Act.[125] The shipping that delivered aid required protection from German U-boats, resulting in a doctrinal change for Navy warships serving as escorts to merchant convoys on the voyage across the Atlantic. As coastal patrol aircraft on both sides of the Atlantic were limited in range, there

[125] Baer, *One Hundred Years of Sea Power,* 156.

was a considerable gap in air coverage and protection.[126] Generally, this forced the Navy to find solutions for the air gap— which may have led to Navy support for addition of helicopters to the convoys. More recently, the civil-military paradigm has been marked by the lack of intervention on behalf of helicopters. Since the Reagan era, there is evidence that civilian support for carriers and carrier-based fixed-wing aircraft has come at the expense of helicopters. Currently, considerable resources are committed to fielding the next-generation fighters and logistics aircraft, improving existing fixed-wing aircraft, and developing carrier-based unmanned aerial systems. These efforts support the Navy's preference to maintain the central position of naval aviation's central force—the aircraft carrier and carrier air wing. In the zero-sum nature of budgetary competition and without support from civilian leaders, the Navy helicopter community lacks advocates for further development against the strength of these other naval aviation communities and their civilian supporters.

The most noteworthy civilian involvement in the development of Navy helicopters was made by President Roosevelt. The period between the world wars marked a significant development of military applications of aviation. Within navies, the aircraft carrier emerged as challenger to the battleship as the capital ship and center of naval combat power.[127] Additional roles and types of carriers emerged to meet strategic needs. Prior to U.S. involvement in World War II, the Royal Navy employed fixed-wing aircraft from small carriers to combat the German U-boat threat against British convoys in the Atlantic by increasing detection capabilities and enhancing protection of shipping.[128] Learning from the British case, President Roosevelt suggested, in October 1940, that merchant ships be converted to autogiro carriers in support of trans-Atlantic convoys, whose autogiros could then "hover ahead of convoys, detect submarines, and drop smoke bombs to indicate their location to attacking escort craft."[129] At the time, autogiros—the immediate rotary-wing precursor to helicopters—were being developed and tested for military use. The quotation shows early naval thought by the Commander-in-Chief for rotary-wing aircraft as an anti-

[126] Gregory, *The Helicopter*, 124.

[127] Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development,* 51–2.

[128] Johnson, *Fly Navy*, 283–5.

[129] Johnson, 284.

submarine platform to decrease the vulnerability of Allied shipping during World War II convoy operations in the Atlantic. It is plausible that the sitting American president—also a former assistant secretary of the navy—used his position to force Navy leaders to accelerate develop and implement rotary-wing aircraft within fleet operations, but it is uncertain whether his thoughts translated to direct intervention or even minor influence. However, there is evidence that a "maverick" mid-grade Coast Guard officer, LCDR Ericksen—seconded to the Navy during World War II—switched the emphasis of the helicopter mission from rescue to anti-surface warfare in a 1942 memorandum to the Commandant of the Coast Guard.[130] There is no evidence of advocacy by President Roosevelt for LCDR Erickson's cause. Autogiros were found incapable of carrying a useful weapons payload and, ultimately, the first military helicopter was not introduced until 1944[131]—in time to test the convoy escort concept, but too late to prove impactful on naval warfare in World War II. Anti-submarine helicopter development was deemed too expensive and not essential to the war effort, and mid-grade naval officers found it impossible to change the policy without civilian activism as the U-boat threat dwindled as the war concluded.[132] The capability was eventually filled once the U.S. entered the war by fixed-wing aircraft embarked on escort carriers, starting in mid-1942.[133] Due to the lack of existing literature on the subject, it is difficult to establish whether President Roosevelt's comments had a causal effect on accelerated development or integration of helicopters within the Navy.

Navy helicopters received vacillating support from civilian leaders during the Cold War. In the post-war period, helicopters across all services emerged as the most effective platform for SAR. Recognizing the importance of a modern rescue capability, the Navy awarded a contract in 1957 to Kaman Corporation for a utility helicopter that represented the "highest level of helicopter technology of its era."[134] At that time, Kaman helicopters alone

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130 Frank A. Erickson, "The First Coast Guard Helicopters," *Proceedings* 107, no. 7 (July 1981): 941. https://www.usni.org/magazines/proceedings/1981/july/first-coast-guard-helicopters.

131 Johnson, *Fly Navy*, 284.

132 Robert M. Browning, *The Eyes and Ears of the Convoy: Development of the Helicopter as an Anti-submarine Weapon* (Biloxi, Mississippi: Coast Guard Historian's Office, 1993), 4–16.

133 Johnson, *Fly Navy*, 284–5.

134 Boyne and Lopez, *Vertical Flight*, 98.

accounted for over 20,000 lives rescued.[135] In the mid-1960s, Secretary of Defense Robert McNamara challenged the necessity for such an expensive helicopter by asking, "how many lives will the Navy be unable to save if it doesn't have this expensive procurement?"[136] Navy leaders failed to sufficiently answer the question and the program was canceled. By denying the Navy helicopter community access to the highest available technology, Secretary McNamara effectively squashed further development of helicopter missions and a potential boost in bureaucratic influence. As the Cold War continued in to the 1980s, the Soviet submarine threat became more of a concern for American leaders. Members of Congress called for the Navy to increase ASW capabilities—to include a new carrier-based ASW helicopter—over fielding 15 aircraft carriers.[137] For his part, Secretary of the Navy John Lehman backed the new ASW helicopter and even pushed for expanded capabilities,[138] insisting that if opponents resisted, "blood is on their hands."[139] Eventually, the aging SH-3 was replaced by a modern carrier-based ASW helicopter in the SH-60F CV-Helo in 1989,[140] but evidence shows the decision was based more on the need for a replacement to further protect aircraft carriers as an auxiliary over supporting the expansion of the helicopter branch. In the end, Secretary Lehman cemented the focus of his advocacy behind carriers over other platforms, stating "the last ship we give up is the carrier."[141]

Continued civilian support and intervention in the plight of the aircraft carrier explains the lack of intervention for the helicopter community in recent years. The latest case is found in the pivot away from asymmetric threats—that have characterized the Global War on Terrorism—toward peer adversaries and brings the question of aircraft carrier vulnerability to the forefront. China and Russia both possess considerable anti-access/area-

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135 Boyne and Lopez, 98.

136 Boyne and Lopez, 98.

137 George C. Wilson, "Navy Firm on Copters, Despite Critics," *Washington Post*, November 10, 1982.

138 *Department of Defense Appropriations for Fiscal Year 1985: Hearing Before the Committee of Appropriation*, 98th Cong., 2nd sess., September 14, 1984, *515–8*.

139 Wilson, "Navy Firm on Copters, Despite Critics."

140 Grossnick, *United States Naval Aviation*, 361.

141 Bill Keller, "The Navy's Brash Leader," *The New York Times Magazine*, December 15, 1985.

denial (A2AD) capabilities that affect both the carrier itself and its striking arm—the carrier air wing. China's development of anti-ship ballistic missiles and advanced air-to-air missiles, combined with potent Russian air defense systems, provides the greatest threat to American carriers and air wing aircraft since World War II.[142] These vulnerabilities, combined with their expense, have attracted criticism from members of Congress and academia.[143] In 2020, the Senate Armed Services Committee's National Defense Authorization Act (NDAA) required the Navy to "report on aircraft carrier air wing composition…to better prepare for potential conflicts envisioned in the National Defense Strategy."[144] As a result, Navy leaders conceived the "CVW of the Future," based on a combination of manned and unmanned platforms. The concept will earmark funding for the F-35 Lightning II and next-generation fighters, an additional E-2D *Hawkeye*, new tiltrotor CMV-22B *Osprey* logistics aircraft, and the unmanned MQ-25 *Stingray* refueling tanker.[145] The new air wing reduces risk to the carrier by extending the range of the aircraft, allowing the carrier to remain out of reach of Chinese anti-ship missiles. UAS integration charts the course for further unmanned aircraft, reducing risk to aircrew and overall costs. The effects of the Congressional intervention and the resultant conception of the future air wing on Navy helicopters is two-fold: resources that could be used on improving existing—or developing new—helicopters are unobtainable; and over 30 percent of the helicopters will be removed from air wings and carriers to make room for newer and more capable platforms. The Navy helicopter community leaders lack the bureaucratic power to fight against being pulled from the center of naval aviation—the carrier—and do not have the civilian activists to keep them in place.

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142 *Carrier Air Wing and the Future of Naval Aviation: Hearing Before the Subcommittee on Seapower and Projection Forces of the Committee on Armed Services House of Representatives*, 114th Cong., 2nd sess., February 11, 2016, 28 and 31.

