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Processing the Lessons of War: Organizational Change and the U.S. Military

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Processing the Lessons of War: Organizational Change and the U.S. Military

by

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Abstract

Failing to understand the lessons of war can cause militaries to repeat past failures, leading to increased costs in terms of resources and causalities in future conflicts. Modern Western militaries faced a range of difficulties on the battlefields of Iraq and Afghanistan that they struggled to address, and they need to learn and institutionalize the lessons of their experiences if they are to succeed in future conflicts. This dissertation addresses this by asking: *to what extent has the battlefield experience of the U.S. military influenced post-war organizational change?* The various service branches of the U.S. military have needed to adapt at the tactical, operational, and strategic levels of war. However, what remains to be understood is if, and more importantly how, such battlefield adaptations and the lessons of military operations were actually learned and thus influenced the overall organizational changes of the U.S. military. This dissertation examines whether battlefield adaptations of the U.S. Army, Air Force (then the Army Air Force), Navy and Marine Corps during the Second World War influenced the process of post-war organizational change within the military in the aftermath of that conflict. In particular, this dissertation explores the role of junior and midlevel officers in the change process, which is an area of focus that has been largely undervalued by much of the existing literature on military change. Building on archival research, this dissertation develops a framework to explain the process of how the lessons of combat become institutionalized in a post-war period.

Preface

This dissertation is original, unpublished, independent work by the author Alexander Salt.

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Finally, I would like to thank Ali Kimlinger for putting up with my rambling over the years and for assisting the research process in so many ways. This dissertation would have been impossible to complete without your help.

Thank you all.

Dedication

For my parents

Table of Contents

List of Tables

List of Abbreviations

Air Force Tactical School (ACTS)

Air Liaison Parties (ALP)

Air Support Command (ASC)

Air Support Parties (ASP)

Army Air Forces (AAF)

Ballistic missile armed submarine (SSBN)

Close Air Support (CAS)

Communities of Practice (COP)

Field Manual (FM)

Fleet Marine Force (FMF)

Forward Air Controllers (FAC)

Functional Ballistic Missile Program (FBM)

Global War on Terror (GWOT)

High Altitude Daylight Bombing (HADB)

Imperial Japanese Navy (IJN)

*Kidō Butai (*1st Air Fleet)

Marine Air Ground Task Force (MAGTF)

Marine Air Ground Unit-24 (MAG-24)

Naval War College (NWC)

Non Commissioned Officer (NCO)

Standard operating procedure (SOP)

Strategic Air Command (SAC)

Tactical Air Command (TAC)

Tactical Air Force Development Program (TAFDP)

Task Forces (TF)

United States (U.S.)

United States Air Force (USAF)

United States Marine Corps (USMC)

United States Navy (USN)

Chapter 1: Introduction

War is the remedy that our enemies have chosen, and I say let us give them all they want[1]
General William Tecumseh Sherman

Failing to understand the lessons of war may cause militaries to repeat past failures, leading to increased costs in terms of resources and causalities in future conflicts. Modern Western militaries faced a range of difficulties on the battlefields of Iraq and Afghanistan that they struggled to address, and they need to learn and institutionalize the lessons of their experiences if they are to succeed in future conflicts. There has been a growing level of attention paid towards lessons learned from combat, both in academia and within Western militaries themselves. For example, the United States (U.S.) military continuously encourages the diffusion of ideas through professional publications such as the *Joint Force Quarterly* and *Parameters*, and have sought to utilize formal institutions such as the Centre for Army Lessons Learned to help expedite this process. However, they continue to struggle to understand the social and organizational phenomenon of how wartime learning can be properly and fully utilized outside of the immediate combat zones. Positive, though reasonably minor steps have been made towards furthering the understanding of this process, but much work remains to be done, and the growing need to understand it increases constantly.[2]

In both Afghanistan and the Iraq, the U.S. and its allies found themselves facing a chaotic situation of having to engage in counter-terrorism and counter-insurgency combat operations. Further, these militaries were forced to overcome non-traditional challenges associated with stability operations, such as rebuilding local infrastructure and government institutions. The learning curve in these recent conflicts was steep, and often proper solutions were never truly found or implemented. Nevertheless, as the major combat operations of the Global War on Terror (GWOT) have drawn to a close, and conversely, as new challenges also start to emerge, the U.S. and its allies need to be able to integrate effectively these lessons learned as best they

[1] Quoted in, Victor Hanson Davis, "Sherman in Gaza," *National Review* (2014), https://www.nationalreview.com/2014/08/sherman-gaza-victor-davis-hanson/
[2] Robert T. Foley, Stuart Griffin, and Helen Mccartney, "'Transformation in Contact': Learning the Lessons of Modern War," *International Affairs* Vol. 87, No. 2 (2011), 250-259.

can, lest the recent past repeat itself.[3] My research addresses this by asking: *to what extent has the battlefield experience of the U.S. military influenced post-war organizational change?*

The various service branches of the U.S. military have needed to adapt at the tactical, operational, and strategic levels of war. However, what remains to be understood is if, and more importantly how, such battlefield adaptations and so called lessons learned during military operations were actually learned and thus influenced the overall organizational changes of the U.S. military. This research examines whether battlefield adaptations of the U.S. Army, Air Force (then the Army Air Force), Navy and Marine Corps during the Second World War influenced the process of post-war organizational change within the military in the aftermath of that conflict.

Analytical Framework

Central to this analysis is the literature on military change. The literature on battlefield adaptation explores how militaries change strategy, plans, and operational concepts when facing challenges during wartime in order to improve effectiveness in combat. Not all militaries successfully adapt in response to major challenges; as John Nagl has noted, the U.S. Army largely failed to adapt during the Vietnam War despite facing multiple strategic, operational and tactical challenges.[4] James Russell explores an example of a successful, yet gradual adaptation in how the U.S. Army and Marine Corps underwent a series of tactical and operational level changes in Anbar province, Iraq from 2005-2007 in order to overcome the growing challenge of an insurgency. Russell notes these adaptations were varied in nature, and included new flexibility in creating sub-organizational structures, reforms to intelligence gathering and distribution, and an increased emphasis on empowering tactical level combat commanders.[5] Chad C. Serena in his

[3] For more on the struggles surrounding adaptation in the GWOT see, Todd Greentree, "Bureaucracy Does Its Thing - US Performance and the Institutional Dimension of Strategy in Afghanistan 2013," *Journal of Strategic Studies* Vol. 36, No. 3 (2013), 325-326; Janine Davidson, *Lifting the Fog of Peace: How Americans Learned to Fight Modern War (*University of Michigan Press, 2010), Keith L. Shimko. The *Iraq Wars and America's Military Revolution* (Cambridge, MA: Cambridge University Press, 2010); David H. Ucko, *The New Counterinsurgency Era: Transforming the U.S. Military for Modern Wars* (Washington, DC: Georgetown University Press, 2009); David Kilcullen, *The Accidental Guerrilla: Fighting Small Wars in the Midst of a Big One* (Oxford: Oxford University Press, 2009).

[4] John A. Nagl, *Learning to East Soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam* (Chicago, IL: University of Chicago Press, 2002), 201-203.

[5] James A. Russell, *Innovation, Transformation, and War: Counterinsurgency Operations in Anbar and Ninewa, Iraqi, 2005-2007* (Stanford, CA: Stanford Security Studies, 2011), 200-205.

exploration of U.S. Army adaptation in Iraq identifies how leadership and organizational osmosis is important to successful adaptation becoming diffused within a military service during wartime.[6] It remains unclear if these Iraq War adaptations have been institutionalized.

The other set of military change literature concerns major innovations, which primarily occurs in peacetime and explores shifts in doctrine, strategy, force structure and integration of new technologies.[7] An example of major peacetime innovations involves the changes the U.S. military underwent during the wake of the Vietnam War, which include: the creation of an all volunteer force; significant reforms in training; introduction of a variety of new technologies; and the development of Airland Battle, a new warfighting doctrine which significantly shifted U.S. Army and Air Force's strategic focus from a defensive posture to an offensive one in Central Europe.[8] These peacetime innovations do not involve minor tactical level adjustments or minor technological upgrades that tend not to fundamentally alter the organization as a whole in significant ways. Such minor changes tend to have less impact politically, strategically or in terms of resource allocations. This literature has identified the primary sources of change as strategic challenges, politics, alliance commitments, legitimacy, new technology , and leadership. A variety of factors will also influence and shape the process including strategic/ political/ organizational culture, resources, bureaucratic politics as well as leadership. Overall these factors may either block or shape the development of military organizational change.[9] These two sets of changes - battlefield adaptation and peacetime innovation - are similar, but have yet to be directly connected to one another.

The concept of military change from the bottom up, where junior and midlevel officers seek to understand and learn from their battlefield experiences, has been noted, but not thoroughly explored.[10] The process of change in a post-war environment is often conceptualized

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[6] Chad C. Serena, *A Revolution in Military Adaptation: The US Army in the Iraq War* (Washington, DC: Georgetown University Press, 2011), 160-163.
[7] Theo Farrell and Terry Terriff, "The Sources of Military Change," in Theo Farrell and Terry Terriff eds., *The Sources of Military Change* (Boulder, CO: Lynne Riener Publishers, Inc., 2002), 10.
[8] Frederick W. Kagan, *Finding the Target: The Transformation of American Security Policy* (New York, NY: Encounter Books, 2006), 3-73.
[9] Farrell and Terriff, "The Sources of Military Change," 5-10; Terry Terriff and Frans Osinga, "Conclusion," in Terry Terriff, Frans Osinga and Theo Farrell, eds. *A Transformation Gap? American Innovations and European Military Change* (Stanford, CA: Stanford University Press, 2010), 209.
[10] See, Terry Terriff, "From the Bottom up or Middle up?: Learning in the Vietnam War and the Sources of FMFM-1 *Warfighting* in the US Marine Cops," Paper Presented at the International Studies Association 57th Annual Convention, February 18-21, 2015, New Orleans, Louisiana; Adam Grissom, "The Future of Military Innovation Studies," *Journal of Strategic Studies* Vol. 29,

by the literature as being a top down process and is thus often linked to bureaucratic and political factors. Under this top down view, innovation can be led by civilians[11] or internally by senior officers,[12] or even both. Civilian leadership plays a key role in this process, as they provide sufficient political protection for these officer innovators to enact changes, while military leadership remains important due to their expertise in military affairs.[13] Senior military leaders, however, can also block change from occurring if it clashes with their conceptualization of war.[14]

The role of junior and midlevel officers, and their interaction or lack thereof with senior leaders, in the process of major organizational change in the aftermath of war has been underexplored. As a result, the field remains dominated by a top down focus. Yet it is these officers whose experience was most directly involved in actual combat and thus they are the officers who may have had to adapt in order to succeed. In effect, these junior and midlevel officers are likely the service personnel who saw firsthand the gaps or flaws in how their service prepared to or did operate in actual combat. Hence, there ultimately remains a significant gap in the literature linking how the lessons of battlefield adaptations become institutionalized in peacetime, and thus become major organizational changes over time.[15] This project's analysis recognizes junior and midlevel officers as one of the primary factors in understanding how wartime adaptations unfold, and also in how those adaptations transform into major innovations in the post-war period.

Organizational theory is of central importance to this study as it explains how internal and external factors and structures can shape the change process of military services. The overall shift from wartime to peacetime allows for the introduction of new strategic policies and doctrines within the military and creates an environment for change to occur. This highlights the importance of organization theory, which explores how internal structures, processes, and standard operating procedures (SOP) of an organization interact with external influences such as

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no. 5 (2006), 905-934.

[11] See, Barry R. Posen, *The Sources of Military Doctrine: France, Britain and Germany Between the World Wars* (Ithaca, NY: Cornell University Press, 1984).

[12] See, Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell University Press, 1991).

[13] See, Posen, *The Sources of Military Doctrine*.

[14]Adam M. Jungdahl and Julia M. Macdonald, "Innovation Inhibitors in War: Overcoming Obstacles in the Pursuit of Military Effectiveness," *Journal of Strategic Studies* Vol. 38, No. 4 (2015), 467-499.

[15]See, Theo Farrell, Sten Rynning, and Terry Terriff, *Transforming Military Power since the Cold War: Britain, France and the United States, 1991-2012* (Cambridge: Cambridge University Press, 2013).

new resource constraints, as well as domestic and international politics, and how new information relating to operational experiences becomes disseminated throughout an organization.[16]

Traditional organizational theory tends to assume that organizational decision making is the result of a rational actor process.[17] However, more recent explorations of organizational dynamics have begun to explore the role of culture.[18] Peter Katzenstein notes that ideational and normative factors are incredibly important to understanding strategic affairs, arguing that there are constitutive norms that express actor identity and regulative norms that define standards of expected behaviour.[19] Terry Terriff describes organizational culture "as the symbols, rituals, and practices which give meaning to the activity of the organisation".[20] Elizabeth Kier observes that culture influences and shapes an organization's perception of the world, and constrains behaviour, noting that, as a result, sometimes organizations will make decisions that seem incompatible with strategic realities.[21] Culture influences decisions concerning strategy, tactics, technology, kit procurement, and how a military service understands the character of warfare in a particular period.[22] Elizabeth Hull observes how militaries tend to be "strong organizations" and as a result are inherently resistant to change.[23] Culture provides the context in which military

[16] For more on organizational theory, see Peters, B. Guy. *Institutional Theory in Political Science* (New York, NY: Continuum, 2000); Paul J. DiMaggio, and Walter W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review* Vol. 48, No. 2 (1983), 147-160; and Graham T. Allison, and Philip Zelikow, *Essence of Decision: Explaining the Cuban Missile Crisis* (Boston, MA: Little Brown, 1999).
[17] See, Jay M. Shafritz and Albert C Hyde, eds., *Classics of Public Administration* (Oak Park, IL: Moore Publishing Co., 1978).
[18] See, Peter J. Katzenstein, *Cultural Norms and National Security* (Ithaca, NY: Cornell University Press, 1996); Terriff and Farrell, *Sources of Military Change;* Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel*. (Stanford, CA: Stanford Security Studies, 2010).
[19] Katzenstein, *Cultural Norms and National Security*, 18-19.
[20] Terry Terriff, "'Innovate or die': Organizational culture and the origins of maneuver warfare in the United States Marine Corps," *Journal of Strategic Studies*, Vol. 29, No. 3 (2006), 477-478.
[21] Elizabeth Kier, *Imagining War: French and British Military Doctrine Between the Wars*, (Princeton: Princeton University Press, 1997), 4-21; see also, Terriff, "Innovate or Die," 475-503.
[22] See, Brian McAllister Linn, *The Echo of Battle: The Army's Way of War* (Cambridge: Harvard University Press, 2007); Thomas Mahnken, *Technology and the American Way of War* (New York, NY: Columbia University Press, 2008); Kier, *Imagining War*; Katzenstein, *Cultural Norms and National Security*.
[23] Isabell V. Hull, *Absolute Destruction: Military Culture and the Practices of War in Imperial Germany* (Ithaca, NY: Cornell University Press, 2005).

change may occur or not occur.[24] The role of culture thus helps to explain why some wartime lessons are retained, and others ignored.

Methodology

This research will examine different battlefield adaptations for each of the service branches of the U.S. military during the Second World War and will trace their impact or lack thereof on the processes of post-war military organizational change until 1960. This end date was selected in part because in the following year the U.S. began to significantly increase its intervention into Vietnam. Further, introducing and implementing major change takes time and 1960 marks roughly 15 years following the end of the Second World War, thus giving sufficient time to observe the process of lessons learned integration. The Korean War in this period serves as a test case for reforms undertaken or will underscore that lessons have not been institutionalized. These cases are analyzed in a comparative framework. The experiences of the different services can be effectively compared as they each serve under the same national government, and follow the same national strategic policy within and under the context of the same national strategic culture. For each case, the service adaptations were selected for their large size and organizational impact in order to avoid focusing on only minor changes. What is of interest to this study is not just the specific process of the adaptations undertaken during the war, but also, what was the significance of the adaptations, how different were they from prewar or early war practices, and how these were or were not institutionalized in the post-war period. Further, a key concern is what factors influenced the implementation by facilitating, slowing, changing, or blocking their development.

To address the research question, this project consulted a diverse range of datasets. Primary source analysis includes: extensive review of archival documents; published governmental and military documents; official histories; personal accounts and memoirs. The archives and collections consulted during this project include: U.S. Marine Corps History Division and Archives, Quantico, VA; Air Force Historical Research Agency, Montgomery, AB; National Archives at College Park, Washington DC; and Combined Arms Research Library, Fort Leavenworth KS. A key data source for the project was professional military service journals,

[24] Raphael D. Marcus, "Military Innovation and Tactical Adaptation in the Israel-Hizballah Conflict: The Institutionalization of Lesson-Learning in the IDF," *Journal of Strategic* Studies Vol. 38, No. 4 (2014), 502.

which included: *The Marine Corps Gazette*; *Leatherneck*; *Cavalry/Armor Journal*; *Air and Space Power Journal*; *Proceedings*; and the *Military Review*. Service journals in particular allowed for analysis of how, in their own words, junior and midlevel officers were thinking about particular issues. There was also an extensive review of military innovation and adaptation literature, secondary sources relating to the U.S. military's tactical and operational conduct during the Second World War and after, and biographies of key individuals in the U.S. military.

Case Study Layout

Each of the case study chapters follows the same pattern. The chapter begins with an overview of the service branch on the eve of the U.S. entry into the Second World War by discussing its major internal organizational narratives, norms, and ideational trends, while also outlining its doctrine and preferred operational methods. Next, the chapter reviews the services' combat experiences and adaptation process during the Second World War, tracing how the selected adaptation unfolded. Third, the immediate postwar period is explored, that examines initial organizational attempts to institutionalize (or forget) the lessons of its combat experiences while also examining how the early Cold War impacted the process. The fourth part of each chapter overviews the service branch's combat experiences during the Korean War. Each chapter then concludes with an examination of the final efforts of the service to either institutionalize or forget its Second World War experiences during the later 1950s.

The Marine Corps (USMC) developed a series of Close Air Support (CAS) related adaptations throughout the war. The Marines leadership became drawn to CAS as it fit well within the Corp's idealized view of war, which was the killing of enemy troops via ground combat. Interestingly, however, the majority of USMC aviation combat experience in the Pacific Theatre was mostly interdiction strikes against enemy supply lines and military facilities, as well as air to air combat rather than CAS. Nevertheless, USMC leaders sought to further the integration of air and land units during the Second World War, which would continue into the post-war period. It appears that the end product of this adaptation was the Marine Corps Air Ground Task Force organizational concept that emerged at the end of the 1950s.[25]

[25] Allan R. Millett, *Semper Fidelis: The History of the United States Marine Corps* (New York, NY: The Free Press, 1991).

The U.S. Army underwent several adaptations that led to the emergence armor centric combined arms. The concept of combined arms which the Army brought to war in North Africa in 1943 would prove far too disjointed and ineffective in combat, which ultimately resulted in constant adaptation during the different campaigns of the war.[26] The evolution of the Army's conception of combined arms throughout the war lead to changes in doctrine and force structure. In particular, it helped to further cement the emergence of Armor as a major combat arm of the organization.[27]

The U.S. Army Air Forces (AAF) integrated close air support (CAS) into its wartime operations.[28] This occurred despite the fact that many AAF senior officers had become hostile towards CAS in the interwar period out of concern of losing control of aircraft to ground commanders, and because they had developed an overall preference for strategic bombing. CAS involves air action against hostile battlefield targets that are in close proximity to American and allied ground forces. The AAF's use of CAS evolved continuously from initial fighting in North Africa to operations in Northern Europe later in the war. However, the AAF, which later became the USAF, would later reject the institutionalization of the lessons of this adaptation in the post-war period. This case thus presents the opportunity to understand failure in this adaptation to innovation process.[29]

The Navy underwent a major adaptation in the Pacific, as carriers emerged as the primary platform for the fleet, and became the central element of its doctrinal vision of war. At the start of the war, the Navy had understood that carriers were to play a role in naval combat, however, all they had were a series of hypothesis as carriers had not fought in combat prior to the Second World War. However, during the course of the war it became clear that changes to how they utilized carriers would need to be made. The result of these changes led to the emergence of the carrier task force as the primary force structure of the Navy.[30]

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[26] David E. Johnson, *Fast Tanks and Heavy Bombers: Innovation in the U.S. Army 1917-1945* (Ithaca, NY: Cornell University Press, 1998), 189 –188.
[27] Jonathan M. House *Combined Arms Warfare in the Twentieth Century* (Lawrence, KS: University of Kansas Press, 2001), 136-148.
[28] The AAF became the United States Air Force on September 18, 1947 following President Truman's signing of the 1947 National Security Act which formally established the USAF as an independent service, equal to the U.S. Army and U.S. Navy.
[29] See, Daniel R. Mortensen, A *Pattern for Joint Operations: World War II Close Air Support, North Africa* (Washington, DC: Office of Air Force History and U.S. Army Center of Military History, 1987).
[30]Craig L. Symonds, *The US Navy: A Concise History* (Oxford: Oxford University Press, 2016).

Contribution to Knowledge

This research contributes to the development of a theory of military change that links battlefield experience to wider organizational change, which is something that has been largely ignored by the current literature. Further, it adds the role of junior and midlevel officers to the theoretical understanding of major military change. The literature on the sources of military change identifies failure in wartime as a driver of change, yet because the U.S. military was victorious in the Second World War and some services still changed anyways, this research helps further identify new elements in the change process.

Each service branch participated in extensive combat experience within different geographic contexts, making this conflict particularly unique compared to smaller scale wars in Iraq, Vietnam or Afghanistan that have come to dominate the military change literature.[31] The U.S. combat experience during the Second World War was conventional in character, further separating this research from much of the recent military change literature that has become transfixed on asymmetrical warfare aspects of the GWOT. The analysis, as well as findings, will be useful to Canada, as well as other Western states that have recently participated in operations in Afghanistan and Iraq. These Western states will be facing a similar context to what the U.S. experienced at the end of the Second World War, where they will likely be attempting to understand in peacetime the lessons to be learned from their war time experience and institutionalize them. Further, the recent War in Ukraine is forcing states, including members of NATO, to consider what they know about twenty-first century conventional warfare.[32] The analysis will assist academics as well as civilian and military policy makers to further understand the positive and/or negative factors (the latter is why the USAF failure to institutionalize CAS is important) that affect whether and how militaries learn lessons from conflicts and how those lessons impact peacetime defence policy. Finally, this research has the potential to assist in the

[31] For example, the Navy has played a relatively minor role in all three of those conflicts compared to the Army and Marines.

[32] David Barno and Nora Bensahel, "The Other Big Lessons That the U.S. Army Should Learn From Ukraine," *War on the Rocks* (27 June 2022), https://warontherocks.com/2022/06/the-other-big-lessons-that-the-u-s-army-should-learn-from-ukraine/; John R. Deni, "What NATO can do now to apply lessons from Russia's war in Ukraine," *Atlantic Council* (20 March 2023), https://www.atlanticcouncil.org/blogs/new-atlanticist/what-nato-can-do-now-to-apply-lessons-from-russias-war-in-ukraine/.

streamlining of post-war military organizational change, which have historically proven to be costly in terms of time and money.[33]

[33] Robert R. Tomes, *US Defense Strategy from Vietnam to Operation Iraqi Freedom* (London: Routledge, 2007); Kagan, *Finding the Target*.

Chapter 2: Analytical Framework

> Everything in war is very simple but the simplest thing is difficult[34]
> -Carl von Clausewitz, On War

Military Organizational Change

Military organizational change is a relatively small yet rich field of multidisciplinary study. While primarily associated with strategic studies, it has attracted scholarship from other parts of the humanities and social sciences. The field has drawn on the work of anthropology, sociology and organizational sciences, though remains dominated by the work of military historians and political scientists. This literature has sought to explain why militaries fight in certain ways and what leads them to alter their behavior during periods of war and peace. The diversity of the field has led to a broad variety of research on related subjects.[35] Military historians have written grand historical narratives attempting to account for sweeping revolutionary changes in strategic affairs.[36] Others have written narrower operational and organizational histories.[37] Political science contributions have primarily attempted to build and test the explanatory powers of different theoretical models of the organizational change phenomenon using case studies.[38]

Strategic history has ebbed and flowed with multiple periods of change and inertia which in turn have impacted the character of military affairs. Certain periods have attracted far more

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[34] Carl von Clausewitz, Michael Howard and Peter Paret trans. *On War* (Princeton, NJ: Princeton University Press, 1976), 119.

[35] For overviews of the field of military organizational change see Grissom, "The Future of Military Innovation Studies,"; Stuart Griffin, "Military Innovation Studies: Multidisplinary or Lacking Discipline?," *Journal of Strategic Studies* Vol. 40, No. 1-2 (2017), 196-224; Jeremy Black, "Military Organisations and Military Change in Historical Perspective," *The Journal of Military History*, Vol. 62, No. 4 (1998), 871-892.

[36]For example, Geoffrey Parker, The Military Revolution: Military Innovation and the rise of the West, 1500-1800 (Cambridge: Cambridge University Press, 1996); Williamson Murray and MacGregor Knox, *The Dynamics of Military Revolution, 1300-2050* (Cambridge: Cambridge University Press, 2001); J. F. C. Fuller, *Armament and History*: *the influence of armament on history from the dawn of classical warfare to the end of the Second World War* (New York, NY: Da Capo Press, 1998).

[37] For example, Harold R. Winton and David R. Mets eds., *The Challenge of Change: Military Institutions and New Realities, 1918-1941* (Lincoln, NB: University of Nebraska Press, 2000); James S. Corum, *The Roots of Blitzkrieg* (Lawrence, KS: Kansas University Press, 1992).

[38] For examples of political science research on military change see, Posen, *The Sources of Military Doctrine*; Terriff, Osinga and Farrell, eds. *A Transformation Gap?*.

scholarly attention than others. The interwar era (1918-1938) is one such period.[39] Several scholars have attempted to understand how the German military transformed itself from having a defeated and depleted force following its surrender at the end of the First World War into one of the most lethal militaries in the world at the onset of the Second World War.[40] Another era of noticeable interest for the military change field is the period following the end of the Gulf War (1991), where Western military forces sought to transform themselves to increase their technological sophistication and to better prepare for expeditionary operations.[41] To varying degrees these studies have detailed how doctrine, technology, force structure and operational approaches changed while also exploring variables such as the importance of leadership and organizational culture.

The broad nature of the military change field has prevented consensus from emerging on several topics, including how exactly to define major military change and there remain heated debates on the role of normative factors such as organizational culture on the change process. The field, however, can be divided into two broad categories: the first is innovation which primarily occurs during peacetime; the second is battlefield adaptation which occurs during wartime. These two sets of change are similar but have yet to be directly connected to one another. This chapter brings together the different literatures on peacetime innovation, battlefield adaptation, as well as elements of organizational theory and learning to synthesize a theoretical lens to explain the process of how the lessons of combat become institutionalized in the post-war period and thus develop into innovations.

Military Innovation: Change from the Top Down

The breadth of the military change field has created numerous ways of defining military innovation. Definitions run the risk of getting bogged down in minor technical dynamics, such as

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[39] Williamson Murray and Allan R. Millett eds. *Military Innovation in the Interwar Period* (Cambridge: Cambridge University Press, 1996); Harold R Winton, *To Change an Army: General Sir John Burnett-Stuart and British Armored Doctrine, 1927-1938* (Lexington: University Press of Kansas, 1981); Winton and Mets, *The Challenges of Change*.

[40] Robert Citino, *Blitzkrieg to Desert Storm: The Evolution of Operational Warfare* (Lawrence, KS: University of Kansas Press, 2004); Robert M. Citino, *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920-39* (Boulder, CO: Stackpole Books, 2008); Corum, *The Roots of Blitzkrieg*.

[41] Shimko, *The Iraq Wars and America's Military Revolution*; Eliot A. Cohen, "Change and Transformation in Military Affairs," *Journal of Strategic Studies*, Vol. 27, No. 3 (2003), 395-407; Harvey M. Sapolsky, Benjamin H. Friedman and Brendan Rittenhose Green, *US Military Innovation since the Cold War: Creation without Destruction* (London: Routledge, 2009); Kagan, *Finding the Target*.

incremental technological upgrades or minor adjustments to tactical approaches, and so a definition must also be broad enough that it remains inclusive of interrelated trends. A common trend among military change studies is to focus on shifts in organizational doctrine; however, a survey of the field suggests that often change can be much broader in scope.[42] An innovation is something which should lead to a major organizational upheaval, rather than maintaining organizational consistency.[43] There can be two broader categories of innovation; those that sustain a military organization's traditional way of war and those that disrupt those traditional approaches by forcing the organization to focus on new tasks.[44]

Adam Grissom's influential survey of the military change field defined military innovation as having three core elements: it must impact how the military fights, which is the core function of any military organization; secondly the innovation must be very influential in scope; thirdly that the innovation leads to greater effectiveness in combat.[45] However, equating innovation with effectiveness can be problematic as sometimes an innovation can actually make a military less effective in the field.[46] Further, Chris Demchak notes that as change increases organizational complexity, it can lead to unpredictable outcomes which can have a negative impact on operational effectiveness in wartime.[47] Theo Farrell and Terry Terriff offer another definition that better encapsulates the broader dynamics of military innovation by arguing it represents "change in the goals, actual strategies, and/or structure of a military organization."[48] This definition allows for change beyond doctrinal shifts and also avoids minor changes. The other core dynamic of military innovation is that it that it primarily occurs in peacetime as the strategic and operational demands of wartime often constrain militaries from being able to engage in major organizational shifts.[49]

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[42] Examples of this bias towards doctrinal change include: Sten Rynning. *Changing Military Doctrine: Presidents and Military Power in Fifth Republic France, 1958-2000* (Westport, CT: Praeger, 2002); Benjamin M. Jensen, *Forging the Sword: Doctrinal Change in the U.S. Army* (Stanford, CA: Stanford Security Studies, 2016).
[43] Harvey M. Sapolsky, Brendan Rittenhosue Green, and Benjamin H. Friedman, "The missing transformation," in Sapolsky, Friedman, Green eds. *US Military Innovation since the Cold War: Creation Without Destruction*, 6
[44] Gautam Mukunda, "We Cannot Go On: Disruptive Innovation and the First World War Royal Navy," *Security Studies*, Vol. 19, No. 1 (2010), 126-129.
[45] Grissom "The future of military innovation studies," 907.
[46] Farrell, Rynning, and Terriff. *Transforming Military Power since the Cold War: Britain, France and the United States, 1991-2012*.
[47] Chris C. Demchak, *Military Organizations, Complex Machines: Modernization in the U.S. Armed Services* (Ithaca, NY: Cornell University Press, 1991).
[48] Farrell and Terriff, "The Sources of Military Change," 4.
[49] See, Murray and Millett eds. *Military Innovation in the Interwar Period*.

The military innovation literature is dominated by top-down approaches where senior military or civilian leaders are seen as the central variable causing changes. Barry Posen's book, *The Sources of Military Doctrine* was one of the first major influential works to champion a theoretical view of change centred on a top-down framework. [50] Posen developed a civil-military model of military innovation where change is the product of civilian politicians intervening in military affairs and allying themselves with a maverick military leader (those who hold radically differing ideas on a strategic issue from their peers) who act as change agents. According to Posen, this process ultimately leads to successful top-down driven innovation within the military and that civil-military intervention was key for more radical doctrinal evolution. Posen's view conforms to the neo-realist/realist assumption that military organizations and civilian leaders are focused first and foremost on securing military effectiveness and rational state goals.

Stephen Rosen would later offer a direct challenge to Posen's model, arguing that often successful innovation is develops internally within military organizations. Rosen developed an intra-service model of innovation, which argues that innovations occur when alliances of convenience formed between senior and midlevel officers around consensus over a "new theory of victory." Rosen states that it is often senior leadership who develop the new ideas, which are diffused across the service via winning over mid-ranked officers who have strong credentials and successful campaign experience. Those midlevel officers are in turn rewarded by their embrace of the new ideas with a promotion, which in turn further cements the new changes within the organization.[51] Benjamin M. Jensen also contends that innovation comes from an intra-service pathway. Jensen argues that senior officers develop new theories of victory to overcome strategic challenges. According to Jensen, these new ideas are generated within institutional incubator sites that allow for the ideas to flourish and are then legitimized and diffused across the military via advocacy networks.[52]

Deborah Avant offers another top-down variation of military innovation that, like Posen, focuses on civil-military relations; however. this model places a new focus on domestic political institutions. For Avant, the structure of a state's institutional oversight mechanisms for civilians over the military will either constrain or help facilitate change. If a military lacks a strong

[50] Posen, *The Sources of Military Doctrine*, *222*-236.
[51] Rosen, *Winning the Next War*, 20-23.
[52] Jensen, *Forging the Sword*.

organizational identity it will be more receptive to civilian intervention; however, if the military strongly values organizational integrity, it will be less receptive. Further, if the domestic political system has weak civilian oversight mechanisms, the military organization will be able to resist civilian interventions, but if civilians have tight control over the hiring and firing of senior officers, they will be able to micromanage the military with greater ease and thus be able to facilitate necessary innovations.[53] Underlying all of this is also the institutional dynamic of inter-service competition among the different services within a military for access to resources.[54] For example, Avant notes that the U.S. Army and its leadership has been biased towards conventional warfare as it guarantees a significant budgetary commitment from Congress, and that in turn it has resisted adopting less cost-intensive core-competencies such as counter-insurgency.[55]

Organizational theory explains how internal and external factors and structures can shape the change process of military services as they are professional bureaucracies. For militaries, the overall shift from wartime to peacetime allows for the introduction of new strategies, technologies, structures, policies and doctrines within the military and creates an environment for change to occur. This highlights the importance of organization theory, which explores how internal structures, processes and SOPs of an organization interact with external influences such as new resource constraints, as well as domestic and international politics, and how new information relating to operational experiences becomes disseminated throughout an organization. Traditional organizational theory tends to conceptualize bureaucracies and militaries as being conservative in nature and thus highly resistant to change.[56] Organizational theory also furthers the idea that senior leadership is an important variable in guiding organizational interests.[57]

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[53] Deborah D. Avant, *Political Institutions and Military Change: Lessons from Peripheral Wars* (Ithaca, NY: Cornell University Press, 1994); Deborah D. Avant, "The Institutional Sources of Military Doctrine: Hegemons in Peripheral Wars," *International Studies Quarterly* 37 (1993), 409-430.

[54] This inter-service model has been identified in other studies of military change, see also: Owen Reid Cote, Jr. "The Politics of Innovative Military Doctrine: The U.S. Navy and Fleet Ballistic Missiles," (Phd diss., Massachusetts Institute of Technology, 1996); Harvey M. Sapolsky, *Polaris System Development: Bureaucratic and Programmatic Success in Government* (Cambridge, MA: Harvard University Press, 1972).

[55] Avant, *Political Institutions and Military Change*, 131-132.

[56] The idea of militaries being conservative in nature was established by the literature on civil-military relations. For example, Samuel P. Huntington, *The Soldier and the State: The theory and politics of civil-military relations* (Cambridge, Mass.: Belknap Press, 1959).

[57] For an overview of Organizational Theory see: Graham Astley and Andrew H Van de Ven, "Central Perspectives and Debates in Organization Theory," *Administrative Science Quarterly*, Vol. 28 No. 2 (1983), 245-273; Jeffrey

Kimberly Zisk notes that military organizations as bureaucratic actors are often focused on domestic battles for resources, autonomy, organizational prestige and stability.[58] Senior leadership will prefer to maintain policies that are perceived to have succeeded in the past and will try to constrain innovative efforts that hold the potential to disrupt that stability. However, Zisk also identifies that senior military leaders will be more open to organizational shifts if they observe changes among foreign enemy military forces. Zisk highlights that senior officers will bring in individual characteristics and experiences into their decision-making processes, and that ultimately major changes are often the result of decisions made by a collective defence community consisting of both senior officers and civilian defence officials.[59]

The literature on the "New Institutionalism" has expanded the sociological understanding of organizations and has identified isomorphism as a means of facilitating organizational change. Isomorphism involves ensuring that units within the same field begin to resemble one another under similar environmental conditions. Isomorphism can occur as the result of coercion from political influences; it can be mimetic as a response to environmental uncertainty and can be normative in that it is associated with meeting professional standards.[60] Military organizations can engage in isomorphic behavior to change through numerous channels. Officers can form professional networks across different militaries, spreading new ideas and facilitating change.[61] These professional networks of officers are formed with greater ease within alliances, such as NATO. Terry Terriff, Theo Farrell and Frans Osinga observed how, following the Gulf War, European NATO members attempted to emulate the U.S. military out of fear they were being left behind and integrated new technologies and force structures into their national militaries. The political dynamics of military alliances, including issues like burden sharing and diplomacy, gives members greater concern to pay attention to the changes undertaken by other allies. Undergoing change and organizational transformation can be seen as means of conveying

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Pfeffer, *New Directions for Organization Theory: Problems and Prospects* (Oxford: Oxford University Press, 1999); Peters, *Institutional Theory in Political Science*.

[58] Kimberly Marten Zisk, *Engaging the Enemy: Organization Theory and Soviet Military Innovation, 1955-1991* (Princeton, NY: Princeton University Press, 1993).

[59] Zisk, *Engaging the Enemy*.

[60]DiMaggio and Powell, "The Iron Cage Revisited," 41-63; DiMaggio and Powell, "The Iron Cage Revisited," in Powell and DiMaggio eds., *The New Institutionalism in Organizational Analysis*, 147-167; Peters, *Institutional Theory in Political Science*.

[61] Terry Terriff, "US Ideas and Military Change in NATO, 1989-1994,"in Farrell and Terriff eds., *Sources of Military Change*.

legitimacy and securing new access to resources.[62] The diffusion of military norms and ideas can occur among non-allied states as well. Emily Goldman has demonstrated how Japan adopted Western professional military practices out of a quest for efficiency, legitimacy and identity. Japan, in the late 19th Century, became well aware of Western military superiority and emulated their practices as a result.[63]

Traditional organizational theory assumes that organizational decision making is the result of a rational actor process, which has mirrored realist/neo-realist assumptions of the world.[64] However, the constructivist turn in International Relations theory has opened up space for introducing the role of culture, norms and ideas into analysis of military organizations.[65] Peter Katzenstein notes that ideational and normative factors are incredibly important to understanding strategic affairs, arguing that there are constitutive norms that express actor identity and regulative norms that define standards of expected behaviour.[66] Ideas and beliefs help to shape the way that states and their institutions respond to the intentional environment. Belief systems can act as "cognitive blinders" that impact if and how a state responds to the external environment; as well, ideas will determine how a state will react to security issues and threats. Ideas also shape state and institutional interests as well as behavior.[67]

The literature on strategic culture has identified how states tend to have unique national styles as they respond to security issues including weapons procurement and waging war.[68] For example, Colin S. Gray demonstrated how national security communities think and behave in different ways from state to state, showing how the U.S. and Soviet Union developed different approaches to nuclear weapons strategy during the Cold War as a result of their unique strategic

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[62] See, Terriff, Osinga and Farrell, eds. *A Transformation Gap?*.
[63] Emily O. Goldman, "The Spread of Western Military Models to Ottoman Turkey and Meiji Japan," in Terriff and Farrell, *Sources of Military Change*, 41-67.
[64] See, Shafritz and Hyde, *Classics of Public Administration*.
[65] Katzenstein, *Cultural Norms and National Security*; Alexander Wendt, *Social Theory of International Politics* (Cambridge: Cambridge University Press, 1999); Judith Goldstein and Robert O. Keohane eds., *Ideas and Foreign Policy: Beliefs, Institutions, and Political Change* (Ithaca, NY: Cornell University Press, 1993); Theo Farrell, *The Norms of War: Cultural Beliefs and Modern Conflict* (Boulder, CO: Lynne Rienner, 2005); Theo Farrell, "Constructivist Security Studies: Portrait of a Research Program," *International Studies Review* Vol. 4, No. 1 (2002), 49-72; Terriff and Farrell, *Sources of Military Change;* Adamsky, *The Culture of Military Innovation*.
[66] Katzenstein, *Culture of National Security*, 18-19.
[67] Peter Trubowitz, Emily O. Goldman, and Edward Rhodes, eds. *The Politics of Strategic Adjustment: Ideas, Institutions, and Interests* (New York, NY: Columbia University Press, 1999).
[68] For more on cultural influences on approaches to war see: Lawrence Sondhaus, *Strategic Culture Ways of War* (London: Routledge, 2006); John A. Lynn, *Battle: A History of Combat and Culture from Ancient Greece to Modern America* (Cambridge, MA: Westview Press, 2004).

cultures.[69] Alastair Johnston's study of Chinese strategic culture showed how entrenched cultural preferences found in the Ming Dynasty were the origins of the Chinese preference for realpolitik responses to security challenges, rather than structural influences of the international system.[70] Azar Gat's landmark study of military thought notes that new strategic ideas are not conjured together in an intellectual vacuum; rather he argues they are heavily influenced by wider societal intellectual trends.[71] In the field of military change, Dima Adamsky has demonstrated how national strategic culture can be a major variable for military innovations. Adamsky demonstrated that strategic culture shapes how countries approach military change, in particular how they develop, conceptualize and use new technologies.[72]

Organizational culture is another important factor that helps to explain the military change process.[73] Terry Terriff describes organizational culture "as the symbols, rituals and practices which give meaning to the activity of the organisation".[74] Carl Builder points out that service branches of the military will develop their own distinct personality which will help shape and guide much of their behavior, and that each service branch will in turn have intra-service distinctions within them.[75] Culture influences decisions concerning strategy, tactics, technology, kit procurement and how a military service understands the character of warfare in a particular period.[76] Organizational culture shapes the behavior of militaries in different ways. Elizabeth Kier outlined how culture influences and shapes an organization's perception of the world and constrains behaviour, noting that, as a result, sometimes organizations will make decisions that seem incompatible with strategic realities. For example, Kier demonstrates how the British Army's "officer-gentleman" culture of its regimental system constrained and helped prevent Britain from adopting mechanization on the same scale as the German army during the interwar period despite having access to the same technology.[77] Jeffrey Legro showed how the

[69] Colin S. Gray, *Nuclear Strategy and National Style* (Lanham, Mass: Hamilton Press, 1986).
[70] Alastair Iain Johnston, *Cultural Realism: Strategic culture and grand strategy in Chinese history*.
[71] Azar Gat, *A History of Military Thought: From Enlightenment to the Cold War* (Oxford: Oxford University Pres, 2004).
[72] Adamsky, *The Culture of Military Innovation*.
[73] Neorealist works on military change continue to contest this assumption, see: Jensen, *Forging the Spear*; Rynning. *Changing Military Doctrine.*
[74] Terriff, "Innovate or Die," 477-478.
[75] Carl. H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Washington, DC: Johns Hopkins University Press, 1989)
[76] See, Linn, *The Echo of Battle*; Mahnken, *Technology and the American Way of War*; Kier, *Imagining War*; Katzenstein, *Culture of National Security*.
[77] Kier, *Imagining War*, 4-21; see also, Terriff, "Innovate or die".

organizational cultures of the German and British militaries during the Second World War shaped their perceptions of certain ways of war, such as unrestricted submarine warfare or strategic bombing against civilian targets. Legro notes that once a cultural norm becomes institutionalized, it will be more powerful than external influences including international law.[78]

Elizabeth Hull observed how militaries tend to be "strong organizations" with dominant cultural traits and as a result are inherently resistant to change. Hull's study of the German Army during the First World War showed how it had developed an embedded organizational cultural trait of requiring "absolute destruction" of its enemies, which in turn greatly shaped its operational behaviour during the war, often hampering effectiveness.[79] Lynn Eden showed how the culture of national security organizations frames the search for solutions to certain problems, causing some options to be more acceptable than others.[80]Terry Terriff's analysis of the USMC outlined how its cultural trait of "organizational paranoia" acted as a constitutive norm that helped lead the service towards adapting mechanization in order to demonstrate its relevancy in conventional warfare for the European theatre of the Cold War.[81] Terriff has also shown how the U.S. Army's organizational cultural preference for high intensity conventional warfare led it to be unprepared for the counter-insurgency challenges it would face in Afghanistan and Iraq as part of the GWOT.[82]

Organizational culture thus helps to explain why militaries will prefer certain operational approaches over others and will impact the content and process of innovations. Culture leads some technologies to be favored over others and helps explain why some military organizations pursue seemingly irrational behavior that clashes with current strategic challenges that lie before them. Culture does not determine or drive military change, but rather shapes its scope and content. Culture provides the context in which military change may occur or not occur. Adam Grissom has linked culture to top-down perspectives on innovation. Grissom observes that senior military leadership plays a central role in developing and fostering cultural traits. Further, astute

[78] Jeffrey W. Legro, *Cooperation under Fire: Anglo-German Restraint During World War II*, Ithaca, NY: Cornell University Press, 1995).
[79] Hull, *Absolute Destruction*.
[80] Lynn Eden, *Whole World on Fire: Organizations, Knowledge, and Nuclear Weapons Devastation* (Ithaca, NY: Cornell University Press, 2004).
[81] Terriff, "Innovate or Die".
[82] Terry Terriff, "The Past as Future: The US Army's Vision of Warfare in the 21st Century," *Journal of Military and Strategic Studies* Vol. 15, No. 3 (2014), 195-228.

senior leaders may in fact even seek to utilize culture to get the organization to acquiesce to their change agenda.[83]

These different models of military innovation can be grouped under certain themes. Almost all of these approaches address large scale changes which also tend to be disruptive of organizational stability. The process of change in the peacetime environment is primarily conceptualized by the literature as a top- down process, where it can be led by civilians, or internally by senior officers, or even both. Organizational interests play a large role in the process either in an intra-service or inter-service dynamic. Ideational and cultural factors also clearly have a large role to play in the process too. Ultimately, the multitude of different variables that help to impact the process of military innovation prevent the phenomenon from being explained via a singular formulaic theory; rather the different variables involved can be categorized as being either drivers or shapers of the innovation process and are listed in Table 1.[84]

Table 1: The Drivers and Shapers of Peacetime Innovation

Drivers	Shapers
• Senior Leadership (Civilian or Military) • Strategic Challenges • Technology • Alliance commitments • Legitimacy (resources)	• Strategic and national political cultures • Military organizational culture (and subcultures) • Resources • Bureaucratic Politics • Leadership

Leadership acts as both driver and shaper because while the source of an innovation often originates from leaders, they will also oversee its implementation and shape the process as well. Drivers alone will not lead to innovation; they also require shapers that will guide and influence how a military organization changes. Further the degree of influence that each individual driver and shaper will have on peacetime innovation will vary on a case to case basis. In some instances, some of the drivers and shapers will not play any role in the process.

[83] Girssom, "*The future of military innovation studies*," 920.
[84] The format of drivers and shapers of military change originates from, Terriff and Farrell, *The Sources of Military Change*; Terriff, Farrell, Osinga *A Transformation Gap*.

Wartime Adaptation: Change from the Bottom Up

The second subcategory of military change is adaptation which occurs during wartime. Military history is filled with instances of armed forces having to change their behavior in the face of evolving operational conditions that lie before them. War is highly chaotic and remains difficult to accurately forecast how it will unfold. Clausewitz wrote that war will always involve the interaction of two living forces and as such there remains the constant chance that the enemy forces will behave in ways that cannot be predicted. Further, Clausewitz notes of the existence of "friction", which he defined as uncertainties and unforeseen challenges which will constantly plague military forces in war.[85] As a result of wars unpredictability and chaotic nature, militaries must be able to change to survive, and the literature on adaptation has attempted to understand and explain this phenomenon. Battlefield adaptation can be defined as "change to strategy, force generation, and/or military plans and operations, undertaken in response to operational challenges and campaign pressures."[86] The scale of adaptation will vary; it can occur among small units such as a company, battalion or brigade and at a larger army or even service-wide level.

The literature on battlefield adaptation is relatively smaller than peacetime innovation. Much of the literature that exists is in the form of historical case studies, while the social scientific contributions have been few and far between, and as such theoretical understandings of battlefield adaptation remain far less developed than peacetime innovation. While the literature on military innovation remains dominated by top-down approaches, there has emerged room for "bottom-up" explanations for adaptation.[87] The idea behind a bottom-up approach to military change is that the experiences of frontline forces during a war becomes the major variable in the change process, rather than the ideas of a singular or small group of senior leaders. However, some studies on adaptation remain under a top-down centric framework.[88]

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[85] Clausewitz, *On War*, 77, 119.
[86] Theo Farrell, "Introduction: Military Adaptation and War," in Theo Farrell, Frans Osinga and James A. Russel, eds. *Military Adaptation in Afghanistan* (Stanford, Stanford Security Studies Press, 2014), 2.
[87] One of the first articles to speculate on "bottom-up" change was Cohen, "Change and Transformation in Military Affairs."; the other work that brought considerable attention to the idea was Grissom's "The future of military innovation studies."
[88] Foley, Griffin and Mccartney,"'Transformation in contact'."

Theo Farrell argues that adaptation can happen at different levels: the strategic level, where militaries will alter their strategy, force levels and resources (including new equipment) and at the operational level, where military forces will develop, plan and carry out engagements against the enemy (this also includes the tactical level of war).[89] Further, he argues that during the adaptation process militaries can either modify or refine existing tactics and use of existing technologies; secondly, that they may develop brand new capacities and operational approaches. The latter method, while nearing the threshold for the impact of an innovation, will only fully transform into one if it later becomes institutionalized within the organization.[90]

A few historical studies have explored adaptation among the Imperial German Army of the First World War that have touched on the concept of bottom-up driven change to varying degrees. These studies have done much to challenge the popular notion that First World War militaries were largely static unchanging organizations. Timothy Lupfer identified how the Germans switched their defensive operational approach from massing their forces on the frontlines to one that relied on strategic depth.[91] Lupfer describes the process by which the German Army adapted: first, particularly by senior officers, there emerged a perception for the need to change within the Army; following this was the solicitation of different perspectives from frontline units on the matter; next came analysis of the information and development of reforms which were then diffused across the service; finally, the integration of these lessons was enforced by senior officers. Lupfer noted how the integration of lessons into new training procedures greatly assisted in their dissemination across the army. Lupfer's work highlights how adaptations emerged out of a broad collective effort, rather than the work of a single senior office, although senior officers remained key factors in the process.[92]

Bruce Gudmundsson explored small unit tactical adaptations among the German Army in the First World War.[93] He noted that frontline units engaged in combat experimentation of different unit structures and weapons usage. Gudmundsson showed how technology played a key role in this process, as weapons like flamethrowers and stick grenades gave units options to

[89] Farrell, "Introduction: Military Adaptation and War," 2-8.
[90] Theo Farrell, "Improving in War: Military Adaptation and the British in Helmand Province, Afghanistan 2006-2009," *Journal of Strategic Studies*, Vol. 33, No. 4 (2010), 567-594.
[91] Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War*, Leavenworth Papers No. 4 (Fort Leavenworth, KS.: Combat Studies Institute, 1981).
[92] Lupfer, *The Dynamics of Doctrine*.
[93] Bruce I. Gudmundsson, *Stormtroop Tactics: Innovation in the German Army, 1914-1918* (New York, NY: Praeger, 1989).

approach tactical level objectives in different ways. Ultimately, frontline units essentially had to self-educate themselves on how to overcome the operational challenges that lay before them and there was no singular method or formula for the German Army's First World War adaptation process. Though Gudmundsson does argue that the relatively decentralized nature of the German Army made it easier for frontline units to experiment with changes.[94]

James Foley offers a more theoretical overview of the First World War German adaptation efforts, narrowing his analysis to learning among frontline units and how they shared experiences among themselves.[95] Lessons became diffused among German Army subunits and this process was greatly enhanced by the relatively flexible organizational networks which allowed for the spread of ideas and concepts. Foley notes that the German Army had an organizational cultural bias towards encouraging learning and as a result had developed a robust lessons learned system for analysing combat experiences. German units would produce ad hoc operational reports, and this trend became embraced by members of the German General Staff who disseminated the most useful reports across different units. The German General Staff members also formed informal networks among themselves to discuss reforms. Interestingly, Foley notes there are obvious limits to bottom- up adaptation; for example, frontline units would not have the authority and leeway to create new force structures.[96]

Organizational theory has shown that militaries can learn from experience and that pre-existing institutional knowledge will shape the learning process.[97] Organizational learning differs from individual learning in that it is a collective process, and that lessons learned will remain even as personnel change.[98] Organizational learning may however emerge as the result of individual learning, as it is individuals who have primary experiences and will be the ones to seek out solutions to perceived problems within the confines of organizational procedures and biases.[99] Interest in how organizations learn and acquire new knowledge and improvise solutions

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[94] Gudmundsson, *Stormtroop Tactics*, 44-51, 172-177.
[95] Robert T. Foley, "A Case Study in Horizontal Military Innovation: The German Army, 1916-1918," *Journal of Strategic Studies* Vol. 35, No. 6 (2012), 799-827.
[96] Foley, "A Case Study in Horizontal Military Innovation," 814-815.
[97] Allison and Zelikow, *Essence of Decision*; Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976).
[98] James H. Lebovic, "How Organizations Learn: U.S. Government Estimates of Foreign Military Spending," *American Journal of Political Science* Vol, 39, No. 4 (1995), 835-863; Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York, NY: Currency Doubleday, 1990).
[99] Anne S. Miner, Paula Bassoff, Christine Moorman, "Organizational Improvisation and Learning: A Field Study," *Administrative Science Quarterly*, Vol. 46, No. 2 (2001), 304-337.

is heightened when they face considerable challenges in their environments, including threats to their survival and the same is true for militaries in the midst of a war.[100] The learning process tends to follow a set of stages: first is the discovery period where individuals within the organization will realize there is a problem in need of a solution; the invention period where solutions to the problem are developed; the implementation period for the solutions; lastly is the eventual diffusion of the lessons learned across the entire organization.[101]

Organizational learning is not a deterministic process; sometimes factors can disrupt and hinder it. Barbara Levitt and James March note the existence of the "competency tap" where organizations find it difficult to change in-place SOPs which they have developed to a high degree of proficiency given the degree of sunk costs and vested interests associated with them. The competency trap can then lead organizations to favor SOPs ill-suited to new challenges. When organizations have poor institutional memory regarding certain tasks, they may have less of a bias against new directions as they lack entrenched SOPs to give preferential treatment.[102] Another problem with the organizational learning process is how evidence from experience is analyzed due to subjectivity of key personnel. Further, existing organizational memory of past lessons will in turn shape the organization's collective interpretations of current experience.[103]

Janine Davidson outlined how the U.S. military was able to engage in tactical level learning during the Iraq War (2003). In particular, she cites the role of informal networks and "Communities of Practice" (COP) as key conduits for the US militaries' learning process. Informal and formal networks allow individual members of the organization to collaborate and share ideas as well as potential solutions. COPs are a collective professional group linked by a strong sense of identity and purpose and members of the community will seek to push one another to perfect their trade.[104] The role of informal networks and COPs allowed U.S. officers to engage in bottom-up learning in Iraq, as officers who were deployed to different parts of the country were able to share experiences via a variety of formal channels such as educational seminars or institutions such as the Centre for Army Lessons Learned. However, Davidson's analysis also demonstrates the limits of learning, as while the U.S. was able to learn various

[100] Arthur K. Yeung, David O. Ulrich, Stephen W. Nason, Mary Ann Von Glinow, *Organizational Learning Capability* (Oxford: Oxford University Press, 1999), 3-4.
[101] Yeung, *Organizational Learning Capability*, 31.
[102] Barbara Levitt and James G. March, "Organizational Learning," *Annual Review of Sociology* 14 (1988), 319-340.
[103] Levitt and March, "Organizational Learning," 324-326.
[104] Davidson, *Lifting the Fog of Peace*, 25-26.

tactical lessons, it had great difficulty taking that knowledge and utilizing it for strategic level success.[105]

Keith Bickel described the formation of the USMC's interwar era's Small Wars doctrine as the result of a bottom-up learning process. Bickel outlines how information was shared via informal linkages among USMC units and individual officers helped the organization to learn and institutionalize different lessons from their experiences in the various small wars of the early 20th century. Officers would communicate with one another in professional journals, as well as holding debates within the services' education centres. This learning process originated in an ad-hoc manner and eventually was disseminated upwards through the organization's hierarchy.[106] Official service and unit publications have emerged as important to sharing lessons in other studies on wartime adaptation, though some studies have shown they are more effective at disseminating information in smaller units rather than larger organizational structures.[107]

The role of formal and informal networks plays a large role in the military adaptation literature. Nina Kollars, who explored U.S. Army learning during Vietnam and Iraq, showed how networks helped to facilitate the learning processes for transport truck related adaptations among frontline units. Ad hoc networks formed to allow units to better ensure their survival and when information was lacking, allowed for solutions to travel with more efficiency. Importantly, Kollars notes that networks in a decentralized structure will have difficulty institutionalizing and centralizing solutions, while officially sanctioned and centralized networks will have an easier time retaining information.[108] Sergio Catignani's review of British Army adaptations in Afghanistan further supports this notion that bottom-up driven adaptations will eventually need a degree of top-down support to be effective. Decentralized bottom-up learning will simply lack staying power. Catignani also outlines how social networks among officers via either formal or informal structures allowed officers and commanders to communicate with peers regarding operational concerns in Afghanistan. However, informal social networks were constrained in

[105] Davidson, *Lifting the Fog of Peace*, 191-202.
[106] Keith B. Bickel, *Mars Learning: The Marine Corps Development of Small Wars Doctrine, 1915–1940* (Boulder, CO: Westview 2001).
[107] Nina A. Kollars, Richard R. Muller and Andrew Santora, "Learning to Fight and Fighting to Learn: Practitioners and the Role of Unit Publications in VIII Fighter Command 1943-1944," *Journal of Strategic Studies* Vol. 39, No. 7 (2016), 1044-1067.
[108] Nina A. Kollars, "War's Horizon: Soldier-Led Adaptation in Iraq and Vietnam," *Journal of Strategic Studies* Vol. 38, No. 4, (2015), 529-553.

many ways, as while they helped to disseminate some tactical lessons from unit to unit, they had difficulty creating larger service-wide lessons learned within the Army.[109]

Recent studies of the Iraq War have identified different formal and informal aspects of the adaptation process. Chad Serena's review of U.S. adaptation in Iraq showed how small Army subunits were able to adapt using a relatively informal process at a much more rapid pace than the wider army was able to learn; further, these adaptations occurred primarily from a bottom-up structure where junior officers played a much larger role. Serena also notes that militaries can undergo learning, but not have it lead to adaptations. He argues that adaptations are ultimately the product of a series of localized incremental changes that happen throughout a military during a campaign.[110] James Russell posits that adaptation in Iraq occurred organically via formal and informal pathways as frontline units underwent a series of pragmatic field experimentations. Russell's work challenges the idea that militaries are resistant to change during war, noting that commanders welcomed new ideas from subordinates and information flowed among networks of battlefield commanders and officers. In particular, Russell noted how units made innovative use of technologies to both help refine existing operational methods and to create new opportunities for different approaches.[111]

Others works have linked variables commonly found in military change studies to the adaptation process. For example, culture shapes battlefield adaptation, much like it does with innovation.[112] John Nagl notes that culture is a noticeable variable, arguing the British military in Malaya during the 1950s had an organizational culture that was much more open to learning counter-insurgency lessons when faced with challenges, compared to the U.S. military in Vietnam whose organizational culture constrained change from occurring.[113] David Ucko also points out how the culture of the U.S. Army constrained the ability of individuals in the U.S.

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[109] Sergio Catignani, "Coping with Knowledge: Organizational Learning in the British Army?," *Journal of Strategic Studies* Vol. 37, No. 1 (2013), 30-64.
[110] Serena, *A Revolution in Military Adaptation*.
[111] Russell, *Innovation, Transformation, and War*.
[112] Though, this remains a somewhat contested variable during adaptations. For example, James Russell's analysis of U.S. Adaptation in Iraq argued that organizational culture did not play much of a role in the process. Theo Farrell's analysis of UK adaptation in Afghanistan noted that while culture was part of the process, it mattered far less than the pragmatic desire to overcome strategic and operational challenges as effectively as possible, see: Farrell, "Improving in War".
[113] Nagl *Learning to Eat Soup with a Knife*.

military from attempting to adapt during the Occupation of Iraq.[114] Olivier Schmitt argues that isomorphism has a role to play during the adaptation process, showing how the French military looked to the experiences and behavior of their U.S. and U.K. allies to guide their adaptation process in Afghanistan.[115] James Russell also argues that civil-military relations and domestic politics played a large role in shaping the adaptation process by the U.S. in Afghanistan, noting that the Bush Administration's focus on the war in Iraq hindered the military's efforts to adapt in Afghanistan.[116]

Ultimately, as is the case with peacetime innovation, there can be no singular formula or theory that totally encapsulates all the different facets of wartime adaptation. Similarly, the literature has helped to identify different drivers and shapers of the process; they are listed in Table 2.

Table 2: The Drivers and Shapers of Wartime Adaptation[117]

Drivers	Shapers
• Senior Officers • Junior and Midlevel officers • Strategic, Operational and Tactical Challenges • Technology	• Strategic and national political cultures • Military organizational culture (and subcultures) • Alliance politics • Civil-Military Relations (and domestic politics) • Officers (networks and as change agents)

There remains some overlap with the drivers and shapers of peacetime innovation; however, there are also certain important differences. For example, the bottom-up nature of adaptation allows for junior and mid-ranked officers to play a role in driving the adaptation process. The broader nature of adaptation allows for smaller scale operational and tactical challenges to also

[114] David Ucko, "Innovation or Inertia: The U.S. Military and the Learning of Counterinsurgency," *Orbis* Vol. 52, No. 2 (2008), 290-310.
[115] Olivier Schmitt, "French Military Adaptation in the Afghan War: Looking Inward or Outward?," *Journal of Strategic Studies* Vol.40, No. 4 (2017), 577-599.
[116] James Russell, "Into the Great Wadi: The United States and the War in Afghanistan," 51-82 in Farrell, Osinga and Russell eds., *Military Adaptation in Afghanistan*.
[117] The format for the drivers and shapers of wartime adaptation originates from: Farrell, Osinga and Russel, eds. *Military Adaptation in Afghanistan*.

be included among drivers, unlike peacetime innovation which tends to focus on strategic challenges. As with innovation, the role that each individual driver and shaper will play on a particular adaptation will vary greatly on a case to case basis.

How Adaptations Become Innovations

The linking of military change from the bottom-up, where junior and midlevel officers seek to understand and learn from their battlefield experiences transforming into larger scale innovations has been noted, but not thoroughly explored.[118] Further, the role of junior and midlevel officers and their interaction or lack thereof with senior leaders in the process of major organizational change in the aftermath of war, has not been examined in great detail. As a result, the field remains dominated by a top down focus. Yet it is these officers whose experience was most directly involved in actual combat and thus they are the officers who may have had to adapt in order to succeed. In other words, these junior and midlevel officers may well be the service personnel who saw firsthand the gaps or flaws in how their service prepared to or did operate in actual combat; further, their combat experiences give them additional credibility during organizational debates. Junior and midlevel officers are thus the primary actors in connecting bottom-up and top-down military change via driving the process, and do so via different pathways which are listed in Table 3 and explained subsequently.

Table 3: The Primary Drivers and Pathways of Bottom Up Innovation

Primary Drivers	Pathways
• Junior and Midlevel Officers	• Promotion up the chain of command. • Information and Advocacy Networks

The first pathway is that that some of the midlevel officers involved in the adaptation process become promoted to senior organizational positions. Following the promotions, they will

[118]Works that have discussed this connection include: Farrell, Rynning, and Terriff. *Transforming Military Power since the Cold War*; Marcus, "Military Innovation and Tactical Adaptation in the Israel-Hizbollah Conflict."; Terriff, "From the Bottom up or Middle up?: Learning in the Vietnam War and the Sources of FMFM-1 *Warfighting* in the US Marine Cops."

hold the authority and necessary credibility as a result of their previous wartime combat experience to ensure the lessons learned from the adaptation process become institutionalized in peacetime. Once they become senior officers they can ensure the codification of the lessons learned in doctrine and shift the necessary organizational resources to further safeguard the changes. Junior officers may also become more senior midlevel officers and thus also have increased influence within the organization and support the institutionalization of the adaptations.

The second pathway is that the junior and midlevel officers who remain in the organization following the end of the war can form information and advocacy networks which can allow them to share the lessons of their frontline combat experiences. Information networks allow for the common exchange of ideas and opinions, which in turn help to facilitate organizational narratives and dialogue that can help drive organizational change. These information and advocacy networks can take formal and informal structures which include: articles in service professional publications and journals, seminars and debates at service educational institutions, participation in wargames and simulations and workshops on doctrine writing and personal correspondence among personnel. These networks help to foster the understanding of the adaptation that occurred during the war. While information networks are focused on sharing of experiences, advocacy networks consist of individuals who are already convinced that the lessons learned from specific wartime adaptations needs to be institutionalized and actively lobby to ensure it happens. This lobbying can manifest itself in diverse ways, including writing articles and opinion pieces in professional journals, participating in debates on service doctrine and influencing the curriculum of service education institutions. The networks can also consist of former junior and midlevel officers who have left the service for the civilian sector and these individuals can influence the organizational change process by working as journalists, civilian defence bureaucratic positions or in the legislative or executive branches of government. Advocacy networks can go beyond intra-service dynamics to involve external influences.

Overall, these pathways allow for both the role of individuals and collectivist action to drive and shape the institutionalization of adaptations in peacetime. The pathways allow for bottom up perspectives on military change to account for large scale innovation, something which has largely been unexplored by the existing literature. The pathways do not discount the

role of senior leadership as clearly militaries remain hierarchical organizations and senior officers remain key actors in the process. Senior officers can act as protectors or guardians for the junior and midlevel officers as they form networks, as well as by directly participating in the networks themselves. Further, senior officers may opt to amplify battlefield experiences of lower ranking officers to the rest of the organization.

These primary drivers can be fit within the wider framework of military innovation drivers and shapers as previously plotted in Table 1. While junior and midlevel officers remain the primary drivers of the bottom up innovation process via the discussed pathways, they are not the only variables involved in the process of the institutionalization of battlefield adaptations. The adaptation to innovation process remains influenced by the prevailing variables of peacetime military innovation, but with the addition of the impact of combat veteran junior and midlevel officers who play the most important role in the success or failure of the institutionalization of wartime adaptations during the post-war period via the previously discussed pathways. The peacetime military innovation drivers and shapers retain a degree of relevancy as the process of learning (or forgetting) a major lesson of wartime occurs during the post-war period after hostilities have ended, thus the conditions are similar. These secondary drivers help establish additional motivations to retain the lessons of the previous wartime adaptation, while the shapers help to either accelerate or constraint the institutionalization process. A new shaping element is the role of junior and midlevel officers, who not only will act as the primary drivers in the entire process, but will ultimately shape how the process unfolds. This is notable as junior and midlevel officers can also thus be responsible for the failure of the adaptation to innovation process; this will be the result when either the officers fail to undertake any of the pathways from Table 3, or in some cases, opt to form counter-networks and outright oppose the institutionalization of the adaptation. The adaptation to innovation process is plotted in Table 4.

Table 4: The Drivers and Shapers of the Adaptation to Innovation Process

Primary Driver	Secondary Drivers	Shapers
• Junior and Midlevel Officers	• Prevailing Strategic, Operational and Tactical Challenges • Senior Leadership (Civilian or Military) • Alliance commitments • Legitimacy (resources) • Technology	• Strategic and national political cultures • Military organizational culture (and subcultures) • Resources • Bureaucratic Politics • Junior and midlevel officers • Leadership

The literature on the sources of military change identifies failure in wartime as a driver of change, yet because the U.S. military was victorious in the Second World War and some services still changed anyway, this research has the potential to identify a new source of change. Each service branch participated in extensive combat experience within different geographic contexts, making this conflict particularly unique compared to smaller scale wars in Iraq, Vietnam or Afghanistan that have come to dominate the military change literature.[119] The U.S. combat experience during the Second World War was conventional in character, further separating this research from much of the recent military change literature that has become transfixed on asymmetrical warfare aspects of the GWOT.

[119] For example, the Navy has played a relatively minor role in all three of those conflicts compared to the Army and Marines.

Chapter 3: The Marine Corps

Being ready is not what matters. What matters is winning after you get there[120]
Lieutenant General Victor H. Krulak, USMC

The USMC has undergone several organizational transformations since its establishment during the Revolutionary War of Independence. Following the Spanish American War of 1898, the role of the USMC evolved from serving as infantry who fought on ships into an expeditionary orientated force designed to secure U.S. global interests in locals such as the Asia-Pacific and Caribbean.[121] Technology would also bring changes to the Marines, most notably in 1912 when their personnel began aviation training.[122] This would mark the first step of the Marines eventual development into a fully combined arms air-ground organization that was later formalized with the establishment of the Fleet Marine Force (FMF) in 1933. Central to this organizational structure was the relationship between air and ground units as the Marines would come to develop a belief and doctrinal position that aviation units should first and foremost operate in support of infantry. The evolution of CAS as practiced by the USMC has not been the result of predestination but was the end product of many hard-working Marines and their various combat experiences.

The USMC has a long embedded organizational historical narrative that links its origins of CAS to the various interventions in the Caribbean during the interwar era (1919-1938), most notably the Nicaragua expedition.[123] However, arguably this connection is considerably overstated and likely reflective of the powerful mythmaking aura of the Marines.[124] Rather, this

[120] Reference Branch Marine Corps History Division, "Famous Quotes," *Marine Corps University* (2021), https://www.usmcu.edu/Research/Marine-Corps-History-Division/Frequently-Requested-Topics/Famous-Quotes/.
[121] For general histories of the Marine Corps see, Millett, *Semper Fidelis*; J. Robert Moskin. *The U.S. Marine Corps Story*, 3rd Edition (Boston: Little, Brown and Company, 1992).
[122] For an introductory history of Marine aviation see, Peter B. Mersky, *U.S. Marine Corps Aviation Since 1912* (Annapolis, MD: Naval Institute Press, 2009).
[123] This belief can be found in many popular histories of the Marine Corps as well as official Marine Corps publications/historical pamphlets, for example, see Lt. Col. Clyde H. Metcalf, *A History of The United States Marine Corps* (New York, NY: G. P. Putnam's Sons, 1939). It is also largely reflective by current serving personnel, see this article as a recent representation of the belief: Lt. Col. Michael D. Russ, "The Marine Air-Ground Task Force in Nicaragua, 1927-33," *Marine Corps History* Vol 2, Iss. 1 (2016).
[124] The Nicaragua expedition is reflective of many Marines' central beliefs on how they view themselves and so this becomes a convenient origin for the 'proper' role of Marine aviation. For example, the narrative highlights the image of the Marines as an innovative organization, where frontline solders learned for the first time how to use aviation to support infantry. Further, it was an operation that was solely conducted by Marines, meaning they were

chapter will demonstrate that the modern Marine understanding of CAS originated during the Pacific Theatre of the Second World War, where it underwent a series of successful adaptations, that was followed in the postwar period by a gradual process of lessons learned institutionalization. Further, by extension, in many ways the very origins of the modern Marine Air Ground Task Force (MAGTF) can be traced back the CAS adaptations from this period.

This chapter comprises five sections. Firstly, it begins with an overview of the Marine Corps as an organization on the eve of the U.S. joining the Second World War by discussing its major internal organizational narratives and norms, and will outline the Marines' doctrinal view of CAS prior to hostilities. The second section discusses the Marines' combat experiences with CAS and traces the various adaptation processes that surrounded its usage and evolution during the war. Thirdly, the immediate postwar period will be explored, examining initial organizational attempts to process its campaign experiences while dealing with the early stages of the Cold War. Fourth, the next section will briefly explore combat during the Korean War, demonstrating how it largely reflected the CAS system learned over the course of the Second World War. The final section will trace the remaining initialization process and organizational views of CAS leading up to the early stages of the US involvement in Vietnam. The chapter concludes demonstrating that the Marines Corps' attempts to institutionalize its CAS lessons learned was ultimately highly successfully in part due to the interactions of different bottom-up and top-down processes, which includes the role of junior and midlevel officers as key conduits between the adaptation and innovation stages.

The Marine Corps in 1941

In December 1941 the Marine Corps was by far the smallest of the services, numbering just over 65, 000 personnel.[125] The Marines lacked the public profile and national prominence that they would come to hold in the post-war era. Organizationally, they were heavily constrained by their budget being controlled by the Department of the Navy, which, along with Congress, during the leadup to the war was directing the bulk of funds to the construction of new warships for the fleet, rather than arming the Marines. Still, the Marines had been beneficiaries

not fighting in a joint context with the other services and helps highlight their unique contributions to the development of CAS.

[125] Millett, *Semper Fidelis*, 352.

of the military's gradual mobilization that started in 1939 which ultimately enhanced the service's operational capabilities and gradually increased the number of personnel.[126] Nonetheless, there remained tensions among the different services of the military, particularly between the Army and the Marines over resources and preferential missions.[127]

Despite the Marine's overall small size and bureaucratically disadvantaged position, the service had developed over time a considerably strong identity and organizational culture. This sense of identity was the result of actions by the organization and key individuals over the prior decades. This directed effort was undertaken in many ways to confirm and justify the continued existence and organizational independence of the Marines. The Marine Corps was always in a particularly unique position. It was never fully a land centric ground force, nor was it ever fully a maritime one either; this created a context of being viewed as an 'other' entity by the other services, which was in turn embraced by the organization itself as a form of exceptionalism.[128]

This identity then led to the development of a sense of superiority, where Marines embraced the self-image of an elite fighting force. Aaron O'Connel observes that during this period that the organization was filled with consistent "affirmations of the Marines' inherent superiority over everyone else, coupled with a wariness of outsiders that bordered on paranoia. They imagined themselves as a small and loyal tribe of warriors who were outnumbered, disrespected and persecuted, even by their sister service, the Navy".[129] This perception of elitism, produced an intense bond of organizational loyalty amongst its members; this was reinforced by its emphasis on frontline close combat, where in principle every member of the service was expected to fight, and where the notion of "every Marine is a rifleman" reigns supreme. While the Marine Corps was by design structured around combined arms, nonetheless, the infantry was the dominant focus.[130] This norm of maintaining "courage under fire" during frontline combat

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[126] Allan R. Millet "Assault from the Sea: The development of amphibious warfare between the wars," in Williamson Murray and Allan R. Millett eds. *Military Innovation in the Interwar Period* (Cambridge: Cambridge University Press, 1996), 83.

[127] The Marines were hostile to the idea of the Army preparing for major amphibious operations. Many of these Army-Marine tensions were partially a legacy of inter-service relations during the First World War where many Army officers felt the Marines contributions overshadowed those of the Army in the eyes of the public; Millett, *Semper Fidelis*, 351.

[128] Heather Venable, *How the Few Became the Proud: Crafting the Marine Corps Mystique, 1874-1918* (Annapolis, MD: Naval Institute Press, 2019), 1-15.

[129] Aaron B. O'Connell, *Underdogs: The Making of the Modern Marine Corps* (Cambridge, MA: Harvard University Press, 2012), 6.

[130] Victor Krulak, *First to Fight: An Inside View of the Marine Corps* (Annapolis, MD: Naval Institute Press, 1984),155-159.

permeated throughout the organization and was continuously socialized into new recruits during training and education, and in turn shaped how Marines viewed themselves and their operational behavior. This emphasis on the 'warrior' mindset led to a bias against technology and any machine based approach to warfare; the purest form of combat was man versus man in the eyes of the Marines.[131]

A core component of the service's organizational culture was a strong sense "organizational paranoia", where the Marines were consistently concerned about other services and political forces in Washington threatening their budgetary resources, missions and even continued existence.[132] This norm began to significantly influence the organization during the interwar era, where the Marines were routinely attempting to reinvent their role and adjust their doctrine to maintain their separation from the Army in order to justify their continued role within the U.S. military.[133] This paranoia, or concern with its survival, came to shape the way in which the organization behaved to a widening degree. The Marines became more aware of external pressures for change due to shifts in the global strategic environment that became paired with a fear of perceived public irrelevance should they fail to change accordingly. Further, within this context the Marines were very wary of overlapping their preferred missions and operational methods with the other services out of concern they may appear to be duplicating the behavior and role of others. The Marine Corps then sought to change themselves at times when necessary to continue to maintain their organizational independence or even their very existence.[134]

The Marine Corps of 1941 had spent many of the preceding years attempting to carve out a unique role for itself in the U.S. military. Its combat experience during the First World War was that of a major land force where Marines found themselves fighting large scale land battles in France (most famously at Belleau Woods) against the Imperial German Army. While the Marines embraced the public attention gained by participating in such a high profile conflict, it nonetheless would lead in turn led to an uncomfortable internalized debate over how to further distinguish itself from the Army.[135] The Marine operations that followed were exclusively minor

[131] Jeannie L. Johnson, *The Marines Counterinsurgency and Strategic Culture: Lessons Learned and Lost in America's Wars* (Washington, DC: Georgetown University Press, 2018), 100-105.
[132] Krulak, *First to Fight*, 15-52.
[133] Millet "Assault from the Sea," 75.
[134] Terriff, "Innovate or Die," 483-485.
[135] Publications written by former Marines during this time period focused a great deal on the combat experiences of the organization during First World War as it was by far the most popular achievement of the Marine Corps in the

deployments, best described as 'colonial policing' or counter-insurgency in China, the Caribbean and South America, where Marines found themselves fighting small bands of insurgents rather than any sort of high intensity conventional combat.[136] The largest organizational transformation that had preceded this period was the shift towards amphibious warfare. Here, the Marines conceptualized a new role for itself that was mainly geographically focused on the Pacific, where Japan was identified as the likely future adversary. The U.S. developed War Plan Orange to prepare for future conflict against Japan, where the Marines role in amphibious warfare was to fight in a combined arms approach alongside naval forces to seize and hold territory as part of an expeditionary orientated force that placed emphasis on speed of maneuver.[137] In 1939 the Navy's General Board had formally declared that Marine aviation was first and foremost supposed to focus on supporting Marine landing operations and infantry in the field. This was demonstrated during field training exercises in 1940/41; however, it became very apparent during these exercises that the organization's CAS system, or lack thereof, had significant problems, particularly with communications and coordination between ground and air units which increased the risks of friendly fire.[138]

The Marines doctrinal position on CAS was fairly underdeveloped during the leadup to the U.S. entrance in the Second World War. The main amphibious operations doctrine during this prewar period was *FTP 167: Landing Operations Doctrine*, which formally acknowledged the importance of CAS to the Marines and its relevancy to the service's ability to carry out their preferred way of war. The doctrinal manual directly mentions that CAS should receive "careful planning" during operations, yet, the document does not pay much attention to any specifics of the CAS process.[139] The other influential doctrinal source for CAS during this period was the *Small Wars Manual* that was published in 1940 and was largely shaped by the Corps' counter-

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eyes of the U.S. public. For examples of these see**,** Capt. John W. Thomason, Jr., *Fix Bayonets* (New York, NY: Charles Scribner's Sons, 1927).

[136] Moskin. *The U.S. Marine Corps Story*, 219-225.

[137] B.A. Friedman Ed., *21st Century Ellis: Operational Art and Strategic Prophecy for the Modern Era* (Annapolis, MD: Naval Institute Press, 2015), 44-48; this embrace of amphibious war was also a popular topic of discourse by Marine personnel at the time, see for example, Col. Frederic M. Wise and Meigs O. Frost, *A Marine Tells It To You* (New York, NY: J. J. Sears and Company, Inc., 1929).

[138] Maj. W. E. Sullivan Jr, "History and Development of Close Air Support," *Marine Corps Gazette* Vol. 40, Iss. 11 (Nov 1956), 20ff; The electronic versions of the *Marine Corps Gazette* and *Leatherneck* do not include individual page numbers, only the page on which an article started.

[139] Department of the Navy, *FTP 167 Landing Operations Doctrine* (Washington, DC: Government Printing Office, 1938).

insurgency operations in the Caribbean. The *Small Wars Manual* firmly stated that CAS must be among the primary operational tasks of Marine Corps aviation, and that centralized command and control was key to maximizing its efficiency.[140] This doctrinal value of CAS was also shared by individual Marines who had collectively identified it as playing an essential part of combined arms.[141] Marines during this period even went as far as to develop an elitist view of their approach to CAS in comparison to the Army, feeling that they valued it more and could conduct it more effectively.[142] Overall, the official doctrinal position of the Marines was that CAS was highly valued for its impact on combat power, however, clearly the service was lacking any sophisticated or well planned system for its operationalization. Furthermore, none of the Marines doctrinal documents of this time even formally defined CAS.