143 Weaver and Richard, "Navy Helicopters are Changing Course."

144 *National Defense Authorization Act Fiscal Year 2021*, H.R. 6395, 116th Cong., 2nd sess. (January 3, 2020), 10.

145 Richard R. Burgess, "Navy's Future Carrier Air Wing Configuration Coming into Focus," *Sea Power*, September 14, 2020.

C. INTER-SERVICE MODEL

Inter-service dynamics—ranging from cooperation to competition—have played a considerable role throughout the history of Navy helicopters. Cooperation characterized the early development phase. On June 30, 1938, an inter-agency board was created to administer rotary-wing development funds earmarked by the Dorsey Act.[146] Within the military services, the Army took the lead and awarded contracts to Platt-LePage and Sikorsky in 1940.[147] The Army led testing throughout the development phase with officers from the Navy, Coast Guard, and Royal Navy consistently present.[148] Cooperation was forced on the Coast Guard and Navy as President Roosevelt transferred operational control of the Coast Guard to the Navy in 1941 in anticipation of U.S. involvement in World War II.[149] In the process, the Navy gained several mid-grade and senior Coast Guard officers that advocated for the use of helicopters for ASW and rescue missions. After a successful demonstration of a Sikorsky XR-4 in 1943, Admiral Ernest King, Commander in Chief, U.S. Fleet, assigned responsibility for helicopter development—specifically for ASW duty—to the Coast Guard.[150] The Navy's increasing desire for ASW capabilities over the Army's priority for an observation platform was the point of divergence. On May 4, 1943, Admiral King directed the creation of what would become the "Combined Board for the Evaluation of the Ship-Based Helicopter in Antisubmarine Warfare," which initially included the Navy, Coast Guard, British Admiralty, and Royal Air Force.[151] While the board did eventually include the Army, the Navy's increased involvement in helicopter development marked a dynamic shift between the services. Cooperation now became competition between the Army on one side and the Navy and Coast Guard on the other.

Competition became more prevalent in the military drawdown in the post-war era. World War II effectively ended a period of rapid innovation in naval applications of the

146 Secades, *The Naval Helicopter*, 5.

147 Evans and Grossnick, *United States Naval Aviation*, 261.

148 Boyne and Lopez, *Vertical Flight*, 19–24.

149 Secades, *The Naval Helicopter*, 6

150 Evans and Grossnick, *United States Naval Aviation*, 261.

151 Evans and Grossnick, 261.

helicopter. For example, immediately after V-J Day, 390 out of a joint Navy-Army order of 455 Sikorsky R-5s were canceled (with the remaining 65 already delivered).[152] A new era of resource competition began. Continuing a procurement tactic from the end of World War II, the Navy deliberately contracted helicopter manufacturers that the Army—now Air Force—had not. The result was Piasecki's HRP-1 "Flying Banana" which had a payload three times larger than any other helicopter. This effectively silenced criticism that the Navy had not leveraged the new technology and capabilities and was no longer losing the inter-service competition.[153]

In the post-war period through the Korean War, the Navy continued to find innovative uses to match emerging helicopter technology. The Navy continued ASW development, successfully testing a dipping sonar against a captured German submarine in May 1946.[154] This capability not only proved vital for fleet defense, but also helped close out competition in aviation ASW from other services. During the Korean War, Navy helicopters—operating from aircraft carriers and large warships—provided SAR for downed aviators, fleet cargo and passenger transfers, spotting for shore bombardment, and mine clearing.[155] In the competition for resources during this era, the Navy developed innovative applications in tandem with higher-technology helicopters.

In the modern era, UAS emerged as an area for inter-service competition that effects both service level budgets and the future of manned aircraft communities. Similar to other defense programs, UAS development began in the spirit of cooperation. From 1988 to 1994, a newly established joint program office (JPO) oversaw all aspects of the DOD's UAS programs.[156] Despite the attempts at cooperation, not a single UAS achieved full production during the JPO's administration.[157] Responsibility for the acquisition and development of

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[152] Boyne and Lopez, *Vertical Flight*, 22.

[153] Robert Lemds, "The Helicopter: A Hundred Years of Hovering," *Wired*, December 12, 2012. https://www.wired.com/2007/12/gallery-helicopter.

[154] Secades, *The Naval Helicopter*, 11.

[155] Barker, "The Helicopter in Combat."

[156] John David Blom, *Unmanned Aerial Systems: A Historical Perspective* (Fort Leavenworth, Kansas: Combat Studies Institute Press, 2010), 73.

[157] Blom, 88.

UAS returned to the services in Fiscal Year 1998.[158] This set the groundwork for inter-service competition, but also innovation. The Navy pioneered the use of UAS in combat operations during Desert Storm. The aptly named *Pioneer* system deployed from battleships as an effective gunnery spotter for shore bombardment and was the first unmanned system to be surrendered to when an Iraqi unit waved white flags at the overflying drone.[159] After Desert Storm, the Air Force quickly surpassed the other services—aided by budget increases—by integrating the *Predator* and *Global Hawk* in the conflicts in Kosovo, Iraq, and Afghanistan.[160] In order to remain competitive, the Navy needed to develop ways to integrate unmanned systems in fleet doctrine.

Despite an ingrained reluctance within naval aviation culture, there is a history of unmanned aircraft within the Navy. Specific to helicopters, the Navy developed the QH-50 Drone Anti-submarine Helicopter (DASH) starting in 1958 through 1970, which even impacted ship design with the addition of aviation fuel tanks onboard non-carrier warships.[161] The program was eventually abandoned due to technological limitations, serving as a case of failed innovation. More recently, the Navy has developed several unmanned platforms to compete in the UAS arena and increase its budget share. These include the MQ-25 *Stingray*, MQ-8B/C *Fire Scout*, and the MQ-4C *Triton*. The Navy plans to include five to eight fixed-wing *Stingray* in the carrier air wing as a tanker and ISR platform,[162] taking up precious space and forcing helicopters from the carrier. The helicopter community attached itself to the rotary-wing Fire Scout and endeavored to adopt manned-unmanned tactics, but the program continues to struggle with fleet integration.[163] Not only

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158 Blom, 96–7.

159 Blom, 88–90; Jeremiah Gertler, *U.S. Unmanned Aerial Systems*, CRS Report No. R42136 (Washington, DC: Congressional Research Service, 2012), 1.

160 Gertler, *U.S. Unmanned Aerial Systems*, 2.

161 Secades, *The Naval Helicopter*, 19, 25; Chinnery, *Vietnam: The Helicopter War*, 46–7.

162 Thomas Newdick, "Navy's Aviation Boss Lays Out Big Vision for Drone-Packed Carriers of the Future," *The Warzone*, March 31, 2021, https://www.thedrive.com/the-war-zone/40007/navys-aviation-boss-lays-out-big-vision-for-drone-packed-carrier-air-wings-of-the-future.

163 *Department of Defense, Director, Operational Test and Evaluation, FY-19 Navy Programs: MQ-8 Fire Scout* (Washington, DC: December 20, 2019), 151–2, https://www.dote.osd.mil/Portals/97/pub/reports/FY2019/navy/2019mq8firescout.pdf?ver=2020-01-30-115519-503.

does the Fire Scout affect the manned helicopter budget but being connected to a struggling program has been detrimental the helicopter community's bureaucratic influence. The larger, high-endurance, fixed-wing Triton is more of a threat to the future of the P-8A *Poseidon* and EP-3E *Orion* of the maritime patrol and reconnaissance community, but still represents an additional alternate pathway for the Navy's resources to be diverted away from manned helicopters.

Naval aviation has possessed a near monopoly in airborne mine warfare since its emergence, which limits innovation within MCM force, of which helicopters are a part. The helicopter proved its capability for mine detection during the Korean War,[164] although this was limited to the naked eyesight of aircrew. In 1960, the Navy successfully demonstrated air-portable mine sweeping gear, making the helicopter a self-contained minesweeper.[165] Existing helicopters were converted to the airborne MCM role until the Navy established a dedicated HM squadrons—comprised of RH-53s—in 1971.[166] Despite the addition of mine squadrons to the bureaucratic structure, within the Navy, mine warfare historically holds a subordinate role to all other warfare areas.[167] With no competition from other services and the Navy's complacent attitude toward mine threats, MCM ships and helicopters occupied an inferior position for funding. The impact on training, readiness, and morale emerged in the Persian Gulf during Desert Storm, where MCM ships and helicopters performed inadequately, resulting in damage to the USS *Tripoli*—ironically, the MCM helicopter carrier—and the USS *Princeton* as a result of Iraqi mines.[168] This provided an impetus for the transition of the airborne MCM mission to the MH-60S and development of new MCM technology. However, while still under-going testing, the Navy stated in 2016 that this prospective configuration was not "operationally effective or suitable to conduct mine

164 Kreisher, "Rise of the Helicopter During the Korean War."

165 Secades, *The Naval Helicopter*, 20.

166 Secades, 20.

167 Builder, *The Masks of War*, 25.

168 Edward J. Marolda, "The United States Navy and the Persian Gulf," *Naval History and Heritage Command*, August 23, 2017, https://www.history.navy.mil/research/library/online-reading-room/title-list-alphabetically/u/the-united-states-navy-and-the-persian-gulf.html.

countermeasure operations."[169] Without inter-service competition to drive innovation, this program risks being another failed innovation case for the Navy and its helicopter community. However, the increased emphasis placed on Chinese and Russia A2AD may have a positive effect and lead to increase funding for more effective technology and a more suitable aerial MCM platform.