When the Japanese attacked Pearl Harbor on 7 December 1941 there were very few Marine aviators remaining in the service who had any combat experience with CAS; the vast majority of marine pilots in service were young men who had spent the bulk of their time since joining the Marines training alongside Naval aviators for missions such as air superiority or anti-ship missions.[143] For the Marine Corps of 1941, CAS was valued at the normative level, and believed to have strong potential for its combat efficiency, but in practical terms lacked both a unique system for its implementation on the battlefield as well as not having many members with direct experience with it. Thus, the Marines would go to war against Japan with a relative blank slate for CAS, ready to be shaped by their future combat experiences.

The Second World War

Marine Corps units fought in many of the opening U.S. engagements throughout the first six months of the Second World War. During this period Marines stationed across the Pacific fought a series of desperate and dispersed defensive battles and found themselves facing an aggressive and hyper determined Japanese military machine. Their enemy was a well trained, well equipped modern force that was focused on fighting high intensity conventional warfare at a rapid pace; this was a considerably different character of warfare than the Marines had faced

[140] Department of the Navy, *Small Wars Manual* (Washington, DC: Government Printing Office, 1940).
[141] A representation of this sentiment can be found here, Lt. Col. Harold C. Major, "Marine Corps Aviation," *Marine Corps Gazette* Vol. 25, Iss. 2 (Jun 1941), 7ff.
[142] For example, "Reports-Observation of US Army IV Corps Maneuvers," 1940, Box 316, Studies and Reports Collection, 1930-2006, Marine Corps History Division, Quantico, VA. Hereafter MCHD.
[143] Millett, *Semper Fidelis,* 361.

during the various interwar era counter-insurgency operations. As the U.S. began its counter-offensive that would eventually end with the capitulation of Japan, the Marines would form part of a joint force alongside the Navy and Army. This was the USMC's opportunity to put their amphibious warfare concepts into practice as they would frequently have to carry out amphibious landings that were paired in some cases with extended ground campaigns. Geographically, the Marines would have to fight their way across the various islands of the South and South-Western Pacific; it was truly an immense theatre of operations.[144]

Interestingly, the aviation and ground components of the FMF would spend much of the war not fighting as an integrated air ground team. The General Board of the Navy had directed Marine aviation to focus on air superiority missions, specifically centered on the protection of U.S. Naval carriers. This focus would remain for most of the war; and Marine aviation would largely not operate in a combined arms framework by providing direct CAS for Marine infantry.[145] Marine senior wartime leadership, including Commandant Alexander A. Vandegrift, frequently drew public attention to the Marine aviators' air supremacy combat successes; it was viewed by the organization as both a point of pride and a means of upping the organization's public profile.[146] Overall, the Marine Corps learning experience for CAS over the course of the war was gradual, but at times disjointed and uneven; nonetheless by the end of the war the organization had discovered via the hard fought experiences of its frontline forces how to conduct CAS in a highly more effective manner than it had during the start of hostilities.[147]

On 7 August 1942 Marines began landing on Guadalcanal, this would mark the most prominent operation for the service since the start of the war. This early campaign would demonstrate many of the inadequacies of the organization's prewar CAS system. Further, the tactical and operational elements of the campaign showed there were many constraints on the adaptation process. Guadalcanal was in many ways an idealized representation of the type of war the Marines had spent the previous two decades preparing for in terms of organizational training

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[144] For a broad overview of the early operations of the US Marines during the Second World War see, Frank O. Hough, Henry I. Shaw, and Verle E. Ludwig., *Pearl Harbor to Guadalcanal* (Washington, DC: Historical Branch, G-3 Division, Headquarters, U.S. Marine Corps, 1958).

[145] Fred Allison, *The Black Sheep Squadron: A Case Study in U.S. Marine Corps' Innovations in Close Air Support* (PhD diss., Texas Tech University, 2003), 73-74.

[146] Alexander Vandegrift, "Marines in the Pacific," April 1944, Box 10, Alexander A. Vandegrift Collection, COLL/3166, MCHD. Hereafter Vandegrift Papers.

[147] Marine Aviators operated a number of different aircraft throughout the war during tactical aviation missions, some of the most common included F4F Wildcat, 4FU Corsair, F6F Hellcat, SBD Dauntless, and SB2C Helldiver.

and intellectual development.[148] However, there were still some divergent elements from this vision of war; for example, Air and Ground components of the Marine Fleet Marine Force spent much of the campaign separated from one another, as Marine pilots spent the majority of the operations engaged in air superiority missions. This separation would be lamented by many Marine officers, and reinforced the desire to eventually operate with a joint air-ground Marine force structure. It was Naval aviators who provided air support during the initial landings for Marine infantry; many of these men were veterans of the Battle of Midway and had significant air-to-air combat experience but had participated in few, if any CAS missions prior to the start of fighting on Guadalcanal.[149] Following the landing, CAS was very rudimentary based on an underlying logic that a simpler system would be more successful at carrying out strikes given the circumstances on the ground. However, it became very clear that the communications system between ground forces and their air support was poor quality. There was a lack of effective coordination between the different elements of the air support process; these problems were exacerbated by a lack of pre-operational joint planning nor any significant joint training and operational rehearsals prior to the start of the campaign. Overall, the communication system used for CAS was too lengthy and overcomplicated; frontline troops lacked the ability to secure any near real time support from the air. What was becoming more apparent to U.S. forces was that they needed specialized personnel on the ground and in the air to properly streamline coordination for successful CAS strikes to happen in future.[150]

The natural terrain of Guadalcanal proved to be a constraining factor on the successful implementation of CAS; the dense foliage of the jungle prevented clear identification of enemy positions. The enemy forces were also themselves adaptative in their means of countering U.S. CAS; they learned to keep a close gap between them and frontline U.S. forces which often deterred U.S. pilots from attacking out of fear inflicting friendly fire on their own troops.[151] Nonetheless, the U.S. forces were able to develop their own learning events during the battle; for

[148] A.A. Vandegrift and Robert B. Asprey, *Once a Marine: The Memoirs of General A.A. Vandegrift United States Marine Corps* (New York, NY: Ballentine Books, 1964), 17-18.
[149] Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II," October 1945, Box 4, Gen. Keith B. McCutcheon Personal Papers MCHD. Hereafter McCutcheon Papers.
[150] Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II".
[151] Allison, *The Black Sheep Squadron*, 96-97.

example, pilots learned that by physically visiting the front line areas on foot prior to the launch of air strikes they could conduct their operations with greater accuracy.[152]

Overall, at Guadalcanal, junior and midlevel officers were the first to identify the shortcomings in the CAS system, as they were the men forward deployed and able to observe and experience the various operational difficulties that resulted from the dysfunctional CAS system. These officers were able to recognize as early as the initial landings and follow-on operations that the Naval aviators tasked with providing CAS were wholly unprepared. It was clear to these officers that the assigned air support had no pre-operational training, nor was it able to rely on a working system to carry out the needed air strikes. What was immediately clear to these junior and midlevel officers was they had no real ability to consistently communicate with pilots. As the campaign continued, these officers complained of the lack of any attempt to foster coordination between air and ground, such as holding joint meetings or engage in any pre-operational training. The fighting on Guadalcanal essentially sent a shock to frontline Marine officers that CAS needed to be vastly improved for future operations, and that a functional system needed to be developed from scratch in order to avoid further difficulties. The primary conclusions drawn by these officers, was that: there needed to be a formalized CAS system developed that standardized methods of communication between ground and air units; there needed to be better organized command and control of the CAS process to more efficiently allocate and coordinate air assets; and, when able, there needed to be more pre-operational planning and preparation between ground and air units.[153]

Marine aviators spent the majority of the Solomon Islands campaign engaged in air superiority operations against the Japanese. This continued on after Guadalcanal as U.S. carrier assets in the Pacific were stretched very thinly and the Navy would require Marine aviators to continue to serve on carriers as part of the Navy's air efforts during the war.[154] After the campaign was over, the Marines had identified that there was a surplus of junior and midlevel officers deployed, particularly at the Colonel level. The officers were then ordered back to the

[152] Jeter A. Isely and Phillip A. Crowl, *The Marines and Amphibious Warfare: Its Theory, and Its Practice in the Pacific* (Princeton. N.J.: Princeton University Press, 1951), 172.
[153] Headquarters, Marine Corps, "An Evaluation of Air Operations Affective the U.S. Marine Corps in World War II".
[154] Mersky, *U.S. Marine Corps Aviation Since 1912*, 54-59, 72.

United States to form new units, and this would in turn allow them to diffuse the lessons of combat experiences to newly recruited Marines.[155]

The campaigns that followed Guadalcanal did not involve any rapid improvement to the Marines CAS system, although some gradual lessons were integrated into the organization by their operational experiences. The Marines use of CAS during the Bougainville campaign in November 1943 reflected many of the same problems that had been identified during previous engagements, which included lack of coordination between air and ground units along with little pre-operational CAS related training. While it was very clear that Marine infantry units valued the potential for CAS to support their ongoing tactical engagements during the battle, the command and control system involved was still lacking in many different ways. Interestingly, official lessons learned documents have attempted to spin the combat lessons during this campaign as being significantly important to the Marines understanding of CAS; however, this is likely an over-stated position given how relatively minor of a role that CAS played and how few relevant adaptations resulted from these engagements.[156]

The Battle of Tarawa on the Gilbert Islands saw similar results when it came to CAS, though this engagement involved one of the first major attempts from the Marines at utilizing airborne controllers, where specially designated forward deployed officers on the ground communicated with aviation units to help coordinate strikes, and it led to some positive effects. In a similar fashion to Bougainville, official lessons learned documents tend to portray the CAS undertaken at this battle as making a positive impact.[157] However, this is directly contradicted by other senior Marines, including General Vandegrift who claimed in reference to Tarawa that "[w]e knew by now that close air support had not worked well".[158] The fighting on the Marshall Islands offered little in the way of CAS adaptations other than reinforcing the lessons learned from previous operations. Positively, however, it was during these campaigns that the Marines as an organization fostered the diffusion of knowledge and experiences among junior and midlevel officers. These officers were very much at the forefront of these campaigns, and were able to observe firsthand the tactical and operational level impacts of decision making and pre-

[155] Vandegrift and Asprey, *Once a Marine*, 160.
[156] Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II".
[157] Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II".
[158] Vandegrift and Asprey, *Once a Marine*, 232-233.

operational planning. Thus, deficiencies (including those relating to CAS) became more apparent as the war continued. The Marines had a fairly friendly atmosphere among the officer corps that allowed for networking to flourish. Senior Marine officers, including Vandegrift, attempted to take advantage of this atmosphere, and developed more formal structures (such as officer exchanges) to allow field officers and those back in headquarters to network and share experiences.[159]

It was during the campaign to liberate the Philippines, starting in October 1944, where the Marines began to develop some of the most radical and far-reaching CAS adaptations of the war. For the first two and a half years of the U.S. war effort, the Marines had not properly developed an effective CAS system, nor had they even had the ability to practice CAS in a combined arms force of Marine ground and aviation units. Nonetheless, senior Marine leadership continued to promote the idea that CAS was a very important part of the organization, yet had begun to acknowledge that it needed to be better utilized and a more effective and formalized system needed to be developed.[160] On the frontlines in the Philippines, junior and midlevel officers observed first-hand that the lack of any standardized CAS system severely hampered the combat effectiveness of frontline units. There was very poor communication and coordination between ground and air assets, which led to inaccurate bombing and strafing strikes that missed hitting the enemy. In other instances, these officers experienced an outright lack of air support as planes were often not ready for action when needed. This was clearly a problem that needed to be solved, driven by the desire to improve combat effectiveness; it also presented an opportunity to build a new system for CAS where there had been nothing prior. Interestingly, during the Philippines campaign, the strongest lessons learned for developing a modern CAS system manifested from the joint efforts of Marine aviation providing CAS for U.S. Army and Filipino insurgent ground forces, rather than for their Marine infantry counterparts. This adaptation would pair the idea that tactical aviation should act in a subservient role to ground forces with technological improvements and some analysis of recent operations to improve operational efficiency.

[159] Vandegrift and Asprey, *Once a Marine*, 240-241.
[160] "Statement of Lieutenant General A. A. Vandegrift, USMC, Commandant of the Marine Corps, to the House Select Committee on Post-war Policy," 11 May 1944, Box 17, Vandegrift Papers, MCHD.

A key figure in the development of the CAS Philippines adaptations was Lt. Col. Keith Barr McCutcheon as well as his staff of junior and midlevel officers. McCutcheon was tasked with serving as the operations officer for Marine Air Ground Unit-24 (MAG-24) which was to provide CAS for the U.S. Army during the Philippines campaign. Upon arriving in the theatre of operations, McCutcheon began to oversee a series of impactful reforms to better prepare Marine aviators for their assigned role. McCutcheon and his staff identified a number of deficiencies with CAS operations earlier in the war and began to develop significantly different ideational views on CAS compared to counterparts elsewhere in the Marines as well as the Army, Army Air Force and Navy. Namely, McCutcheon and his staff felt that it was imperative that it should be up to local ground forces to command and control CAS strikes, and that CAS was viewed as a decisive part of combined arms. This perspective from McCutcheon and his fellow junior and midlevel officers was largely driven by their analysis of frontline combat, either via direct experience themselves, or by the careful study of campaign after action reports. These officers continued to identify common problems, for example, they were able to understand how the problems with communication between air units and ground forces had continued to reduce combat efficiency and that any efficient CAS system needed improved communications; further, they understood that, specifically, there continued to be a lack of a formalized system to oversee the distribution of CAS strikes across a localized battlespace.[161]

After deploying to the Philippines, McCutcheon and his fellow officers began to implement a series of localized reforms to the pre-operational training regime of Marine aviators. This was in part driven by McCutcheon's view that Marine aviation was totally unprepared to effectively conduct CAS. McCutcheon observed that, "efforts were made immediately to assemble all the available literature on the subject but it became clearly apparent that the existing instructions were published piecemeal in many forms and much of the data was contradictory".[162] As a result of this, McCutcheon along with other junior and midlevel officers began to develop a new training/educational program that was delivered via a series of lectures. These lectures were led by officers (primarily Lieutenants and Captains, along with some Majors and Colonels) and allowed for aviators as well as some infantry officers to share experiences

[161] For a strong overview of McCutcheon's impact on the Marine see, James Ginther Jr., *Keith Barr McCutcheon: Integration Aviation into the United States Marine Corps, 1937-1971* (PhD Diss: Texas Tech University, 1999).
[162] Col. Keith B. McCutcheon "Report: Close Air Support," Undated, Box 3, Gen. Keith B. McCutcheon Papers, MCHD.

among one another. The officers appointed to the lecturer positions were given specialized instructions from McCutcheon and his staff on their views on CAS. The intention of the lectures was that participants would return to their units to then diffuse the knowledge they learned among other personnel (the attendance of the lectures varied from 50-200 students). In particular, there were specialized lectures and courses for those who would serve in Air Liaison Parties (ALP) and who would be the ones coordinating CAS on the ground during the campaign.[163] The courses were intended to diffuse a deeper understanding of the role of CAS in operations as well as develop a stronger technical understanding of the technical details of CAS; the students were tested on questions like "name three types or ways of designating targets" and "name the six elements of an Air Support Request".[164] McCutcheon noted these lectures were also designed to educate infantry officers in order to overcome the "[f]ailure of small unit commanders to understand what is and what is not a profitable air target; not taking fullest advantage of the potential benefits of air support by a reluctance to request close support missions; and requesting air strikes on targets that could better be handled by a artillery, or wasting air strikes on improperly designated targets".[165]

What McCutcheon and his fellow officers were undertaking in the Philippines was building a new CAS system that could easily be adopted and integrated by both air and ground units. While different manifestations of ALPs had been in use since the fighting in Bougainville, the first major change to happen in the Philippines was the enforced standardization of ALP units which were to consist of: someone with pilot experience to act as the air coordinator serving on the ground; veteran infantry officers to serve as ground observers; a Non Commissioned Officer (NCO) who would serve as radio mechanics and operators; and usually a private or private first class serving as the driver who operates a quarter-ton truck equipped with communications equipment (including smoke grenades for signaling).[166] It was decided that ALPs should be kept together as a unit and kept within a certain geographic location as the mission unfolds to allow them to gain greater understanding of the geography and conditions on

[163] Intelligence Section, MAG 24, "Memorandum: Air Ground Support Pilot Training Ground School," 1944, Box 3, McCutcheon Papers, MCHD.
[164] Marine Aircraft Group 24, "Pilot Training Examination," 1944, Box 3, McCutcheon Papers MCHD.
[165] Col. Keith B McCutcheon, "Lecture: Introduction to the SOPI," 8 June 1945, Box 3 McCutcheon Papers, MCHD.
[166] Headquarters, 1st Marine Amphibious Corps, "Close Air Support," 3 March 1944, Box 3 Gen. Keith B. McCutcheon Personal Papers, MCHD.

the ground. This process was significantly emphasized during the pre-operational CAS lectures. Aircraft were to be employed in combat via two procedures; the first was to have them in a state of active readiness in a nearby airfield to await further strike directions from the ALP; the second was to have them in the air circling directly overhead of the combat zone.[167] ALPs prior to the start of operations would map and study the terrain and continue to advise local commanders on all matters relating to CAS during the fighting. Further standardization included the formalizing of the CAS request process which included information such as: nature of request, time and location of the target, type of planes to be employed, and direction of attack. CAS was finally being defined within USMC documents as "that type of aviation support which executes missions against enemy forces holding up the advance of our own front line units."[168]

The McCutcheon led reforms also completely overhauled the communications system involved for CAS, helping to fix one of the main problems that had been apparent since the first combat operations at Guadalcanal. This was intended to enhance command and control capabilities and allow for a more flexible and streamlined networked approach to CAS. Under this system, the support air commander (who was stationed in the rear, often close to the senior operational commander), was linked to forward controllers either in the air or those in the ALPs. This system was centred on the development of a radio network linking all the different nodes in the CAS system together.[169] New technology would play a role in this process, as newer radios allowed ground forces to have an easier time communicating with aviation units, helping to solve the longstanding problem with communication issues in the CAS process. This system was diffused to fellow officers via the pre-operational lectures and training exercises. Overall, it was part of the attempts by McCutcheon and his officers to build a truly integrated air-ground team that could maximize the effectiveness of combined arms.[170]

During the fighting in the Philippines, early uses of CAS still showed some limitations, such as the majority of strikes were pre-planned the night before on target locations and were often not even in direct support of ground units during the day of fighting. Part of this was due to confidence issues between Army ground units and Marine aviators; however, this proved to be a limited hinderance and adaptations to increase efficiency happened quickly. Trust between Army

[167] McCutcheon "Report: Close Air Support".
[168] Headquarters, 1st Marine Amphibious Corps, "Close Air Support".
[169] Ginther, *Keith Barr McCutcheon*, 47-48.
[170] "S.O.P. For AIF Radio Nets," Undated, Box 3 Gen. Keith B. McCutcheon Papers, MCHD.

and Marine units was built fast as officers from the two services got to know one another and CAS strikes were able to happen increasingly in a timelier fashion.[171] The most successful implementation of the McCutcheon built CAS system occurred in February 1945 during the Army's 1st Cavalry's march on Manila. This was a rapid advance, covering 109 miles in 66 hours, where the emphasis was on speed and seizing territory as quickly as possible by overwhelming enemy units with speed and firepower. The armor of the 1st Cav and its 'flying columns' advanced so rapidly they outpaced their logistical support. This was the type of combat that the USMC had idealized; centred on face-to-face frontline combat with the enemy and was the ideal testing ground for the new CAS system. Marine aviators remained in constant communication with ground units, this allowed them to even pause bombing and strafing runs during CAS strikes if there was a sudden risk of friendly fire. Overall, the command and control of CAS strikes was excellent, as strikes were dispatched to targets in a very timely manner, and led to the infliction of heavy damage on enemy forces.[172]

The CAS adaptations during the Philippines ultimately produced a decentralized CAS system. This was largely the result of how the adaptations unfolded, as it was primarily driven by junior and midlevel officers. As senior officers played little direct role in guiding the adaptations in the Philippines, there was less motivation among those involved to ensure that rigid hierarchal control over the CAS process be maintained. Rather, the opposite occurred, as the junior and midlevel officers intended to develop a system in which CAS would unfold in a way that supported how they experienced frontline combat, which was decentralized in character. Further, the Philippines campaign demonstrated to a wider number of junior and midlevel officers the importance of joint combined arms force structure. MAG-24 fought alongside advancing Army units during a rapid advance, which was a highly visible lesson learned on the extremely effective combat power of a combined arms unit. This essentially would help lay the ideational grounding for many of these officers of the very basics of the future MAGTF concept, which was to be centered around a force structure and doctrine that emphasized rapid unit maneuverability in an offensive expeditionary context which also emphasized flexibility and adaptability. All of these modern MAGTF concepts were experienced during the liberation of the Philippines.

[171] McCutcheon "Report: Close Air Support".
[172] Maj. B.C. Wright. *The 1st Cavalry Division in World War II* (Tokyo: Toppan Printing Company, 1947), 127-131.

During the later stages of the war, the Marines' confidence in their CAS system had grown as a result of the gradual learning experiences of various frontline units, as well as the growth of the incubations of new ideas such as those which emerged during the Philippines campaign. Articles began to appear in service publications, such as the *Marine Corps Gazette*, which echoed many of these recent lessons; for example, an aviator, 1st Lt. Leo B. Pambrun wrote on the importance of maintaining close coordination between ground and air units and that such coordination can allow for "danger close" strikes of near proximity to friendly forces. Pambrun also noted that ground commanders have a tendency to overestimate the information known by pilots in the air.[173] The fighting at Iwo Jima during this period showed the results of the previous learning experiences. While geographic factors such as the 'torturous terrain' constrained the overall effectiveness of CAS during that period, ALPs were able to operate in a reasonably successful manner in terms of coordinating air strikes.[174]

The U.S. assault on Okinawa, code named Operation Iceberg, was the other important campaign for the development of Marine CAS during the War. This battle was one of the climatic elements of the Pacific theatre, with U.S. strategists viewing the island as one of the last stepping stones until a potential invasion of Japan could be launched. Here, Marine leadership were able to push for more direct control over their own forces, allowing for one of the first times where Marines were able to fight in a proper combined arms framework of integrated air and ground units.[175] This battle thus can be seen as in many ways the defining engagement for the Marines in the war; as historian Craig M. Cameron observes that, "[w]ith three years' combat experience had come refinements in tactics and organization, from the scientific community arose new technological capabilities, and from the factories streamed a wealth of material, all of which the marines could hardly have dreamed of at the time of Guadalcanal."[176]

Okinawa was the first major battle where Marine CAS aircraft operated from Marine controlled support carriers. The CAS system utilized here was different from that of the Philippines campaign. The CAS on Okinawa was more centralized in terms of command and control, and was largely influenced by previous Marine combat operations from the South-

[173] 1st Lt. Leo B. Pambrun, "If You Want Close Air Support," *Marine Corps Gazette* Vol. 29, Iss. 3 (Mar 1945), 8ff.
[174] Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II".
[175] James A. Warren, *American Spartans* (New York, NY: Free Press, 2005), 75-91.
[176] Craig M. Cameron, *American Samurai: Myth, Imagination, and the Conduct of Battle in the First Marine Division, 1941-1951* (Cambridge: Cambridge University Press, 1994), 170.

Central Pacific campaigns. Only 35% of all CAS missions were the result of ALPs calling in strikes to meet the requirements on the ground, while the remaining 65% of strikes were from pre-planned orders the day before. This centralized approach was thought to allow pilots to gain greater battlespace awareness and have better coordination with other units.[177] Further, it was believed that it would reduce the need for mid-operational communications (thus avoiding the pitfalls of existing constraints in the communications system). A final rational for this centralized CAS approach was that given the relative static character of the Okinawan battlespace paired with the large amount of frontline forces, and other types of support fires (including artillery and naval bombardments), it was felt that tighter control of CAS was necessary to avoid overlap of support and reduce potential for friendly fire casualties.[178] Marine officers tended to view CAS during this battle as being fairly effective; it was observed that ALPs were functioning very smoothly and that strikes tended to be very accurate; essentially it was felt the gradual learning from experiences of Marine personnel, paired with enhancements in training, along with some changes in technology such as radio communications, had led to the development of a highly lethal CAS system. However, it was felt that constraints on CAS remained, particularly in terms of communication systems used for it.[179]

The centralized character of the Okinawa CAS adaptations was largely result of the shaping influence of senior leadership, and the significant organizational priority of the battle. Okinawa was one of the highest profile engagements of the late war, having been identified as a key objective by the U.S. military for its close proximity to mainland Japan. A considerable amount of resources was dedicated towards the battle, and along with it came the eyes of senior Marine leadership. As such, there was a greater need for senior leaders to be involved in the loop of any newly developed CAS process, and so it developed in a more centralized fashion. While much of the work during the adaptation process was largely driven and developed by junior and midlevel officers, the final outcome needed to conform to the preferences of senior command. The combat at Okinawa also further influenced the office corps of the USMC towards gaining a greater understanding of combined arms force structures in offensive, expeditionary settings.

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[177] Sullivan, “History and Development of Close Air Support”.
[178] Sullivan, “History and Development of Close Air Support”.
[179] See, Capt. John McJennett "Air Power for Infantry,” *Marine Corps Gazette* Vol. 29., Iss. 8 (Aug 1945) 14ff; Sgt. Don Braman, “Cannonball Support,” *Leatherneck* Vol. 29, Iss. 10 (Oct 1945), 30ff.

CAS during the battle demonstrated to these junior, midlevel, and senior officers alike of the extreme lethality of a proto-MAGTF air-ground force unit in practice. Notably, this also the first time that Marine officers could see such a combined arms unit being comprised of solely USMC units, as opposed to the earlier battle in the Philippines which was a joint operation between USMC and Army units.

By the time of the Japanese formally signed the surrender documents in September of 1945, the Marine Corps had undergone a fairly substantive adaptative process for CAS. This was not, however, a smooth undertaking. Despite the Marines professing support for the importance of CAS during the prewar era, it was evident during early war engagements that there were major deficiencies in how CAS was being operationalized. This was primarily the result of inexperience among personnel, but, there were also other major constraints, first and foremost the lack of any formal and standardized CAS doctrine. The Marines would overcome this constraint with the hard fought experience of its frontline forces. Here, primarily junior and midlevel officers saw firsthand the deficiencies within Marine CAS capabilities and they worked hard to overcome them. This would lead to the development of two different CAS systems; the decentralized and mobile CAS system developed in the Philippines, along with the more centralized and structured one that was used during the battle of Okinawa. The Marines who helped undertake these campaign adaptations would go on to influence the organization during the post-war era, knowing what needed to change, and more importantly, why that change needed to happen.

The Post-War Era

The USMC emerged from the Second World War as a service that had gained considerable operational experience. Upwards of 90% of Marine personnel had some form of overseas deployment during the war (compared to just 73% on average for the other services). With this came a sense of reinforced self-superiority which intensified long standing inter-service rivalries and resentments with the rest of the U.S. Military.[180] The Marines, like the other U.S. Military services, had several immediate challenges to overcome as it entered a new era of peacetime. Firstly, was the force structural impact of post-war demobilization and the brain-drain of experience that would come with it; second, was inter-service rivalry that potentially

[180] O'Connell, *Underdogs*, 43-45.

threatened the very existence of the Marine Corps; third, was the organization's role in the new global strategic environment during the early tensions of an emerging Cold War and the impact of new technologies, especially atomic weapons; fourth, and finally, was how to process and potentially integrate the recent experiences of high intensity warfare into the organization's structures and doctrine. All of these different challenges would shape the development of USMC CAS in the postwar period.

The mass exodus of personnel via demobilization created a concerning gap in technical expertise for combat operations; this was concerning for the organization as there was the risk of losing too many personnel who may have undergone particularly valuable experiences during the war. The hard-earned organizational prowess in amphibious landings as well as technical dimensions of combat such as CAS were at potential risk of being diluted due to this exodus of personnel. An Admiral remarked during a postwar Amphibious Warfare conference that "the horrors of demobilization have left us with few men and little money".[181] Nonetheless, this situation also provided opportunities for advancement for lower ranked personnel who remained in the service. Brigadier General Chesty Puller, a senior officer, who had himself advanced from enlisting as a private to becoming a senior officer used this period to ensure that those who had served under him during the war were given opportunity for promotion up the chain of command to ensure their experiences of frontline combat remained in the organization.[182]

USMC senior leadership in this period spent much of their attention focused on maintaining organizational survival as they had developed an understanding that the other military services, primarily the Army, were bureaucratically maneuvering against them. This sentiment was echoed very publicly by the Marine leadership, including Commandant Vandegrift, to the press and even during Senate testimonials.[183] This perceived threat grew to its zenith during the debates surrounding Defence Unification and the leadup to the 1947 National Security Act which would eventually merge the War Department and the Department of the Navy.[184] In the midst of this bureaucratic maneuvering, the Army was advocating that the

[181] Chief of Naval Operations, "Proceedings of the Amphibious Type Conference, Navy Dept, 13-16 January 1947," January 1947, Box 256, Studies and Reports Collection, MCHD.
[182] Jon T. Hoffman, *Chesty: The Story of Lieutenant General Lewis B. Puller, USMC* (New York, NY: Random House, 2001), 366.
[183] "Statement by General A. A. Vandegrift, US Marine Corps, Before Senate Naval Affairs Committee: 7 May 1946," 7 May 1946, Box 17, Vandegrift Papers, MCHD.
[184] Overall, the sense of organizational paranoia during the entire Unification process was deeply felt across the Marine Corps. Even as it came to an end with the enacting of the 1947 National Security Act there remained

Marines force structure be rolled back significantly, including eliminating its aviation wings and formally removing amphibious assaults as its central mission, thus reducing the Marines to a force similar to how it existed prior to the First World War.[185] In response to this challenge, senior Marine leadership developed an aggressive advocacy campaign aimed at the public and elected officials in Washington that emphasized the importance of the Marines to U.S. national security strategy. A central part of this public relations effort was to emphasize the uniqueness of the FMF structure, particularly the coordinated air-ground component that allowed the Marine Corps to respond to threats rapidly with the full lethality of combined arms.[186]

Senior Marines in public statements made direct comparisons that explicitly detailed the gap between the strategic airpower focus of the Air Force and the tactical airpower emphasis of Marine Aviation.[187] Early postwar Marine public relations materials, including magazine articles, promoted the role of CAS within the organization, highlighting the battlefield evolution of CAS as well as the tactical effectiveness of Marine pilots. These public relations efforts attempted to link Marine tactical aviation to its overall combat power and thus was argued to be a vital part of U.S. national security.[188] Paired with these publications and public statements from senior Marines, the other element of the Marines' survival strategy was the use of networks of Marine officers who had close ties with journalists and members of Congress to push favorable narratives, such as the uniqueness of the FMF air-ground structure.[189] CAS and its role in the Marines thus became linked to the perceived survival of the organization and, in turn, this strategy ensured that senior Marine leadership would support a balanced force structure of air and ground components to help distinguish the service from the Army and Air Force.

The changing global strategic environment paired with the emergence of powerful new national security related technologies such as the atomic bomb also greatly shaped the Marine

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tensions between the Marines and the other services (especially the Army); for a representation of this sense of distrust see, General Clifton B. Cates, "The Commandant Speaks to Congress," *Leatherneck* Vol. 52, Iss. 5 (May 1948), 22ff.

[185] Millet, *Semper Fidelis*, 456-57.

[186] Alexander Vandegrift, "Presentation for the Calvin Bullock Forum," Jan 1947, Box 11, Vandegrift Papers, MCHD.

[187] Alexander Vandegrift, "Speech, International Rotarian Convention," Oct 1948, Box 11, Vandegrift Papers, MCHD.

[188] "Expanding Marine Aviation," Undated, Box 5, Gen. Keith B. McCutcheon Personal Papers, MCHD.

[189] The most famous of these networks was known as the 'Chowder Society' who focused on building a pro-Marine contingent in Congress, and had members such as Lt. Col. Victor H Krulak and Col Robert Hogaboom who would both go on to influence the development of the Post-War Marine Crops in other ways; Warren, *American Spartans*, 101-102

Corps' internal decision making during this period. There was a growing sense that as the FMF was undergoing changes, in part due to their Second World War combat experiences, that it would not return to the interwar era force of focusing on 'banana wars', but rather would need to remain focused on high intensity combat operations against peer and near peer adversaries.[190] Atomic weaponry was identified by the service as being a major force in global politics, but senior Marine leadership tended to be less enamored with the technology compared to the Air Force, Navy, and even the Army. There was broad consensus within the Marines that should a new great power war break out, their role would closely reflect how they fought during the Second World War, and that there would be a need for the Marines' rapid amphibious abilities and combined arms centric approach to conventional combat. General Vandegrift echoed this sentiment during a speech concerning the role of maritime air power where he stated that, "[n]ew weapons will endanger new tactics to a degree, but we must remember that new weapons have definite limitations and that pushbutton warfare is not here. There is no cheap and easy way to win wars and we cannot place too much reliance upon unproven weapons."[191] The Marines were first and foremost a tactical and operationally focused organization, fundamentally strategic weapons systems such as atomic bombs would not lead to any major revolutionary new thinking about warfare in the organization, though it would eventually lead to some force structural changes. The Marines understood that if a war occurred with the Soviet Union, there would be a need to rapidly seize important territory such as the Middle East's oilfields and Suez Canal. Such a task would likely require a force similar to the one that fought in the Second World War, and thus it became important to analyze the combat experiences of that war in order for the organization to enhance its capabilities for future conflicts.

The process of integrating the combat lessons of the Second World War into the service began in many ways over the final months of that conflict. Groups of senior Marines along with junior and midlevel officers participated in this process through different ways. Senior Marines used their positions of authority in the service to directly implement integration of lessons learned, while lower and midlevel Marines participated in information and advocacy networks to promote the integration of certain best practices. Further, some junior and midlevel Marine

[190] Sgt Edward J Evans, "Fleeter Marine Force," *Leatherneck*, Vol. 30, Iss. 11 (Nov 1947), 9ff; this line of thinking is also reflected in official strategy documents, for example, "Amphibious Operations: Command and Organization in the Attack Force," 1948, Box 13, Historical Amphibious Files Collection, MCHD.
[191] Alexander Vandegrift, "Speech, Naval Air Power," 1948, Box 11, Vandegrift Papers, MCHD.

officers, such as Lt. Col. McCutcheon, would continue to rise up the chain of command, thus gaining more direct authority themselves to influence the direction of the service.

During this period official lessons learned reports were published on issues relating to amphibious operations, and on more specific topics such as CAS. The most prominent of which was titled "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II." This evaluation presented an analytical overview of Marine Corps' CAS during each of the major campaigns of the Pacific theatre and allowed for the diffusion of important lessons learned, especially from the Philippines and Okinawa.[192] However, there was a healthy discourse among midlevel officers in service publications, particularly the *Marine Corps Gazette* as some had become convinced of the importance of certain central CAS adaptations during the War, and began to establish informal networks to advocate for the formal institutionalization of the lessons into the service. Other Marines during this period were less focused on formally changing the organization but wanted to share their wartime combat experiences with their fellow Marines.

One of the central figures during the development of these post-war narratives of CAS was Lt. Col. Keith McCutheon. Following the operational successes of Marine CAS adaptations in the Philippines, McCutcheon published an article in the *Marine Corps Gazette* entitled "Close Air Support SOP", where he outlined in great detail the CAS system used during that campaign. The article was highly descriptive and detailed, and was clearly intended to market the system to fellow Marines who had yet to learn of these adaptative experiences.[193]

Other midlevel officers also wanted to share the successes of CAS in the Philippines; in an article Capt. Holt McAloney also detailed the effectiveness of the system, and argued that the independence of command for ALP units was very important and allowed for quicker operations and better coordination between air and ground units; overall his article argued thoroughly that the Marine aviation would increase in operational effectiveness if it integrated the lessons of this campaign.[194] The CAS system used during Okinawa was also a focus of attention from different Marines, citing the importance of the CAS system that was used during that battle.[195] Even senior Marines, such as Brigadier General Vernon Megee, opted to participate in this growing

[192] See, Headquarters, Marine Corps, "An Evaluation of Air Operations Affecting the U.S. Marine Corps in World War II".
[193] Lt. Col. Keith B. McCutcheon, "Close Air Support SOP," *Marine Corps Gazette* Vol. 29, Iss. 8 (Aug 1945), 48ff.
[194] Capt. Holt McAloney, "Is Air Support Effective," *Marine Corps Gazette* Vol. 29, Iss. 11 (Nov 1945), 38ff.
[195] For example, see Sgt. Don Braman, "Cannonball Support," *Leatherneck* Vol. 29, Iss. 10 (Oct 1945) 30ff; Capt John DeChant, "Devil Birds: The Battle For Okinawa," *Marine Corps Gazette* Vol. 31, Iss. 10 (Oct 1947), 46ff.

chorus of voices discussing and analyzing the role of CAS during the Second World War. General Megee reflected on his wartime experiences in an article entitled "Control of Supporting Aircraft", where he interestingly observed that "[t]he wartime battalion and company commanders I found, knew relatively little about the history and principles of close air support of troops".[196] He was largely critical of the Marine handling of CAS during much of the war, in particularly citing poor command and control issues. He acknowledged the two main systems that were developed during the war, but urged the need to further reassess and integrate the proper lessons from the war, feeling the organization had much work to be done in that process.[197]

McCutcheon would ultimately become the organization's leading voice for CAS reform and would go on to write several more articles in early post-war period promoting the CAS adaptations that he was involved with during the war. In 1946 he would publish a new series of articles in the *Marine Corps Gazette* aimed at marketing his vision of CAS to his fellow officers. The first article he published that year was entitled "Close Air Support on Luzon" that was a detailed history of the operational impact of the CAS system he helped develop; one core theme from the piece was that the more operational experience gained, the more effective the system became. McCutcheon also did not shy away from problems, noting that the lack of quality maps led to difficult target designation.[198] Another article by McCutcheon in 1946, entitled, "Air Support Techniques", that offered a cross comparison of the different CAS systems used during the Philippines and at Okinawa. Interestingly, McCutcheon did not noticeably attempt to argue the superiority of the system he helped develop in comparison to the one developed at Okinawa; the intent of the article was clearly to educate Marines about best practices for CAS, and McCutcheon fully acknowledged the positives of alternative systems while also reminding the reader of the strong merits of his own. McCutcheon concluded the piece arguing that the Marines must integrate the most effective merits of each system.[199]

Aside from analyzing the specifics of CAS during the Second World War, other relevant narratives found in service publications during this period touched on the strategic versus tactical

[196] Brig. Gen. Vernon E. MeGee, "Control of Supporting Aircraft," *Marine Corps Gazette* Vol. 32, Iss. 1 (Jan 1948), 8ff.
[197] Megee, "Control of Supporting Aircraft".
[198] Lt. Col. Keith B McCutcheon, "Close Air Support on Luzon," *Marine Corps Gazette* Vol. 30, Iss. 4 (Apr 1946), 23ff.
[199] Lt. Col. Keith B McCutcheon, "Air Support Techniques," *Marine Corps Gazette* Vol. 30, Iss. 4 (Apr 1946), 23ff.

airpower debates. Predictably, most Marines tended to be highly skeptical of the suggested dominant role of strategic airpower in U.S. national security policy at the time, arguing that in fact atomic weapons and guided missiles were not ending the importance of conventional warfare capabilities.[200] Other articles during this period reaffirmed the importance of tactical airpower, and its role in combined arms, often citing the combat role of CAS and interdiction attack aviation during the defeats of Nazi Germany and Japan, and stressed further integrating cooperation amongst the various combat arms in future wars.[201] Other articles debated the impact of mechanization on the Corps, where some argued against the further integration of heavy kit such as tanks into the organization, citing that it would slow down the Marines operational tempo and that Marine CAS could ultimately provide the necessary fire support.[202]

In response to the organizational narratives and self-reflections concerning the role of CAS during the Second World War, the Marines underwent a series of institutional shifts in order to better integrate the best practices being discussed and analyzed in official lessons learned documents and public debates, as well as the service publications. First and foremost, Marine training and educational institutions began to gradually integrate combat lessons into their programs. However, this process was not entirely smooth and there remained ongoing debates among Marines on the subject. There was a broad acknowledgement during the very early post-war period that CAS during the Second World War had been somewhat uneven in terms of effectiveness, and that careful analysis was needed in order to properly craft a singular and standardized CAS system. A 1946 *Marine Corps Gazette* article commented on the complexity of this task, observing "[t]he total problem is an exceedingly complex one, revolving around communications, target designations and mutual understanding of related capabilities and limitations on the parts of air and ground".[203] In order to offset this challenge, Marine leadership authorized the establishment of the Marine Air-Infantry School as part of the Marine Corps

[200] For an example of these sentiments see, Rathvon M Tompkins, "To War by Air," *Marine Corps Gazette* Vol. 31, Iss. 1 (Jan 1947), 8ff; Anonymous, "Tactical Air Power," *Marine Corps Gazette* Vol. 30, Iss. 2 (Feb 1946), 46ff.
[201] Col. John W. Hansborough, "A Military Digest: The Air-Ground Problem," *Marine Corps Gazette* Vol. 30, Iss. 11 (Nov 1946), 59ff; Capt Thomas N Greene, "Greater Coordination of Supporting Fires," *Marine Corps Gazette* Vol. 31, Iss. 4 (Apr 1947), 40ff.; Maj. Angus M. Fraser, "Amphibious Armor," *Marine Corps Gazette* Vol. 32, Iss. 3 (Mar 1948), ff. 14.
[202] For some examples from this debate see, Lt. Col. W. Walt, "Letter: Mechanize the Amphibious Attack…?," *Marine Corps Gazette* Vol. 33, Iss. 10 (Oct 1949), 2ff; Lt. Col. Robert C. Hiatt, "Goodbye 'Little Dynamite'," *Marine Corps Gazette* Vol. 33, Iss. 8 (Aug 1949), 44ff.; Lt. Col. Arthur J. Stuart, "Mechanization of the Amphibious Attack," *Marine Corps Gazette* Vol. 33, Iss. 8 (Aug 1949), 26ff; Fraser, "Amphibious Armor," 14.
[203] James R. Ray, "Marine Air-Infantry School" *Marine Corps Gazette* Vol. 30, Iss. 3 (Mar 1946), 9ff.