An alternate perspective within the inter-service model posits that increased jointness stifles innovation.[170] Despite a history of inter-service competition, the Army and Navy have often shared rotary-wing platforms—to include the current H-60 fleet—with the Army as the lead and shouldering most of the research and development costs. The Army leads the development of the Future Vertical Lift (FVL) program, which officially began in 2009 and is expected to field successors to current Army platforms in the early 2030s.[171] These new aircraft will replace the full spectrum of the Army's helicopter requirements, including manned assault and attack reconnaissance helicopters and tactical rotary-wing UAS.[172] Leveraging technology from the Army's FVL efforts, the Navy plans to introduce the FVL-MS program to replace the current MH-60R/S helicopters and MQ-8C by the mid-2030s.[173] The FVL-MS is expected to be a "family of manned and unmanned systems" aimed to address the capability gaps due to the emergency of peer adversaries and the capacity gaps faced by the upcoming retirement of aging platforms.[174] It remains to be seen whether the Navy will develop an innovative and impactful platform unique to the maritime environment or if the FVL-MS be a less-capable compromise for the sake of jointness.

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169 *Department of Defense Inspector General, Acquisition of the Navy's Mine Countermeasures Mission Package* (Washington, DC: July 25, 2018), 11, https://media.defense.gov/2018/Jul/27/2001947725/-1/-1/1/DODIG-2018-140.PDF.

170 Grissom, "The Future of Military Innovation Studies."

171 "Future of Vertical Lift Gets Closer," *Vertiflite: The Vertical Flight Technical Society Magazine (*March/April 2021): 20–21, https://vtol.org/files/dmfile/fvl-gets-closer-v-marapr-2021.pdf.

172 "Future of Vertical Lift Gets Closer," 20.

173 Department of the Navy, *Future Vertical Lift (Maritime Strike) Analysis of Alternatives*. Washington, DC: January 28, 2021, https://sam.gov/opp/bd38391fe9de4d388d1579ab31f03bb1/view.

174 Department of the Navy, *Future Vertical Lift (Maritime Strike)*.

D. INTRA-SERVICE MODEL

The intra-service model highlights the importance new theories of victory developed by senior services leaders and the competition between branches within that single service to fulfill the new theory. This section will address competition between the three primary unrestricted line branches of the Navy—aviation, surface, and submarines—but will primarily analyze the communities within the aviation branch. Historically, the preferred theory of victory for naval aviation is power projection and offensive strike operations delivered by carrier-based, fixed-wing fighters.[175] However, space has been available for emerging technologies, missions, and subsequent force structure changes. This section will describe the effects of new theories of victory and bureaucratic dynamics (via analysis of promotion data) on the Navy helicopter community.

The history of Navy helicopters is characterized by continuously evolving theories of victory. Helicopters gained a foothold within naval aviation when a small group of mid-grade officers—led by the aforementioned LCDR Erickson—allied with the Commandant of the Coast Guard, Vice Admiral Russell Waesche, to advocate for the use of helicopter in ASW. After viewing an early helicopter demonstration, VADM Waesche convinced Admiral King, CinC, U.S. Fleet, of the viability of helicopters for military applications.[176] Admiral King directed the Navy's BuAer to develop and evaluate helicopters for a role within the new theory of victory—ASW.[177] In the early 1940s, a position within the bureaucracy was created by way of a helicopter class desk within BuAer, officially establishing the Navy helicopter community.[178]

During the Cold War, a new theory of victory centered around nuclear war. Due to rotary-wing technology limitations and the Navy's focus on developing other nuclear platforms, the helicopter community centered on ASW, logistics, and SAR in the immediate aftermath of World War II. However, new missions emerged for which helicopters were

175 Builder, *The Masks of War*, 25.

176 Erickson, "The First Coast Guard Helicopters."

177 Secades, *The Naval Helicopter*, 6–7.

178 Evans and Grossnick, *United States Naval Aviation*, 261.

uniquely suited, including MCM, NSW support, ASuW, and UAS integration. Each new mission represented a new theory of victory that resulted in the expansion of the helicopter community. In Korea, mine warfare emerged, for which new helicopter squadrons (HM) were created and new technology developed. During the Vietnam War, senior leaders recognized a need for aerial support of PBRs and SEALs. The Navy acquired helicopters from the Army and created a new squadron, the HAL-3 *Seawolves*, in 1967.[179] Though the Seawolves were stood down in Vietnam, NSW support represented a new theory of victory and a mission that Navy helicopters continue today.

The 1980s and 1990s marked the beginning of the asymmetric threat against the Navy. At the time, the helicopter fleet focused on ASW, logistics, SAR, and MCM. The lessons learned from interaction with smaller Iraqi combatants during Desert Storm informed the expansion of ASuW to the aerial domain.[180] The culmination occurred when Navy leaders established the HMP and Helo CONOPs 1.0 in 2001.[181] The HMP and CONOPs 1.0 provided for the acquisition of high-technology helicopters armed with machine guns, anti-surface missiles, and rockets; and their implementation within Navy doctrine. Additionally, the Navy altered the force structure to reflect the newfound support for helicopters. The helicopter fleet was consolidated from seven to two aircraft and organized into two squadron types—sea combat (HSC) and maritime strike (HSM).[182] Helicopter presence was also doubled within the carrier air wing, cementing a period of unprecedented growth for the helicopter community.

The preceding examples of evolving theories of victory clearly facilitated the emergence of the helicopter within naval aviation. Recently, a new theory of victory emerged with a negative impact on helicopters: UAS. In an attempt to adapt, leaders within the

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179 Chinnery, *Vietnam: The Helicopter War*, 72–3.

180 Department of the Navy, "Thunder and Lighting: The War with Iraq."

181 Bauknecht, "Helo CONOPs, Organizing for 21st Century Warfare;" Burgess, "Navy Maps Out Transition Plan for New Helicopters," 33, ProQuest.

182 Christian F.M. Liles and Christopher Bolkcom, *Military Helicopter Modernization: Background and Issues for Congress*, CRS Report No. RL32447 (Washington, DC: Congressional Research Service, 2004), 16–18. The MH-53E and HM squadrons are still active past their planned decommissioning dates due to delays in MH-60S MCM implementation and are administered by HSC type wings.

helicopter community latched on to the Fire Scout program, but the results have proved disappointing. A new squadron type was formed in 2012—Unmanned Helicopter Reconnaissance Squadron ONE (HUQ-1)[183]—and managed by the helicopter community but was decommissioned and downgraded to a maintenance detachment in less than two years.[184] Despite continued bureaucratic and development setbacks, the *Fire Scout* remains integral to the helicopter community's endeavors to adapt to the unmanned theory of victory.

Unmanned systems also provide an arena for intra-service competition between the surface and aviation communities. In order to garner a larger budget share, the surface Navy is developing unmanned surface combatants to support the unmanned theory of victory.[185] Naval aviation's reaction is the previously mentioned "CVW of the Future." In 2019, due to impending budgetary decisions, senior aviation leaders directed the helicopter community to accelerate the analysis of planning for Helo CONOPs 2.0.[186] While the concept is still under development and is undoubtedly an example of innovation, it is a reactionary consequence to the Navy's preferences that—in the short term—physically removes helicopters from the carrier and air wing, reduces the role of helicopters within carrier aviation doctrine, and diminishes the bureaucratic influence of the helicopter community.

The previous examples are illustrative of the Navy helicopter community as a continuously evolving and successful innovation case with respect to theories of victory, but it is necessary to look at the other side of the intra-service model—officer promotion—to explain its limited bureaucratic power. As discussed above, the force structure of the Navy and naval aviation has been changed several times to establish helicopter squadrons in support of new theories of victory. Bureaucratically, this establishes the helicopter community on par with the surface, submarine, and other aviation communities. However, empirical evidence found in higher-level promotions explains why helicopters hold an

183 Dave Bradford, "2012 Year in Review," *Naval Aviation News*, last modified August 5, 2012, https://navalaviationnews.navylive.dodlive.mil/2013/08/05/2012-year-in-review.

184 Jonathan LaQuay, "New Det to Keep Fire Scouts Fully Functional," *Naval Aviation News*, last modified April 27, 2015, https://navalaviationnews.navylive.dodlive.mil/2015/04/27/new-det-to-keep-fire-scouts-fully-functional.

185 Weaver and Richard, "Navy Helicopters are Changing Course."

186 Weaver and Richard.

inferior position within naval aviation and the larger Navy. Three primary communities comprise naval aviation (listed below):

- Tactical air (TACAIR): F/A-18E/F *Super Hornet*, F-35 *Lightning II*, E-2D *Hawkeye*, EA-18G *Growler*.
- Maritime Patrol and Reconnaissance Forces (MPRF): P-8A *Poseidon*, EP-3E *Orion*, E-6B Mercury.
- Helicopters and tiltrotor: MH-60R *Seahawk*, MH-60S *Knighthawk*, MH-53E *Sea Dragon*, CMV-22B *Osprey*.

Since World War II, the pinnacle of naval aviation—and the Navy, in general—has been the TACAIR community and—more specifically—carrier-based fighters. The remaining fixed-wing carrier aircraft fall beneath fighters. The land-based MPRF community comes after fixed-wing carrier aircraft. Literature summarizing the hierarchy either did not mention helicopters or insinuated a ranking at the bottom of the pecking order.[187]

In line with the intra-service model, analysis of promotion data[188] provides explanatory power for the dynamics between the communities within naval aviation. Up to and including O-5 squadron command, aviators are chosen and assigned to milestone billets within their respective communities.[189] Aviation major command follows successful O-5 command. Peak major command billets represent the first milestone in which officers from each aviation community compete against one another for promotion. Ranked in descending order from most prestigious to least is the command of aircraft carriers (CVNs), CVWs, big-

[187] Builder, *The Masks of War*, p. 25. The author did not reference the Navy helicopter community but ranked carrier (TACAIR) and patrol (MPRF) aircraft; Jackson, et. al., *Raising the Flag*, 110. The authors mention officers from certain platforms (i.e., communities) rarely get picked for flag, alluding to the inferior bureaucratic position of the Navy helicopter community.

[188] Promotion data derived from current commanding and executive officers (CVN, LHA/D), current commanders and deputy commanders (CVW), Fiscal Year 2022 aviation major command screen board results (bases), and Fiscal Year 2021 PERS-43 aviation lists (flag).

[189] Jackson et al., *Raising the Flag*, 92–7.

deck amphibious ships (LHA/Ds), and shore bases.[190] Subsequently, officers selected for CVN and CVW command are highly likely to promote to flag rank[191] over the other major command billets. However, successful completion of any major command is a prerequisite for selection to flag rank.[192] The breakdown of aviation major command and flag promotion by community is listed in Table 1.

Table 1. Promotion breakdown by naval aviation community

	Av Major Cmd[1]	CVN	CVW	LHA/D	Base	Flag[2]
TACAIR	59%	73%	94%	0%	25%	71%
MPRF	7%	0%	0%	0%	31%	10%
Helicopters	34%	27%	6%	100%	44%	19%

[1] Aviation Major Command (AV Major Cmd) is O-6 command of CVNs, LHA/Ds, and bases.

[2] Flag rank includes paygrades O-7 to O-10.

This promotion data largely reflects the historical naval aviation hierarchy but does not reflect the current force structure. In terms of number of naval aviators, the helicopter community comprises 35 percent of naval aviation, followed by TACAIR at 34 percent. MPRF makes up the smallest portion at 31 percent.[193] Helicopter pilots experience a relatively proportional promotion rate for major command, but the likelihood of promoting to flag rank is reduced. MPRF's promotion rates are negatively disproportionate for both major command and flag. In contrast, TACAIR aviators experience disproportionately high rates of promotion to major command and even higher rates to flag rank. A simple explanation is found in the composition of the carrier air wing. The current CVW is

190 An additional major command—type wing commodore—falls between LHA/Ds and shore bases but is left out of this study's promotion data because officers are selected from the same aviation community (i.e., HSC commodores are selected from officers that have successfully completed O-5 HSC squadron command).

191 Jackson et al., *Raising the Flag*, 110.

192 Jackson et al., 90.

193 "PERS-43 Aviation Update." The presentation from August 2020 lists helicopters at 35 percent (up from 30 percent in 2010) of naval aviation. TACAIR accounts for 34 percent (down from 41 percent in 2010). MPRF accounts for 31 percent (up from 29 percent in 2010).

comprised of six TACAIR squadrons (four of which are VFA), two helicopter squadrons, and a fleet logistics support (VRC) detachment. Mathematically, a TACAIR officer—specifically, a VFA pilot—is more likely than a helicopter pilot to be selected for higher promotion. A nuanced explanation can be found in the Navy's long-standing organizational preference for TACAIR over all other platforms, despite TACAIR's reduced share of naval aviation compared to helicopters and MPRF. Promotion pathways to senior rank for TACAIR aviators have been established almost as long as naval aviation has existed. As the tendency is for "ducks to pick ducks,"[194] TACAIR admirals continue to pick TACAIR aviators to promote to higher ranks with impunity. The Navy's warfare branches possess a high degree of autonomy in promoting their own officers,[195] allowing TACAIR's bureaucratic power to dominate internal politics to an extent that is difficult for the other communities to challenge. The cycle continues as these senior TACAIR admirals perpetuate the theory of victory based on the aircraft carrier and carrier air wing. For helicopters, the reverse is true—lower selection for peak aviation major command jobs results in lower promotion to admiral. Less high-ranking helicopter pilots are then unable to influence the promotion of promising helicopter pilots or advocate for the community. The disproportionate promotion opportunity to flag ranks has cascading effects and provides an explanation for the legacy of limited bureaucratic influence and the current deemphasis of helicopters within the Navy.

E. CULTURAL MODEL

The helicopter's role in U.S. Navy doctrine has been shaped by the Navy's unique strategic and organizational culture. The Navy's strategic culture values power projection through conventional offensive platforms—principally, aircraft carriers.[196] Organizationally, the Navy values independence, command at sea, and technical expertise for its unrestricted line officer corps.[197] Within naval aviation, carrier-based fixed-wing

194 Jackson et al., *Raising the Flag*, 186.

195 Jackson et al., 97.

196 Builder, *The Masks of War*, 76, 174.

197 Jackson et al., *Raising the Flag*, 82.

fighter pilots are the organizational preference,[198] which aligns with the Navy's strategic culture of strike and power projection. The realities of these dynamics have influenced the evolution of the Navy helicopter community.

Helicopters influenced a paradigm shift within the Navy soon after being introduced to the fleet. After World War I, the U.S. Navy emerged as one of three major navies—along with the Royal Navy and Imperial Japanese Navy—to develop naval aviation.[199] In the 1920s, U.S. naval aviation was comprised of carrier-based aircraft, airships and dirigibles, land-based bombers, catapult seaplanes, and sea-based patrol planes.[200] At the time, helicopters were in early stages of development and not considered to be of future military value. However, by late 1949, helicopters completely replaced the catapult-launched seaplanes on battleships and cruisers for utility missions, such as gunnery spotting, reconnaissance, and rescue.[201] This evidence shows that the emergence of helicopters influenced a cultural shift, but the impact was minor in nature and failed to affect the greater cultural preferences of naval aviation and the Navy.

When helicopters were introduced to the fleet in the mid-1940s, aircraft carriers and carrier-based aircraft were established as the Navy's central battle force due to combat performance in World War II.[202] The emergence of carrier aviation itself was compatible with the Navy's strategic culture of offensive sea control and power projection that was previously filled by the battleship.[203] In contrast, from inception, Navy leadership relied on civilian manufacturers to prove the usefulness of helicopters for military applications.[204] As technological advancements made the helicopter a viable military option, the Navy's ingrained culture—plus technology limitations compared to fixed-wing aircraft—shaped

198 Builder, *The Masks of War*, 25, 174.

199 Geoffrey Till, "Adopting the Aircraft Carrier: The British, American, and Japanese Case Studies," in *Innovation in the Interwar Period*, ed. Allan R. Millett and Williamson Murray (Washington, DC: Office of Net Assessment, 1994), *301–2.*

200 Hone, Friedman, and Mandeles, *American & British Aircraft Carrier Development*, 59–60.

201 Grossnick, *United States Naval Aviation*, 175.

202 Baer, *One Hundred Years of Sea Power*, 144.

203 Baer, *One Hundred Years of Sea Power*, 136–147.

204 Evans and Grossnick, *United States Naval Aviation*, 261.

how senior service leaders integrated helicopters within the Navy. Helicopters were used for defensive and supporting missions to protect ships and provide logistics for the fleet.[205] These auxiliary roles are incompatible with the culture of offensive action, providing an explanation for the limited influence of the helicopter community that endures today.