Schools in Quantico. The purpose of this new institution was to further learn about problems and challenges impacting Marine infantry and aviation officers, and to foster mutual understanding of those issues, as well as diffuse standardized technical understanding of air and ground operations. The other established purpose of the institution was to foster the critical understanding of junior and midlevel officers of the underlying common failings that were constraining the effectives of tactical aviation, especially CAS. These earlier failings included problems with communications between air and ground units, as well as poor command and control for coordinating CAS. Simply put, one of the motivations for the establishment of the Air-Infantry school was to help disseminate the lessons learned from recent Second World War combat experiences.[204]

Overall, the Marines Corps Schools was an early post-war adapter of integrating the best practices of CAS in different areas – its curriculum highlighted the increased importance of effective communications during the CAS process as well as operational freedom for ALP units to control and guide strikes to allow for better conformity to the situation on the ground during combat. The Marine Corps School valued CAS and tactical aviation as the highest priority for Marine Corps aviation, with introductory texts to the program stating that, "[i[n some respects aircraft may be thought of as mobile platforms for transporting shells closer to the target; in other words long range and mobile artillery".[205] Several officers who would play an important role in the post-war CAS changes with the Marines Corps were intimately involved with the education and training of this institution, including LT. Col McCutcheon as well as Col. R.E. Hogaboom and Lt. Col Robert E. Cushman.[206]

The Marines held a series of field exercises to assist their development of CAS. Operation Packard (1947) and Operation Penny (1948) attempted to replicate the major amphibious landings that the Marines had undertaken during the previous war. Together, these field exercises were driven by the desire to enhance integrated combined arms efficiency among Marine units.[207] The Marines were also integrating jet aircraft into the organization during this

[204] Ray, "Marine Air-Infantry School".
[205] Marine Corps Schools "Tactical Employment of Close Support Aviation," 1946, Box 4, McCutcheon Papers, MCHD.
[206] These officers would all serve on either review boards for Marine Corps aviation, or participated in the drafting of doctrine and strategy documents concerning aviation and the Marines in the post-war period.
[207] Howard Rice, "Operation Packard – Amphibious Command Exercise," *Marine Corps Gazette* Vol. 31, Iss. 7 (Jul 1947), 38ff.; Sgt. Lindsey Allen, "Operation Penny," *Leatherneck* Vol. 31, Iss. 2 (Feb 1948), 2ff.

late 1940s period. This integration process included testing jets during field exercises to evaluate their abilities; this technology would later play a major role impacting the development of CAS. Jets would gradually replace the propeller aircraft Marine aviators had flown during the Second World War and were functionally different in many ways. One of the main differences was that jets were considerably faster and but could not operate at as low of altitudes.[208] By the end of the 1940s the processing the Second World War CAS adaptations was still an ongoing endeavor. However, in to the pre-war era, the Marines had made considerable progress institutionalizing and standardizing CAS throughout the organization, even settling on an agreed formal definition of it, "[c]lose air support includes those air operations which are so intimately related with friendly front-line operations as to require detailed integration of each air mission with the fire and movement of the ground forces".[209]

The Korean War

The Marines played a significant role as part of the U.S. intervention in the Korean War, including being among the first units to set boots on the ground in June of 1950. This conflict would in some ways mirror the character of the preceding war as it would once again be characterized by high-intensity conventional combat as opposed to the counter-insurgency operations the Marines had experienced during the interwar era. Despite this similarity, the U.S. military was caught off guard when the North Korean communist forces poured into the South, and so it began the war largely unprepared. Unlike the Second World War, the Marines would begin the Korean conflict as an integrated air-ground team, where Marine aviation would be under the command of Marine officers and thus be in a position to fly a large number of tactical aviation missions in support of Marine ground units. The CAS system that the Marine air-ground team brought to Korea was the end result of the post-war internal organizational analysis of the CAS adaptation experiences of the Second World War. Marine CAS in Korea was essentially a mix of the system developed in the Philippines, that allowed for flexibility of command and control via the role of ALPs having the ability to dictate strikes, paired with some lessons from

[208] Sgt. William J Morris, "Martcom at the Point," *Leatherneck* Vol. 32, Iss. 10 (Oct 1949), 30ff.
[209] "Amphibious Operations: Training (Tentative)," 1946, Box 13, Historical Amphibious Files Collection, MCHD, 19.

the Okinawa experience where in some situations closely coordinated pre-operational strikes were used as well to support ground units.[210]

Soon after the start of hostilities, the Marine Corps initiated a series of training maneuvers to prepare soon to be deployed aviation and ground units for the rigors of combat in Korea. These training exercises, which occurred in July of 1950 and included "Operation Crossover", gave CAS a very high priority.[211] The impact of these CAS centric training exercises was demonstrated a month later during the 2 August landings at Pusan where Marine aviation units flying F4U Corsairs off of carriers carried out successful CAS for both Marine and Republic of Korea infantry units. While the Marines had begun the initial processes of integrating jets into the service, the propeller based F4Us remained effective at conducting CAS during these early engagements due to their ability to loiter for longer periods above the battlespace.[212] The Marines would be able to practice their idealized vision of amphibious warfare during General MacArthur's counterattack landings at Inchon in September 1950. Here, Marine aviators provided continuous CAS for Marine ground units and were highly effective at destroying North Korean armor. CAS would remain a central part of the Marines war effort during the fall of 1950, distinguishing itself yet again at the Battle of Chosin Reservoir where Marine aviation provided near seamless air support for Marine and some Army units. The Marines success at Chosin garnered the organization considerable international attention, and could in some ways be seen as the ultimate triumph of the Marines CAS development up until that point.[213]

By the end of 1950, the wider internal view within the Marine Corps was that CAS had been highly successful during the war, especially the degree of coordination between forward air controllers on the ground and pilots in the air which was seen to be flexible and sufficient in leading to tactical and operational successes. Further, it was felt that the time between ground units requesting strikes and air attacks on targets was felt to be optimal.[214] Marine junior and midlevel officers openly acknowledged the influence of the Second World War CAS adaptations

[210] For an overview of the Marine experience in the Korea War see, Robert Moskin. *The U.S. Marine Corps Story*, 429-584.
[211] "Dry Foot Landing," *Leatherneck* (Jul 1950); Tsgt. George Burlage, "Fighting Team," *Marine Corps Gazette* Vol. 33, Iss. 7 (Jul 1950), 40ff.
[212] Mersky, *U.S. Marine Corps Aviation Since 1912*, 121-125.
[213] Moskin, *The U.S. Marine Corps Story*, 462-485.
[214] MSgt. Fred Braitsch, "Dateline Korea," *Leatherneck* Vol. 33, Iss. 12 (Dec 1950), 58ff.

at Okinawa and in the Philippines on the Marine CAS system that was used in Korea. In an article in the *Marine Corps Gazette*, Maj. W.G. Wethe observes how many of those previous war's adaptations were being utilized, such as the communications net allowing for free-flowing dialogue between ALPs and pilots, and that for the most effective CAS a Marine commander should control both air and ground units. However, there was an acknowledgement that the lessons learned integration from the Second World War were still a work in progress, and that CAS in Korea (and for the Marine Corps as an organization) would need further analysis and change.[215]

Interservice tensions began to interfere with Marine CAS by the winter of 1951. During this period, Marine aviators had been ordered to provide CAS for U.S. Army units, while the USAF's 5th Air Force in turn was being used more frequently for Marine ground unit air support, with a centralized Joint Operations Centre overseeing the coordination of tactical air power for frontline forces. Marine leadership openly voiced their opposition to this system, yet they were largely ignored. There emerged a key trend of dissatisfaction among both senior Marines as well as junior and midlevel Marine officers in the field with their loss of control and access to CAS from Marine aviators. An example of this dissatisfaction can be demonstrated by the significant difference in CAS response times between Marine and USAF aviators during the Inchon-Seoul campaign of the early stages of the war. During that May-June 1951 period, Marine Aviators would on average take just 15 minutes to respond to a call for CAS, while it would take the USAF upwards of 80 minutes to respond to a similar request by Marine ground forces; further, roughly 35 minutes of that 80 minute period involved waiting for requests to clear the Joint Operations Centre.[216]

In 1951, the Marine Corps formed a research board in order to make appropriate recommendations over aviation issues. It consisted of a mix of senior and midlevel Marine officers (including eight Colonels, four Lt. Colonels, and three Majors one Captain and one 2nd Lieutenant) and was informally named the Harris Board after its commanding officer, Major General F. Harris. One of the primary tasks of the Harris Board was to analyze the battlefield effectiveness of Marine CAS. The overall findings of the Board's review of the Korean

[215] Maj. W.G. Wethe, "Marine Aviation in Support of Amphibious Troops," *Marine Corps Gazette* Vol. 35, Iss. 1 (Jan 1951), 26ff.
[216] Moskin, *The U.S. Marine Corps Story*, 543-547.

experience was, "[w]hile the Korean war has again demonstrated the soundness of our concept of a Marine Corps air-ground team, there is still ample room for improvement in tactics, techniques, equipment, and training."[217] Interestingly, the Board was in part motivated by inter-service rivalry, noting that "[d]uring the Korean campaign, the U.S. Air Force has made great strides in the development of close air support. This should spur the Marine Corps to even greater efforts in this field."[218] While there seemed to be a consensus that Marine CAS had performed well during the early stages of the war, there was clearly a sensitivity that the USAF could leapfrog them in terms of adaptations.

The Harris Board identified several advantages that jet aircraft, such as the F9F Panther, had finally demonstrated their superiority over propeller driven aircraft for the provision of CAS. The board noted the advantages of jet aircraft included: speed; increased survivability; ability to maintain better visibility; and that they could deliver more 'shock power' on target. However, there had been some constraints on jet aircraft effectiveness, with the Board finding that, "the tactics employed by jet aircraft for close air support have not been perfected. As a result of errors in the tactical employment of jets early in the Korean operations, the ground troops did not fully appreciate the jet and preferred the propeller type aircraft for close air support."[219] This is a key example of the problem of introducing new technologies mid-war, as personnel during life and death situations such as frontline combat may be inclined to turn towards weapons platforms and systems they have past experience with – hence the Marine infantry officers early preference for propeller based aircraft for CAS despite the clear advantages of the jet aircraft for that task.

Some other key findings from the Harris Board was that the Forward Air Controllers (FAC) of the ALPs should have enhanced training to better understand both flight tactics from the perspective of pilots as well as a mastery of infantry tactics. Further, that terminology used by FACs when conducting communications and guiding strikes to targets needed to be standardized, as it was found that individual units tended to invent their own terms for things, which caused confusion.[220] Essentially, the Board's central findings was that CAS was still a work in progress for the Marines, particularly in the area of communications, as there was a

[217] Maj. Gen F. Harris to Commandant Marine Corps, "Report of Board to Study and Make Recommendations on Air Ground and Aviation Matters," 1951, Box 15, Studies and Reports Collection, MCHD. Hereafter Harris Board.
[218] Harris Board, "Report of Board to Study and Make Recommendations on Air Ground and Aviation Matters".
[219] Harris Board, "Report of Board to Study and Make Recommendations on Air Ground and Aviation Matters".
[220] Harris Board, "Report of Board to Study and Make Recommendations on Air Ground and Aviation Matters".

perception that too many disruptive elements remained, such as strike requests overloading the channels of the communications net. They also identified a need for the development of new technologies, including "homing devices", to allow pilots operating jets to have a better understanding during an attack of the specific location of a target. The final conclusion from the Board was that CAS needed to remain an integral part of the Marines' combined arms centric approach to warfare and would continue to do so in future, albeit with changing technologies such as jet aircraft, and that ultimately the existing CAS system that had been developed during the Second World War was sound, though it too would need to be upgraded due to new data and analysis.[221]

By the summer of 1951 the situation on the ground in Korea had become a stalemate, with both communist and U.S.-Coalition forces digging into defensive positions which would characterize the situation on the ground until the cessation of hostilities in July 1953. During this period CAS strikes remained a consistent part of operations, however the lack of rapid maneuver operations influenced some further changes for the CAS process. Firstly, the presence of ground radar stations paired with reliable radio aids lowered the instances of friendly fire. There was a formal acknowledgement by aviation officers that there were too many delays from the time of a request for a CAS strike to its eventual launch. Officers continued to critique problems with coordination between ground and air controllers and those in headquarters, as was the need to better identify enemy targets. In order to increase the effectiveness of CAS during this period, all pilots from the 1st Marine Division were mandated to physically observe CAS operations from the ground, alongside a FAC to allow them to better understand firsthand what was required for an effective strike as well as to gain deeper understanding of the terrain and the tactical situation. This highly structured approach to knowledge diffusion for aviators led to more effective bombing.[222]

Other lessons learned analysis by the Marines during this stalemate stage of the war continued to affirm the superiority of new technology, such as the use of jets for tactical aviation missions, including CAS. Studies from this period found jets were 50% less vulnerable than the

[221] Harris Board, "Report of Board to Study and Make Recommendations on Air Ground and Aviation Matters,"
[222] Commanding General, 1st Marine Aircraft Wing "Conference at 5th Air Force Headquarters on Control Procedures with Emphasis on Close Air Support," August 1952, Box 256, Studies and Operations Reports Collection, MCHD.

older F4U aircraft when facing enemy anti-air systems.[223] The Marines also began to experiment with helicopters to support infantry units, mostly though resupply or medical evacuation missions. Marine officers, including McCutcheon, remained highly intrigued by the potential for helicopters based on their limited usage in Korea, namely their ability to operate without full airfields and the sheer closeness to which they could operate near infantry units.[224]

Eventually, the various adaptations and lessons learned during the war were gradually integrated in the Marines CAS system. In 1953, a new doctrinal manual, *Landing Force Manual: Air Operations*, identified CAS as playing a central role in combined arms. The legacy of the Okinawan and Philippines adaptations from the Second World War are found throughout the document, which cites the importance of both pre-planned strikes as well as the need for flexibility of coordination from the ground as the operations are underway. The new doctrinal manual also integrated some newer lessons learned detailing the specific steps of the CAS communications net.[225] By the end of the war in Korea, the Marines had achieved a significant amount of CAS operational experience that allowed them to test and refine the system that they had developed from the Second World War, and hence the service entered the new post-war period with increased confidence in its ability to perform CAS and operate as a joint air-ground team. Korean Operations, such as the landing at Inchon, was further evidence in the eyes of Marine officers of the lethality of a joint air-ground team force structure concept. These Korean combat experiences allowed officers to continue to build off the earlier Second World War operational lessons, and would help drive the organization towards formalizing the joint air-ground force concept with the eventual emergence of the MAGTF by the end of the decade.

The Shadow of Vietnam

The failure to achieve decisive victory in Korea was a difficult result to process for much of the U.S. military, especially for the Army, Navy, and Air Force. The Marines, however, ended the war with a more positive outlook on their experience. The service felt the battlefield

[223] Operations Evaluation Group "Study 491: the Relative Risk to Antiaircraft Fire for Jet and Propeller-Driven Ground-Attack Aircraft in Korea," August 1952, Box 256, Studies and Reports Collection, MCHD.
[224] See, Commanding General 1st Marine Division "Logistics Support of an Infantry Regiment by helicopter," Nov 1952, Box 01, Studies and Reports Collection, MCHD; "Presentation: Military Operation of Helicopters," October 1951, Box 5, Gen. Keith B. McCutcheon Papers, MCHD; Commandant of the Marine Corps "Study on Supply Concept to Support Helicopter-born Units," Nov 1952, Box 01, Studies and Reports Collection, MCHD.
[225] "Landing Force Manual: Air Operations," 1953, Box 27, Historical Amphibious Files Collection, MCHD.

performance of their personnel was highly effective, with the organization being able to successfully field a joint air-ground team. Nationally, the war had become a public relations boon for the Marines who had encouraged dense media coverage of their successes, especially earlier in the war, and had worked with Hollywood on developing feature films such as like *Retreat, Hell!* (1952) and *Back the Night* (1956) that painted their exploits during the war in a highly favorable manner. The Marine Corps viewed this post-war period as an opportunity to secure their continued existence against their bureaucratic rivals and cement their role in U.S. national security in the eyes of the public and political elites.[226]

The Eisenhower Administration developed an approach to national security that was focused on countering the threat of the Soviet Union on a global level. This view placed nuclear weapons at the forefront of U.S. military policy, however, it would become clear to the Administration (as well as senior military leaders) that there were still numerous global security issues that were emerging in regions such as the Middle East, the Asia-Pacific and Caribbean that would require a conventional military response. The Marines positioned themselves to be at the forefront of the U.S.' response to these new challenges by ensuring their combined arms air-ground team alongside naval assets in a unified force structure remained flexible and prepared for rapid global deployment.[227] During this post-Korea period, the Eisenhower Administration developed a strategic focus on the Asia-Pacific, which included protecting Taiwan, Japan, and Korea as well as a growing concern about the instability in French Indochina. This regional focus would ensure the need for amphibious capabilities, thus the Marines and the FMF would remain at the forefront of the U.S. regional strategy and so the majority of their deployments were to the Asia-Pacific during the 1950s-1960s.[228] This process included the testing of different force-structures designed to maximize the combined arms fighting power of the Marines; one of the first steps was the establishment of the 1st Provisional Air/Ground Task Force which was activated at Marine Corps Air Station, Kaneohe Bay, Hawaii in January of 1953. The development of these proto-MAGTF concepts had been in part driven by the combat experiences

[226] O'Connell, *Underdogs*, 164-167.
[227] Capt. William D. Parker, *A Concise History of the United States Marine Corps 1775-1969* (Washington, DC: Marine Corps Historical Division, 1970), 87-90.
[228] Warren, *American Spartans*, 188.

of Marine officers during the Second World War and Korean War, where they observed the importance of joint air and ground capabilities during operations.[229]

With the experiences of the Korean War fresh on the minds of those in the Marines, there began an active discourse concerning CAS among many like-minded junior and midlevel officers during this period who would go on to form informal advocacy and information networks to promote best practices. Senior officers would also play a role in this period, some of whom had served during the Second World War as junior or midlevel officers. For example, Col. J.C. Murray demonstrated a desire to learn from comparative CAS case studies, like the use of CAS during the Greek Civil War – where he noted that air superiority would likely not be much of a concern for military's conducting CAS against insurgencies.[230] Other officers sought to ensure the Marines doubled down on integrating existing lessons learned into the Corps, such as the importance of air-ground teaming in the age of new jet aircraft technology. In an article to the *Marine Corps Gazette*, Maj. Robert Steinkraus warned his fellow marines that the air-ground team was now as important as ever and needed to be enhanced as technology was rapidly advancing in order to maximize battlefield effectiveness.[231] As the Marine Corps continued deeper into the 'jet age', the CAS system evolved with it; in particular its training program became far more sophisticated given the integrating of newer 'electronic equipment' specialists.[232] Other Marines such as Lt. Col. JF Bolt were firm advocates for the continued integration of newer technology, such as jets into the Marines CAS system. Seemingly influenced by jet aircraft performances during the Korean War, Lt. Col. Bolt in his *Marine Corps Gazette* article "Goodbye Able Dog" attempted to sell the importance of jets towards a perceived audience of primarily infantry officers with an understanding there were some internalized biases against new technology among Marines.[233]

There remained a healthy discourse over the influence of previous war's operational experience on the development of the Marines' CAS system where Marines wrote articles in an attempt to bring awareness to best practices as well as to potentially inspire new ideas and ways of approaching CAS. Capt. W.F. Wagner wrote an article, "Air-Suppress That Incoming!",

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[229] Ralph W. Donnely, Gabrielle M. Neufeld, et al., *A Chronology of the United States Marine Corps, 1947-1964* Vol 3 (Washington, DC: Marine Corps Historical Division, 1971), 27.
[230]Col. J.C. Murray, "The Anti-Bandit War," *Marine Corps Gazette* Vol. 38, Iss. 5 (May 1954), 52ff.
[231] Maj. Robert F. Steinkraus, "Rotate the Squadron," *Marine Corps Gazette* Vol. 39, Iss. 1 (Jan 1955), 24ff.
[232] Anonymous, "Glenview Reservists," *Leatherneck*, Vol 38, Iss. 7 (Jul 1955), 28ff.
[233] Lt. Col. J.F. Bolt, "Goodbye Able Dog," *Marine Corps Gazette*, Vol. 41, Iss. 10 (Oct 1957), 28ff.

which detailed a series of CAS experiments conducted by the 1st Marine Division during the Korean War that shaped how they conducted CAS during night operations.[234] LT. Col. C.W. Boggs Jr. authored a piece overviewing the broader historical development of the system, particularly highlighting the Second World War.[235] Senior officers also sought to participate in this internal organizational narrative. Lt. Gen. V.E. Megee published an article entitled "Tactical Air Support of Ground Forces", which linked the origins of the Marines CAS system (especially the CAS standard procedures used during the Korean War) to the Second World War combat experiences. LT. Gen. Megee's article spends much of its space focused on outlining the particular details of the current Marine CAS system, but in doing so fundamentally attempted to remind his fellow Marines that the very nature of Marine aviation is tactically orientated as he concludes the piece stating, "that as a Marine I have always felt that the raison d'etre of Marine Corps Aviation, per se, is the capability to Closely Support the ground elements of the Fleet Marine Forces".[236]

During this period, the Marine Corps convened a new board to review the state of aviation in the service. Officially titled 'The Marine Corps Aviation Board' in 1955, though it would become better known as the Smith Board due to the prominence of its senior member, Lieutenant General Oliver P. Smith. The other members of the Smith Board included: Maj. Gen. Vernon Megee, Maj. Gen. Robert Bare, Maj. Gen. Homer Litzenberg, Brig. Gen. John C. Munn, and notably, Colonel Keith B. McCutcheon. This group was well respected within the Marines and had among them, a considerable amount of frontline combat experience – particularly McCutcheon who had pioneered CAS adaptations during the Second World War as well as helping to oversee the integration of helicopters into operations during the Korean War.[237] The Board argued the highest likelihood for a future Marine deployment would be the Asia-Pacific region and that the Marines joint air-ground team force structure was ideally positioned to play a leading role in U.S. national security in that region due to its expeditionary and rapid deployment capabilities. The Board reaffirmed that CAS and tactical aviation was the central role for Marine Corps aviation into the future. The Board also argued that helicopters must continue to be

[234] Capt W. F. Wagner, "Air-Suppress That Incoming!," *Marine Corps Gazette* Vol. 39, Iss. 5 (May 1955), 18ff.
[235] LT. Col. C. W. Boggs Jr. "Marine Aviation Its Origins and Growth," *Marine Corps Gazette* Vol. 40, Iss. 5 (May 1956), 14ff.
[236] Lt. Gen V E Megee, "Tactical Air Support of Ground Forces," *Marine Corps Gazette* Vol. 39, Iss. 12 (Dec 1955), 12ff.
[237] Ginther, *Keith Barr McCutcheon*, 129-131.

integrated into all elements of the Marines force structure.[238] Helicopters (or 'whirlybirds' as Marines would often call them) were being tested for their potential to provide CAS for frontline forces. Officers were divided on the utility of helicopters for that role; the ability of helicopters to fly low and close to enemy forces was seen as a very attractive attribute, but they were also identified as being vulnerable to anti-aircraft fire.[239] Essentially, this Smith Board confirmed the continued integration of post-war lessons from the Second World War and Korean War and also furthered the organization towards developing the eventual MAGTF force structure.

A second board, known as the Hogaboom Board, was put together to oversee changes to the organization, composition and equipment of the current FMF that would allow it to meet a variety of strategic and operational challenges such as conventional, nuclear and insurgency conflicts.[240] The Board identified the Soviet Union and China, as well as their proxies, as the main adversaries in the global security environment. More specifically, it identified areas on the 'periphery' in South-east Asia such as Cambodia, Thailand, Laos and Vietnam as potential areas for force deployments to deal with pacification and insurgency, while estimating that conventional wars were to likely occur in Europe or in Korea. Similar to the findings of the Smith Board, the Hogaboom Board also advocated for a force structure that maximized the potential for the combined arms air-ground team of the Marines, and also argued that helicopters should be further integrated into the force structure. The findings of the Board cemented that the Marines in the post-war period would be focused on building a force structure that allowed for maximum flexibility, mobility and combined arms where CAS would play a central role. This would be one of the final internal organizational shifts that laid the groundwork for the MAGTF.[241]

The final few years of the 1950s had the Marines continuing to process and refine the core learning experiences of the Korean War, as well finalizing some legacy issues from the Second World War. Paired with this were internal debates over how some emerging security

[238] Smith Board "Aviation: Report on Board to Study the Composition and Functions of Marine Corps Aviation," February 1955, Box 15, Studies and Reports Collection, MCHD.
[239] For examples of Marine's views of helicopters during this period see, MSgt. A. L. Petry, "Choppers and Grasshoppers," *Marine Corps Gazette*, Vol. 40, Iss. 2 (Feb 1956), 30ff; Col. Theodore K. Thomas, "Don't Hobble the Helicopters," *Marine Corps Gazette*, Vol. 41, Iss. 4 (Apr 1957), 20ff.
[240] The board consisted of 16 officers, of note was the presence of CAS enthusiast Col. Keith McCutcheon among them.
[241] For an overall review of the Hogaboom Board see, Hogaboom Board "Fleet Marine Force Organization and Composition Board Report," 1957, Box 63, Studies and Reports Collection, MCHD.

challenges, such as the potential return to counter-insurgency operations as opposed to conventional warfare, might impact the service. Training exercises such as LANTPHIBEX 1-58 (1958), Packard IX (1959), and Exercise Bob-Lo (1959) continued to enhance the coordination of air and ground units to allow for better CAS capabilities. As part of this process, training exercises would often involve officer exchange elements between air and ground units to maximize the 'hands on' experiences that aviators and infantry officers could gain from one another. Helicopters were also starting to be used with increasing frequency during air support training.[242] Marines began to speculate about the likelihood of the next war being against an insurgency, yet some like Col. O.R. Simpson would point out that based on historical experiences of the Marines, even counter-insurgency operations would still involve a fair amount of CAS.[243]

Up until the very end of the decade, Marines were still participating in an active discourse within service journals regarding the legacy of the Second World War on the development of CAS within the organization, and on the wider importance of refining the CAS system due to new technologies and new geographic areas of operations.[244] It was thus right into the very shadow of the early U.S. deployments to Vietnam that advocacy and information networks were still trying to refine and influence the adaptations they had first encountered during 1941-1945. The Marines various postwar organizational evolutions would eventually cumulate in the 1963 establishment of the MAGTF, which standardized a force structure of a balanced air-ground team combined arms organization under unity of command.[245]

Conclusion

The Marine Corps' development of CAS during the Second World War as well as its institutionalization during the post-war period is an example of a highly successful adaptation to innovation framework. What began as gradual lessons learned during a war would grow into

[242] "LANTPHIBTRAEX 1-58: Final Report," 1958, Box 78, Exercises Collection, MCHD; "Packard IX Information Packet," 1958, Box 78, Exercises Collection, MCHD; R. D. Lyons, "Exercise Bob-Lo," *Leatherneck* Vol. 42, Iss. 1 (Jan 1959), 40ff.
[243] Col. O. R. Simpson, "Limited War," *Marine Corps Gazette* Vol. 41, Iss. 3 (Mar 1957), 34ff.
[244] Capt. D. C. MacMichael, "Bottleneck in Close Air Support," *Marine Corps Gazette* Vol. 43, Iss. 5 (May 1959), 38ff; and for another example of this sentiment see, "A Look at the Future of Marine Aviation," Leatherneck Vol. 43, Iss. 5 (May 1960), 22ff.
[245] Headquarters, Marine Corps "Marine Corps Order 3120.3, The Organization of Marine Air-Ground Task Forces," (1963).

something that would reshape the very force structure and formal fighting doctrine of the military service during the post-war period. The Marines as an organization was culturally and normatively welcoming of this change, as tactical aviation was recognized by both senior and lower ranked Marines as being something that supported the overall organizational warfighting philosophy. However, despite having few ideational barriers to the integration of CAS related lessons learned, it remained a complex process that only successfully occurred due to efforts of different Marines during periods of war and peace.

Despite deeply ingrained organizational myths during the leadup to the Second World War, the Marines CAS system at the start of that war was highly primitive, lacking standardization and efficient functionality. CAS within the organization had to thus be built from the ground up during a series of complex adaptations over the course of the war. The adaptation process was the result of a series of likeminded, determined individuals who in two different geographic locals, first in the Philippines and later during the leadup to the assault on Okinawa, were able to develop a series of highly effective CAS reforms that resulted in new systems being developed from scratch. This process was largely the result of bottom-up driven approaches from efforts of junior and midlevel officers (especially in the case of the Philippines), however top down forces also played a role as senior officers either granted their approval for the changes or in some cases helped develop the adaptations themselves.

The adaptation process began with a broad understanding that CAS was not working well during the early stages of the war, especially during higher profile battles like Guadalcanal. These early war engagements demonstrated there were considerable deficiencies with communications between ground and air units, as well as dysfunction with the command and control of air strikes. Officers began to study the ongoing efforts during the early periods of the war and began to develop newer ideas of how CAS could be conducted. It then took groups of highly motivated officers, who were deployed to the right combat zones and were then given freedom of action to implement the new approaches. The most prominent example of this happening was during the Philippines campaign where Lt. Col. McCutcheon and a small band of fellow likeminded junior and midlevel officers held great influence in shaping and developing CAS for that campaign. In order to enact the adaptation, McCutcheon and his men used formal methods such as revising training programs for deployed soldiers and writing pamphlets for dissemination among the frontline personnel, and essentially wrote their own new CAS doctrine.

Further, McCutcheon and his men wrote analytical reports that were sent to senior command and then disseminated across the service as whole. McCutcheon and other officers who served in the Philippines also developed informal networks of likeminded individual officers, who communicated in part through the publication of articles in professional service journals such as the *Marine Corps Gazette* to market their ideas to other Marine officers who had been deployed elsewhere. McCutcheon and those officers had formed information and advocacy networks where they attempted to develop an internalized organizational narrative within the Marine Corps to help spread the adaptation lessons. Although many of the CAS adaptations occurred via a bottom-up vector, top-down processes also played a role as senior leadership helped oversee the production of official lessons learned documents to help spread best practices, and also gave their formal approval for the integration of the new CAS approaches into operations.

There were several constraints on the adaptation process during the war. Interservice and bureaucratic structures prevented the Marines from operating as a joint air-ground team. This was something the Marines had little to no control over and proved to be a considerable constraining force as the bulk of Marine aviators lacked any real CAS experience during the duration of the war. Geography was another constraining factor on the adaptation process. Some battles, such as Guadalcanal with its dense jungles or the small area of operations at Tarawa, proved to be obstacles for the implementation of any successful CAS. The geographic vastness of the Pacific also prevented some lessons from being diffused in a streamlined manner. The most successful and radical CAS adaptations occurred on the Philippines, which was a campaign that had limited Marine involvement; it lacked the prominence that other engagements such as Iwo Jima or Okinawa possessed, which limited the immediate diffusion of its lessons. The adaptations developed in the Philippines also occurred under a jointness context where Marine aviators were providing air support for Army and Filipino insurgent ground forces; thus, Marines had limited control over their ability to develop a new system. In the Philippines it was not until Marine aviation units had formally proven their effectiveness during early combat operations did ground units become more receptive of their efforts.

The adaptation to innovation process took root during the final weeks of the Second World War and continued into the years following the cessation of hostilities. This process was influenced from bottom-up and top-down driven forces, as well as a mix of internal and external factors. From a top-down perspective, senior leadership authorized the continued study of

combat operations of the war, which allowed for deeper analysis of best practices to occur and shape the development of post-war doctrinal development. Senior leadership also approved changes to training programs and authorized appropriate technological procurements, all of which influenced the integration of CAS lessons learned into the organization. It was senior leaders, such as Marine Commandant Vandegrift, who decided to highlight the Marine use of CAS as part of their strategy to ward off bureaucratic encroachments and threats from the other services, which in turn increased organizational focus on its development during this period. Shifts in the international strategic environment also helped create a favorable environment for CAS's expansion within the organization as there seemed to be a clear need for the Marines to serve as a rapid expeditionary force that would need a FMF force structure that had combined arms capabilities to overcome any contingency.

However, one of the most important drivers of the adaptation to innovation process in this post-war period was the formation of formal and informal networks of junior and midlevel officers who strongly encouraged an active discourse within the organization concerning the importance of CAS and of the importance of retaining the combat experiences of the Second World War. Key figures in the wartime adaptation process such as Lieutenant Colonel McCutcheon played a leading role in these networks, and this was not a coincidence; McCutcheon was vehemently convinced that it was essential for the Marines to integrate these CAS lessons and so he became a proactive participant in shaping the internal-organizational narrative with his frequent articles published in Marine service journals and publications. Senior officers supported and participated in these networks which allowed pro-adaptation advocates to grow their influence.

The Korean War experience primarily confirmed the effectiveness of the Second World War adaptations. It offered junior and midlevel officers as well as senior leadership clear and tangible proof that the new CAS system was tactically and operationally sound, and its integration into the service needed to continue. Even the introduction of new technology such as jet aircraft merely enhanced the lethality of the CAS system, and did not lead to any major rethinking of the relevancy of those Second World War adaptations. The post-Korean War period during the leadup to the U.S. entrance into Vietnam mirrored in some ways the earlier post-Second World War era. Senior leaders continued to offer both direct and tacit approval for the integration of the CAS system into the organization, while junior and midlevel officers

remained a driving force in its continued integration. Key individuals, such as McCutcheon, during this period found themselves being advanced up the chain of command via promotion, and placed into new positions of authority, such as serving on formal boards designed to review Marine aviation. By this point these men had earned credibility from their extensive combat experience that was now amplified by their new positions, and were able to directly influence the institutionalization of CAS reforms; this fundamentally blurred the lines between bottom up and top down innovation processes.

The Marine Corps of 1960 had a CAS system that was massively different from what the organization had in 1941. This was the end result of a nearly 15 year process of properly analyzing and integrating the combat experiences of the Second World War. This process impacted the organization's doctrine, training programs, technological procurement and even force structure. The eventual formation of the MAGTF in 1963 was in many ways the end of result of the various extensive changes that occurred within the organization as result of this adaptation to innovation process. It was during the Second World War that Marine officers were able to observe the combat effectiveness of a joint air and land force structure in a modern warfare setting. One of the first major examples of this occurred during the campaign in the Philippines, where Marine aviators, utilizing their newly adopted CAS system, fought with Army ground units and demonstrated the power of an air-ground force via rapid unit maneuverability in an offensive expeditionary operation. Later, at the battle of Okinawa, Marine aviators, this time supporting Marine infantry units, showed how a joint Marine air and ground force could be incredibly effective; this battle was particularly influential within the Marine Corps due to its high-profile strategic context, and the bravery of individual Marines in combat, which helped to cement its legacy within the organization. Following the end of hostilities of the Second World War, Marine officers would take this knowledge of the importance of joint air and ground forces, and use it to drive their approach to organizational changes that occurred during the following 15 years, that would then lead to the formalization of the concept with the MAGTF, which to this day, remains the central force structure of the Marine Corps.

Chapter 4: The Army

Let us have a respectable Army, and such as will be competent to every contingency[246]
George Washington

The modern U.S. Army is an armored one. Tanks are a central part of the service's force structure and have become a major part of the Army's identity.[247] However, the Army of the contemporary period is very different from the version that existed prior to the Second World War. The Army has undergone a number of evolutionary changes since the early years of the 20th Century. Some of these organizational shifts were conceptual, others centered on force structure, and others related to the introduction of emerging technologies. One of the more significant technologically driven changes occurred in 1917 when the U.S. War Department formally introduced tanks into the Army via the establishment of the Tank Corps.[248] However, it was not until over two decades later during the combat experiences of the Second World War that the Army underwent its most radical mechanized transformation. Here, tanks demonstrated, as a result of a series of adaptations throughout the course of the war, their increased relevancy as part of a combined arms force structure, and fundamentally reshaped the Army's operational methods. The various lessons learned during the Second World War demonstrated that tanks should be seen as a core branch within the Army alongside infantry, artillery and engineering.

This chapter begins with an overview of the Army as an organization on the eve of the U.S. entry into the Second World War by discussing its major internal organizational narratives and norms; this section also outlines the Army's doctrinal position prior to the start of hostilities. The following sections discusses the Army's combat experiences with tanks and traces the various adaptation processes that occur during the war. The chapter then explores the immediate post-war period, examining initial organizational attempts to process its campaign experiences

[246] John C. Fitzpatrick, ed., *The Writings of George Washington* (Washington, DC: Government Printing Office, 1944), Vol VI, 380.
[247] For more on the role of Armor and the modern Army's identity see, Williamson Murray ed., *Army Transformation: A View from the U.S. Army War College*, Monographs 109, (2001), https://press.armywarcollege.edu/monographs/109/?utm_source=press.armywarcollege.edu%2Fmonographs%2F109&utm_medium=PDF&utm_campaign=PDFCoverPages
[248] For a histories of the U.S. Army see, Alan R. Millett, Peter Maslowski, and William B. Feis, *For the Common Defense: A Military History of the United States from 1607 to 2012* (New York, NY: Free Press, 2012); Russell E, Weigley, History of the United States Army, (London: Macmillan Publishing CO., Inc.1967).

while dealing with the early stages of the Cold War. After, the chapter briefly examines combat during the Korean War, demonstrating how it largely reflected lessons learned over the course of the Second World War. The final section traces the remaining initialization process and organizational views of tanks leading up to the early stages of the U.S. involvement in Vietnam. The chapter concludes demonstrating the Army's attempts to institutionalize its armor centric lessons learned was ultimately highly successfully in large part due to the role of junior and midlevel officers as well as other factors in the adaptation to innovation process.

The US Army in 1941

As the Second World War began, the Army was an organization undergoing a modernization process in terms of force structure, technological integration, and doctrine. The Army was lagging behind the more radical military innovations which were occurring in Europe, and in particular in Germany, which was developing a modernized combined arms approach to operations which involved more streamlined integration of mechanization and airpower.[249] The U.S. Army of the interwar period emphasized mobilization of mass manpower as rapidly and effectively as possible; this was influenced by the belief that wars would be won primarily by infantry paired with artillery support, while mechanization was viewed as a supporting force, existing on the periphery of operational methods.[250] In the years leading up to 1940, the Army's doctrinal development and technological integration remained secondary to the organizations' emphasis on manpower management, something that was fundamentally a legacy of the First World War. In the Army's view, wars would be won or lost by the infantry more so than any other combat arms branch. Further, much of the Army's existing equipment stockpiles was largely legacy kit from the previous war. This was in part the result of a fiscally conservative Congress seeking to limit federal expenditure paired with an isolationist minded general public's

[249] For more on Germany's interwar military innovations in relation to combined arms see, Robert Citino, *Quest for Decisive Victory: From Stalemate to Blitzkrieg in Europe, 1899-1940* (Lawrence, KS.: University of Kansas Press, 2002).