A potential exception to the Navy's cultural preference against helicopters is found with the introduction of the HMP and Helo CONOPs 1.0 that equipped helicopters with offensive weaponry in missiles, rockets, and machine guns. When introduced, senior Navy service leaders appeared to adapt the helicopter to fit within naval aviation's strategic culture of offensive strike within the ASuW arena. The shift in favor of expanded helicopter capabilities was informed by the experience with smaller surface combatants in the Persian Gulf during Desert Storm,[206] which can be seen as an external shock that forced the innovation. In theory, the addition of weapons and sensors positioned helicopters on par with other "first line combat aircraft."[207] However, once introduced to the fleet, helicopters fell back into their legacy defensive and supporting roles—albeit with considerably more firepower. Ingrained cultural preferences of ship and air wing commanders provide a potential explanation. In the years since Desert Storm, the asymmetric threat of small combatant ships largely disappeared, removing the external shock that served as the impetus for the increased presence of armed helicopters. With no real threats, the Navy's cultural preferences and culture of autonomy for operational commanders squashed the attempt at innovation by senior Navy leaders.

F. TECHNOLOGY MODEL

Technology has both enabled and inhibited the expansion of the Navy's helicopter community. Despite prevalent criticism of technology as a sole determinant of innovation, evidence shows that technology is inextricably linked to the helicopter case. Advancements in rotary-wing technology have failed to make demonstrable improvements in speed,

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[205] Evans and Grossnick, 261.

[206] Department of the Navy, "Thunder and Lighting: The War with Iraq."

[207] National Research Council (U.S.), *The Implications of Advancing Technology for Naval Aviation* (Washington, DC: National Academy Press, 1982), 28.

endurance, and payload, thereby inherently limiting capabilities—especially when compared to fixed-wing aircraft. These limited capabilities—combined with the Navy's shaping of helicopter technology–have resulted in minimal strategic impact and bureaucratic influence.

At first, the helicopter's unique technological capabilities—hovering and slow flight— commanded new military applications and missions. As early as 1943, the helicopter proved the ability to operate from smaller areas than fixed-wing aircraft, leading to testing for shipboard applications.[208] Suitability for non-carrier warships was quickly proven, opening a path for new helicopters missions, primarily ASW and rescue. Sensor technology caught up with and expanded mission effectiveness. A prime example is the addition of dipping sonar for submarine detection in 1945.[209] Helicopters have also been armed with missiles, rockets, and machine guns, providing additional capabilities to expand missions sets. In theory, these weapons can be used in offensive roles, but are limited to action against small vessels. Compared to the Navy's current premier strike platform—the F/A-18 *Super Hornet*—MH-60R/S helicopters carry approximately one-third the external payload but lack the advanced weapons to leverage that capacity at a comparable level to the *Super Hornet*.[210] The only ordnance carried by the MH-60R/S that could be considered a strike weapon for ASuW—the legacy AGM-114 Hellfire—has a small (18 pounds) warhead and short range[211] for use against asymmetric surface combatants. The MH-60R/S is included in the DOD's fielding of the new AGM-179 Joint Air-to-Ground Missile (JAGM), but lethality is underwhelmingly reported as "at least equal to that of the Hellfire,"[212] hardly proving a case

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208 Gregory, *The Helicopter*, 111–4.

209 Secades, *The Naval Helicopter*, 10.

210 The F/A-18E/F *Super Hornet* has an external takeoff payload of 17,700 pounds ("Aircraft – Fixed-Wing – Military – Boeing F/A-18 Super Hornet," *Janes*, August 27, 2020, https://customer.janes.com). A best-case scenario considers the lighter of the Navy's helicopters (MH-60S), which also has the most weapons stations, has a no-fuel empty weight of approximately 14,500 pounds, and maximum takeoff weight of 23,500 pounds (https://www.globalsecurity.org/military/systems/aircraft/ch-60-specs.htm). Accounting fuel for a typical sortie length (three hours and 3,700 pounds of fuel), theoretical ordnance payload for the MH-60S is 5,300 pounds.

211 "Weapons: Air Launched – AGM-114 Hellfire and Longbow Hellfire," *Janes*, October 23, 2020, https://customer.janes.com.

212 *Department of Defense, Director, Operational Test and Evaluation, FY-20 Army Programs: Joint Air-to-Ground Missile (JAGM)* (Washington, DC: January 2021), 95–6, https://www.dote.osd.mil/Portals/97/pub/reports/FY2020/army/2020jagm.pdf?ver=EUx8GgvmeEmjebm739_-bA%3D%3D.

for innovation. In contrast, the Navy's new Offensive ASuW (OASuW) strike weapon for the Super Hornet—the AGM-158C Long Range Anti-Surface Missile (LRASM)—is an air-launched cruise missile with a 1,000-pound warhead,[213] a significant increase in stand-off firepower for future peer adversary conflict. The LRASM adds to the already considerable weapons loadout for the Super Hornet, which also includes air-to-air missiles and precision guided bombs. In comparison, the payload limitations prevent helicopters from truly fulfilling the Navy's preferred offensive strike role.

Additionally, the SST view asserts that helicopters are not affected by technological limitations, but by Navy leadership's shaping of the helicopter technology within a certain role. Since inception, Navy leaders have viewed helicopters in defensive and supporting roles, further providing explanatory power for the lack of resources funneled to technological development of helicopters and helicopter-carried weapons. The inherent technological limitations are further limited by the Navy's reluctance to truly develop platform and weapons technology to make helicopters an offensive contributor on par with fixed-wing aircraft.

The Navy's social shaping of UAS technology has secondary effects on the helicopter community. As unmanned technology underwrites the vision of future warfare for both civilian and service leaders alike, UAS are emerging to potentially supplant helicopters in traditional roles within the Navy. Leaders envision UAS as a more cost-effective and risk-averse war of war that also overcomes the range and endurance limitations of manned platforms.[214] Without substantial bureaucratic influence within naval aviation, the helicopter community struggles to counter the Navy's SST dynamics. The Navy's current UAS inventory—the aforementioned *Stingray*, *Fire Scout*, and *Triton*—primarily focus on aerial

213 "Weapons: Air Launched – AGM-158C Long-Range Anti-Ship Missile (LRASM)," *Janes*, September 30, 2020, https://customer.janes.com.

214 Blom, *Unmanned Aerial Systems*, 1–3.

refueling and ISR, but capabilities are being extended to core helicopter missions of ASW[215] and ASUW.[216] This evidence suggests that advances in UAS technology—and the Navy's shaping of the technology into traditional helicopter roles—contribute to the Navy's deemphasis of the helicopter community and may lead to its ultimate demise.

G. SYNTHESIS AND CONCLUSION

In summary, evidence shows that the standing of the Navy helicopter community is a result of the combination the five military innovation levels. While there is evidence of some civilian intervention over the course of the Navy's history with helicopters, the level of direct influence over any phase is questionable. Any civilian intervention appears largely to reflect general opinion or reinforce the perspective of the senior service leaders. For example, President Roosevelt's thoughts on including autogiros in convoys for ASW was made at about the same time that the group of mid-grade military officers were trying to convince senior officers of the viability of helicopters in that very role. There is no evidence to show that President Roosevelt's thoughts influenced Admiral King—then the Commander-in-Chief, U.S. Fleet—to direct the development of helicopters for the ASW role. Since inception, the lack of civilian support for helicopters provides a possible explanation for their persistently limited role. Other platforms—aircraft carriers, fighters, UAS—simply garner more attention from civilian leaders.

Evidence suggests that inter-service dynamics influences the Navy's treatment of helicopters, but indirectly. Each DOD service employs helicopters in support roles—reducing bureaucratic influence—and many helicopters have been developed jointly, limiting the chances for innovation. Throughout history, inter-service competition arises

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215 Sam LaGrone, "Northrop Grumman Pitching Fire Scout Helicopter Drone for ASW Missions," *USNI News*, February 16, 2021, https://news.usni.org/2021/02/16/northrop-grumman-pitching-fire-scout-helicopter-drone-for-asw-missions.; John Keller, "Navy Orders Three MQ-4C Triton Long-Range Maritime Surveillances UAVs for Anti-Submarine Warfare (ASW)," *Military & Aerospace Electronics*, May 22, 2017, https://www.militaryaerospace.com/unmanned/article/16726349/navy-orders-three-mq4c-triton-longrange-maritime-surveillance-uavs-for-antisubmarine-warfare-asw.

216 Joseph Trevithick, "Huge Navy Unmanned-Focused Experiment Underway Featuring Live Missile Shoot and 'Super Swarms,'" *The Drive*, April 20, 2021, https://www.thedrive.com/the-war-zone/40262/huge-navy-unmanned-focused-experiment-underway-featuring-live-missile-shoot-and-super-swarms; Keller, "Navy Orders Three MQ-4C Triton Long-Range Maritime Surveillances UAVs."

from the quest for resources for marquee programs that have strategic impact. For the contemporary Navy, these programs include the *Ford*-class aircraft carrier, *Columbia*-class submarine, and several unmanned aerial, surface, and sub-surface systems. These programs garner the most attention from within and without the Navy, funneling resources—and opportunities for expansion and influence—away from the helicopter community.

The strongest explanation appears to be in the Navy's enduring theory of victory centered on power projection and offensive sea control and its effects on intra-service politics and culture. Although the new ASW theory of victory drove the introduction of helicopters immediately after World War II, the defensive nature of the role limited the influence of the helicopter community, a reality that continues today. In contrast, the TACAIR community embodies the power projection mission, giving it undeniably superior bureaucratic power within the Navy at large, and specifically above the helicopter and MPRF communities within naval aviation. As a result, officers of the strike-fighter community are promoted at greater rates and comprise a significant portion of prestigious command billets and flag ranks. With the prevalence and power of these officers, the culture supporting the preference of carrier-based, fixed-wing, offensive operations perpetuates at the expense of others. Inherent technological limitations underwrite the helicopters inability to fulfill the Navy's offensive strike and power projection roles, further confirming cultural bias against the helicopter community and limiting its influence within the Navy and naval aviation.

IV. CONCLUSION, IMPLICATIONS, AND RECOMMENDATIONS

A. IMPLICATIONS

The U.S. Navy's commitment to helicopters spans over 70 years. In the face of unprecedented expansion of the helicopter community in the first two decades of the 21st century, the Navy seems to be reversing its investment. What explains the Navy's apparent deemphasis of helicopters despite a long-proven record of supporting naval strategy and doctrine? This thesis attempts to answer the question by analyzing the Navy's historical and current treatment of the helicopter community through five models of military innovation studies—civil-military, inter-service, intra-service, cultural, and technology—and to determine which model provides the best explanation.

Ultimately, this thesis finds that no single model provides a sufficient explanation for the Navy's apparent deemphasis of helicopters. However, analysis of the empirical evidence shows that the best explanatory power is found in the dynamic interaction of the models. The Navy's treatment of helicopters evolved throughout the platform's history as aspects of each model waxed and waned and, thus, provided both beneficial and unfavorable different outcomes. Fluctuations in the influence of different aspects of each models explain the varying levels of importance applied by the Navy to helicopters. This chapter provides a detailed review of the findings for each hypothesis, outlines policy recommendations for the Navy, and presents potential future contributions to the field of military innovation studies.

1. Civil-Military Model (H_1)

The civil-military model posits that military innovation occurs when civilian leaders' interpretation of the geopolitical environment drives an intervention in military policy.[217] The hypothesis based on this model asserts that civilian intervention in Navy policy caused the Navy to deemphasize the role of the helicopter community. Empirical

[217] Grissom, "The Future of Military Innovation Studies," 920.

evidence suggests minimal civilian intervention in favor of helicopters, attributing less explanatory power to this hypothesis. However, a modification of the hypothesis appears to be valid.

A stronger explanation is found in a distinct lack of support for the helicopter community due to civilian intervention for other Navy programs, typified by current backing for the "CVW of the Future." The concept is an example of innovation based advanced aviation platforms—the F-35 *Lightning II*, CMV-22B *Osprey*, and MQ-25 *Stingray*—against which the helicopter community was unable to counter due to a lack of civilian intervention. The effect for helicopters appears to be less budget share, reduced influence, and diminished physical presence on aircraft carriers, the center of naval aviation.

2. Inter-service Model (H_2)

In this model, military service organizations within a state compete for budget share in a zero-sum game, resulting in innovation.[218] The inter-service hypothesis argues that the competition for resources between the services within the DOD caused the Navy to deemphasize the helicopter community. Throughout history, helicopters have proved to be a source of jointness, specifically between the Navy and Army. Since World War II, inter-service competition positively affected the helicopter community—refuting the hypothesis—as the Navy funneled resources for ASW helicopters. First to fight the German U-boats and then to counter Soviet submarines, the Navy continuously developed technology and doctrine for helicopters to provide aerial ASW in concert with surface ships, a main-stay helicopter mission to this day.

More recently, empirical evidence provides validity for the hypothesis in the form of UAS. The Navy currently invests in several forms of UAS—the *Stingray*, *Fire Scout*, *Triton*—as unmanned platforms become more central the American way of war. Resources that could be funneled to the helicopter community are instead given to Navy UAS programs, thus validating this hypothesis.

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[218] Grissom, "The Future of Military Innovation Studies," 910–1.

3. Intra-service Model (H_3)

The intra-service model asserts that innovation emerges when a new community within a military service embraces new capabilities in a challenge against an established community.[219] The new community embraces a new theory of victory based on the capabilities. The innovation cycle is completed when the new community usurps influence and control over officer promotions.[220] The hypothesis based on this model contests that the Navy deemphasized the helicopter community as a result of the development of a new theory of victory by senior Navy leaders and subsequent bureaucratic structure. Historically, Navy helicopters benefited from a new theory of victory. Empirical evidence shows that helicopters were initially brought into service to conduct ASW for trans-Atlantic convoys during World War II and continued ASW mission throughout the Cold War. A corresponding bureaucratic structure was created throughout the period, bringing helicopters pilots on par with other aviation and Navy communities—on paper at least. Another example that benefited helicopters—but refutes the hypothesis—was the development of the HMP and Helo CONOPs 1.0 in 2001, which played to helicopters capabilities, expanded presence within the carrier air wing, and paved a path for increased bureaucratic influence.

The trend in favor of the helicopter community appears to be reversing. Recent evidence validates the hypothesis as the Navy has transitioned its focus from asymmetric warfare—a wheelhouse for Navy helicopters—to an era of great power competition. The pivot emphasizes other strategies, concepts, and platforms (i.e., theories of victory) that nullify the swell of influence from the early 2000s and diminishes the role of helicopters under the new theory of victory. As a recent development, the effect on promotion for helicopters pilots remains to be seen. It is doubtful that the helicopter community's still-under-development response to the current situation—Helo CONOPs 2.0—will garner significant change in the current dynamic.

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219 Grissom, "The Future of Military Innovation Studies," 913.

220 Rosen, *Winning the Next War*, 20–1.

4. Cultural Model (H_4)

In this model, a military organization's unique culture explains why and how innovation occurs.[221] The cultural hypothesis argues that the Navy's unique strategic and organizational culture caused the deemphasis of the helicopter community. Empirical evidence presents strong support for this hypothesis over the course of history of Navy helicopters. In a culture typified by fixed-wing, offensive strike launched from aircraft carriers, the defensive-oriented helicopters—that largely do not deploy from carriers—prove incompatible with naval aviation culture. Despite being outfitted with more armament in recent decades, the weaponry is employed in a defensive role, which has not allowed for a breakthrough to greater cultural acceptance.

5. Technology Model (H_5)

The technology model asserts that changes in technology determine how military organizations innovate and, thus, how wars are fought.[222] The hypothesis based on this model contests that inherent technological limitations—combined with advancements in other platforms—caused the Navy to deemphasize helicopters. Empirical evidence lends strong explanatory power to this hypothesis. Since the early Navy helicopters, manufacturers have struggled to increase speed, range, and weapons payload at the same rate as developments in fixed-wing aircraft. While the ability to hover and fly at slow speeds is beneficial for some mission sets—ASW, SAR, NSW support—evolving concepts of warfare require increased firepower carried by helicopters. The current inventory of Navy helicopters is capable of carrying missiles, rockets, machine guns, and rockets, but the amount of ordnance and the range at which the ordnance can be employed is insignificant compared to the Navy's fixed-wing aircraft. As a result—and with some influence from the culture model—limited technological capabilities have kept Navy helicopters in defensive and supporting roles.

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221 Adamsky, *The Culture of Military Innovation*, 5.