[250] The Army underwent a lessons learned effort in the immediate aftermath of the First World War spearheaded by a series of boards formed to oversee the internal study. General John J. Pershing lead the most influential of them referred to as the "Superior Board". This effort played a major role in influencing organizational preferences, and biasing them towards the infantry and artillery branches. Many of these findings became codified in the doctrinal manual, War Department, *Field Service Regulations United States Army 1923* (Washington, DC: Government Printing Office, 1924). For more on doctrinal development during this interwar period see, Walter E. Kretchik, *U.S. Army Doctrine: From the American Revolution to the War on Terror* (Lawrence, KS: University of Kansas Press, 2011).

reluctance to support the establishment of expeditionary orientated force designs. Internally, the Army was being shaped by intensive intra-organizational competing interests among the different branches, namely infantry and artillery.[251] By 1941, the Army, along with the other services were undergoing a gradual rearmament, with a sizeable portion of the investments dedicated towards increasing personnel size to over 269 000 soldiers.[252]

The Army of the late 1930s remained highly conservative in its approach to innovation as well as its responses to shifts in the international security environment. The sense of conservatism was embedded in the services' various educational institutions, especially the General Staff School at Fort Leavenworth, where future staff officers received an education very much centered on the First World War experiences which emphasized the importance of infantry over the role of mechanized and aviation units. These Army educational institutions essentially fostered an 'officer-gentleman' culture that was wary of broader changes.[253] The dominant organizational branches of the infantry and artillery had cemented their organizational position as a result of the experiences of the First World War, which had further strengthened a normative identity for the Army as being focused on mass, firepower, and the annihilation of the enemy field forces in its vision of how war should be waged. This organizational bias was first embedded in the Army during its experiences during the U.S. Civil War, where commanders like General Ulysses S. Grant fielded mass armies to destroy the Confederacy via annihilation on the battlefield.[254] Historian Brian Linn has observed there are different and sometimes contradictory strands of organizational identity that run deep through the Army. Linn points out there were many in the Army who preferred to approach military affairs through an engineering and scientific lens; while others championed a more qualitative approach that valued heroism and personal ingenuity to overcome challenges; and lastly, there was a group he referred to as "managers" who approached war as an industrialized affair where mass was the preferred response to large scale operational challenges.[255] Thomas Mahnken argues that the Army

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[251] David E. Johnson, "From Frontier Constabulary to Modern Army: The U.S. Army between the World Wars" in Winton and Mets eds., *The Challenge of Change: Military Institutions and New Realities, 1918-1941*, 162-201.
[252] "US Military By the Numbers," *The National World War Two Museum* (2022), https://www.nationalww2museum.org/students-teachers/student-resources/research-starters/research-starters-us-military-numbers.
[253] Johnson, "From Frontier Constabulary to Modern Army," 185-187.
[254] For more on this see Russell Weigley, *Eisenhower's Lieutenants: The Campaign of France and Germany 1944-1945* (Bloomington, IN: Indiana University Press, 1970), 1-6; and Russell Weigley, *The American Way of War: A History of United States Military Strategy and Policy* (Bloomington, IN: Indiana University Press, 1960).
[255] Linn, *The Echo off Battle*.

remained highly shaped by strong intra-service identities of its different branches, which acted almost as guilds, and that new technologies are integrated into the Army via the individual combat-arms branches rather than as an organization wide effort.[256] This compartmentalization of the Army into the different branches would act as a constraining element at the functional as well as the ideational level of the development of modernized combined arms.

The role of armor in Army doctrine by 1941 remained relatively underdeveloped. Tanks were introduced to the Army in 1917 with the formation of a Tank Corps to fight in the First World War, where U.S. tankers were heavily influenced by the French and British in terms of operational approaches, technology and doctrine.[257] The internal organizational discourse during the period in the years immediately following the First World War was one in which traditional cavalry still had a major role to play in military affairs. This discourse was not one centred on mechanization via gasoline driven machines, but of horse mounted troops armed with sabres.[258] Even George C. Patton, an officer who would come to play a significant role in the growth of armor in the Army during the Second World War and had commanded a tank unit during the First World War, remained skeptical of the impact of armor during the early interwar period, writing that it would likely remain a niche weapon.[259] However, other officers such as Hamilton Howze lamented and were demoralized by the lack of modernized approaches to armor doctrine and equipment.[260] Overall, the central focus of these internal debates was not so much on whether or not tanks should exist, as there was an internal acceptance of the need for them on a future battlefield. Rather, the discourse remained focused over which bureaucratic structures should subsume the tanks as well as their specific role in doctrine and operational approaches.[261]

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[256] Mahnken, *Technology and the American Way of War*.
[257] Dale E. Wilson, "World War I: The Birth of American Armor," in George F. Hofmann and Donna A. Starry eds., *Camp Colt to Desert Storm: The History of U.S. Armored Forces* (Lexington, KS: The University Press of Kentucky, 2001), 1-36.
[258] For examples of this pro-horse cavalry discourse during the early interwar period see, Maj-Gen. Lenord Wood, "Cavalry's Role in the Reorganization," *The Cavalry Journal* Vol. XXIX, No. 120 (April, 1920), 113-121; Col. George H. Cameron, "The Cavalry School and Its New Functions," *The Cavalry Journal* Vol. XXIX, No. 120 (April, 1920), 1-13; Maj Le Roy Eltinge, "Review of Our Cavalry Situation," *The Cavalry Journal* Vol. XXIX, No. 120 (April, 1920), 14-22; R. M. Preston, *The Desert Mounted Cavalry* (London: Constable and Company, 1921).
[259] Maj. George S. Patton, Jr. "Comments on "Cavalry Tanks"," *The Cavalry Journal* Vol. XXX, No. 125 (Oct 1921), 251-252.
[260] Hamilton H. Howze, *A Cavalryman's Story: Memoirs of a Twentieth-Century Army General* (Washington, DC: Smithsonian Institute Press, 1996), 19-20.
[261] Timothy K. Nenninger, "Organizational Milestones in the Development of American Armor, 1920-40," in Hofmann and Starry eds., *Camp Colt to Desert Storm,* 38.

Official capstone doctrine, including the 1939 *Field Service Regulations*, continued to constrain the development of armor. The 1939 *Field Service Regulations* was embedded with the lessons of First World War operations, and thus the artillery-infantry team remained the central fixture to the Army's operational methods.[262] However, the Army continued to tinker with doctrinal development during the immediate period leading up to 1941, as many of its branches remained dissatisfied with capstone doctrine, as each branch wanted to exert more direct influence on its framing of operations.[263] Other earlier armored doctrine manuals during the years just prior to the U.S. entry into the Second World War acknowledged the growing role of mechanization on modern battlefields, however they too remained somewhat speculative as to the shape in which it would impact.[264] Even as hostilities began in Europe, the Army continued to lag behind both conceptually, technologically and doctrinally in how to respond to the challenge of mechanized modern warfare.[265] Most significantly was that just over two weeks following the fall of France in the summer of 1940, the War Department formally established a separate Armored Force branch, and then later an Armor Board at Fort Knox to help oversee future mechanization developments.[266] However, these moves had come in many ways too little too late to radically alter the Army's underdeveloped view of armor in war. The newly created Armored Force was not formed to participate as independent combined arms units, rather it was intended to follow the path of traditional cavalry, where in tactical engagements it would focus on the exploitation of enemy weak points in order to penetrate deeper into their lines by entering holes created by the Army's artillery-infantry teams. [267]

Starting in August 1941 the Army held a series of larger scale exercises known popularly as the Louisiana Maneuvers which were intended to further develop doctrine, training and command capabilities. The exercises led to a mixed impact on the status of armor in the Army.

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[262] War Department, *FM: 100-5 Tentative Field Service Regulations* (Washington, DC: Government Printing Office, 1939).
[263] Kretchik, *U.S. Army Doctrine*, 147.
[264] For example see, War Department, *Tactical Employment of the Mechanized Division (Tentative)* (Fort Leavenworth, KS: The Command and General Staff School Press, 1937); further, other officers had felt that the fighting during the Spanish Civil War implied that future war would involve creased mechanization to various degrees, see for example Brig. Gen. Henry J. Reilly, "Tank Attack in Spain," *The Cavalry Journal* Vol. XLVIII, No. 1 (Jan 1939), 281-283.
[265] Hoffman, *Through Mobility We Conquer*, 263.
[266] General Adna R. Chaffee Jr. was placed in command of the 1st Armored Corps in July 1940. He would later be called the "Father of the Armored Force" for his work in helping to further integrate armor into the structures and doctrine of the U.S. Army. Chaffee would sadly die of cancer in August of 1941.
[267] Hoffman, *Through Mobility We Conquer*, 268-270.

The immediate impact was they lead to a loss of status by the newly formed Armor Forces and a shift away from larger tank formations. Positively, the Louisiana Maneuvers did lead to a slightly more developed understanding of combined arms for the Army, and helped finally push the organization away from the idea of horse centric cavalry units in favor of embracing wider mechanization for cavalry roles. However, the most influential operational lessons learned was to reinforce the doctrinal dominance of the infantry-artillery team.[268] The final Army capstone doctrine that would be produced prior to the entry of the U.S. into the Second World War was the 1941 *Field Service Regulations*. Building off the 1939 version of FM 100-5 and recent lessons learned from the Louisiana Maneuvers, the 1941 edition placed a heavier emphasis on combined arms, although infantry-artillery coordination would remain at the forefront of the Army's operational methods. Mechanized armor was not conceptualized to have a role in defensive operations, rather they were to be used to strike at opportune moments against weak points.[269] Thus the Army of 1941 had accepted a role for armor in its way of war. Armor was able to conform well to longstanding normative preferences for firepower and mass on the battlefield. However, at the conceptual level, the Army had not managed to develop an advanced understanding of the potential for armor to have in reshaping combined arms. The service's conservatism, paired with rigid intraorganizational branch dynamics along with scarce available resources, led to a situation in which the Army would have to go to war with an underdeveloped role for armor. This would present the organization with an opportunity to have their understanding tested and shaped and altered by their future operational experiences when having to face life or death situations in the deserts of North Africa to the farmers' fields and forests of Northern Europe.

The Second World War: North Africa

The first Army units to see combat during the Second World War were part of garrison detachments in the Pacific, most notably in the Philippines.[270] However, the majority of the Army would spend the first several months following the U.S. entry into the war preparing for

[268] For an overview of the Louisiana Maneuvers and their impact on the Army see, Christopher R. Gabel, *The U.S. Army GHQ Maneuvers of 1941* (Washington, DC: Center of Military History, Untied States Army, 1992).
[269] War Department, *FM 100-5*, *Field Service Regulations: Operations* (Washington, DC: Government Printing Office, 1941).
[270] For an overview of the early war Army experiences in the Pacific Theater see, John C. McManus, *Fire and Fortitude: The US Army in the Pacific War, 1941-1943* (New York, NY: Dutton, Caliber, 2019).

eventual combat against the German and Italian fascist forces in North Africa. During this period some doctrinal refinement occurred; for example, in March 1942 the Army published a new armored doctrine, *FM 17-10 Armored Forces Field Manual: Tactics and Technique* This field manual did not particularly challenge the pre-war doctrinal position of the Army, noting that "[t]he role of the Armored Force and its components is the conduct of highly mobile ground warfare, primarily offensive in character, by self-sustaining units of great power and mobility".[271] The conceptualized role of armor remained exploitative in character, with the field manual advising that tanks avoid playing the leading role in any offensive assaults against concentrated defensive forces, leaving that role for infantry and engineering units, and the doctrine further dismissed any defensive role for armor. Essentially, U.S. armor doctrine identified a minor role for heavy tanks during engagements that required firepower, light tanks for more mobility orientated pursuits, and not much of a role for medium tanks.[272] The updated Tank Destroyer field manual published a few months later in June 1942, reiterated that Tank Destroyer units were to be the main anti-armor weapon of the Army in both offensive and defensive situations.[273]

Many of the Army's service journals reflected the limited view of armor's potential. The most notable of these outlets when it came to mechanization was *The Cavalry Journal*, yet as late as 1942 many of the articles published remained focused on traditional horse cavalry and the debates regarding whether animals remained an important part of combined arms warfare.[274] A small handful of articles during this period addressed some issues relating to armor, for example, General George C. Patton promoted the establishment of the U.S. Desert Training Centre as a means of increasing readiness for the fighting in North Africa.[275] Other articles acknowledged that warfare continued to evolve, and that likely a reassessment of tank tactics needed to occur.[276] Internally, many armored officers were looking for an opportunity to expand

[271] War Department, FM 17-10 *Armored Force Field Manual: Tactics and Technique* (Washington, DC: Government Printing Office, Mar 1942), 1.
[272] *Armored Force Field Manual*, 6, 120.
[273] War Department, FM 18-5 *Tank Destroyer Filed Manual: Organization and Tactics* (Washington, DC, Government Printing Office, Jun 1942).
[274] For examples of these horse centric articles see, Lt. Col. E.M. Burnett and Maj Henry M. Zeller, "Horsemanship Training at Our CRTC," *The Cavalry Journal* Vol. LI, No. 1 (Jan 1942), 53-55; Capt. Robert A. Boyce, "Evolution of the Horse," *The Cavalry Journal* Vol. LI, No. 1 (Jan 1942), 82-83.
[275] Maj. Gen. George C. Patton, Jr, "The Desert training Corps," *The Cavalry Journal* Vol LI, No. 5 (Sep-Oct 1942), 2-6.
[276] C.H. Q. "Tank Tactics," *The Cavalry Journal* Vol. LI, No 5 (Sep-Oct 1942), 17-20.

its role and doctrinal influence within the Army. However, this independent streak remained constrained by senior Army leadership at the start of the war, namely senior officers like Lieutenant General Lesley McNair who were fixated on the role of infantry-artillery teaming as the leading element of ground combat; McNair was particularly conservative when it came to armor at the start of the war, resisting claims by some officers that the character of war was shifting dramatically due to mechanization. In terms of equipment, the Army's armor forces were relying on technology designed and mostly built during the previous decade, such as the near obsolete M3 Stuart light tanks, as well as the medium tanks of the service, namely the M3 Grant and M3 Lee which were also older designs.[277]

Aside from its doctrinal limitations, the Army had other problems with preparedness during these early months of the war. There were considerable problems with armor training during leadup and early stages of the war. Part of this was influenced by the more conservative armor doctrine. This inadequate training had prevented tank-infantry teaming from developing any sort of operational effectiveness prior to the early war engagements.[278] Pre-deployment training was also hampered by limited quantities of equipment, and much of the available equipment was of poorer quality; often makeshift props were used in place of actual weapons during exercises. Nonetheless, there remained a fairly high level of optimism and confidence among its personnel about their ability to win a victory.[279] Essentially, the Army was continuing its gradual modernization process during this period, which was marked by inadequate combined arms training and preparedness, as well as the human resources context of having a massive influx of junior officers into the service who lacked any sort of previous operational experiences. Essentially, the officer corps of the Army was a blank slate, and thus susceptible to be to be shaped by future combat experiences.[280] Many of the junior officers during this period who were assigned to armored units were highly enthusiastic about the potential for mechanized warfare

[277] Christopher R. Gabel, "World War II Armor Operations in Europe," in Hofmann and Starry eds., *Camp Colt to Desert Storm*, 144-145, 149.
[278] Steven Thomas Barry, *Battalion Commanders at War: U.S. Army Tactical Leadership n the Mediterranean Theater, 1942-1943* (Lawrence, KS: University Press of Kansa, 2013), 83.
[279][279] Rick Atkinson, *An Army at Dawn: The War in North Africa, 1942-1943* (New York, NY: Picadro, 2002), 9, 17.
[280] Peter R. Mansoor, *The GI Offensive in Europe: The Triumph of American Infantry Divisions, 1941-1945* (Lawrence, KS: University Press of Kansas, 1999), 19-25.

and about maximizing tactical effectiveness, they just needed an opportunity to experience their craft in practice.[281]

The Army began its major combat operations of the war in November of 1942 during Operation Torch, where it participated in the Allied landing operations in North Africa. While overall a success, these landings and follow-on operations would demonstrate examples of the Army's early hurdles with regards to operational effectiveness. The friction of war was at play, with units often lacking proper coordination, and communication with one another which led to causalities during early fighting against Vichy French forces. These first kinetic engagements against the French were predominantly in the form of infantry-artillery teaming more so than a broader combined arms effort involving armor and airpower.[282] The first armor centric engagement following Torch involved a small skirmish where U.S. tanks destroyed a smaller Vichy French tank force; while strategically insignificant this was first evidence that U.S. tanks could be used to counter-enemy armor, thus contradicting pre-war doctrine.[283] Overall, the initial Torch operations demonstrated the earliest signs that the Army would not be guaranteed a victory, that warfare in this new era was very complex and that it would need to learn to be better at meeting the challenges.

During the operations that followed the Torch landings, Army units experienced the start of a gradual lessons learned process regarding the role of tanks in combat. First and foremost, there were glaring decencies in the Army's approach to combined arms in comparison to the enemy units. The most effective U.S. fighting power came from infantry-artillery teaming, reminiscent of the operational methods of the end of the First World War. However, it was becoming clear to officers at the junior, midlevel and even senior levels that combined arms needed to be expanded to include armor, airpower and other elements, and that training likely needed to be changed in order to prevent these early war errors from repeating. It was clear to these officers that there was a complete lack of coordination among infantry and armor, as tanks would find themselves exposed, lacking infantry screens, while infantry officers in turn often misunderstood the potential for armor to support their own attacks. Some midlevel officers in

[281] Lewis Sorley, *Thunderbolt: From the Battle of the Bulge to Vietnam and Beyond: General Creighton Abrams and the Army of His Times* (New York, NY: Simon & Schuster, 1992), 35-38.
[282] Atkinson, *An Army at Dawn*, 125-130.
[283] Barry, *Battalion Commanders at War*, 74.

particular noted that there was no effective formal communication system between tank and infantry units which exacerbated the problems with coordination.[284]

The feeling of some midlevel officers during these early engagements was that the Wehrmacht had superior tactics as well as weaponry, especially in terms of tanks.[285] Officers had started to reflect on their experiences in service journals, intending to spark an organizational discourse and push for needed adaptations to occur to overcome future operational challenges. Colonel James Crockett published an article, "Armored Infantry in Armored Operations", in the *Cavalry Journal* during the winter of 1943, where he reflected on the *Wehrmacht's* combined arms efforts, and commented that the U.S. Army needed to match those capabilities. Colonel Crockett argued that the striking power of U.S. tanks could be amplified via a combined arms approach more so than letting them operate on their own.[286] Other *Cavalry Journal* articles at this time reflected on the early lessons of the North African campaign; however, not all of these lessons were progressive in character. Rather, some articles continued to advocate for pre-existing doctrinal positions, including the idea that tanks should not be used in defensive operations.[287] While other articles, such as "Fire Power vs Armor", argued that officers should not be fooled or seduced into changing their ways due to the German success with tanks in combined arms, rather that traditional U.S. army doctrine that favored tank destroyers as the best way to neutralize enemy armor would prevail, with one article bluntly stating "the tank is not invincible". [288] It was clear that although the early stages of the adaptation process had begun with officers reflecting on the problems faced during operations, there was far from any consensus in terms of next steps.

Following the Torch landings, the campaign in Tunis posed several challenges to the majority of Army units who remained largely raw and untested. Their Wehrmacht counterparts were well trained, with ranks filled with many combat veterans. The outcome of this campaign was far from a certainty, and fear of defeat remained a legitimate concern, although optimism still seemed to remain high among the U.S. forces. The operational inexperience of U.S. armor

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[284] Michael D. Doubler *Closing with the Enemy: How GIs Fought the War in Europe, 1944-1945* (Lawrence, KS: University Press of Kansas, 1994), 16-19.
[285] Howze, *A Cavalryman's Story*, 52-53.
[286] Col. James C. Crockett. "Armored Infantry in Armored Operations," *The Cavalry Journal* Vol. LII, No. 1 (Jan-Feb 1943), 22-24.
[287] For an example of the traditionalist sentiment see, "General Hawkins Notes; A Few Principles for Tank Forces," *The Cavalry Journal* Vol. LII, No. 2 (Jan-Feb 1943), 35-37.
[288] "Fire Power vs Armor," *The Cavalry Journal* Vol. LII, No. 1 (Jan-Feb 1943), 27.

was particularly noticeable during this campaign; the outdated U.S. tanks proved to be highly flammable when facing German firepower. Many engagements tended to be fought mostly by infantry units, and lacked opportunities to better enhance combined arms capabilities. Armor units continued to demonstrate poor coordination ability with infantry counterparts, and often made tactical errors during battle, such as having a tendency for blind charges against enemy units that became disparaging known as "rat races" among U.S. troops.[289] Armor battles frequently had mixed results; for example, the first U.S. versus German tank battle of the war occurred at Chouigui Pass, where U.S. light Stuart Tanks demonstrated tactical competency at the small unit level resulting in several destroyed German tanks. However, later at Medjez El Bab, poor operational leadership severely hampered U.S. combat effectiveness, as there was little to no combined arms coordination as the components of U.S. forces essentially fought as separate branches and a determined German combined arms assault inflicted heavy causalities.[290]

The most influential battle of the Tunisian campaign was at Kasserine Pass on 18-24 February 1943. Here, German General Erwin Rommel spearheaded an attack led by Panzer units and inflicted a humiliating defeat on U.S. Army forces which lost over 3 000 men and 180 tanks. The result of the battle was due to a mix of poor leadership, doctrinal deficiencies and poorer quality technology. The U.S. commander of the battle, General Lloyd Fredendall, was a staunch adherent to pre-war Army doctrine, and primarily approached combat focused on infantry and artillery teaming in defensive positions, and lacked an understanding of the importance of mobility and mechanized forces. The battle was a major blow to U.S. Army unit morale levels, and led to the firing of several officers, including General Fredendall. Kasserine Pass was a shock moment for the Army.[291]

Despite the defat at Kasserine Pass, the campaign in Tunisia would cumulate in a victory for the Army. This war in the desert saw no major breakthroughs, nor any examples of exceptionally executed operational art, rather was the result of grinding attrition and the concentration of force. Causalities among U.S. forces was high, and fighting at the tactical level remained fierce. The campaign had signaled to the U.S. officer corps that existing doctrine and preferred operational methods needed refining despite the eventual victory. The Army had

[289] Atkins, *Army at Dawn*, 219.
[290] Barry, *Battalion Commanders at War*, 97-102.
[291] Hofmann, *Through Mobility We Conquer*, 302-304; Stephen R. Taaffe, *Marshall and his Generals: U.S. Army Commanders in World War II* (Lawrence, KS: University Press of Kansa, 2011), 72.

implemented a system to allow for the formal accumulation of operational lessons. By the end of the Tunisia campaign, the Army instituted it so individual units would formally be required to draft lessons learned documents which would then be centrally submitted. The War Department then processed the reports and disseminated updated reports based on the findings.[292]

Some of the lessons learned during this period were from positive combat outcomes. For example, Lt. Col. Hamilton Howze, who served in North Africa as the commander of the 13th Armored Regiment of the 2nd Armored Division, proved to be a highly capable commander, who had his troops utilize mobility and rapid maneuver when engaging in attacks on German units and during rarer occasions when supporting infantry. Howze engaged in many tactical adaptations, such as changing the shapes of his battle formations and taking better care with pre-engagement planning with his subordinate officers that allowed for more experimentation beyond the constraints imposed by prewar doctrine.[293] Howze attempted to empower his junior officers whenever possible, as he felt mission command principles were essential to maximizing U.S. Army fighting power and developed a stronger sense of cohesion among his unit.[294]

On the negative side of operational learning, a noticeable lesson learned was widespread dissatisfaction with the performance of tank destroyers. Many officers, especially those in command of frontline units, had a lack of training surrounding their best practices. The North African desert terrain had left many tank destroyer units exposed and highly vulnerable to enemy fires, thus negating their effectiveness. It was becoming clearer to officers that existing doctrine had failed, and that tank destroyers were very limited in their ability to contribute to combined arms operations, especially offensively. German Panzer adaptations also further negated the effectiveness of U.S. tank destroyer units, as the Germans shifted operational methods to involve smaller combined arms units, which prevented the tank destroyers from maximizing firepower to inflict large casualties. Overall, the fighting in North Africa demonstrated that the Army's pre-war hypothesis about how war should and would be fought was proven wrong. Tank destroyers lacked the mobility, operational flexibility and offensive capabilities to play any sort of decisive impact on the battlefield. [295]

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[292] Mansoor, *The GI Offensive in Europe*, 98.
[293] Barry, *Battalion Commanders at War*, 153-157.
[294] Howze, *A Cavalryman' Story*, 120.
[295] Harry Yeide, *The Tank Killers: A History of America's World War II Tank Destroyer Force* (Havertown, PA: Casemate Publishers, 2007), 56-57; Christopher R. Gabel, "Seek, Strike, and Destroy: U.S. Army Tank Destroyer Doctrine in World War II," *Leavenworth Paper 12* (Fort Leavenworth, KS, 2008).

As the fighting drew to a close in North Africa officers began to reflect on their experiences. A U.S. armor officer, Colonel Peter Hains, described different lessons of U.S. armor in their article "Tanks in Tunisia". Colonel Hains noted there were major deficiencies in the U.S. training regime for armor units, essentially describing a gap between theory and practice. Hains also stressed for the need for better coordination of tanks and infantry units as well as the importance of allowing local commanders a degree of mission command to allow them to overcome tactical challenges.[296] Another article, "Lessons from a Tank Battalion Commander in Tunisia", stressed the need to retain different operational experiences, such as the need for more realistic training to allow for better tank-infantry coordination, and that despite prewar doctrine, it was clear that tanks have a role to play in defensive operations, especially against enemy armor units.[297] Other articles challenged different prewar assumptions about the role of tanks, such as that fighting in North Africa disproved the assumption that tanks cannot fight effectively during nighttime operations.[298] More senior officers, such as Brigadier General Edwin Schwien, acknowledged the growing controversy when it came to debates over the best practices of how to use tanks in the war. General Schwien noted that there were tensions between prewar assumptions and the experiences of those fighting in ongoing operations, demonstrating there remained some who needed convincing that tanks had changed the way the Army should fight.[299]

After the combat experiences of North Africa, the Army finally had combat data to begin the process of self-assessment, and to incubate potential changes in response to early understood lessons. Major Franklin Davis, in an article "Training While Testing", describes how midlevel officers played a leading role in this process. Major Davis described the "Battalion Tests" of the II Armored Corps that involved improving the effectiveness of small unit armored operations. These tests were designed by Lieutenant Colonel A. A. D. Surles Jr. and Lieutenant Colonel James B. Quill, and they were seen as providing valuable assessments of the lessons learned of wartime combat operations. These lieutenant colonels ensured the training regimes were as realistic as possible, and sought to prevent external forces such as senior officers from placing

[296] Col. Peter C. Hains III "Tanks in Tunisia," *The Cavalry Journal* Vol. LII, No. 4 (Jul-Aug 1943), 10-14.
[297] "Lessons from a Tank Battalion Commander in Tunisia," *The Cavalry Journal* Vol. LII, No. 4 (Sep-Oct 1943), 38-39.
[298] For example, see, Lt. Elmer Slovacek "Night Tank Firing Can be Accurate," *The Cavalry Journal* Vol. LII, No. 5 (Sep-Oct 1943), 76-77; "Training in Night Firing," *The Cavalry Journal* Vol. LII, No. 6 (Nov-Dec 1943), 70-74
[299] Brig. Gen. Edwin E. Schwien, "The Role of the Tank in the War of Today," *The Cavalry Journal* Vol. LII, No. 4 (Sep-Oct 1943), 22-26.

artificial controls on the process, allowing participating officers in the field exercises to respond to the challenges as they saw fit, unconstrained by existing doctrines. Ultimately, these field exercise following the completion of the North African campaign were intended to enhance the coordination of forces, particularly combined arms operational methods.[300]

The Second World War: Italy

Following the defeat of the Axis forces in North Africa, the next major U.S. Army operation was focused on the liberation of Italy. The Army had spent the months preceding the invasion undergoing a series of force structure changes driven by the lessons of their recent operational experiences. By September 1943 Army armored divisions had undergone a re-structuring in order to maximize operational flexibility and adaptability; this process would involve shifting away from regimental echelon substructures to one based around smaller battalions.[301] The U.S. campaign in Italy began with Operation f Huskey, which involved an amphibious landing on Sicily in July 1943. The fighting during the month long operation to seize control of the island had not challenged any major understanding of the use of armor. Rather, lessons learned were mostly to do with mountain warfare and logistics.[302] The physical geography of Sicily's mountainous terrain was a major constraining factor on tanks' physical ability to operate. However, officers were able to observe that medium tanks, during the limited times they were used during the Sicilian operations, were efficient at teaming with infantry to cause breakouts in enemy defensive positions, especially when there was limited field artillery support available.[303]

The invasion of mainland Italy began 3 September 1943. By this point in the war the M4 Sherman was the Army's primary tank. The Sherman had first seen combat in North Africa, and was viewed as a considerable upgrade over the older U.S. tanks in terms of hull thickness, engine speed and firepower. The Army's preparation for the invasion involved the establishment of ad hoc training centres to prepare units for the campaign. This was driven by an attempt to diffuse some of the lessons learned from the fighting in North Africa to improve the combat

[300] Maj. Franklin M. Davis Jr., "Training While Testing," *The Cavalry Journal* Vol. LII, No. 5 (Sep-Oct 1943), 72-74.
[301] George F. Hofmann, *Through Mobility We Conquer: The Mechanization of U.S. Cavalry* (Lexington, KY: The University Press of Kentucky, 2006), 311.
[302] Rick Atkinson, *The Day of Battle: The War in Sicily and Italy, 1943-1944* (New York, Picador: 2007), 172-175.
[303] W.B. Goodard, "Tanks in Sicily," *The Cavalry Journal* Vol. LIII, No. 3 (May-Jun 1944), 6-9.

effectiveness of newly deployed troops. In particular, emphasis was placed more on small unit training. Overall, the training was fairly minimalist, though attempts were made to simulate realism such as the use of live ammunition. There was a basic attempt at these centres to improve combined arms operations, particularly enhancing the role of tanks. During this process, little of the knowledge diffusion attempts occurred via lectures or officer socialization, rather the emphasis was on fostering an atmosphere of 'learning by doing'. There was also a further attempt to improve tank destroyer effectiveness during these training preparations.[304]

The fighting that followed the September 1943 landings was grueling and slow moving. Rather than engaging in a rapid advance relying on mechanization and mobility through Italy, U.S. forces found themselves locked into a fairly static attritional slog against a well-entrenched and determined German defending force The character of the combat in Italy was driven by two primary factors: first was the Germans use of pre-established defensive lines designed to wear down any offensive action from the allies; and second, was the terrain of Italy was full of mountains, narrow and winding roads, hills and valleys. This was not a situation that was conducive for the widespread utilization of armor in combat, as mass numbers of tanks physically could not operate in large numbers together throughout much of the campaign, nor could they effectively operate on terrain such as mountains. One of the earlier major engagements during the mainland Italy campaign was the Battle of San Pietro Infine, which occurred in a small mountain town in December 1943. The Battle at San Pietro Infine illustrated the severe constraints that the natural terrain of Italy was placing on U.S. combined armed operations, as the attempts to use tanks to spearhead the breakout failed due to the Germans having the high ground paired with well placed anti-tank defences which inflicted heavy causalities. Instead, the U.S. won at San Pietro due to the efforts of its infantry.[305]

By the spring of 1944 the Army finally had the opportunity to engage in major armor centric combined arms operations in Italy for the first time. U.S. forces had undergone another amphibious landing in January 1944, but found themselves bottled up for months by defending German forces; this changed in May when a breakout occurred at Anzio which would eventually cumulate with the liberation of Rome. This breakout was spearheaded by tanks of the 5th Army's

[304] "Fifth Army History: From Activation to the Fall of Naples 5 January – 6 October 1943," Undated, World War II Operational Documents Collection, Ike Skeleton Combined Arms Research Library (hereafter ISCARL), https://cgsc.contentdm.oclc.org/digital/collection/p4013coll8/id/1447/rec/187.
[305] Gabel, "World War II Armor Operations in Europe," 160; Atkinson, *The Day of Battle*, 290, 399-401.

1st Armored Division, fighting in a combined arms approach supported by infantry and the other combat arms; U.S. tanks would help end the static attritional combat that had characterized the majority of the fighting until this point by pushing the Germans back upwards of 250 miles by the end of the offensive. This breakout represented the first major successful armor combined arms attempt of the Army of the war, and was an important step in the Army's armor adaptation process by demonstrating its operational potential.[306] The operational success of the breakout was attributed by officers to the training efforts that had occurred just prior to the offensive, which gave special attention to combined arms and infantry-tank teaming. It was noted during the offensive that the more aggressive combined arms approach had played a decisive factor in driving the breakout. This training involved repeated rehearsals of the opening maneuvers paired with detailed briefings for personnel down to individual tank and infantry commanders; it was stressed that all infantry officers receive direct training experience with tanks during this period.[307] The importance of combined arms during the breakout was identified in service journal articles in the immediate months following the start of the offensive; a *Cavalry Journal* article entitled "Tank Training at Anzio" described the importance of recent developments in tank-infantry-artillery combined arms training, as well as improvements in pre-operational joint planning, in enhancing the combat power of the Army that enabled the breakout to occur. However, it was acknowledged that much work was still needed, particularly when it came to communicating between the different combat arms during combat.[308]

During this period, the Army's service journals were filled with articles by officers continuing to process their campaign experiences and attempting to identify lessons learned for the fighting that was still to come. Colonel Haines argued that tank destroyers had shown their operational limitations, and that they could not be used in a similar way as tanks, which was implicitly a criticism of prewar doctrine which had envisioned a greater role for tank destroyers during combat operations.[309] Lieutenant Richard Gottschall acknowledged that the Italian terrain, particularly its mountains, had acted as a major constraint on any sort of armor adaptations, or

[306] Headquarters, Mediterranean Theater of Operations, "Training Memorandum Number 2: Lessons From the Italian Campaign," March 1945, 6-12, World War II Operational Documents Collection, ISCARL, https://cgsc.contentdm.oclc.org/digital/collection/p4013coll8/id/4676/rec/18.
[307] Lt. Gen. Jacob L. Devers, "Tactical Notes from the Italian Campaign," *Military Review* Vol. XXIV, No. 7 (Oct 1944), 3-8.
[308] Msg. Robert C. Geaks "Tank Training at Anzio," *The Cavalry Journal* Vol. LIII, No. 4 (Jul-Aug 1944), 24-25.
[309] Col. Peter C. Haines, III, "Employment of Tank Destroyers," *The Cavalry Journal* Vol. LIII, No. 3 (May-Jun 1944), 60-69.

even the ability to practice mechanized warfare in any sort of idealized fashion. Gottschall advocated that whenever possible, combined arms approaches to operations be followed rather than any disjointed usage of the individual combat arms.[310]

More senior officers, such as Lieutenant General Jacob Devers, identified the experiences of the Italian campaign as contributing to the Army's ability to learn lessons about combat effectiveness, noting that "the Italian Peninsula has been a fertile ground for the testing of tactical principles in combat. Of outstanding significance has been the wide experience in the integrated and supporting action of the several combined arms and services".[311] Jacob went on to write that, "[a]nother major lesson which has been applicable throughout the entire campaign has been the need for a higher level of proficiency in infantry-tank cooperation".[312] Other articles, such as "The Scope of Employment of Armored Forces – Tactics and Conduct", echoed that sentiment, noting that combined arms by this point in the war had clearly demonstrated its importance to combat effectiveness; however it also projected many traditional sentiments towards armor, as tanks should not be used for breakouts, rather they should be used during the exploitation phases of operations, and that tanks should avoid direct confrontations against enemy tanks, rather that task should be left for tank destroyers.[313] Thus, while it was clear that adaptation progress was being made among many officers, there remained many strong tenants from pre-war doctrine embedded in how they viewed operations. Tanks were starting to play a more advanced role in combined arms operations, and indeed, combined arms was viewed as key to battlefield success among many officers, yet the specific role of armor in that process remained up for debate.

Official lessons learned reports for the Italian campaign were produced by theatre headquarters in order to diffuse its lessons with the stated intent of influencing future doctrinal development and to enhance the fighting power of the Army for the rest of the war. The introduction to the primary report stated that "it is believed that the lessons and examples they contain will be of value in the training of units and individuals who have not yet entered combat, and also to those who have yet to experience combat under the conditions peculiar to the phases

[310] Lt. Richard K Gottschall, "The Mountain Goat, M-4," *The Cavalry Journal* Vol. LIV, No. 1 (Jan-Feb 1945), 29-33.
[311] Devers, "Tactical Notes from the Italian Campaign," 3.
[312] Devers, "Tactical Notes from the Italian Campaign," 4.
[313] "The Scope of Employment of Armored Forces – Tactics and Conduct," *The Cavalry Journal* Vol. LIII, No. 4 (Jul-Aug 1944), 29-34.

of the Italian Campaign".[314] The report stated the primary lesson learned of the campaign was that tightly integrated cooperation among the combat arms was integral to winning on the battlefield. However, it noted that much of the campaign had demonstrated a failure to achieve this, which in turn had hampered the combat efficiency of the U.S. forces and constrained their ability for rapid advance. The report also stated that "when the deficiencies in the inter-arm teamwork were corrected, the results were outstanding in success".[315] Ultimately, the Army's combined arms adaptations remained a work in progress; combat experience was leading to gradual improvements in the Army's combat power, there was much work still to be accomplished. This was particularly true concerning its more technical elements, such as severe problems with the communication system between tank and infantry commanders during campaign as radio system effectiveness remained inconsistent.[316]

The Italian campaign represented a continued step forward for the Army's armor adaptations, but was far from the conclusion of the process. For much of the hostilities in Italy, armor would remain on the periphery of operations, which fundamentally prevented any sort of rapid continued evolution in armored operational methods. Nonetheless, the campaign was an educative experience for the Army and its officers, as at the broadest level it presented more data to be analyzed to figure out best practices. The Army was able to analyze the various lessons learned regarding combined arms during the campaign to gain a deeper understanding towards what ultimate changes would likely need to occur; this process was eagerly participated in by a mix of junior and midlevel officers, as well as their senior leadership. Midlevel officers in particular were growing in their veteranship; they had understood via their experiences that further adaptations were needed and would go on to disseminate their experiences during the rest of the war, into even the post-war period.[317] However, some midlevel officers who served as tank commanders felt that they had not been challenged during the campaign, that there was a feeling of being "unemployed" due to the lack of battlefield engagements.[318] Clearly, the Army needed further time and space to flesh out how its understanding of armor had changed.

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[314] Headquarters, Mediterranean Theater of Operations, "Training Memorandum Number 2: Lessons From the Italian Campaign," 2.
[315] Headquarters, Mediterranean Theater of Operations, "Training Memorandum Number 2: Lessons From the Italian Campaign," 18.
[316] Headquarters, Mediterranean Theater of Operations, "Training Memorandum Number 2: Lessons From the Italian Campaign," 33.
[317] Barry, *Battalion Commanders at War*, 117.
[318] Howze, *A Cavalryman's Story*, 84.

The Second World War: Northern Europe

The Western Allies launched Operation Overlord on 6 June 1944, making a series of amphibious landings across the English Channel on the beaches of Normandy that was paired with a massive airborne assault.[319] At the time of the invasion, the Army still had not completed its adaptation process with armor and combined arms. The Army had learned during the North African campaign that its prewar doctrine was ill-suited to the complexity of contemporary warfare and that its understanding of how armor and mechanized forces should be employed on the battlefield was severely lacking in comparison to the Wehrmacht's doctrine. The Italian campaign had furthered the Army's ability to learn more about the changes that needed to occur in order to improve combat effectiveness, yet few formal changes had occurred. A month prior to the invasion of France the Army published an updated capstone doctrine, *FM 100-5*, that sought to incorporate some of the experiences of the early war, along with changes in certain technologies in relation to things like airpower. However, this publication largely echoed, albeit to a diluted degree, the sentiments of the previous doctrine in that the key pillars of combined arms were identified as the infantry and artillery, and mechanized forces remained essentially a peripheral branch in the process.[320] Rather, it would be the fighting in France that would spearhead the final part of the adaptation process, as operational difficulties would force the Army to finally develop a modernized role for armor in combined arms.