222 Grissom, et. al., *Innovation in the United States Air Force*, 9; Friedman and Friedman, *The Future of Warfare*, x.

This hypothesis is further supported by recent technological advancements in other aviation programs. Manned aircraft—including the F-35 and *Osprey*—prove more capable of conducting missions in the Navy's preferred methods. Unmanned aircraft—*Stingray*, *Fire Scout*, and *Triton*—increasingly infringe on traditional helicopter missions at a cheaper bottom line with less risk to human life. These programs gain additional resources to further improve the technology, while the future Navy helicopter remains in conceptual development.

6. Alternate Hypothesis: The Dynamic Interaction of Models

The dynamics of each model are present in this case study, but individually do not provide a sufficient explanation for the Navy's deemphasis of a community that has existed for over eighty years and represents a current plurality of naval aviation. Analysis of the empirical evidence provides an alternate hypothesis—the dynamic interaction between the military innovation models caused the Navy to deemphasize the helicopter community. There is precedent for this hypothesis. Griffin asserts that while each military innovation model can provide a specialized explanation for a given case, the best explanatory is often found in a synthesis of the models due to their mutual compatibility.[223] During World War II, the dynamics of the models fused, leading to the establishment of helicopters within the Navy. Since, fluctuating dynamics have both benefited and disadvantaged the helicopter community, enabling the helicopter community to remain relevant, both bureaucratically and in the warfighting realm.

The alternate hypothesis provides the strongest explanation for the current deemphasis of the helicopter community by the Navy. Helicopter technology has not developed sufficiently to allow it to emerge into an offensive strike platform. This—combined with the Navy's preference to relegate helicopters to defensive and supporting roles—prevents the community from truly embodying the culture of naval aviation. Because they are culturally incompatible, helicopter pilots face institutional inertia against promotion to higher ranks and positions. As a result, the helicopter community lacks

[223] Griffin, "Military Innovation Studies: Interdisciplinary or Lacking Discipline?" 216–218.

advocates in senior ranks, which restrains bureaucratic influence and power within the Navy. Less power and influence leads to the helicopter community losing the intra-service competition for resources, personnel, and relevance—completing the loop that keeps helicopters in a diminished position. Finally, there is no evidence of civilian intervention to counter Navy leadership and save the helicopter community from its apparent demise.

B. RECOMMENDATIONS

The field of military innovations studies aims to provide pragmatic research and analysis to aid practitioners in formulating policy and strategy.[224] In that spirit, this section's purpose is to provide several recommendations for Navy policy toward helicopters. Force structure recommendations are geared towards maintaining bureaucratic influence through effective reorganization as the helicopter community adapts to recent Navy decisions that disadvantage helicopters. However, it is also important to emphasize that the helicopter community must maintain the competencies in asymmetric warfare that have been learned since the Gulf War. Similar to the Cold War—where the threat of nuclear escalation actually led to lower-intensity conflicts—the GPC era may be characterized by asymmetric tactics (i.e., swarming by small boats) against U.S. carriers and other warships—instead of attacks by the feared "carrier killer" missiles. The helicopter may come back into vogue for defense of capital ships and must maintain the organizational knowledge for this eventuality. Nevertheless, the focus of these conceptual recommendations is helicopter support for the fleet concept of DMO under the current Navy policy towards helicopters.

1. Force Structure

a. Realignment of Sea Combat (HSC) Squadrons

The "CVW of the Future" reduces the number of helicopters by three MH-60S (HSC squadron) and one MH-60R (HSM squadron). Despite a 30 percent reduction in helicopters, the rank structure of the HSC squadrons remains largely the same. In effect, an O-5 carrier-based HSC squadron commanding officer—supported by another O-5

224 Griffin, 201–2.

executive officer— is doing the same job as an O-4 amphibious-ship-based HSC detachment officer-in-charge (OIC), as both are responsible for three aircraft and associated personnel. Eventually, the larger Navy will recognize the cost differences and force a transition on the helicopter community. Instead, helicopter community leaders should lead a reorganization. The number of carrier-based HSC squadrons should be reduced and adjusted to mirror the construct of expeditionary HSC squadrons, which sends detachments of one to three aircraft to sea under the responsibility of an O-4 OIC. An HSC detachment would then deploy as part of the air wing—similar to the current VRC detachments of C-2A *Greyhound* aircraft—or become an auxiliary to the HSM squadron that remains largely intact on the carrier, reporting to the HSM commanding officer—who then reports to the air wing commander (CAG). This composite carrier-based helicopter squadron concept of the ASW MH-60R and utilitarian MH-60S mirrors the pre-Helo CONOPs 1.0 air wing HS squadron, which was comprised primarily of ASW helicopters and several utility helicopters for SAR and logistics. The decommissioned carrier-based HSC squadrons will be available to transition to rotary-wing UAS (HUQ) squadrons and personnel available for a similar transition or to fill the ranks of proposed NSW squadrons (discussed below). Not only does this realignment create a cost-effective solution for the helicopter community, but also provides alternate pathways for helicopters pilots to pursue while remaining under the umbrella of the Navy helicopter community.

b. Reinstatement of Rotary-Wing UAS Squadrons

To remain relevant in the intra-service competition for resources and bureaucratic influence, the helicopter community must re-establish dedicated rotary-wing UAS squadrons. In 2012, HUQ-1 was the first U.S. Navy UAS squadron to be established but was decommissioned within two years. The Navy recently showed a regained appetite for dedicated UAS squadrons by standing up an unmanned carrier launched multi-role squadron (VUQ-10) to operate the MQ-25 *Stingray*, in addition to an unmanned patrol squadron (VUP-19) that has been established since 2013.[225] Compared to shore-based

[225] Joseph Trevithick, "Navy Establishes First Squadron to Operate Its Carrier-Based MQ-25 Stingray Tanker Drones," *The Warzone*, October 1, 2020, https://www.thedrive.com/the-war-zone/36859/navy-establishes-first-squadron-to-operate-its-carrier-based-mq-25-stingray-tanker-drones.

VUP and carrier-based VUQ, rotary-wing UAS squadrons and their detachments face physical limitations. The smaller warships—primarily LCS—on which they deploy simply lack the space—for both personnel and aircraft—to support a dedicated UAS detachment in addition to a helicopter detachment. While the reasoning was never released, this may explain why HUQ-1 was disestablished almost as soon as it was created. Regardless, in an environment that prioritizes unmanned systems and will for the foreseeable future, the helicopter community must push to create a rotary-wing UAS fleet replacement squadron (FRS), at a minimum.

An example is found in the new HUQ iteration assuming the lineage of the most recently decommissioned HSC squadron—HSC-15—and renaming the squadron HUQ-15. This squadron will administratively fall under the HSC type wing—HSC Wing Pacific—as HUQ-1 did. Not only does this preserve the heritage and tradition of helicopter squadrons but positions the helicopter community to command influence over rotary-wing UAS and brings it on par with other aviation communities embracing UAS squadrons. As leaders find a solution to space issues or deployments extend to larger warships, precedent is set for future operational HUQ squadrons to assume the lineage of carrier-based HSC squadrons that may decommission in the coming years due to the emergence of the "CVW of the Future."

c. Expansion and Reinvestment in NSW Support Squadrons

Despite the increased importance placed on Navy SEALs during the GWOT era, the Navy currently only has a single helicopter squadron dedicated to NSW support—and a reserve squadron at that. Additionally, that squadron—HSC-85—has been on the budgetary chopping block every year since 2016.[226] Traditional active HSC squadrons provide NSW support, but those missions are largely conducted in training or during non-combat exercises. First, the Navy should transition the reserve HSC-85 to a fully active unit and recommission HSC-84 similarly. The "extra" MH-60S helicopters released from

[226] Joseph Trevithick, "Check Out This Eerie Image of a Navy Special Ops Seahawk Raining a Ship in the Dead of Night," *The Warzone*, March 23, 2020, https:/www.thedrive.com/the-war-zone/32711/check-out-this-eerie-image-of-a-navy-special-ops-seahawk-raiding-a-ship-in-the-dead-of-night.

the carrier in the "CVW of the Future"—not used for DMO (outlined below)—can be repurposed to both squadrons. Qualified pilots and aircrewmen would transition and train specifically for NSW support, closing the gap with Army and Air Force aviation units that typically operate with Navy SEALs. Additionally, both squadrons should also be re-envisioned as composite helicopter-tiltrotor units. As the Navy acquires more *Ospreys*, the aircraft should be made available to the NSW squadrons. Ospreys have a longer range and increased payload compared to the MH-60S, expanding the capabilities of the squadrons. Ultimately, increased aviation NSW capabilities of a composite HSC and fleet logistics multi-mission squadron (VRM) may garner a larger interservice budget share as special operations forces (SOF) missions are increasingly used as an instrument of national power.