After the Allies had successfully fought their way off the Normandy beaches, they had difficulty penetrating deeper within the French countryside. The U.S. Army was contained by a mix of physical terrain, and competent German defences. The terrain was characterized by swamplands that were then subdivided into a series of hedgerows or *bocage*, which were a series of earth walls that were thickly covered in trees, vines and bushes. These walls divided a series of differently shaped smaller farmers' fields. The German army was well imbedded in defensive entrenchments in and around the hedgerows. At the tactical level, the hedgerows presented the German defenders a highly advantageous position as they had depth, protected flanks, and natural camouflage. The weather during this period was also a problem for any offensive action,

[319] For an overview of Overlord and Operation Neptune see, Peter Caddick Adams, *Sand and Steel: The D-Day Invasion and the Liberation of France* (Oxford: Oxford University Press, 2019).
[320] War Department, *FM 100-5 Operations* (Washington, DC: Government Printing Office, May 1944).

as the rain, mist and fog helped to further obscure the position of the Germans. This situation posed a massive strategic, operational, and tactical challenge to the U.S. Army, essentially the very fate of the campaign was a stake and being held up by these French hedgerows.[321]

Several factors exacerbated the operational challenge of the German hedgerow defences. Army planners had largely failed to undertake the necessary pre-operational planning for the unique physical challenges that Army units would face beyond the beaches.[322] Further, a significant portion of Army personal deployed as part of Overlord had no prior combat experience. Thus, in many ways, a significant share of the officers in France were new to the adaptation process, and were learning on the go some of the experiences in combined arms that others had already experienced during the earlier campaigns.[323]

The fighting in the *bocage* was a sudden and extremely blunt lesson for the Army that many of their earlier operational methods were no longer effective at dealing with these newer challenges. The prewar bias for infantry-artillery teaming for fire and maneuver efforts was continuously unsuccessful at dislodging the determined, and well dug in German defenders. During the early attempts to clear out the hedgerows, there was little in the way of combined arms coordination among Army units. Infantry units found themselves often alone, and thus exposed to German machine gun fire, hindering their ability to advance. U.S. tanks failed at several attempts to advance during the early fighting, often unsupported by infantry, and found that the compartmentalized structure of the hedgerows terrain constrained the tanks from utilizing mobility and firepower; the narrow barriers of the hedgerows made the tanks vulnerable to German 88mm anti-tank guns. The inexperience of Army units also meant that armor and infantry officers had minimal experience coordinating with one another; the relationships had to be built from the ground up on the battlefield.[324] A substantial constraint on attempts to better coordinate combined arms when trying to breakout from the hedgerows was inconsistency in radio communications between infantry and tank commanders; during this dysfunction, units would often use different radios which had difficulty connecting to one another.[325]

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[321] G-3 Division Supreme Headquarters Allied Expeditionary Force, "Employment of Tanks and Infantry in Normandy," *Military Review* Vol. XXIV, No. 9 (Dec 1944), 13-17; Mansoor, *The GI Offensive in Europe*, 142.
[322] Weigley, *Eisenhower's Lieutenants*, 127.
[323] House, *Combined Arms Warfare in the Twentieth Century*, 167.
[324] Doubler *Closing with the Enemy*, 42-45.
[325] Mansoor, *The GI Offensive in Europe*, 163.

In response to the severity and breadth of the challenges posed by the German hedgerow defences, Army officers began to undertake a series of ad hoc adaptations that would eventually cumulate into significant shift in how they conducted combined arms operations. A core part of this process was junior and midlevel armor and infantry officers working together to improve armor-infantry teaming. Central to this was the trend of Sherman medium tank equipped units developing stronger relations and bonds with infantry counterparts. The medium tanks at this point in the war had demonstrated their operational relevancy ahead of light and heavy tanks due to their mobility but also firepower. Bonds were formed between armor and infantry via continued combat experience; tankers began picking infantry up to help move them, and would work closer together during staging areas prior to assaults. This was all part of an active effort among officers to work in closer coordination.[326] Officers debriefed during combat interviews in France following the Normandy landings highlighted the importance of the adaptation efforts during the hedgerow fighting. Here, tactical approaches were developed, where infantry would attack German anti-tank guns positioned in the hedgerows by using their small arms and flanking maneuvering; essentially infantry would begin an attack knocking out the German defences protecting the anti-tank guns, then the anti-tank guns themselves. Following this, U.S. medium tanks could follow-on with an assault, using their main guns to pound German embedded defensive positions thus providing the infantry with direct fire support. This was highly effective at clearing out the German defenders.[327]

The adaptation process being undertaken by Army officers fighting in and among the *bocage* was in part the result of small unit integration and socialization among armor and infantry units. As units spent more time fighting together, as well as eating, living, and overall spending time with one another, trust began to develop which led to better coordination during operations.[328] The Army's combined arms adaptations in France was the result of a vectored bottom-up driven process. The Army during this period, while facing the threat of defeat, encouraged debate, experimentation and the exchange of ideas among the frontline officers, who were lieutenants, captains, majors, and colonels. The ideas that concerned new operational methods that gained enough traction among the junior and midlevel officers would flow up the

[326] "Combat Interviews, 69th Battalion, 6th Armored Division," 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, National Archives and Record Administration, College Park, MD. Hereafter, NARA.
[327] "Combat Interviews, 69th Battalion, 6th Armored Division," 2.
[328] Weigley, *Eisenhower's Lieutenants*, 126.

chain of command, where senior officers would review and disseminate the best ones and reject the others. This dissemination also occurred via the distribution of after-action bulletins and reports, that were not explicit orders to reform, but rather the sharing of information so that other midlevel officers could analyze them and then if relevant use them to help their own operations.

As a result of these changes, as infantry and tankers worked together, it was discovered that establishing an ad hoc bumper device to the front of tanks would also allow Sherman's to clear out many of the physical obstacles of the terrain, allowing follow on infantry to advance through the cleared gaps.[329] In a *Military Review* article, published by senior command to promote the combined arms adaptations, described the infantry-tank teaming process as tanks providing cover and delivering fire support, while "the infantry kept abreast of the tanks and protected them from hostile infantry armed with antitank grenades or rifles. The infantry also mopped up and, in the absence of other targets, fired at the most likely enemy cover in sight".[330]

Further technical adaptations included changes to the communications system, such as installing external telephones on the rear of tanks, so that infantry officers had the ability to directly communicate with tank crews without having to rely on problematic radio issues. As these smaller units began to adapt, so did larger units, even at the divisional level such as the 6th Armored Division. The larger unit changes tended to go beyond just tank-infantry teaming to incorporate the wider aspects of combined arms, including engineering and artillery. Artillery and mortars pinned down enemy units, while engineers would clear out physical obstacles while the tank-infantry teaming would jointly advance, each protecting one another from different threats.[331] The end result of these changes was the Army finally being able to conduct combined arms in a manner on par, or even better than any other country at the time. The adaptations led to a considerable increase in the fighting power. Overall, this adaptation process was marked by limited centralization. Experimentation had been encouraged, and the best practices later disseminated so others could benefit.

The Army's armor and combined arms adaptations progressed, so did the organization's fighting effectiveness. This allowed the Army in July 1944 to eventually breakout from the

[329] Doubler, *Closing with the Enemy*, 49, 60, 64.
[330] G-3 Division Supreme Headquarters Allied Expeditionary Force, "Employment of Tanks and Infantry in Normandy," 16.
[331] "Combat Interviews, Capt Walt Smith, 49th Tank Battalion, 6th Armored Division," 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA; House, *Combined Arms Warfare in the Twentieth Century*, 138.

hedgerow defences that had contained them since landing in Normandy. Here the First and Third Armies leaned on combined arms and mechanization to drive their columns forward, pushing the Wehrmacht forces back across France, bringing the fighting from the countryside into urbanized terrain. The breakout began with Operation Cobra, where tank-infantry teams, following an extended period of joint field training and trust building, spearheaded the offensive. What separated these operations from the earlier hedgerow fighting was that they were focused on mobility and maneuver across wider terrain, rather than ranged attritional combat within a contained space.[332]

The Army's combined arms adaptations had at this point were being diffused up from smaller frontline forces which was starting to directly and positively impact the combat effectiveness of units across the front. These adaptations allowed units to push through the hedgerows, rupturing the German lines. Once more in open ground, the Army was able to engage in deep penetration sweeps by forming mobile columns that continued to push and pursue the Germans at a rapid pace. U.S. armor was able to lean into its strengths of mobility and firepower, which were close supported by infantry and artillery units, as well as airpower. The Army was able to thus finally practice combined arms to their maximum effect.[333] The success of the adaptations during the process of the breakout, and in subsequent operations can be demonstrated by the operational outcome, where the Army was able to advance over huge swaths of territory as a result. Further, junior and midlevel frontline officers, the men tasked with carrying out the operations, felt that there had been a successful organizational shift. These officers, such as Captain McMahon of the 4th Armored Division, or Major Goodin of the 6th Armored Division, reflected in after action reports about how much better they were at coordinating offensive action among different units.[334]

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[332] Weigley, *Eisenhower's Lieutenants*, 156.

[333] For discussions of the successful combined arms centric engagements during the process of the breakout, see "Combat Interviews, Capt. McMahon Narrative of the Advance of the 37th Tank Battalion, 4th Armored Division from Vic Raids to Lorient, 27 July-9 Aug," 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA; "Combat Interviews, Combat Command A, Action: the Normandy Breakthrough," Jul 1944, Box 19074, WW2 Operational Reports 1941-1948, RG 407, NARA.

[334] For examples of officers reflecting positively on improved combined arms capacity of the Army in France see, "Combat Interviews, Maj Goodin, 6th Armored Division," Aug 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA; "Combat Interviews, Capt. McMahon Narrative of the Advance of the 37th Tank Battalion, 4th Armored Division from Vic Raids to Lorient, 27 July- 9 Aug"; "Combat Interviews, Capt Charles J. Stauber, 8th Tank Battalion, 4th Armored Division, on action from Raids to Lorient, 28 Jul to 14 Aug," 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

In an article published following the breakout in the *Military Review*, Colonel Leo Connor discussed the developments with Tank and Infantry units, arguing that the origins of the adaptation can be traced all the way back to the earlier fighting in the Mediterranean theatre. Colonel Connor described the process of combined arms as, "[t]hroughout the attack the infantry, the tanks, and the artillery must function as a team. The tanks capture the successive objectives. Its attached infantry take over these objectives, covers its reorganization, and accompanies its forward to assist it where conditions are unfavorable for tanks".[335] The Army had at this point, evolved well beyond its prewar doctrine, which had fixated on infantry-artillery teaming as the core element of its operational methods, towards one in which armor was now playing a leading role.

Following Cobra and the Allied breakout in France, one of the next major operations became known as the Lorraine campaign, where, starting in September 1944, the Third Army pushed the Germans back between the Moselle and Sarre Rivers in Northern France. At this point, the Army was well underway in terms of its armor and combined arms adaptation. The organization at this point had accepted that the adaptations were ongoing, and were essentially focused on refining the process. By this point in the war, junior and midlevel officers had frequently found prewar doctrine lacking, and not at all suited to the tactical and operational challenges that they found themselves facing in France. For example, despite prewar doctrine's assertion that armor had little role to play in defensive operations, officers found that in fact tanks could make a positive impact in countering German armor counter-attacks.[336] Midlevel officers, such as Captain Eugene Bush of the 4th Armored Division, and Colonel H. C. Davall of the 6th Armored Division, continued to reiterate in after action reports and interviews the newfound orthodoxy that armor centric combined arms was the key to achieving operational success in driving out German defenders.[337]

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[335] Col. Leo. B Connor "The Employment of Tanks with Infantry," *Military Review* Vol. XXIV, No. 5 (Aug 1944), 6.

[336] Lt. Robert M. Batley "Mechanized Cavalry Group in Defense," *The Cavalry Journal* Vol. LIV, No. 5 (Sep-Oct 1944), 10-12.

[337] For examples of the officer sentiments towards combined arms operations following the breakout see, "Combat Interviews, Capt. Eugene A Bush, 4th Armored Division, Action at Hill 318," Sep 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA; "Combat Interviews, Lt. Col. H.C. Davall, 68 Tank Battalion, 6th Armored Division Lorraine Campaign, Nov-Dec 1944," June 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

During after action interviews of the Lorraine campaign, officers described combined arms as unfolding as business as usual for the Army. By the fall of 1944, armor centric combined arms was on its way to becoming a SOP for Army units in major combat situations, including complex operations such as river crossings. These combined arms operations continued to be spearheaded by Sherman-infantry teaming. However, a constant danger for U.S. tanks during the offensive remained German 88mm antitank guns, which gained a fearsome reputation among U.S. forces; U.S. infantry squads attached to tanks were very sensitive to their presence and would immediately seek to disable them whenever possible, allowing the tanks to continue the advance.[338] During engagements where tanks were unavailable or unable to fight along with infantry, it was assessed that those infantry unit's fighting power severely reduced.[339] However, operations on more open ground, where tanks could maximize their mobility, showed that assaults could to be incredibly effective as tanks could use speed to overrun enemy defensive lines, while supporting infantry continued to protect them against anti-tank defences as well as mopping up remaining defenders.[340]

The other major doctrinal deficiency that had been discovered by the fighting in France up to this point, was that U.S. tanks could in fact be highly effective at destroying German Panzers. The mobility of Sherman tanks made them far superior to the slower, less mobile tank destroyers during offensive operations. Given the rapid pace of the offensive in Lorraine, and elsewhere, Sherman's were the best fire support that could keep up with infantry, meaning that they were thus needed to take on Panzers, rather than waiting for the slower tank destroyers to catch up.[341]

An official report of the operational impact of the Lorraine campaign was compiled by Captain Delo Dayton and Second Lieutenant Gordon Harrison, which discussed engagements from the 4th Armored Division, which was selected for the study as its experiences were seen as typical of the average armored unit. This report was written and distributed in order to diffuse lessons of the campaign. Thus, the report represented lessons accumulated by junior and

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338 "Combat Interviews, 6th Armored Division Lorraine Campaign: Fighting around Berlise Seille and Nied River Crossings," 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
339 "Combat Interviews, Maj Walter. G. Smith, 69th Battalion, 6th Armor Division, Lorraine Campaign, Nov 1944," June 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
340 "Combat Interviews, Task Force Forrest, 6th Armor Division, Lorraine Campaign, Nov-Dec 1944," May 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
341 Headquarters, 4th Armored Division, "After Action Report, November 1944," Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

midlevel officers, which were then approved of by senior officers which then allowed their distribution. The central theme of the analysis was the importance of infantry-tank teaming within a combined arms framework; especially during urban and village based operations. Further, the report found that tanks were seen as the best defensive option against German tank attacks.[342]

The Battle of the Bulge fought during December 1944-January 1945 in and around the Ardennes, further demonstrated the outputs of the Army's combined arms adaptations during defensive fighting. The battle, also known as the Ardennes Offensive, was the last major German offensive action of the war.[343] During this engagement, as with the rest of the fall of 1944, the Army continued its process of learning and adapting in a fairly decentralized process. From smaller units to divisions, officers across the organization were granted a degree of leeway to utilize their best decision making and ingenuity, based on the operational challenges and experiences they encountered to adapt and change when needed. The German offensive in the Ardennes was characterized by the Wehrmacht's combined arms approach to operations, and U.S. units needed to respond in kind. During defensive engagements, as well as the follow-on counter-attacks, the U.S. focused on tank-infantry teams supported by artillery and air support.[344]

By this point in the campaign, Army officers were fully aware of the defensive importance that tanks could play. For example, during an engagement near Bastogne on 5 January 1945, officers from the 69th Tank Battalion of the 6th Armored Division were able to observe and identify tactical patterns of German forces, such as how they positioned and maneuvered their infantry and tank units. In order to counter this, Colonel Chester Kennedy devised a defensive approach to stop the next German advance that was centered on the role of medium tanks. Colonel Kennedy placed his medium tanks in a concealed position, waited for the enemy advance to begin and then maneuvered his tanks up a nearby hill in order to maximize their firepower against the advancing German panzers; while this occurred, he sent his light

[342] History Section, European Theater of Operations "Battalion and Small Unit Study No. 8," 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[343] For an overview of the battle and U.S. Army's experiences see, Harold Winton, *Corps Commanders of the Bulge: Six American Generals and Victory in the Ardennes* (Lawrence, KS: Kansas University Press, 2007).
[344] Headquarters, 4th Armored Division, "After Action Report Relief of Bastogne," Dec 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

tanks and supporting infantry under his command to bypass the German armor in order to overrun their infantry.[345]

During the main U.S. counter-attack through Bastogne, the U.S. combined arms operational method continued to learn lessons. For example, a Captain B. P. Ezell noted that infantry units supporting tanks during the battle learned to prioritize eliminating German infantry armed with 'bazookas' (*panzerfaust* anti-tank weapons) due to the rising threat they posed to U.S. armor. This was part of the wider symbiotic relationship that U.S. infantry were forming with tanks, with each branch learning to support one another to maximize operational effectiveness.[346] Other midlevel officers also learned that tanks were very effective during urban combat. Here, US forces learned to use the heavy firepower support from a tank's cannon to destroy German troops that were heavily entrenched in buildings or rubble, allowing infantry to mop up remaining resistance.[347] Overall, the perception of many midlevel officers during the fighting in and around Bastogne was that the Army was carrying out combined arms warfare at a highly effective degree. A captain from the 47th Tank Battalion referred to its approach to combined arms at this point in the war as being at the level of "perfection"[348].

The Army's offensive towards the German defensive Siegfried Line, followed by the breakout into the German heartland was the final representation of the Army's combined arms adaptations in battle until the eventual German surrender in May of 1945. Like with other campaigns in France, participating units underwent specific training, in this case at the divisional level, for multiple weeks during the early fall of 1944 in anticipation of the drive to the Siegfried Line; this training included building simulated models of the German defence entrenchments to better allow for combined arms coordination. Part of this training process was to stimulate conceptual thinking about the forthcoming operational challenges, noting that of the training "the chief value was to get officers and men thinking about the problems".[349] As the assault on the Siegfried Line was underway, armor was playing the leading role in the combined arms assault

[345] "Combat Interviews, 69th Tank Battalion, 6th Armor Division, Action of Bastogne 31 Dec – 13 Jan," 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[346] Headquarters, III Corps, "Combat Interview, Description of Action Relief of Bastogne, 8th Tank Battalion, 4th Armored Division," Jan 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[347] "Combat Interview, Relief of Bastogne, 35th Tank Battalion, 4th Armored Division," Feb 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[348] Sorley, *Thunderbolt*, 76.
[349] "Miscellaneous notes for future operations picked up in visits to the 4th Armored Division," Oct 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

on the German positions, with engineering units first and foremost aiming to clear anti-tank defences such as dragons teeth, craters and mines as quickly as possible in order to prevent the advance from being stalled for significant periods of time. At this point in the war, pre-war doctrinal legacies of the infantry-artillery teaming playing the leading role for any offensive situation were clearly no longer relevant.[350] Light tanks which had played a much larger role during the start of the war had declined significantly in terms of organizational relevancy; during this part of the war, they were often used to move men and supplies across the battlespace, as well as helping to rescue wounded soldiers more so than any sort of direct combat role against the enemy, other than serving the role of traditional cavalry screens on the flanks of Army units.[351] Overall, the fighting near the Siegfried line further enhanced and confirmed the combined arms lessons of earlier campaigns.

By the winter of 1945, officers were publishing articles in the *Cavalry Journal* reflecting on the experiences of armor in France and Germany during the previous fall. Captain Donald Dupree, a tank commander, discussed U.S. armor operations in and around Berg, France. Captain Dupree noted that improved communications were essential to enhancing coordination and thus combat effectiveness. Dupree also discussed tactical lessons learned by tankers in France, such as making better use of natural terrain for concealment purposes, which would also lead to a reduction in losses in combat.[352] Another article, "Armor and Its Place in the Future" by Major John North, discussed the wider implications of the war on the role of armor in the U.S. military. Major North noted that the combat in Normandy had not conformed to pre-war expectations about how tanks should be used in warfare, but rather fighting from North Africa to France had clearly demonstrated that the biggest impact that armor had on fighting power was when it operated in a combined arms approach to operations. North also noted that the adaptations that had shaped tank-infantry teaming had allowed the Army to overcome many challenges from the Germans, including their use of anti-tank guns.[353] Thus, as the final months of the war unfolded, armor officers realized the dramatic impact that changes in how armor was

[350] "Combat Interviews, Engineers in the Siegfried Line Penetration Combat Command "B"," 3rd Armored Division, 12-22 Sept 1944," Box 19075, WW2 Operational Reports 1941-1948, RG 407, NARA.
[351] "General Information Obtained from a Visit at CCB Headquarters, Cutting, France," 9 Dec 1944, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[352] Capt. Donald J. Dupree, "Berg, France – A Tank Company in Support," *The Cavalry Journal*, Vol. LIV, No. 1 (Jan-Feb 1945), 25-26.
[353] Maj. John North "Armor and Its Place in the Future," *The Cavalry Journal*, Vol. LIV, No. 1 (Jan-Feb 1945), 2-4.

used during war, and began the process of promoting pro-armor ideas and laying the groundwork for pro-armor advocacy networks to form to further institutionalize the lessons of the war.

The final engagements of the war against Germany demonstrated the full effect of the previous combined arms adaptations. Even during urban combat situations, which had proved to be a considerable new challenge for Army units during the earlier phase of the liberation of France, by 1945 were now a routine procedure. An after action interview with Colonel John Cole of the 5th Armored Division described assaulting the German town of Rheindahlen as a well coordinated combined arms affair, where artillery and air support softened up German defenders, followed next by a tank assault opening up more holes in the defensive lines and pinning the enemy down via direct fire, finally follow-on supporting infantry mopped up remaining resistance. Colonel Cole described the Rheindahlen assault as being "the most beautiful piece of artillery, tank, plane, infantry cooperation I have ever seen".[354] Midlevel officers such as Lieutenant C. L. Miller and Major R. S. Lawry of the 3rd Armored Division reflected on the capture of Bergerhausen, where they described Army tank-infantry teaming as unfolding in a highly effective manner. As Army units entered Bergerhausen, they swept the town clean by moving in and among the housing and buildings as tanks moved closely alongside infantry, firing into occupied buildings while infantry drove out any remaining defenders.[355]

The only major constraint on combat effectiveness for the Army by the end stage of the war was when fresh units were brought to the front lines, as veteran officers expressed concerns about the newcomer's ability to function as seamlessly in a combined arms framework. These new units did not have time to socialize with officers from other branches, and essentially had to learn the adaptations in coordination and combined arms from the bottom up.[356] In order to offset the constraints of fresh troops being brought into the front, the Army published in April 1945 a new training manual for Armored units, *FM 17-15 Combat Practice Firing, Armored Units* which placed an emphasis on tank-infantry teaming during training exercises.[357] The only other

[354] "Combat Interview, CCB Staff, 5th Armored Division, Action near Rheindahlen Germany," February 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.
[355] "Combat Interview, Lt Col. C. L. Miller and Maj. R. S. Lawry, 2nd Battalion, 43nd Armored Regiment, 3rd Armored Division, Action near The Boer to the Rhine River," February-March 1945, Box 19076, WW2 Operational Reports 1941-1948, RG 407, NARA.
[356] "Combat Interview, Maj. R. M. Rogers, 2nd Battalion, 3rd Armored Division, Action the Roer to the Rhine," February 1945, Box 19076, WW2 Operational Reports 1941-1948, RG 407, NARA.
[357] War Department, *FM 17-15 Combat Practice Firing, Armored Units*, (Washington, DC: Government Printing Office, Apr 1945).

constraint on Army combined arms at this point in the war was logistics, often an unit's advance was so rapid and deep that it disrupted access to gasoline, however units quickly overcame this constraint by simply carrying up to six days' worth of gasoline and supplies with them as they fought.[358]

However, the majority of Army operations over the final few weeks of the war against Germany demonstrated the effectiveness of combined arms, which at this point was now finalized as a SOP for the Army during major combat operations. No longer was armored centric combined arms an exception to how the Army fought, rather it represented the Army's main operational approach.[359] For example, the 3rd Armored Division's fighting during the Ruhr pocket, highlighted in the words of Brigadier General Doyle Hickley, "something of a classic in the use of armor".[360] During these final weeks, engagements in which the Army was able to utilize a full spectrum of combined arms tended to end decisively in a U.S. victory, such as the capturing of Altenkirchen, or crossing the Rhine river; while engagements in which a combat branch, particularly the infantry, had to fight in isolation, the Army faced considerable more difficulty. The Army's way of war, by the end of the Second World War, was now defined by its use of combined arms in which armor played a leading role.[361]

The Army's way of war had fundamentally changed by the end of the conflict. The organization first approached combat with an operational hypothesis that was quickly disproven during difficulties in the early war period. The North African campaign was a stark demonstration that the Army's understanding of combined arms was highly disjointed and well below the standard being used by their enemies. This was the first step in the learning process towards changing the organization through a wartime adaptation process. The Sicilian and mainland Italian campaigns furthered this adaptation process, however, several constraints,

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[358] "Combat Interviews, Lt. Col. James C. Boggs and Maj. William B. Ravene, 6Th Armored Division, Action of the drive from Rhine to Mulde River, 25 March- 15 April 1945," Apr 1945, Box 19079, WW2 Operational Reports 1941-1948, RG 407, NARA.

[359] For example, see "Combat Interview, Lt. Col. Hal C. Pattison, Crossing of Kyll to Chemnitz Germany, 4th Armored Division," Mar-April 1945 Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA

[360] "Combat Interview, Brig Gen Doyle Hickey, 3rd Armored Division, Action of Remagen Bridgehead to Mulde River," April 1945, Box 19076, WW2 Operational Reports 1941-1948, RG 407, NARA.

[361] For an example of a description of individual branches fighting in isolation see, "Combat Interview, Lt. Col. F. B. Butler, 5th Armored Division, Wallendorf Action 16-22 1944," Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA; for another example of combined arms coordination leading to success during the final weeks of the war in Europe see, "Combat Interview, Capt. J. Fred Gehman, Task Force Welborne, 3rd Armored Division, Action of Remagen Bridghead to Mulde River,"April 1945, Box 19076, WW2 Operational Reports 1941-1948, RG 407, NARA.

particularly driven by the terrain of the theatre, prevented the Army from finalizing the adaptation during this part of the war. It was not until the invasion of France, where early difficulties spearheaded the Army's drive to complete its adaptation in combined arms. This was ultimately a highly successful process, that helped lead to the liberation of France and the surrender of Nazi Germany.

The Post-War Era

With the final surrender of the Nazi Germany in May of 1945, and Japan a few months later, the Army found itself immediately in a hostile strategic position. The bulk of the Army's overseas deployed forces remained in Europe. The alliance that had won the war would quickly splinter, and those Army units were now opposite several million Soviet troops and tens of thousands of tanks. While there was no immediate indication that a new war would breakout, the looming challenge of the massive Soviet conventional military power could not be ignored. The split occupational zones in Germany had also placed Army units within a stone's throw away from their Soviet counterparts.[362] During this tense period, the Army was forced to deal with a multi-headed challenge of mass demobilization and the brain drain that it caused, while also attempting to maintain a state of readiness for any potential future war, and ultimately process the lessons of its recent combat experiences.

The officers of the Army who had served in North Africa and Europe began reflecting on the impact of the fighting, even as their counterparts in the Pacific Theatre were still finalizing the defeat of Japan. In June of 1945, prior to the Japanese surrender, Lieutenant Colonel H. C. Davall, of the 6th Armored Division described tank-infantry teaming in a report as essentially representing the primary SOP of the Army during the fighting against Germany. Colonel Davall noted that over the course of the war combined arms had become more streamlined and readily understood by the wider officer-corps among different units.[363] As the post-war period continued, combat reflections would occur via a mix of formal reports endorsed by senior officers, and informal networking by junior and midlevel officers.

[362] Steven T. Ross, *American War Plans 1945-1950* (London: Frank Cass, 1996), 4.
[363] "Combat Interviews, Lt. Col. H.C. Davall, 68 Tank Battalion, 6th Armored Division Lorraine Campaign, Nov-Dec 1944," June 1945, Box 19077, WW2 Operational Reports 1941-1948, RG 407, NARA.

In June 1945, the headquarters of U.S. forces in Europe established a General Board to develop a series of reports that analysed the experiences of U.S. forces during the combat in Europe. These reports were intended to review and disseminate the main lessons learned of the war against Germany and Italy.[364] One of the main reports analysed the experiences of tank units in combat, as well as the equipment they used. One of its central findings was the importance of infantry-tank teaming, stating that linking tank and infantry units during campaigns was key to increasing operational effectiveness. This report observed that for tank companies, "[a]fter the first few weeks, it became an accepted practice in all armies to attach the same company whenever possible to the same regiment for all operations, offensive, and defensive"[365] The report goes on to state in favor of combined arms teams that, "[i]n modern warfare the combat team has become the keystone of all successful operations. The complexity of new weapons and the limitations of each gives a complete interdependence of them on others to attain efficiency. Nothing is more helpless than a lone tank without artillery or infantry support."[366] The armor report concluded that, in future, tanks should be used whenever possible alongside infantry units. Further, it confirmed that tank destroyer units were no longer needed, and that tanks were more than capable of carrying out their roles. It recommended that future tank development have the necessary armament to be able to pierce the armor plating of any foreign tank within an expected combat range. Further, the report stated a survey of armor officers preferred the medium battle tank above light or heavy tanks.[367]

Junior and midlevel officers quickly began an active discourse in service publications discussing their experiences with armor and wartime adaptations. This process helped build an active network of armor enthusiastic officers in the post-war period. The *Cavalry Journal* was one of the main outlets for these armor centric articles. For example, early tank centric articles included Major Norman Marlov's, "The Relief of an Armored Division", and Captain Carl Selts' "Communications in Combat" in January of 1946; both these articles detailed operational and tactical armor experiences and challenges during the war, such as the best practices of

[364] "Organization, Equipment and Tactical Employment of Separate Tank Battalions," Report of the General Board, United States Forces, European Theater Study No. 68 (Bad Nauheim, Germany: The General Board, U.S.F.E.T, 1945), ISCARL, https://carlcgsc.libguides.com/ld.php?content_id=52567752.
[365] "Organization, Equipment and Tactical Employment of Separate Tank Battalions," 4.
[366] "Organization, Equipment and Tactical Employment of Separate Tank Battalions," 6.
[367] "Organization, Equipment and Tactical Employment of Separate Tank Battalions," 12.

communicating with tanks in the midst of combat.[368] However, it was not just armor officers participating in this growing organizational discourse, infantry officers were also active participants. For example, Major Edward Banty published "The Tank Infantry Team in an Armored Division", where he discussed his wartime experiences as an infantryman and stressed the ultimate importance of learning from the combined arms experiences of the Second World War. Major Banty described the importance of building trust and longer term relationships between infantry and armor units that were attached to each other, writing that "[h]ere we have team work at a high level; having lived, worked, traveled, trained, and played together, the officers and men of these battalions more readily understand each other's problems, capabilities, and limitations".[369] Other officers in the *Calvary Journal* promoted specific armor centric adaptations, such as the development of communications systems between infantry and tankers during the fighting in Normandy France. For example, 1st Lieutenant John Haran discussed the development of the interphone system that allowed infantry officers to communicate with tank commanders via an ad hoc attached phone at the rear of tanks.[370]

Midlevel and senior officers also promoted learning from combined arms adaptations in the *Military Review*, a service journal which had a wider audience than the branch specific *Cavalry Journal*. Major General L.S. Hobbs published an article, "Breaching the Siegfried Line", where he discussed his experiences commanding the 30th Infantry Division during the campaign, but spent considerable time discussing how the armor assaults in coordination with infantry as how the U.S. fought. In particular, Hobbs described the overall assault against the heavily entrenched positions as being highly combined arms centric.[371] Major General E.N. Harmon described the Army's combined arms adaptations in his article "Tank-Infantry Action", arguing that tank-infantry teaming was now a natural part of the Army's approach to modern warfare. Harmon also specified that armor had considerable relevancy to defensive operations, noting that "[o]n defense, physical contact between infantry and tanks must be maintained"[372].

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[368] Maj Norman M. Marlov "The Relief of an Armored Division," *The Cavalry Journal* Vol. LV, No. 1 (Jan-Feb 1946), 7-8; Capt. Carl B Selts "Communications in Combat," *The Cavalry Journal* Vol. LV, No. 1 (Jan-Feb 1946), 11-12.
[369] Maj, Edward Banty "The Tank-Infantry Team in An Armored Division," *The Cavalry Journal* Vol. LV, No. 3 (May-Jun 1946), 21.
[370] 1st Lt. John A. Haran, "The Interphone System in Armored Vehicles," *The Armored Cavalry Journal* Vol. LV, No. 4 (Jul-Aug 1946), 24-25.
[371] Maj Gen. L.S. Hobbs "Breaching the Siegfried Line," *Military Review* Vol. XXVI, No. 3 (Jun 1946), 9-14.
[372] Maj. Gen. E. N. Harmon, "Tank-Infantry Action," *Military Review* Vol. XXVI, No. 2 (May 1946), 52-53.

While Colonel E. T. Conley reflected in an article, "The Combined Infantry-Armored Division", that wartime experience had created a new understanding among officers regarding the character of how combat should be waged, writing that "[o]perations in World War II showed a constant desire by infantry division commanders for more armor, and by armored division commanders for more infantry".[373]

Several junior and midlevel officers also published articles reflecting on the lessons learned of specific battles. Lieutenant Colonel H. M. Exton, who was serving as an instructor at the Command and General Staff College in the post-war period, reflected on the experiences of the Second Armored Division during the Cobra campaign. Exton argued that combined arms were essential to the breakout that resulted, and that tanks in particular had played an integral part of the process. Exton noted that tanks had considerably increased the fighting power of U.S. forces in the campaign, but that coordination among the combat arms was essential to campaign success and this was the result of effective communication systems, including the use of radios.[374] Lieutenant Colonel D. M. Oden reflected on the 4th Armored Division's experiences near Bastogne during the Battle of the Bulge. Oden noted the impact of strategic mobility from U.S. armored divisions was massively important to tactical fighting power of frontline forces; the 4th Armored Division was described crossing upwards of 160 miles in just twenty-four hours, which Oden states as being nearly unprecedented in the history of warfare. Overall, Oden demonstrated that the rapid advance of U.S. forces first and foremost came from the barrel of a tank cannon. Essentially, Colonel Oden argued that the Army's way of war had been fundamentally altered in character, but also reflected the traditional preferences for firepower.[375]

Lieutenant Colonel B.S. Cairns described the impact of the operations at Anzio in Italy in their article, "The Breakout at Anzio – A Lesson in Tank-Infantry Cooperation". Cairns noted that a number of wider lessons learned came from the breakout. In particular, they noted the importance of joint operational planning and training, which was key for tank-infantry teaming during the breakout. This joint training made a near immediate impact as it led to the rapid advances during the breakout; during the later stages of the operations, when units became mixed

[373] Col. E. T. Conley, "The Combined Infantry-Armored Division," *Military Review* Vol. XXVIII, No. 3 (Jun 1948), 34-37.
[374] Lt. Col. H. M. Exton, "The 2nd Armored Division in Operation "Cobra"," *Military Review* Vol. XXVII, No. 5 (Aug 1947), 11-19.
[375] Lt. Col. D. M. Oden, "The 4th Armored Division in the Relief of Bastogne," *Military Review* Vol. XXVII, No. 10 (Jan 1948), 39-44.

and matched together in an ad hoc manner where the level of coordination began to drop considerably and with it the combat effectiveness. Cairns describes the fighting of the First Armored Division during the breakout in Italy as a primary case study. Cairns noted that tanks of that division prior to the breakout were also highly successful in defensive fighting against German armor while protecting U.S. forces near the beachhead line.[376] Overall, there remained a consistent discourse among these officers regarding the impact of wartime experience on doctrine within the Army. This narrative helped establish a fairly widespread network advocating for the integration of the lessons learned in combat within the organization.

The network of officers interested in the role of armor in combined arms went beyond the authors of service journal articles. There was an active group of young junior and midlevel officers at the Armored School at Fort Knox who were focused on analyzing the major combat experiences of the Second World War. These officers produced a series of analytical research reports during the late 1940s. The authors of the reports had either direct combat experience during the war, or spent their time socializing and interviewing those officers who had fought in the battles that were being studied. The reports tended to be structured as micro case studies of Armored divisions during battles or campaigns of the previous war. For example, one such report was titled "Armor in the exploitation: The Fourth Armored Division Across France to the Moselle River"[377]. The report was a collaborative project of thirteen officers, including five majors and two captains. Overall it was an attempt to identify core lessons learned and best practices, and then diffuse them to a wider audience. The opening section of the report stated that, "[t]he purpose of this report is to collect all available data pertaining to the advance of the 4th Armored Division from the area of the NORMANDY breakout to the Moselle River, to evaluate the material gathered, process it, and present it in such a form that it can serve as a valuable basis for research, study, and instructional material on the employment of armor in the penetration and exploitation".[378] The report went on to state that the case study was selected because it was " best typifying the employment of armor in the penetration and exploitation thus affording the most fertile territory from which to learn lessons, evaluate principles, and draw

[376] Lt. Col. B. S. Cairns. "The Breakout at Anzio – A Lesson in Tank-Infantry Cooperation," *Military Review* Vol. XXVIII, No. 3 (Jan 1949), 23-32.
[377] "Research Report, Armor in the Exploitation: The Fourth Armored Division Across France to the Moselle River," 1948, Box 8, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA.
[378] "Research Report, Armor in the Exploitation: The Fourth Armored Division Across France to the Moselle River," III.

conclusion that may be applicable to future armored operations".[379] Ultimately, the report cites combined arms adaptations as the main lessons learned of the campaign, "[i]t was learned early in the campaign that the efforts of all combat arms were necessary to reduce enemy resistance with the greatest rapidity and the least number of causalities"[380]

The majority of these reports held similar conclusions regarding what was seen as the most important lessons learned of the Second World War for the U.S. Army. That lesson was of the importance of armor in a combined arms operational method.[381] For example, another report, which covered operations during the final stages of the fighting in Europe was entitled "Exploitation by the 3rd Armored Division – Swine River to Germany" and cited armor-infantry teaming as key to the success of frontline forces.[382] This report was compiled by 14 midlevel and junior officers. One of its central conclusions was that tank-infantry teaming was the core of the Army's combined arms operational success during the war, concluding that, "[a]rmor and infantry ably lead and coordinated, exploited every success to the limit".[383]

These reports also outlined the lessons of failure from the war. For example, the report, "The 1st Armored Division at Faid-Kasserine", confirmed that the operational difficulties during the Army's early engagements during the North African campaign became the catalyst for the its adaptations.[384] The report described the experience of the Army in North Africa as:

> They were unacquainted with the enemy, unfamiliar with the capabilities and limitations of American equipment, and uncertain of the soundness of our organization and doctrine. Officers were in no better state of preparation. Commanders of all grades could refer only to the maneuvers in Louisiana when speaking of their troop leadership experience.

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[379] "Research Report, Armor in the Exploitation: The Fourth Armored Division Across France to the Moselle River," III.
[380] "Research Report, Armor in the Exploitation: The Fourth Armored Division Across France to the Moselle River," 50.
[381] For example of reports with similar conclusions, see, "Research Report, Employment of 2nd Armored division in Operation Cobra 25 Jul-1 Aug 44," 1950, Box 9, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA; "Research Report, 2nd Armored Division in Sicilian Campaign," 1950, Box 9, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA; "Research Report, Super Sixth in Exploitation: 6th Armored Division, Normandy to Brest, Operation Cobra," 1949, Box 7, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA.
[382] "Research Report, Exploitation: Exploitation by the 3rd Armored Division – Swine River to Germany," 1948, Box 8, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA.
[383] "Research Report, Exploitation: Exploitation by the 3rd Armored Division – Swine River to Germany," 53.
[384] "Research Report, The 1st Armored Division at Faid-Kasserine," 1949, Box 7, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA.

> Nevertheless, these brave officers and men were the test pilots of American equipment, organization, and doctrine.[385]

Another report, "Mud, Mountains and Armor - The 1st Armored Division From Rome to the Alps", also would confirm that the terrain of the Italian campaign acted as a major constraining element on the Army's armor adaptation process.[386] This report, compiled by a collection of midlevel officers, concluded that the mountainous terrain in Italy had prevented the Army from being able to test and experiment with mass armor operations, which in turn limited the ability to learn combined arms lessons, noting that, "[m]ountainous terrain, which is highly compartmentalized, tended to divide the battlefield into isolated conflicts which were difficult to coordinate."[387] The report, however, also noted that in the limited experiences where combined arms had been applied with the use of armor, that positive lessons were learned from the fighting in Italy.[388]

The networks of officers interested in advancing the institutionalization and diffusion of combat lessons also focused on changing the Army's educational institutions. One of the midlevel officers who participated in this process was Colonel Davall who had fought with the Sixth Armored Division, which was part of General Patton's Third Army in Europe. Colonel Davall in the post-war period served as the officer in charge of school troops at West Point, a position he held after participating in the Command and General Staff School at Leavenworth. Davall was able to share his personal combat experiences with the new generation of officers.[389] These officers had identified the training and educational experiences that they had received at places like the Armor School and Armored training Center at Fort Knox as key areas to foster the enhancement of armored warfare abilities for future officers, feeling that the more realistic the education and training for new officers would lead to superior combat capabilities for the army.[390]

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[385] "Research Report, The 1st Armored Division at Faid-Kasserine," 54.
[386] "Research Report: Mud, Mountains and Armor - The 1st Armored Division From Rome to the Alps," 1949, Box 8, Armored School Administration Branch, Armor Research Reports 1949-50, RG 337, NARA.
[387] "Research Report: Mud, Mountains and Armor - The 1st Armored Division From Rome to the Alps," 158.
[388] "Research Report: Mud, Mountains and Armor - The 1st Armored Division From Rome to the Alps," 158-159.
[389] "What Are they Doing Now," *Voice of the Fighting Turtle*: *Newsletter of the 68th Tank Battalion Association* (1947).
[390] Capt. Harold W. Keyior, "ARTC's Contribution to Victory," *The Armored Cavalry Journal* Vol. LV, No. 4 (Jul-Aug 1946), 22-23.

Colonel Creighton Abrams was an officer who had fought during the Battle of the Bulge and other Northern European engagements, and was assigned in Spring of 1946 to teach as part of the Tactics Department at the Armored School at Fort Knox. Abrams received this assignment from his superiors because it was believed his extensive mechanized combat experience in Europe had made him the ideal candidate to help update and modernize the curriculum. The emerging consensus was that the school needed considerable modernizing with the experiences of officers who had fought in Europe. Abrams brought with him a pair of fellow midlevel officers from the 4th Armored Division in Europe to serve as instructors in the Armored School – Captain Bill Dwight and Major Edward Bautz, because of his personal connection and with them sharing similar views on mechanized warfare. Overall, the veteran officers of the late war period were highly enthusiastic about what they had accomplished in Europe, and sought to institutionalize those lessons for future officers.[391] Socialization and diffusion of ideas was highly important to this group of armor officers at Fort Knox. They would organize social networking events when visiting officers arrived at the base; they also held regular informal meetings, such as group dinners, where frequent topics of conversation included their battlefield experiences during the War. By grouping these officers together, it allowed for the further processing of their wartime experiences and the strengthening of advocacy and information networks; informal socialization can be just as important as formal pathways. Abrams also personally found that senior leadership was highly enthusiastic about allowing officers with combat experience to diffuse lessons among new officers; there was no resistance, as the organization had accepted that the lessons of its wartime adaptations needed to be retained.[392]

The curriculum of the Armored School underwent several other changes that reflected the shift in thinking towards combined arms. For example, it formally disbanded the separate Tank Destroyer School in November of 1945, a shift that was indicative of the operational experiences of the Second World War where tank destroyer units were seen as being less effective than tanks during operations. An article in the *Cavalry Journal* that discussed the rational of these changes stated that "[t]he postwar aim of The Armored School is to offer its students the latest in armored developments and tactics, and the application of lessons learned in World War II".[393]

[391] Sorley, *Thunderbolt*, 102.
[392] Sorley, *Thunderbolt*, 103.
[393] "The Armored School," *The Cavalry Journal* Vol. LV, No. 3 (May-Jun 1946), 73.

Additionally, there were changes to more technical elements of armor instruction for officers, such as improving communication networks among tanks, as well as between tanks and infantry units that had been learned during the war.[394]

Major General John O'Daniel served as the commandant of the Infantry School following the end of the Second World War. He was tasked with educating and guiding a new generation of infantry officers, and was focused on integrating the lessons of recent combat operations when it came to the importance of combined arms into his educational efforts.[395] In an article that discussed his efforts to enhance the curriculum of the Infantry School, he noted the importance of combined arms, arguing that, "[i]nfantry and armor finished the war with an ability to cooperate which was almost unbelievable to those who had opportunity to see how deficient they were in this respect in the early stages of the war."[396] O'Daniel blamed the initial failures of the Army in North Africa on the lack of proper combined arms education and training among the officers, writing that institutions like the Infantry School in the post-war period would be essential to preventing that process from having to be repeated by integrating and promoting the lessons of the previous war to new officers. This indicated that the core branch parochialism had been severely diluted by this period, and that the Army's vision of war had shifted as the result of its combat experiences.[397] O'Daniel further argued that a major lesson of the war was that unsuccessful operations were often the result of the absence of combined arms. Additionally, O'Daniel wrote that the most influential adaptations occurred during the Northern European campaigns, arguing that "[t]actical ideas and suggestions flowed in from both infantry and tank commanders throughout the European campaign where the number of tanks was far greater than any other theatre".[398] O'Daniel also stated that it was paramount that the lessons of the war be diffused to new officers, that "[o]ur training must keep abreast of new ideas. We musty study those ideas from every angle and try them in every way until we know what the effect will be-how best we can exploit their use."[399]

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[394] "The Armored School, Fort Knox, Kentucky, Program of Instruction for Armored Cavalry Orientation Courses," Jan 1950, Box 93, Armored School Training Lit & Reproduction Dept Programs of Instruction 1945-1950, RG 337, NARA

[395] Maj Gen. John O'Daniel "The American-Infantry Armored Team," *The Cavalry Journal* Vol. LV, No. 3 (May-Jun 1946), 42-46.

[396] O'Daniel "The American-Infantry Armored Team," 42.

[397] O'Daniel "The American-Infantry Armored Team," 43.

[398] O'Daniel "The American-Infantry Armored Team," 44.

[399] O'Daniel "The American-Infantry Armored Team," 46.

During the early post-war period, the Army also reacted to technological changes. It conceptualized new visions for future procurement projects, which would include a new generation of tanks. The other main technological influences on the Army during this period was the emergence of atomic weaponry, as well as advancements in airpower technology. The Army was initially somewhat ambivalent towards nuclear weapons, as it was partially difficult for many officers to conceptualize a role for them in landpower engagements. During the early post-war years, there was even only limited interest in the development of tactical nuclear weapons, as they Army still viewed combat through the lens of large scale conventional operations. However, a gradual interest in nuclear weapons would eventually develop due to a series of external factors, which included the Truman Administration's growing interest in them, and thus there emerged fear among senior Army leaders about loss of missions and budget share to other services, particularly the newly independent USAF in 1947. Further, advancements in the capabilities of nuclear weapons, as well as their visibility among the officer corps after public tests such as at Bikini Kill plus external shock events like the Berlin Crisis, helped to further foster interest in integrating nuclear weapons into the service during the late 1940s.[400] In particular, senior Army leaders began to think more about how tactical nuclear weapons could be used to support defensive operations of Northern Europe.[401] However, many midlevel officers during the immediate post-war years continued to show minimal interest in nuclear weapons; this was particularly true for those from the armor branch.[402]

The other technological focus during this period was on the development of a next generation of tanks to eventually supersede the M4 Sherman. The M4 ended the war as the most popular tank with officers. In particular, the logistical superiority of the Sherman tanks in terms of lower maintenance issues and repair times, as well as superior fuel efficiency, in comparison to German tanks was seen as a key draw for many in the Army. An armor officer, Lieutenant Colonel Albin Izyk, wrote reflecting popular sentiments among Army officers in the early post-war period that "[a]ll in all, the new type Sherman is a marvelous tank. It answered the prayers of the tankers and was on hand to drop the curtain on one of the dirtiest and hardest phases of the

[400] Evangelista, *Innovation and the Arms Race*, 88-91.
[401] Gen. Omar Bradley, "This Way Lies Peace," *Saturday Evening Post*, (15 October 1949), 170.
[402] This article was one of the only main pieces published in *Cavalry* during 1946-1950 to think about the impact of nuclear weapons, Maj. Hal. D. Steward, "The "Atomic Age" Weapon," *The Cavalry Journal* Vol. LV, No. 3 (May-Jun 1946), 28-29.

European war".[403] Essentially, it was felt that the Sherman tank should form the basis of guiding future Army tank development. It was seen as having better firepower than any light tank, and was far more mobile than the heavy tank options. Near the end of the war, the Army had introduced the M26 Pershing, that had been intended to replace the Sherman as it had thicker armor and a more power powerful gun. However, it had failed to make a significant impact among the officers due to being used in fewer combat situations; as well, it had mechanical issues related to engine power as many tankers felt it was underpowered. Broadly, the majority of officers, including senior leadership, acknowledged the need for a new generation of tank, but was constrained due to budgetary limitations while the government was in the process of shifting resources to strategic airpower assets. These budget pressures were exacerbated by an earlier procurement a couple thousand M26 tanks.[404] Despite these constraining factors, a research and development program was eventually accelerated in 1948 to develop a new main battle tank that could meet the firepower and mobility needs of officers. The Soviet army's development of the T-43 tank had helped give added motivation for this research effort. The research project would eventually culminate in the production of the M46 Patton tank in 1949, and the later successor Patton variants in the 1950s.[405]

The Army's development of the M46 Patton was highly influenced by the experiences of armor officers combat experiences during the Second World War. The new tank variant had to be capable of fighting in a combined arms framework, but also at times play a decisive role on its own when needed, such as when countering enemy armor attacks in a defensive operation. To accomplish these roles, the new tanks would need to have heavier armor and gun than the older Sherman tanks while also continuing to be highly efficient in terms of logistics.[406]

As the 1940s drew to a close, the Army formally updated its capstone doctrine in an overall effort to further integrate the lessons that it had experienced during the final stages of the Second World War. By this point, the networks of junior, midlevel and senior officers had advocated for specific changes relating to combined arms warfare to be institutionalized, and this effort was further supported by various official organizational bodies that were tasked with

[403] Lt. Col. Albin F. Irzyk, "Tank versus Tank," *Military Review* Vol. XXV, No. 10 (Jan 1946), 13.
[404] Philip L. Bolté , "Post-World War II and Korea," in Hofmann and Starry eds., *Camp Colt to Desert Storm,* 220.
[405] Bolté , "Post-World War II and Korea, 220-222.
[406] Oscar C. Decker, "The Patton Tanks: The Cold War Learning Series," in Hofmann and Starry eds., *Camp Colt to Desert Storm,* 298-307.

analyzing ongoing trends with the organization, including the General Board or research reports from Army educational institutions such as the Armor School, which had overseen operational studies of the Second World War. There were multiple Army conferences during the immediate post-war years that also helped to further integrate the lessons from the operational experiences of different levels of officers. These conferences allowed for further socialization and networking to develop, which in turn influenced the development of doctrine during this era. These conferences cited the importance of tank-infantry teaming as being key to combined arms effectiveness, and the consensus among participating officers was that doctrine needed to reflect this reality.[407] On top of these internal organizational dynamics was the external influence on doctrine of the growing threat of the Soviet Union, as officers identified the need to defend Northern Europe from the Red Army's vast conventional arms capabilities.[408]

The organizational output of these elements combined was the updated capstone doctrine manual, *FM 100-5 Operations*, in May of 1949. This doctrinal manual was an essentially an update of the previous capstone doctrine of 1944, but had now fully integrated many of the lessons learned when it came to combined arms of the later stages of the Second World War. This doctrine affirmed the importance of combined arms, noting that no single combat branch could secure operational victories on its own. It also acknowledged that tanks could play a strong role in defensive operations.[409] The doctrine, which had been formally approved by General Omar Bradly, who was the Army's Chief of Staff, had largely stayed away from how nuclear weapons could dramatically change how war was fought; rather, this capstone doctrine envisioned warfare in the Army's idealized way, which was major in scale, conventionally orientated, and would be solved by the firepower and mass of the combined arms of the military.[410]

From the late 1940s into the early 1950s, even after the start of the Korean War, the Army participated in a series of major field exercises intended to further refine the institutionalization of its Second World War wartime experience and of its newly developed doctrine. Field exercises in the post-war period frequently needed to allow for tank and infantry

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[407] Robert A. Doughty, *The Evolution of US Army Tactical Doctrine, 1946-76* (Fort Leavenworth, KS: Combat Studies Institute, 2001), 2-3.
[408] For more on the Army's views of European security in the post-war period see, Donald A. Carter, *Forging the Shield: The U.S. Army in Europe, 1951-1962* (Washington, DC: Center of Military History, 2015).
[409] Department of the Army, *FM 100-5 Operations (*Washington, DC: Government Printing Office, May 1949).
[410] Kretchik, *U.S. Army Doctrine*, 161-162.

units to better know one another and develop trust and good communication methods; this had been a major lesson of the adaptations of the previous war.[411] One of the midlevel officers who was very active in this process was Colonel John Cole, who had fought with the 5th Armored Division in Northern Europe and had gained considerable personal experience with combined arms methods.[412] In the post-war period, Colonel Cole would become chief of staff and then later the assistant division commander for the Third Armored Division, where he was tasked with the training of replacement tank units prior to and during the Korean War. During this training, Colonel Cole was able to personally oversee that combined arms lessons were being instructed.[413]

Operation Long Horn (1952) was a field exercise, intended to prepare for advanced combined arms in offensive and defensive situations across a wide front after there had also been chemical and nuclear weapons used. Long Horn was designed to likely reflect conditions if a war broke out with the Soviets in Northern Europe. Long Horn had also been designed to enhance cooperation of the USAF and Army units in a combined arms approach; under this goal, armor led breakouts were seen as a key task of any major operation.[414] Another major exercise during this period was CPX Spring Time (1952) which occurred in Germany, and was a simulation of large scale conventional combat operations in Northern Europe where U.S. forces prepared for offensive and defensive fighting situations that were thought to be necessary if war broke out over the occupied zones in Germany.[415] U.S. forces deployed in Northern Europe were a hub for major field exercises with Operation Combine, Rose Bush and Equinox, all taking place in the early 1950s, and these exercises sought to enhance and replicate major combined arms combat capabilities.[416]

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[411] "Cooperative Training Infantry and Armor," *The Armored Cavalry Journal*, Vol. LV, No. 5 (Sep-Oct 1946), 39-41.
[412] For more on Colonel Coles first hand combat experiences see, "Combat Interview, CCB Staff, 5th Armored Division, Action near Rheindahlen Germany".
[413] For a brief overview of Cole's post Second World War career war activities see, "John T. Cole," *Westpoint Association of Graduates* 2021, https://www.westpointaog.org/memorial-article?id=648d7dd0-1793-4730-94a3-85a2fee8072e
[414] "Report Exercise "Long Horn" Camp Hood, TX," 1952, Box 3, Army Ground Forces, General Records 1951-1952, RG 337, NARA.
[415] "CPX Spring Time," 1952, Box 3, Records of US Army Operational, Tactical and Support Organizations, Seventh United States Army Adjutant General Section, RG 338, NARA.
[416] Carter, *Forging the Shield*, 50-52.

The Korean War

The Army's experience during the Korean War did not fundamentally challenge the lessons it had learned during the Second World War with regards to armor and combined arms. Certain factors constrained the usage of tanks during much of the war, preventing the Army from replicating how it had used combined arms during the fighting in Northern Europe during the Second World War. In particular, the mountainous terrain prevented mass usage of armor, very similar to what the Army had experienced in Italy during the previous war.[417] However, other parts of the fighting seemed to essentially confirm in the minds of many officers that the Second World War armor adaptations remained highly relevant to how warfare should be waged.

The Army was largely caught by surprise by the Korean War. An initial assessment of military strategists presumed that the conflict would be a limited war in nature, that the U.S. intervention would mostly be in the form of peripheral assets at sea and in the air. However, the ferocity and skill of the communist invading forces during the early days and weeks of the invasion quickly proved that assessment to be utterly incorrect. The first major U.S. land engagement of the war was the Battle of Osan in July of 1950, and by September, U.S. and UN ground forces had been pushed all the way back to a small corner in the Southwest of the country; this early difficulty then led to a partial mobilization of the U.S. Army, finally committing the organization to its next major conventional war. The Army had been weakened prior to this during the demobilization phase, as well as post-war budget reductions; for example, it had far more tanks in unserviceable condition than capable of entering the fight.[418]

By the fall of 1950, it was clear that communist armor forces, spearheaded by T34 Tanks, were highly capable. However, the Army began to successfully counter the communist forces onslaught, particularly on the micro unit level, by turning to combined arms. Army units found that they could rely on medium tanks as well as CAS to inflict rising causalities among Soviet tanks; during these earlier war engagements, U.S. tanks fought in a combined arms framework paired with infantry units that came to rely on the fire support and anti-tank functionalities of armor units to counter-Communist advances. However, despite these smaller scale successful usages of armor centric combined arms, it soon became very clear to U.S. officers that they

[417] Lt. Col. George B Pickett, Jr, "Tanks in Korea, 1950-1951," *Armor* Vol. LX, No. 6 (Nov-Dec 1951), 12-16.
[418] Weigley, *History of the United States Army*, 506-511.

would be unable to replicate the successes of the rapid breakout that had occurred in France in 1944. The foremost reason was that the terrain where much of the fighting occurred made it physically impossible for any sort of large-scale armor centric maneuver warfare to unfold. Korea had considerable mountain ranges and highly rough countryside; further, Korea also has considerable amounts of low-country which was covered with rice paddies that were flooded for much of the year, which were also surrounded by irrigation ditches. Combined, these terrain features prevented tanks from operating at their fullest potential. Roads and bridges were also of poor quality, which was another constraint on the physical maneuver of tanks.[419]

U.S. officers had realized by December of 1950 that a quick victory would not be easily achieved and so there needed to undergo an assessment of tactical and operational approaches to see if improvements could be made that would translate to battlefield success. One of the main areas of focus in this regard had to do with training of armored units that were about to be deployed to Korea. To foster this improvement, there was a guided effort to integrate a mix of enlisted men and officers who had already fought in Korea to socialize and mentor soldiers that were slated for deployment. This would also involve using these combat veterans to help develop formal programs of instruction to diffuse their combat experiences to these new personnel. Part of the formal side of this combat experience diffusion was using the veterans to develop literature which could be distributed to these newer personnel. Further, there was an active process of armor trainers and educators seeking access for after action reports from Korean engagements in order to better adjust training and pre-deployment preparation.[420]

During the winter of 1951 Army officers interested in the role of armor began to reflect in service journals on how the war had unfolded, and on the overall relevancy of armor in modern warfare during this early Cold War age. The service journal *The Cavalry Journal* at this point had officially changed its name to *Armor*, which was reflective on how the organization had changed since the Second World War. A consistent theme that was reflected in these articles, was that the pro-armor network of officers remained highly active in promoting its role in the organization. A January 1951 article, "Let's Talk About Armor", argued that tanks remained as relevant as ever to combined arms and to the combat power of the Army.[421] Lieutenant Colonel

[419] Bolté , "Post-World War II and Korea," 229-230.
[420] "Annual History, Office, Chief of Army Field Forces 1 January -31 December 1950," Dec 1950, Box 92, Armored School Training Lit & Reproduction Dept Programs of Instruction 1945-1950, RG 337, NARA.
[421] "Let's Talk About Armor," *Armor* Vol. LX, No. 1 (Jan-Feb 1951), 41-45.

F. F. Carr noted in his article, "Deliberations on Armor", that many strategists in the Army hoped that armor would be the tool to cause a breakout and deliver a victory to the UN and U.S., and described armor as having a large number of internal organizational supporters for its relevancy to modern war. Carr advocated that combined arms would always be the best means of elevating the Army's fighting power, and that the Korean War was demonstrating that combined arms would always be needed for conventional combat even in the age of atomic weaponry.[422] Carr stated that ultimately, "[t]anks provide the infantry division with speed, fire power, and mass which, translated from the potential, means terrific shock action".[423] Junior officers such as 1st Lieutenant Robert Harper also contributed to the discourse. Harper, a combat veteran of the Second World War, had a sober assessment of the combat situation in Korea, noting that armor was facing several constraints to its operational usage. Harper described the character of the fighting in Korea as being first and foremost an infantryman's war, however he noted that when armor has been employed, it closely mirrored the core lessons learned of combat during the Second World War, where tank-infantry teaming was central to combat effectiveness.[424]

The fighting in Korea during the Spring of 1951 was primarily characterized as being focused on infantry-artillery teaming, with armor continuing to play only a supportive role when physically able to participate during operations. Despite some attempts to break out from the frontlines, the Army was usually unable to engage in a war of maneuver, and armor centric operations remained in the minority.[425] In terms of tactical adaptations, the Army started to equip tanks at the frontlines with searchlights to allow them to better support and coordinate with infantry during night operations. The Army's Operations Research Office of the Far East Command paid close attention to armor operations during this period. A key conclusion of a study was to increase tactical flexibility for armor units so they could be given greater opportunity to join infantry units for operations. Further, the Research Office study found that frontline units should be given the opportunity to re-organize themselves in whatever form necessary to allow for more effective combined arms efforts. The report concluded that the Army

[422] Lt. Col. F. F. Carr, "Deliberations on Armor," *Military Review* Vol. XXXI No. 1 (Apr 1951), 15-24.
[423] Carr, "Deliberations on Armor", 20.
[424] 1st Lt Robert S. Harper, "Sum and Substance," *Armor* Vol. LX, No. 3 (May-Jun 1951), 22-23.
[425] For more on the Army's combined arms efforts during this period of the war see, Billy C. Mossman, *Ebb and Flow: November 1950-July 1951* (Washington DC: Centre for Military History, 1992).

continue to place emphasis on tank-infantry teaming, especially for night operations to enhance combined arms effects.[426]

Starting July of 1951, the fighting in Korea became a stalemate, with communist and UN forces facing off against one another near the 38th Parallel, close to where the war began. This situation would remain static until the eventual armistice signed 27 July 1953. This context placed even further constraints on the usage of armor during the fighting; here tanks were usually held in reserve to wait for counter-attacks for situations where communist forces attacked U.S. defensive lines. The front lines were mostly a series of dug in infantry lines, supported by artillery. There did remain some opportunities for tank-infantry teaming, such as at the local level, where infantry and armor units were given the flexibility to plan smaller maneuvers comprised of tank-infantry teams.[427]

As the fighting in Korea began its stalemate phase, more midlevel and even senior officers began to reflect on the role of armor during the war. The *Armor* professional journal began to run a series of articles about officer's experiences on the front lines at this point with the common theme being promoting armor-infantry teaming during both offensive counter-attacks as well as defensive situations.[428] The content of the service journal publications began to reflect the conditions of the frontlines, as more and more articles began to focus on the role of armor during defensive operations. Lieutenant Colonel George Pickett wrote "Tanks in Defense", discussing the tactical success of tanks during defensive combat situations, and highlighted the importance of tank-infantry teaming to this process. However, Colonel Pickett also acknowledged that the usage of armor during fighting in Korea was becoming rarer than in other conflicts, yet when it was used it was seen as being very effective.[429] Colonel Pickett during this period was an active participant in the pro-armor advocacy network, as he published in multiple service journals, arguing that Korean operations were reaffirming the lessons of the Second World War, such as that tanks could play an effective role in defensive situations.[430] Lieutenant Colonel J. F. Rhoades also noted that tanks had a high degree of relevancy for the

[426] Bolté , "Post-World War II and Korea," 252-253.
[427] Doughty, *The Evolution of US Army Tactical Doctrine,* 7-9.
[428] For example, see "The Tank Platoon Leader," *Armor* Vol. LX, No. 4 (Jul-Aug 1951), 12-13.
[429] Lt. Col. George B. Pickett, Jr. "Tanks in Defense," *Armor* Vol. LX, No. 4 (Jul-Aug 1951), 14-17.
[430] Pickett, Jr, "Tanks in Korea, 1950-1951," 12-16.

defence, writing that U.S. operational experiences in Korea had confirmed that to be the case.[431] Senior officers such as Brigadier General D. J. Crawford also joined in the pro-armor narratives, arguing that the Army needed to ensure that significant numbers of tanks were available and in operational condition at all times, and that the armor branch should not have to face any budget cuts in future.[432]

The armor centric discourses continued during the later stages of the war. It was primarily driven by midlevel officers at this point, and remained highly positive about the relevancy of armor to combined arms. The other consistent theme tended to be that the character of the Korean war was not well suited to maximize the potential for armor in combat, but this did not seem to limit the enthusiasm for the pro-armor network of officers. Colonel John Ryan, in an article "Combat Training for the Tank-Infantry Team", stressed that continued attention be paid by the Army to fostering coordination between armor and infantry units, and that this needed to be developed prior to forces being deployed to combat zones.[433] Captain Sam Freedman stressed the operational versatility of armor, and argued that criticisms about the relevancy of armor to the Korean situation were overstated.[434] Captain Freedman stated that, "Korean combat has proved conclusively that the tank, with its powerful main armament, mobility and protection from small-arms projectiles, is a potent adjunct of the regimental combat team. Planners find great tactical latitude when tanks are available in mass for employment in the attack or defense".[435]

Many officers, even by the later war period continued to see armor's experiences in Korea as reflecting the earlier lessons of the Second World War, despite the character of those conflicts being very different to one another. 1st Lieutenant Clark Munroe echoed in their article, "Armor Holds the Hill", the sentiment that armor were highly effective in defensive engagements, and this defensive capability was multiplied when paired with infantry in a wider combined arms framework.[436] 1st Lieutenant Robert Harper argued that, despite the constraints of terrain which had hindered Armor's ability for shock and mobility, that overall the Korean

[431] Lt. Col. J. F. Rhoades, "Is the Tank the Best Defense Against a Tank," *Military Review* Vol. XXXI No. 5 (Aug 1951), 43-48.
[432] Brig. Gen. D. J. Crawford, "A Tank Isn't Born Overnight," *Armor* Vol. LX, No. 4 (Jul-Aug 1951), 6-11.
[433] Col. John L. Ryan, Jr. "Combat Training for the Tank-Infantry Team," *Armor* Vol. LXI, No. 1 (Mar-Apr 1952), 30-33.
[434] Capt. Sam Freedman, "Tankers at Heartbreak," *Armor* Vol. LXI, No. 5 (Sep-Oct 1952), 24-27.
[435] Freedman, "Tankers at Heartbreak," 25.
[436] 1st Lt. Clark C Munroe, "Armor Holds the Hill," *Armor* Vol. LXII, No. 1 (Jan-Feb 1953), 11-14.

War had confirmed the doctrine that had been forged during the Second World War.[437] Harper observed when it came to combined arms in Korea that, "[p]roperly exploited, this unchallenged superiority can become the decisive factor in ground operations in this theater".[438] Major John Brier noted that Korean combat had led to a number of positive lessons learned that would be able to enhance the role of armor in future operations, noting that there had been tangible improvements due to various tactical lessons for tanks regarding concealment, better fire support and communications techniques for tank-infantry teaming.[439] The *Armor* journal also published articles that were very supportive of the new Patton main battle tank, arguing it was a very positive contribution to the Army's fighting power.[440]

The Shadow of Vietnam

The period following the Korean War was a transitional period for the Army. The war had reminded the officer corps, as well as senior national security officials in Washington, that limited wars could pose a major challenge, and their outbreak would not automatically trigger a nuclear exchange along the central European front of the Cold War. The U.S. in turn would also need to continue deterring the Soviet military in Europe. The organization had to process, to some degree, their combat experiences in Korea. However, the Army would also face shrinking budgets during this period, as the civilian government in Washington diverted larger budgetary shares towards nuclear capabilities. In turn, there was a considerable ideational challenge for the Army, as it was trying to figure out what exactly their role would be in a world full of nuclear weapons, and how that would impact the character of future war.

The Army's attitude towards wider lessons of the Korean War was complicated. On one hand, was the fact that the Army had been unable to achieve a consistent offensive campaign that resulted in victory, as it had in Northern Europe during the Second World War, which was disconcerting to many officers. This led many to want to simply move on, arguing the conflict was of a unique character that in some ways was likely not to be repeated elsewhere; essentially, many wanted to just forget. On the positive side, officers pointed out that nuclear weapons had

[437] 1st Lt. Robert S. Harper "Offensive by Fire!," *Armor* Vol. LXII, No. 1 (Jan-Feb 1953), 34-40.
[438] Harper "Offensive by Fire!," 34.
[439]Maj. John K. Brier, "What Can an Armor Officer Learn in Korea," *Armor* Vol. LXII, No. 1 (Jan-Feb 1953), 47-49.
[440] "The Patton 48," *Armor* Vol. LXI, No. 3 (Jul-Aug 1952), 14-17.

not been used to cause a breakout, and that there remained a high degree of relevancy for the army's combat branches in conventional warfare. The Army fought in Korea relying on mass and firepower, and were able to inflict heavy causalities on communist forces, so for many officers there remained some positives to focus on, as the war essentially had confirmed the Army's preferred way of war could still contribute to the overall national security strategy of the U.S.[441]

One of the core combat lessons learned from Korea was that armor remained an important element of combined arms. The war spurred on a considerable amount of tank procurement and research and development into the next generation of tanks for the Army; this led to the development of the M41, M47, and M48 tanks, as well as new systems such as the M59 and M113 armored personnel carriers which were heavily influenced by the role of U.S. tanks in combat. The Korean War helped cement in the minds of U.S. officers of the role of armor during defensive operations.[442] A post-war operational study, "Tank versus Tank Combat in Korea", found that U.S. tanks were in fact far more effective than communist armor and that U.S. tanks destroyed around 25% of communist tanks in the theatre. The study concluded that U.S. tanks had made a positive contribution to the Army's combat power, and that the operational effectiveness of tanks in a combined arms framework increased as the conflict lasted.[443]

During the period following the Korean armistice, the networks of pro-armor officers continued to maintain a healthy discourse about the role of tanks within the Army. For example, Lieutenant Colonel Robert B. Rigg bluntly discussed how armor officers needed to figure out how their operational role may evolve in a nuclear world. Brigs noting that it was likely that the Army would face budgetary constraints which could potentially threaten the existence of the armor branch if officers were not careful. Briggs advocated that other officers be more direct in promoting the role of tanks in U.S. national security strategy, that ground forces are always needed to bear the brunt of any major war.[444] Other officers, like Major Harold Duke, argued that the Army should improve its qualitative training process, and that combined arms needed to be finely tuned to be the most effective, and also expressed concerns about the Soviet quantitative

[441] Kretchik, *U.S. Army Doctrine*, 166.
[442] Doughty, *The Evolution of US Army Tactical Doctrine*, 15.
[443] Bolté , "Post-World War II and Korea," 255-257.
[444] Lt. Col. Robert B. Rigg, "Armor at the Crossroads," *Armor* Vol. LXII, No. 4 (Jul-Aug 1953), 25-26.

advantage in armor in Europe.[445] Lieutenant Colonel Crosby Miller, who had earlier served in the Fourth Armored Division during the Second World War, strongly advocated for the role of armor in defensive operations, noting that tanks are very well suited for the idea of a 'mobile defence' due to their mobility and firepower and that these capabilities were essential for the Army's role in Europe.[446]

The Army of the 1950s had two main geographic focuses; the first was to continue to maintain a conventional deterrence position in Korea against any future North Korean aggression, and the second and larger focus was the central European front of the Cold War. In particular, the Army viewed its European deployed forces as the primary testing ground for doctrinal and training changes. The European theatre also presented the most direct challenge to the Army in how it would respond to the challenge of nuclear weapons.[447] Amplifying this European focus was the rise of NATO in U.S. national security decision making. The U.S. Army found itself integrated into a newly established NATO command structure, and the U.S. would play a primary role in developing alliance strategy.[448] As the Army was figuring out its role as a leading defender of Northern Europe, it also had to contend with fairly severe budget cuts. The Army's budgetary allocation was cut by nearly half in the 1952-1956 period.[449]

The Army's officers were faced with a new challenge of re-establishing the role of the Army within the wider U.S. national security strategy, which involved dealing with new ideas about how the Army should approach the strategic challenges of defending Europe and South Korea while also responding to the emergence of nuclear weapons and their impact on US national security strategy, and the Army's share of the defence budget. Some officers felt that the Army was at risk of losing focus during this post Korea era.[450]

In 1954, the Army produced a new capstone doctrinal manual, *FM 100-05*. This new field manual represented some of the first doctrinal influences of atomic weapons on the Army, while also modernizing the Army's combined-arms centric vision of conventional warfare. The new doctrine advocated for more mobile infantry, armor, and mechanized units relying on speed

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[445] Maj. Harold H. Dyke, Jr. "The Armored Corps and Armored Army," *Armor* Vol. LXII, No. 5 (Sep-Oct 1953), 34-36.
[446] Lt. Col. Crosby P. Miller, "The Armored Division in the Mobile Defense," *Military Review* Vol. XXXV No. 3 (Jun 1955), 21-25.
[447] Carter, *Forging the Shield*, 57.
[448] Carter, *Forging the Shield*, 143.
[449] Carter, *The U.S. Army Before Vietnam 1953-1965*, 7.
[450] Ricks, *The Generals*, 206-207.

and shock and firepower to overwhelm the enemy. The biggest influence of nuclear weapons was the implication that major penetrative efforts of enemy lines would likely be created by nuclear weapons, however much of the doctrine was similar to the earlier capstone doctrine of the late 1940s.[451] It framed armor as playing a leading role in the Army's combined arms approach to operations, and specifically emphasized a major role for tanks during defensive operations. This was to form the basis of a "mobile defence" where the Army maintained a mobile striking force during defensive situations. Armor was seen as a combat branch that held particularly salience on a future atomic battlefield, as the mobility of tanks paired with the physical armor plating was seen to significantly improve survivability during an atomic attack.[452] Describing the capabilities of armor units, the doctrine stated that "[a]rmor is capable of covering broad fronts and deep zones of action. It can concentrate rapidly and disperse over extended distances in combat ready formations. It is able to deliver a large volume of long-range direct fire as well as indirect fire and to execute rapid engagement and disengagement."[453] The 1954 doctrine also contained an explicit endorsement of the importance of infantry-tank teaming, especially in defensive operations.[454] Overall, the doctrine had demonstrated that although atomic weapons were a growing influence on the U.S. military, they had not completely radically changed perspectives towards major combat operations. The Army's approach to war remained heavily influenced by its experiences of the Second World War.

The Army would later update this 1954 doctrine in 1956, and again in 1958, however in both cases the adjustments were relatively minor. Overall, the 1954 capstone doctrine largely captured the Army's sentiments towards how it understood major wars. This doctrine and its updates helped to carve out a firmer understanding of how the Army was conceptualizing the impacts of nuclear weapons on modern warfare. Under this view, the Army did not see nuclear weapons as radically altering the fundamentals of war, rather that nuclear weapons would more so compliment conventional firepower during defensive operations as well as offensive penetration. What remained as a constant, was that the Army's vision of warfare remained centered on mass, firepower, and the emphasis on the destruction of the enemy's field forces.[455]

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[451] Department of the Army, *FM 100-5 Operations* (Washington, DC: Government Printing Office May 1954)
[452] Department of the Army, *FM 100-5 Operations*, 15.
[453] Department of the Army, *FM 100-5 Operations*, 15.
[454] Department of the Army, *FM 100-5 Operations*, 18-19.
[455] Doughty, *The Evolution of US Army Tactical Doctrine, 1946-76*, 15

During the mid to late 1950s, the Army's officer community continued to fixate on how their organization should respond to the increased importance of nuclear weapons to the wider U.S national security strategy. This internal analysis would have high level of significance to the role of armor within the service, as well as how the Army approached combined arms. The Eisenhower Administration under their New Look defence policy had rebalanced the U.S. military towards strategic nuclear weapons, and the USAF had emerged as the biggest winner of these budget allocations. Many Army officers felt that the Army was at risk of being shifted from the centre to the periphery of U.S. national security strategy. The Army was on the outside looking in among the service branches of the military when it came to national defence. This impacted the Army officer corps' morale, and there emerged a need to rethink how to increase the relevancy of the service to civilian policymakers.[456]

Many officers reflected on the impact of nuclear weapons to the Army and combined arms in service journal articles during the 1950s. Major Garth Stevens article, "Tank Defense Against Atomic Attack", speculated on how the U.S. could best prepare for defensive nuclear operations, with part of the focus of this being on how to protect as many tanks as possible as they were identified as a key element of Army.[457] Colonel Rothwell Brown echoed the sentiment that armor needed to be protected during any sort of nuclear exchange given their key importance to any future war effort. Colonel Brown highlighted the Soviet's quantitative advantage when it came to tanks, and noted the continued Second World War armor operational experiences as an influence on U.S. Army doctrine, and there needed to be continued investments into armor in order to maintain the Army's ability to fight, even in the new atomic age.[458] Brown further noted that "[e]nough has been developed from the pattern of atomic research to make it quite clear that armor is the only arm that can exist with any reasonable degree of safety, on the atomic battlefield, particularly in the face of an enemy employment of tactical atomic weapons".[459] While Lieutenant Colonel Robert Rigg noted that officers needed to take seriously the challenge that nuclear weapons posed to the armor branch, that armor was

[456] Kretchik, *U.S. Army Doctrine, 167*.
[457] Maj. Garth Stevens, "Tank Defense Against Atomic Attack," *Armor* Vol. LX, No. 2 (Mar-Apr 1951), 28-29.
[458] Col. Rothwell H. Brown, "The Coming War – A Concept – The Answer – Armor," *Armor* Vol. LXII, No. 4 (Jul-Aug 1953), 4-15.
[459] Brown, "The Coming War – A Concept – The Answer – Armor," 14.

essentially at a crossroads, and that officers needed to reiterate its relevancy to modern war in order to secure necessary budgetary investments in the future.[460]

There were also officers who continued to speculate on how atomic weapons would change the situation in Europe; many of these officers published articles that did not necessarily propose concrete predictions on what was to come, merely arguing that change was likely going to occur.[461] Army officers were forming a consensus that, generally speaking, rejected the Eisenhower Administration's position on massive retaliation as being too radical of a departure, with many officers essentially doubling down on the perspective that conventional combat capabilities would remain necessary, but that the Army as an organization would need to adjust itself in order to maintain its relevancy. The Army, in the mind of these officers, needed to continue to be the service branch that would first and foremost win the nation's wars.

In response to these trends, the Army began to experiment with a degree of force structural changes. The two underpinning focuses for the Army was to increase operational flexibility by maintaining a capability of rapid readiness and deployment, and also the ability for rapid maneuver. This vision was clearly driven by a vision of future war in which the Army was expected to fight a conventional battle, not one which was solely fought by ballistic missiles and bombers. This vision of war was centered on a future central European battlefield, and understood that U.S. forces would need to be able to disburse quickly if under threat of nuclear attack, and then mass quickly when needed to concentrate firepower.[462] Essentially, this new force structure concept, which became known as the "Pentomic Divisions", intended to follow defensive doctrine that allowed for enemy penetration of allied territory, which would then be overcome by rapid mobile massing of forces at the appropriate time to destroy the invading forces with firepower. This process would also likely involve the Pentomic Divisions working in conjuncture with U.S. tactical nuclear weapons, which would open up holes in the enemy lines, allowing columns of U.S. forces to then advance through them. Tanks were to continue to play a

[460] Rigg, "Armor at the Crossroads," 25-26.
[461] For examples of this nuclear warfare centric speculation see, Lt. Col. Jack J. Wagstaff, "The Army's Preparation for Atomic Warfare," *Military Review* Vol. XXXV No. 2 (May 1955), 3-6; Lt. Col. Irving Heymont, "How Will Aggressor Fight an Atomic War?," *Military Review* Vol. XXXVI No. 7 (Oct 1956), 46-56; Col. William E. Roberts, "Keeping Pace with the Future – Training Officers to fight on the Atomic Battlefields," *Military Review* Vol. XXXVII No. 7 (Oct 1957), 22-29; Lloyd Norman, "The 'New Look' Strategy," *Combat Forces Journal* Vol. 4, No. 7 (Feb 1954), 15-20.
[462] A.J. Bacevich, *The Pentomic Era: The US Army Between Korea and Vietnam* (Washington, DC: National Defense University Press, 1986), 60, 65.

primary role under this structure, as their mobility and armor-plated protection against enemy nuclear blasts made them seen as having continued relevance to the aims of the new changes.[463]

By the end of the 1950s the Army began to move away from the "Pentomic Division" concept and back towards the classic organizational structures and doctrine it had developed during the Second World War. By this point, the Army's understanding of the international security environment embraced that there were now a multitude of missions that it could be involved in. These missions could involve major conventional wars; 'local wars' which were seen to be smaller in scale and would likely be expeditionary in nature in places around the world such as Asia; finally, the army would need to play a leading role as part of a conventional deterrent force in places like central Europe. All of these missions, in the eyes of Army officers, would involve doctrine and force structures that emphasized armor centric combined arms.[464] This trend would be accelerated by the Kennedy Administration's Flexible Response national security strategy introduced in 1961 which downplayed the Eisenhower Administration's emphasis on strategic nuclear weapons. The successor to the Pentomic Division concept was the Reorganization Objective Division (ROAD) initiative which was formally introduced in 1963. The ROAD Division concept essentially represented the most direct evolution of the armored lessons from the Second World War and Korea, as it would maximize combined arms usage and infantry-armor teaming during combat operations. The most significant departure from past doctrine with the ROAD concept was the new emphasis on mechanized infantry capability, which was seen as being able to better coordinate with armored units by matching their speed and mobility.[465]

Conclusion

The Army's combined arms armor adaptations during the Second World War followed by their organizational institutionalization during the early Cold War is an example of a highly successful adaptation to innovation process. This outcome could not have been achieved without the extensive role of junior and midlevel officers at every step of the way driving and shaping the process.