2. Concepts

a. Helicopter Support for Distributed Maritime Operations (DMO)

DMO is a concept that emerged from the surface Navy, which aviation has yet to fully support. This provides ample opportunity for the helicopter community to leverage the "extra" aircraft that will be removed from the carrier to lead naval aviation's backing for DMO. Three MH-60S and one MH-60R helicopters will be removed from each new air wing, theoretically making 36 aircraft available.[227] The inherent flexibility of helicopters allows deployment to small warships, large carriers, and shore-based facilities. This permits Navy leaders to position helicopters armed for ASW and ASuW at geographic choke points and almost any type of Navy warship, thus distributing aerial firepower. If the helicopter types are deployed in tandem, a return to the hunter-killer concept of Helo CONOPs 1.0 provides an opportunity for armed helicopter crews to prove the capabilities of the helicopter community. Support for a fleet concept—potentially reinforced through operational success—would garner attention at high levels, leading to increased bureaucratic influence and better positioning in the competition for resources.

F-35s and H-60s: The "Lightning Air Wing"

[227] As of July 2021, there are currently nine active CVWs. In theory, the "CVW of the Future" concept releases 27 MH-60S and nine MH-60R for reorganization.

A proposed "Lightning Air Wing" continues the theme of helicopter—and naval aviation's—support for DMO. Much has been written in recent years about "Lightning Carriers," a concept in which large amphibious ships (LHA/D) deploy with a full contingent of Marine F-35B *Lightning II* short takeoff and landing (STOVL) aircraft in lieu of the traditional Marine Expeditionary Unit (MEU) aviation combat element (ACE).[228] The ACE—sometimes referred to as the Marine air wing—is typically comprised of approximately 28 to 30 jets, tiltrotors, and helicopters in support of the MEU's ground combat element (GCE).[229] As the Marine Corps transitions from land-based operations to focus on the maritime domain in the era of GPC, this concept provides the Navy with an alternate source of flexible aerial firepower that does not rely on the current fleet of Navy aircraft carriers.

The proposed "Lightning Air Wing" is complementary to the "Lightning Carrier" concept and provides an opportunity for the helicopter community to support DMO. This new air wing would embark on LHA/D ships and notionally consist of 16 to 20 F-35Bs—split between two Navy (VFA) or Marine (VMFA) fighter-attack squadrons—and two six to eight helicopters—split into two detachments of HSC's MH-60S and HSM's MH-60R. The Navy helicopters leverage the hunter-killer concept to gain sea control, from which the F-35s project power against a near-peer adversary. Expansion of the concept disperses additional Navy helicopters to the smaller combatants accompanying the LHA/D within the expeditionary strike group (ESG) and brings the detachments to squadron strength (providing additional command opportunities and influence within the air wing for helicopter pilots). An addition of a yet-to-be developed STOVL UAS provides airborne early warning (AEW) and a detachment of *Ospreys* supports the ESG with over-the-horizon logistics. These additions bring the capabilities of the "Lighting Air Wing" on par with the traditional CVW, but on a smaller scale. This smaller scale—that still packs

228 Tyler Rogoway, "Here's the USMC's Plan for 'Lightning Carrier' Brimming with F-35Bs," *The Warzone*, March 30, 2017, https://www.thedrive.com/the-war-zone/8798/heres-the-usmcs-plan-for-lightning-carriers-brimming-with-f-35bs.

229 The LHD/A also has a three helicopter Navy HSC detachment that provides ASuW, SAR, NSW and logistics support—and often integrates with the MEU to support various missions.

considerable firepower—falls directly in line with DMO and provides commanders with an unprecedented flexibility while also reducing vulnerability—and cost.

The proof of concept will include Marine Corps F-35s with Marine aviators and Navy exchange pilots but can transition to a full Navy concept—comprised entirely of Navy F-35s and pilots—if validated. However, an all-Navy "Lightning Air Wing" may be out of reach due to the lack of Navy investment in the STOVL F-35 variant, but the concept can be impactful to DMO as a blue-green team of Navy helicopters and Marine F-35s. The inclusion of helicopters also provides further opportunities to prove capabilities and new unique pathways for helicopter pilots to promote to influential operational command positions.

b. NSW Support: Naval Aviation for Navy SEALs

After almost twenty years of combat in land-locked conflict zones, the Navy SEALs have refocused efforts to the maritime environment. The return to sea presents difficulties for the Army and Air Force aviation platforms that primarily carried SEALs into combat during the period. In 2013, Lieutenant General Eric Fiel, USAF, commander of Air Force Special Operations Command, stated that "the vast expanses of the Pacific area a concern for those tasked with getting SEALs and other commandos where they need to be."[230] A Navy solution is found in naval aviation supporting SEALs from newly commissioned expeditionary sea base (ESB) ships.[231] ESB ships are optimized for SOF missions and contain a large flight deck and considerable aviation facilities.[232] The aforementioned HSC/VRM squadrons could embark the ESB with a SEAL contingent. Navy MH-60S

[230] Dan Parsons, "SEALs to Undergo 'Evolution in Reverse' as They Return to Maritime Operations," *National Defense Magazine*, May 15, 2013, https://www.nationaldefensemagazine.org/articles/2013/5/15/seals-to-undergo-evolution-in-reverse-as-they-return-to-maritime-operations.

[231] In 2018, LT Benjamin Foster, USN, proposed the experimental surface action group (X-SAG) with expeditionary sea base ships and Navy helicopters at the core (https://www.usni.org/magazines/proceedings/2018/may/whats-next-third-fleet-forward). The concept encompassed broad mission sets encompassing the range of military operations and emphasized interoperability with other surface units and strike groups. The recommendation in this thesis emphasizes a specialized HSC/VRM squadron and focuses on naval aviation's support for NSW.

[232] "Expeditionary Sea Base (ESB)," *U.S. Navy Fact File*, January 21, 2021, https://www.navy.mil/Resources/Fact-Files/Display-FactFiles/Article/2169994/expeditionary-sea-base-esb.

helicopters provide a medium-lift capability or can be armed to escort the larger capacity CMV-22B *Ospreys*. Navy pilots accustomed to operating at sea provide a specialized capability to support the SEALs as they return to the maritime environment. The range of the Ospreys extends the reach for potential overland missions. The mobility and flexibility of the ESB allows on-demand NSW missions for combatant commanders. As the concept grows and additional ESB ships are commissioned, naval aviation will have a significant impact on global operations, marking a larger-scaled return to the legacy of the Seawolves of Vietnam.

C. MILITARY INNOVATION STUDIES: FUTURE OPPORTUNITIES

This thesis both advances the field of military innovation studies and highlights opportunities for further research. In line with recent trends in the field, this thesis confirms that the dynamic combination of the models provides greater explanatory power than each model individually.[233] Additionally, Navy helicopters have largely been omitted from historical accounts of naval aviation and lack the contemporary coverage of other platforms. This case study brought the platform to the forefront and potentially increased the visibility of a community that has grown from a late starter in the early aviation years to gaining the plurality of naval aviation as of 2020. Explanations garnered by this thesis may influence naval aviation and helicopter leaders to avoid the perceived demise of the community or—in the least—help guide the transition to other platforms and capabilities.

This thesis provides significant opportunities for further research in the field of military innovation studies. Specifically, an all-encompassing military innovation case study of U.S. naval aviation would offer an unprecedented perspective on the world's leading military aviation organization. While TACAIR historically garners the most attention, an analysis of the community through the lens of military innovation sheds new light on the community's unprecedented and pervasive position at the top of the naval aviation hierarchy. Similar to helicopters, the MPRF community has a long history of Navy

[233] Griffin, "Military Innovation Studies: Interdisciplinary or Lacking Discipline?" 216–218.

service but has not received the field's attention. This thesis humbly presents some insights or—minimally—provides resources for the helicopter portion of the study.

The research is even more important as the Navy's warfighting focus continues to transition towards unmanned platforms, resulting in bureaucratic structures that have already established a fledgling Navy UAS community. In 2015, Secretary of the Navy Ray Mabus asserted that the F-35C "should be, and almost certainly will be, the last manned strike fighter aircraft the Department of the Navy will ever buy or fly."[234] This statement begs several questions that the field of military innovation studies can endeavor to explain. How does U.S. naval aviation ensure its survival as UAS replace manned aircraft? When do the fighter pilots relinquish superior bureaucratic power to UAS operators within naval aviation and the other officer communities within the larger Navy? Does naval aviation get absorbed into the surface fleet? Will the aircraft carrier finally lose its primacy? Further research is required to discover the answers.

234 Meghann Myers, "SECNAV: F-35C Should Be Navy's Last Manned Strike Jet," *Navy Times*, April 16, 2015, https://www.navytimes.com/news/your-navy/2015/04/16/secnav-f-35c-should-be-navy-s-last-manned-strike-jet.

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