[463] Bacevich, *The Pentomic Era*, 104-106.
[464] Lt. Col. Duane S. Cason, "Introduction to the Armored Division (ROCAD)," *Military Review,* Vol. XXXVII No. 7 (Oct 1957), 11-21.
[465] Doughty, *The Evolution of US Army Tactical Doctrine*, 22.

The Army, prior to the U.S. entry into the Second World War, was an organization that had a fairly primitive understanding of how armor should be used in modern warfare. The Army's pre-war doctrine remained tied to the combat experiences of the First World War, where infantry-artillery teaming was seen as the most important component of any operational method. In fact, even horse cavalry officers continued to try to maintain influence in the Army, downplaying the role of mechanized tanks in operations. Tanks were conceptualized as being a peripheral combat arm, relegated to only minor offensive operations such as pursuing broken enemy units; the Army had not conceptualized a role for tanks in defensive operations, or even as a breakout tool against heavy enemy defensive lines.

These perceptions of armor were fundamentally ended in the deserts of North Africa. Here, early operational difficulties, including the humiliating defeat at Kasserine Pass, created a shock moment within the Army's officer corps. These difficulties were a clear signal that the Army's prewar operational hypotheses were incorrect, and in need of change. This was the start of the adaptation process, which was shaped and driven along the way by junior and midlevel officers who created networks of individuals pushing for change to occur; this would involve active participation in drafting after action type reports, but also less formal pathways such as drafting articles in professional service journals to establish armor centric discourses and narratives. Frequently, these junior and midlevel officers were supported either directly or tacitly by senior officers following the shock moment of Kasserine Pass.

The fighting in Italy allowed for further lessons to be learned when it came to combined arms and armor operations. However, there were certain factors that greatly constrained the adaptation process in this part of the war. The physical terrain of Italy's mountains and hills, paired with the German military's defensive lines, created a situation in which mass armor operations could not physically occur. It was not until the post-Normandy landing fighting in France did the Army finalize its adaptation process. Again, facing the shock of defeat in and among the French *Bocage*, infantry and armor units learned to fight together in a highly coordinated manner, essentially helping to finalize the gradual adaptation process. This adaptation process led to the breakout of U.S. forces that would push the Wehrmacht back into Germany and eventually contributed to bringing the War in Europe to a conclusion. U.S. officers continued to refine the adaptation process during the later stages of the war, by maintaining the active armor discourse in professional journals and official reports. New lessons were learned

during this period, including a keen understanding that armor was highly relevant to defensive operations, not just offensive ones.

Senior officers during all of this did not attempt to constrain the lower ranking officers from going about the adaptation process, instead they actively encouraged it and officially sanctioned the changes. Senior officers were drawn to this process by a mix of fear of defeat, paired with the appeal of the adaptations having battlefield success. Senior officers were essential in allowing the adaptations to both develop and then eventually be disseminated across the service. During the post-war phase, senior officers continued to play an important role in the institutionalization process as they endorsed the formal integration of the lessons learned by rewarding the junior and midlevel officers involved with the wartime adaptations with promotions.

During the post-war period, the adaptations continued to be championed by networks of junior and midlevel officers, who continuously advocated for is integration and institutionalization into the organization. These officers established an overwhelmingly powerful discourse in professional service journals regarding the role of armor in the organization; there was also a significant amount of physical networking and knowledge diffusion via socialization. Veterans of combined arms combat in Europe would go on to hold influential positions across the army during this period, which included serving as instructors in the Army's educational institutions. These veterans also socialized with one another, as well as with new officers, which helped to spread their ideas to the next generation of officers. Veterans also helped draft official post-war assessments of the war.

The Korean War seemed to further confirm the armor centric lessons of the Second World War. Interestingly, the physical terrain acted as a constraining factor on the role of tanks due to its mountains, rice paddy fields and poor roads. Nonetheless, officers felt that combined arms with infantry-armor teaming was the best way to maximize combat power, and that tanks had a healthy role to play in offensive and defensive operations. The post-Korean period did little to change or constrain the final institutionalization of the Second World War's armor adaptations. The network of pro-armor officers remained highly active and passionate about promoting the role of armor in the organization. Ideationally, the Army rejected attempts to shift the U.S. military more towards the power of strategic nuclear weapons. Even attempts to embrace nuclear centric reforms such as the Pentomic Division concept still managed to

maintain a heavy role for armor, as it had become by this point significantly imbedded in the organization. By the end of the 1950s into the 1960s, the Army had essentially left the nuclear fixation issue behind and remodeled itself based on the very doctrine and force structures it had forged during the Second World war adaptation process.

Chapter 5: The Air Force

Heard the heavens fill with shouting,
And there rain'd a ghastly dew
From the nations' airy navies
Grappling in the central blue[466]
Alfred Tennyson, Locksley Hall

The U.S. Air Force (USAF) is an organization that is fundamentally transformative.[467] From its prehistory origins with the emergence of the Army Signal Corp's initial Air Installations in 1907 as well as the first deployments of U.S. aviators in combat during the First World War, U.S. military aviation has introduced new ideas, operational methods, technologies, and new even new physical domains of warfare. No longer would war be waged just on land or on water, but now in the skies. During these transformative periods, debates have emerged among members the U.S. military aviation community as to the very nature of airpower and how it should be employed during war.[468] These debates intensified as military aviators developed firmer beliefs as to the proper and improper applications of airpower. One of the starkest divides in this community was the topic of support of ground forces by air assets, also known as CAS. The origins of CAS and the U.S. military can be linked to the First World War where primitive efforts were attempted to coordinate air and ground forces, which led to tactical experimentation such as strafing enemy infantry as allied forces advanced.[469] It was not until over twenty years later during the Second World War that U.S. aviators began to fully develop CAS into a more modernized and streamlined system. However, the Air Force community

[466] Alfred Tennyson, "Locksley Hall," *Poetry Foundation* (1835), https://www.poetryfoundation.org/poems/45362/locksley-hall

[467] U.S. military aviation has undergone several organizational name changes between the First World War and the Cold War: 1918-1926 was the U.S. Army Air Service; 1926 to 1941 was the U.S. Army Air Corps; 1941-1947 was the Army Air Force; 1947-present it finally became the U.S. Air Force as a fully independent service branch organization.

[468] For an overview of historical debates surrounding the nature of airpower see, Colin Gray, *Airpower for Strategic Effect* (Maxwell Airforce Base, AL: Air University Press, 2012).

[469] For histories of the USAF, as well as histories of its predecessor organizations see, Maurer Maurer, *Aviation in the U.S. Army, 1919-1939* (Washington, DC: Office of Air Force History, 1987); Walter J. Boyne, *Beyond the Wild Blue; A History of the U.S. Air Force, 1947-2007* (New York, NY: Thomas Dunne Books, 2007); Juliette A. Hennessy, *The United States Army Air Arm: April 1917 to April 1961* (Washington, DC: Office of Air Force History, 1985).

ultimately remained fairly indifferent, and on occasion, hostile to the continued integration of CAS as a primary function of the organization during the post-war period.

This chapter begins with an overview of the Army Air Force as an organization on the eve of the U.S. entry into the Second World War by discussing its major internal organizational narratives and norms, as well this section will outline the Army's pre-war doctrinal position and preferred operational methods. The next sections discuss the AAF's combat experiences with CAS and traces various lessons learned processes that occur during the war. Next, the immediate postwar period will be explored, examining initial organizational attempts, and lack thereof, to process its campaign experiences while undertaking the shift towards organizational independence as a newly established USAF as well as responding to the pressures of the early Cold War period. The following section briefly explores the USAF's CAS related combat during the Korean War, highlighting the efficiencies and familiar hinderances within the USAF approach to CAS. The final section traces the lingering organizational debates surrounding CAS in the years preceding the formal entry of the US into the Vietnam War. The chapter concludes by demonstrating the USAF's attempts to institutionalize CAS lessons learned was ultimately a failure as an adaptation to innovation process. This is largely due to the inability of junior and midlevel officers to drive the process, paired with other constraining factors.

The Army Air Force in 1941

In December 1941, the AAF was one of the youngest organizational structures of the U.S. military. It was formally established just a few months prior in June 1941 as a successor to the earlier Army Air Corps, in order to better develop air capabilities and doctrine with a wider degree of freedom of action. The AAF operated as service branch, but remained under the official Army chain of command and was thus in a subordinate position to the Army's Chief of Staff. President Franklin Roosevelt in 1938 had personally ordered a buildup of U.S. aviation assets in response to the growing tensions in Europe, which added several thousand planes and tens of thousands of new personnel to the service. Despite this increase in resources, there remained tensions with the ground forces element of the Army over the missions and operational methods preferred by the AAF. This controversy over how airpower should be employed in war has been a defining characteristic of U.S. military aviation since its formal

emergence during the First World War, with each side of the debates developing incredibly dogmatic positions.[470]

The AAF came into existence at a time when a series of ideational currents were reaching their zenith, centered on the belief of the radical and transformative power of air machines on how war could and should be waged. The origins of this view of war from the air can be traced back to the theories of Giulio Douhet and the Italian protofascist movement.[471] This view is rooted in a very positivist and technologically determinist vision of the world. They valued futurism, in which they believed that emerging technologies such as the airplane would bring about deeply entrenched changes to human society, and more specifically how war would be waged. This was to be a new age of machines powered by electricity and gas able to fly through the sky. When it came to war, the power of the modern machines would allow states to overcome the horrors of attrition and of static front lines which they had previous experienced during the First World War by giving them the abilities to strike anywhere deep inside an enemy's home territory.[472]

Douhet outlined his views on airpower in *The Command of the Air* which was published in 1921. This treatise argued that aerial warfare was the most effective way that states have of waging war. Douhet felt that the First World War had proven that sustained ground offensives were ineffective, and that thanks to advances in aviation technology, the wars of the future would be won via massive bombing campaigns against the enemy's centers of population, government and industry. According to Douhet, these mass bombing attacks would shatter the enemy civilian populations morale, giving the opposing government no option but to seek peace. In order to fulfill this vision, states needed to develop independent Air Forces that would be equipped with long range bombers that would be maintained in a constant state of readiness. For Douhet, the bomber was now the king of modern war, all other types of military assets, including fighter aircraft, were all of secondary importance. Bombers were of central importance due to their absolute destructive firepower, and for the relative inability of enemy

[470] Bernard C. Nalty, John F Shiner, and George M. Watson, *With Courage: The U.S. Army Air Forces in World War II* (Washington, DC: Air Force History and Museums Program, 1994), 24-29

[471] Although he was the most influential, Douhet was not the only airpower theorist during this period. For example, another Italian officer, Amedeo Mecozzi argued against Douhet's focus on strategic airpower; Mecozzi advocated that airpower first and foremost be organized around tactical air missions. The Italian pro-tactical airpower positions failed to find an audience among the U.S. military aviation community.

[472] Gat, *A History of Military*, 561-585.

forces to defend against them, as Douhet believed that sufficient numbers of bombers would always break through any defences and go on to strike their targets from the air.[473]

It was during this period of airpower theorizing that the U.S. Army aviation community began to develop an incredibly strong organizational culture. Although it was a relatively new organization, and it held a lesser position in the Army chain of command, the aviation community underwent a rapid process of identity building. This process was influenced by wider technocentric trends in U.S. society during the two decades leading up to 1941, where aviation had captured the minds of the public. New industries dedicated to flight and its infrastructure were growing at fast pace, and the public had become captivated by the exploits of flying celebrities such as Charles Lindbergh and Amelia Earhart.[474] The Army aviation community was highly shaped by a near worship of the power of technology. Airplane technologies in the years prior to 1941 had undergone a fairly rapid development; the aircraft operated by the AAF in 1941 were a significant leap forward in terms of speed, armament and overall aerial capabilities from the First World War. The Airmen of the AAF were drawn to the power of this technology, and it in turn shaped how they felt about future wars. These aviators were now operating aircraft that were only envisioned by early generation air theorists such as Douhet.[475]

Married to this belief in the power of technology was another normative identifier centered on the job of flying. The AAF had a pilot culture, which was also tied to the uniqueness of the domain in which they operated. The senior officers were pilots by training, and the key to promotion was tied to the ability to fly. Further, there was a degree of elitism embedded within the training of pilots. Simply put, not everyone was able to do the job, they needed certain physical attributes like good eyesight and needed to be very academically minded. This elitism allowed members of the aviation community to separate themselves conceptually from those

[473] See, Giulio Douhet, *The Command of the Air* (New York, NY: Arno Press, 1972).
[474]Peter R. Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," in Phillip Meilinger ed., *The Paths of Heaven: The Evolution of Airpower Theory*. (Maxwell Air Force Base, Ala. School of Advanced Airpower Studies, 1997), 190.
[475] Robert Farley, "US Air Force Culture, 1947-2017," in Peter R. Mansoor and Williamson Murray eds., *The Culture of Military Organizations* (Cambridge: Cambridge University Press, 2019), 426-448; Williamson Murray, "Strategic bombing: The British, American, and German experiences," in Williamson Murray and Allan R. Millett eds. *Military Innovation in the Interwar Period* (Cambridge, Cambridge University Press, 1996), 95-98.

who trained to fight wars on the ground.[476] This pilot culture was also a legacy of the First World War, where pilots engaging in dogfighting cemented their status as noteworthy warriors.[477]

In part, due to the high degree of technocentrism within Army aviation, there was also a bias towards futurism and a fundamental rejection of the relevancy of wars of the past. To these airmen, technology had brought forward new ideas and new strategic opportunities that had essentially created a break with the past. A Major who was an Army aviator boldly reflected during a lecture concerning the nature of airpower that "[w]e are not concerned in fighting the past war; that was done 18 years ago".[478] They admittedly acknowledged that this belief was driven by a hypothesis more so than by practical experience, but argued that they were merely following common sense based on technological and strategic trends.[479] Other military aviation lectures would echo similar sentiments; war was to be fought predominantly in a new domain – the air, that in turn would transcend the constraints of the old wars. These wars of the future would require new tactics, new strategies, and new force structures.[480]

Organizational autonomy was another highly coveted value by U.S. Army aviators. Their British counterparts secured the institutional independence of the Royal Airforce back in 1918, and this would become adopted as a goal for early U.S. aviators and this shaped how they thought about preferences for technology, doctrinal development as well as mission types. This goal led to the development of a vision of warfare that was centered on the role of heavy bombers which would be used in a strategic manner to strike deep into enemy territory, rather than focused on tactical aviation missions in support of ground forces. This reflected strong organizational preferences dating back to the early 1930s.[481] The bomber fixation was promoted by officers throughout the organization. The majority of U.S. airmen believed fully in the idea

[476] Melvin G. Deaile, *Always At War: Organizational Culture in Strategic Air Command, 1946-62* (Annapolis, MD: Naval Institute Press, 2018), 21-26.
[477] Michael S. Sherry, *The Rise of American Airpower: The Creation of Armageddon* (New Haven, CT: Yale University Press 1987), 20.
[478] Maj. Harold George, "An Inquiry into the Subject "War"" (Lecture, Air Corps Tactical School, 1936), in Phil Haun, *Lectures of the Air Corps Tactical School and American Strategic Bombing in World War II* (Lexington, KS, University Press of Kentucky: 2019), 35.
[479] Maj. Harold George, "An Inquiry into the Subject "War","33-45
[480] Other examples of ACTS airpower lectures that reflect these themes of futurism include: LT. Kenneth Walker "Tactical Offense and Tactical Defense" (Lecture Air Corps Tactical School, 31 March 1939), in Haun, *Lectures of the Air Corps Tactical School and American Strategic Bombing in World War II*, 99-115; Maj. Muir Fairchild "Air Power and Air Warfare" (Lecture Air Corps Tactical School, 1939) in Haun, *Lectures of the Air Corps Tactical School and American Strategic Bombing in World War II*, 46-57.
[481] Farley, "US Air Force Culture, 1947-2017," 426-431.

that the "bomber will always get through", and that thanks to technology, physical obstacles such as mountains or oceans could no longer stop them from striking at the heart of enemy states. This in turn fueled their desire for organizational independence so that they could focus on such a mission more so than lesser ones like attack aviation or close air support.[482] There was a near religious faith in the power of the bomber as the epitome of modern technological destruction; the bomber, commanded ideally by an air force free of externalized control, would now be able to deliver the true decisive battle against the enemy and bring future wars to swift conclusion.[483]

One of the largest influences of the AAF of 1941 had been the views of Billy Mitchell, who was perhaps the most prominent U.S. military aviator during the interwar period. He was an early public advocate for the establishment of an independent air service within the army, to allow aviators more direct control to shape its organizational preferences and to allow airpower in the U.S. military to no longer be constrained by its ties to ground forces. Mitchell proved to be a controversial figure, gathering ire from senior Army command who promptly shut down notions of aviation independence, as well as from the Navy which sought to minimize his influence on missions and the role of aviation in naval affairs. Mitchell echoed many similar sentiments regarding airpower as Douhet: for example the destructive power of the bomber was supreme; there needs to be an independent air force organization; anti-aircraft defensive measures cannot stop a determined bomber offensive; and overall, they shared a futurist belief in the power of aviation in war and international relations.[484]

While Billy Mitchell remained the most influential individual to influence the shape of the AAF by 1941, the Air Force Tactical School (ACTS) remained by far the most influential institution. The ACTS incubated a group of officers that became highly focused on the role of heavy bombers during wartime which were to be used in strategic strikes; this group became unofficially known as the "Bomber Mafia". [485] This Bomber Mafia developed three core assumptions about the proper way to wage war: first, that aviation can strike anywhere in the

[482] George, "An Inquiry into the Subject "War"," 45; Lt. Kenneth Walker "Driving Home the Bombardment Attack," (Lecture Air Corps Tactical School, October 1930), in Haun, , *Lectures of the Air Corps Tactical School and American Strategic Bombing in World War II*, 87-99.
[483] Sherry, *The Rise of American Air Power*, 5-7.
[484] Mark Clodfelter, "Molding Airpower Convictions: Development and Legacy of William Mitchell's Strategic Thought," in Meilinger ed., *The Paths of Heaven*, 79-115; Farley, "US Air Force Culture, 1947-2017," 428; Edward Kaplan, *To Kill Nations: American Strategy in the Air-Atomic Age and the Rise of Mutually Assured Destruction* (Ithaca, NY: Cornell University Press, 2015), 10.
[485] Faber, "Interwar US Army Aviation and the Air Corps Tactical School: Incubators of American Airpower," 187.

enemy state; second, that the economies of modern states are particularly vulnerable to bombing raids; and finally, that heavy bombers were able to create economic paralysis in enemy states and thus able to end the war on favorable terms relatively quickly after the start of hostilities.[486] Thus the Bomber Mafia's view of war mirrored the views of Douhet and Mitchell. The ACTS became focused on developing High Altitude Daylight Bombing (HADB) as the preferred means of waging war against an enemy. This HADB focus came to overwhelm all other organizational elements and personnel, especially those focusing on tactical air operations who found themselves less and less influential. As the probability of the U.S. being drawn into hostilities in Europe began to increase in the months prior to December 1941, the ACTS heavily influenced the preparation of an aviation strategy that was first and foremost focused on strategic bombing.[487] Overall, the ACTS as the hub of aviation development and intellectualism in the leadup to the Second World War ensured that the doctrinal focus of the Army aviation remained first and foremost on promoting the importance of strategic air warfare at the expense of tactical aviation.

Due the organizational fixation on the strategic bombing mission, the doctrine of tactical aviation of the AAF remained in a state adolescence as the U.S. entered the Second World War. The technological limitations of aircraft during the early interwar period further constrained the development or even interest in CAS. There was a late attempt to try to foster effective air support operations during a series of 1941 exercises in Louisiana and South Carolina. These field exercises sought to replicate the recent battles in Europe where it was identified that the Wehrmacht and Luftwaffe had set a high standard for combined arms operational effectiveness. As such, these wargames emphasized larger scale ground and air operations, but nonetheless still received criticism from pockets of the military community in how they unfolded. The goals of the field exercises were simply too ambitious, an organization as large and as complex as the U.S. Army ground and aviation forces simply could not quickly and completely revamp its approach to combined arms, including CAS. AAF General Hap Arnold and ground forces Lieutenant General Lesley J. McNair both considered the exercises' attempt at air support to be a failure.[488] This was a failure at the senior levels of the Army for not properly developing a

[486] George, "An Inquiry into the Subject "War"," 45.
[487] Kaplan, *To Kill Nations*, 10-11.
[488] Riley Sunderland, *Evolution of Command and Control Doctrine for Close Air Support* (Washington, DC: Office of Air Force History, 1973), 7–9.

working approach to CAS by this time, which in turn trickled down to the lower ranking officer corps, which thus lacked guidance on how to best develop effective air-ground operations.

Basic doctrine of the Air Force leading up to 1941, *FM 1-5 Employment of the Aviation of the Army* did not go into any significant detail about any CAS processes, and in fact fundamentally implied that strategic bombing was the central mission of any Army aviation assets.[489] The most CAS centric doctrine, *FM 31-35 Aviation in Support of Ground Forces*, was developed by drawing on data from observing the war in Europe as well as the experiences of the recent combined arms centric field exercises. This was the AAF's earliest effort at updating tactical doctrine to deal with approaching challenges in the war. However, this was not overall focused on operational methods, rather it was mostly directed towards the organization of air assets that were deployed overseas. For example, it established an air support command as part of the overall sub-system of air commands in an overseas theatre, and this command was allowed to prioritize operations to focus on the larger threats to partnered ground forces. Essentially, the doctrine emphasized a centralized approach to CAS that would allow air officers to have the majority of control of tactical air missions, and that requests for air support would go through the Army chain of command. Further, *FM 31-35* provided few specifics for a functional CAS system; essentially much of the operational processes of CAS remained undecided.[490] Overall, the AAF remained mostly focused on enhancing its strategic air doctrine. This did not sit well with the Army ground forces, who also had multiple objections to the *FM 31-35*; in particular they disliked the push that aviators were making for a more centralized approach to CAS as ground officers favoured a more decentralized and flexible system that allowed for their officers to have more direct influence on missions. The two primary authors of the new Air Force tactical doctrine, Colonel George Schlatter and Colonel William Lynd felt it was tentative and would develop further as operations unfolded.[491]

The Second World War: North Africa

[489] War Department, *FM 1-5 Employment of the Aviation of the Army* (Washington, DC: Government Printing Office, 1940).
[490] War Department, *FM 31-35 Aviation in Support of Ground Forces* (Washington, DC: Government Printing Office, 1942).
[491] Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force 1907-1960* (Maxwell, AB: Air University Press, 1989), 131-133.

The AAFs experience with CAS throughout the war would undergo a series of adaptations in order to end the conflict with a fairly effective system. This was a gradual process, beginning with the largely unsuccessful North African operations. The lessons learned from those early battles shaped how CAS was employed in Sicily and the wider Italian campaign, where the firmer seeds of a successful system began to grow. These experiences were then analyzed and diffused as tactical aviation assets played a large role during the campaigns of France and Germany during the final stages of the war where the final adaptation process occurred. In the view of senior tactical aviation officers of the AAF, there was little doubt that CAS and tactical airpower in general was largely an "unknown factor" as part of the wider military. These officers had hoped that they would make an impact on the war, yet acknowledged that there were clear deficiencies in doctrine and operational methods as the U.S. entered the conflict. This established the ideal condition for the adaptation process to begin, as it became clear that the risk of defeat on the battlefield loomed high if they were unable to fix the problems.[492]

AAF tactical aviation was put to the test starting 16 November 1942 as part of Operation Torch, the Anglo-U.S. invasion of North Africa. This was literally a trial by fire for the organization's new doctrine, and it became clear during early operations that it was very flawed and in need of improvement. The internal assessment by senior aviation officers such as General Elwood Quesada was that the system was lacking structure and coordination of the different aspects of tactical aviation, such as attempting to fulfill air support missions without earlier securing air supremacy to offset German *Luftwaffe* interference. Reflecting on these early North African Operations in the early post-war period, General Quesada would write that "[t]hese conspicuous errors of logic nearly resulted in a catastrophe for our meager force, both air and ground, during this early phase".[493] In the months prior to Operation Torch, there had been an attempt by the Army to try and improve the CAS system. One of the most prominent attempts was the Tennessee Maneuvers in June of 1942. These field exercises managed to identify some

[492] Lt. Gen E. R. Quesada, "Tactical Air Power," *Air University Quarterly Review* Vol 1, No. 4, (Spring 1948), 37-45.
[493] Quesada, "Tactical Air Power," 40.

core elements in the air support system that needed improvement, such as the coordination of the location of forward deployed ground forces with pilots in the air.[494]

The *FM 31-35* CAS system that was used in North Africa had been a sort of compromise between the preferred systems of aviators and their ground officer counterparts. Here, operations were always under the command of a ground officers, who in turn would decide when and where the missions were to occur and which targets would be prioritized. Attached to the headquarters was an AAF officer who would then dictate which available aircraft would conduct the mission as well as the particular methods of the attack and also maintained direct command over the Air Support Parties (ASP) who were deployed with ground units to help coordinate the air support. Sometimes observational aircraft were used to assist in the process; however, the quality of radio communications between the ASPs, observation aircraft and the senior air commander remained unreliable.[495]

It became clear that this system and doctrine had deficiencies as operations continued. They were developed too quickly, and lacked any sufficient battle testing until U.S. expeditionary forces were face to face with the Germans in North Africa. The central crux of the problem lay with extremely poor coordination and communication processes, which in turn manifested in ineffective usage of U.S. air and ground combined arms during the early stages of the campaign in Tunisia. This lack of coordination was made clearer by the fact that the British Royal Air Force was able to work very closely and effectively with the British Eighth Army. The system's attempt to compromise between aviation and ground forces perspectives on CAS had created a doctrine which had pleased neither side. The system demanded strong teamwork between the two sides for successful operations, however it failed to map out explicitly how that teamwork should work. The *FM 31-35* doctrine had proven to be far too ambitious.[496] The existing doctrine also had not effectively prepared deployed U.S. forces for a variety of contingencies. For example, the employment of CAS had not taken into consideration the role of enemy fighter aircraft; during early engagements in Tunisia, the Germans were able to inflict a great deal of damage on U.S. forces while AAF aircraft were restricted for other missions.

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[494] Air Support Command, "Tennessee Maneuvers 1942," 1942, Air Force Historical Research Agency, K245.32-1. Hereafter AFHRA.
[495] John Schlight, *Help From Above: Air Force Close Air Support of the Army 1946-1973* (Washington, DC: Air Force History and Museum Program, 2003), 33-36.
[496] Michael Bechthold, "A Question of Success: Tactical Air Doctrine and Practice in North Africa, 1942-43," *The Journal of Military History* Vol. 68, No. 3 (2004), 822-830.

Aircraft were also not utilized in the most efficient manner; for example, heavy bombers were often deployed on early CAS missions when fighter-bombers likely would have been far more suitable. There was an obvious lack of accessible intelligence data on local geography as well as updated weather patterns. It became clear to General Eisenhower as well as senior AAF leadership such as General Spaatz by as early as November 1942 that U.S CAS was not effective.[497]

These early campaign problems in North Africa inspired an attempt by the U.S. senior command to seek better cooperation with their British allies over issues relating to airpower. In January 1943 during a conference in Casablanca, U.S. and British commanders set out a series of directives to help streamline issues relating to airpower, including CAS. In turn, this led to a reorganization of command and control of tactical aviation in order to better utilize the resources of the AAF and the Royal Air Force. As such, the AAF leaned into absorbing lessons from their British counterparts who seemed to have a more effective CAS process. This led to the CAS missions being placed under the direction of a central theatre tactical headquarters that would prioritize missions and oversee their requirements.[498]

Despite the early attempts at reorganization, problems with CAS during frontline operations persisted. Only a month later in February 1943 at the Battle of Kasserine Pass, further glaring deficiencies in the U.S. CAS system were made clear. During this battle Colonel Paul Williams commanded XII Air Support Command (ASC) which was to support Army field forces against the Germans. During the battle, XII ASC had a variety of aircraft at their disposal, including a mix of fighter aircraft such as the A-20, B-25 and Spitfires. Colonel Williams in his approach to missions during the battle closely followed the *FM 31-35* system. Immediate problems included horrible communications with ground units as battle comms were passed on between air and ground units far too late for effective support to occur, and German aircraft continued to harass U.S. units throughout the battle and air superiority had not been secured or even attempted. [499] At Kasserine Pass, Army ground and air commanders clashed over who

[497] Dan Syrett "The Tunisian Campaign, 1942-1943," in Benjamin Franklin Cooling ed., *Case Studies in the Development of Close Air Support* (Washington, DC: Office of Air Force History, 1990), 161-162, 168; "Desert Campaign: The Story of the Ninth U.S. Army Air Force in Support of the British in Africa," 1943, AFHRA K168.7104-84
[498] Mortensen, *A Pattern for Joint Operations*, 73; Bechthold, "A Question of Success," 838-839.
[499] Richard P. Hallion, *Strike from the Sky: The History of Battlefield Air Attack 1911-1945* (Washington, DC: Smithsonian Institute Press, 1989), 167-172.

exactly was to command supporting aircraft. The disastrous results of this battle led to Army ground officers to push for more direct control of CAS in future operations. One of the earlier disagreements regarded who was to be in command of attack aircraft, which led to debates over proximity of supporting aircraft fields to the front lines. These debates were fiercely held among senior officers as well as those in the mid-range of the chain of command. Army officers wanted aircraft to be as close as possible in order to increase effectiveness of response times, while air officers rejected this notion as they wanted to preserve the freedom to undertake other operations if need be, such as those relating to air superiority, or deeper strike operations well behind the enemy front lines.[500] Overall, Kasserine Pass was a shock moment for CAS observers, and served as a clear signal that more aggressive changes would be needed.

CAS effectiveness remained uneven throughout the bulk of the Tunisian campaign, and this continued to draw ire from high profile commanders, including General George Patton who publicly remarked that he felt there was an overall failure of U.S. air support to attack German armor positions. In the period following Kasserine Pass, the majority of tactical air operations were flown in an air superiority capacity rather than for CAS, which continued to anger ground officers who felt they were not being supported properly. Still, there were some successes; the XII ASC conducted support missions that contributed to the surrender of over 200, 000 German troops by the end of the Tunisian campaign, and air officers took note that XII ASC was not tied directly to any individual ground unit, rather it provided air support operations across a wider front.[501]

As the North African campaign concluded, a number of identifiable issues were made clear. There was a growing divide between air and ground officers over how a new CAS system should function; the aviation officers continued to push for strong centralized control of tactical air mission, while army officers continued in vain to push for a more decentralized approach. There were also a number of technical issues, including: inadequate communications between air and ground units; poor pilot training for CAS missions; untested equipment; poor logistics; and overall poor command and control. The main part of the old system that seemed to continue was the role of Air Support Parties.[502]

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[500] Deaile, *Always at War*, 52-53.
[501] Dan Syrett "The Tunisian Campaign, 1942-1943," 178; XII Air Support "Report of Tunisian Campaign," Undated, AFHRA K651.306-1.
[502] Schlight, *Help for Above*, 38-40, 401-402.

One of the wider legacies of the Tunisian campaign, as well as the high-profile disaster of the Battle of Kasserine Pass, was an immediate discrediting of *FM 31-35*, as well as demonstrating to the eyes of the officer corps as well as senior leadership that there was a clear need for a thorough lessons learned undertaking. As part of this process, there was a rapid diffusion of personnel from North Africa who spread the word of the harsh failings and of need of changes. Officers who had gathered early combat experience were redeployed back to the United States where they were able to discuss their first-hand experiences with the next group of aviators.[503] Senior AAF leadership felt positively that an adaptation process was underway, and that this process also involved assessing enemy experiences with tactical aviation. It was observed that the Germans did not dedicate enough aviation missions towards interdiction strikes as well as maintaining air superiority, and that the Germans had spent too much time focusing on CAS.[504] Overall, it was during the latter stages of the North African campaign that the seeds of a successful adaptation had been laid. The formal structural reorganization for the employment of CAS which occurred at the Casablanca conference had helped to streamline things as information from the British gradually diffused into the AAF, however there was considerable effort from the frontline aviators and ground officers who by trial and error of early stages of combat had become veterans in how to best utilize tactical aviation. Combat experience had clearly identified that pre-war doctrine needed updating, and a new and better system needed to be built.

The main AAF response to the various lessons learned during the first phase of the U.S. wartime experience was to rapidly draft a new basic doctrine that incorporated these elements into new standard ways of operating. *FM 100-20 Command and Employment of Air* was published in July 1943 after approval from General Hap Arnold and the senior AAF command, and outlined new approaches to tactical aviation, including increasing the effectiveness of air support. The most central element here was the clear articulation of the three main priorities/phases of tactical aviation during a campaign. The first phase was to secure air superiority, which can then allow for other mission types to occur; second, was the prevention of movement of enemy field forces in and out and around the battlespace via interdiction strikes; and third was CAS for friendly ground forces. The doctrine largely established the equality of air

[503] Hallion, *Strike from the Sky*, 167-172.
[504] Quesada, "Tactical Air Power," 38.

commanders with their ground force counterpart's, which would place both equally under the command of the theatre commander rather than each other. This was identified as being key to strengthening air support effectiveness by allowing air commands to give direct input on operational planning. Yet, there remained gaps in terms of its coverage, such as specifics relating to the in-theatre organization of CAS, and there remained a need for further integration of future lessons learned into it after more operational experience could be gained[505] Aviation officers were able to see the influences of their time in North Africa in the new doctrine, and the initial responses seemed largely positive. However, it was also viewed with considerable suspicion from many ground force officers who feared it was first and foremost focused on securing AAF organizational independence within the Army, and emphasized non-CAS missions preferred by aviators such as air superiority more so than supporting friendly ground forces.[506]

The Second World War: Italy

As the U.S. forces landed in Sicily during Operation Husky in August 1943, followed by the eventual mainland Italian invasion in September 1943, there was a more direct attempt to apply the combat lessons learned from North Africa in order to better enhance operational effectiveness. In particular, starting in Sicily, increased operational attention was paid to securing air superiority as early as possible in order to allow follow on CAS missions to unfold unmolested by enemy aviation. Further, in Sicily the AAF attempted to expand the conduct of interdiction strikes against enemy field forces in order to reduce the need for demand in CAS later on during the campaign.[507] Despite the attempts to integrate new lessons learned, the legacies of the older CAS system still remained. For example, during the Sicilian campaign the XXII Tactical Air Command (TAC) found that there were some effectiveness issues relating to CAS operations in support of the Fifth Army. For example, an official lessons learned report for XXII TAC concluded that "[c]onfusion and lack of coordination resulted".[508]

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[505] War Department, *FM 100-20 Command and Employment of Air Power* (Washington, DC: Government Printing Office, 1943).
[506] Lt. Col. Benjamin M. Tarver Jr., "Air-Ground Cooperation on the Battlefield," *Military Review* Vol. XXIII, No. 12 (1944), 30-33; Richard R. Muller "Close Air Support: The German, British, and American experiences,1918-1941," in Williamson Murray and Allan R. Millett eds. *Military Innovation in the Interwar Period* (Cambridge, Cambridge University Press, 1996), 186-187.
[507] Quesada, "Tactical Air Power," 41.
[508] Headquarters, Mediterranean Allied Air Forces "XXII Tactical Air Command's Close Support of the Fifth Army," Undated, AFHRA K626.4501-1.

However, the Fifth Army and XXII TAC developed more effective CAS methods as the campaign in the Italian peninsula went on and this led to a continued lessons learned effort to build off this effectiveness. It was discovered that forward deployed AAF units should be allowed wider operational flexibility and that joint operations decisions needed to be made at the Army and Air Command level rather than by smaller units.[509] At headquarters, commanders from XXII TAC and the Fifth Army were jointly present, with daily meetings held at regular times where targets were jointly identified, leading to a mix of prearranged targets that were attacked within 24 hours of the request as well as daily ad hoc targets that were integrated into the mission preparations. Units such as divisions retained the ability via their forward air controllers (known as "Rover Joes") to call in new targets for CAS. Further, a Ground Liaison Officer was also used to enhance coordination matters as well as brief AAF officers on ground forces activities such as explaining decisions and providing near real time data on movements and operations.[510]

Following the Sicilian campaign, the Allies began a series of landings on the mainland, including at Salerno with Operation Avalanche. This operation involved one of the biggest deployments of air support during the wider Mediterranean campaign. The assessment of some junior and midlevel officers during these operations was that tactical aviation was being used in an effective manner, that tactical operations demonstrated the necessary flexibility needed. In the view of Lieutenant Colonel Benjamin Tarver of the AAF, the most impactful usage of CAS occurred when air units were under a centralized command rather than when supporting specific ground units in a decentralized manner.[511] Lieutenant Colonel Tarver further observed that "we see that the setting up of air power and ground power as co-equal, and the fact that the command of each is reserved to members of its own arm, has not resulted in a cleavage between the two forces on the battlefield. They are united by a common objective – defeat of the enemy".[512] These officers were reflecting the orthodox AAF preference for centralized control of aviation.

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[509] Headquarters, Mediterranean Allied Air Forces "XXII Tactical Air Command's Close Support of the Fifth Army".
[510] Headquarters, Mediterranean Allied Air Forces "XXII Tactical Air Command's Close Support of the Fifth Army".
[511] Lt. Col. Benjamin M. Tarver Jr., "Air-Ground Cooperation on the Battlefield," *Military Review* Vol. XXIII, No. 12 (1944), 30-33.
[512] Tarver Jr., "Air-Ground Cooperation on the Battlefield," 33.

Other contemporary reflective commentary from junior and midlevel officers inspired by the Italian campaign highlighted the importance of enhancing air-ground cooperation and coordination. In a *Military Review* article, AAF Major Edward Jenkins asked readers, "[t]hink it over, you in the air forces and you in the ground forces. Do you as an air man understand what your team-mate, the ground man, is trying to do? Can you help him? He is fighting the same war as you".[513] Major Jenkins strongly advocated that his fellow officers learn more about one another's campaign roles, noting that ground force commanders must come to understand the importance of the AAF's three phases of tactical air operations, and that overall continued campaign dialogue between air and ground officers remains key to diffusing appropriate operational experiences and foster a community that can learn lessons from one another. Jenkins concludes his article advising his fellow aviators that, "[i]f you are an air man, find out how little you actually know of ground problems. Resolve to increase this knowledge by personal contact. The doughboy, redleg, and armored force men are essentially the same as you are".[514]

The AAF units involved in the Italian campaign engaged in different types of experimentation as time went on to try and improve their CAS capabilities. For example, XII TAC and the Fifth Army mandated that their forward command posts needed to be physically no more than a few hundred yards of one another to maximize opportunities for coordination. Another was that the Fifth Army headquarters and XII TAC counterpart's engaged in more selectivity when authorizing CAS missions so that only requests directly related to the immediate campaign objective were to be fulfilled. Lingering issues for CAS and XII TAC included: unreliability of accessible intelligence data; technological communications problems such as AAF VHF radios being unable to communicate with ground unit radios; and finally, friendly fire remained a constant worry for commanders due to its unfortunate frequency.[515] An ongoing debate throughout the Italian campaign regarded the types of aircraft that were best suitable for CAS missions. Some officers felt that heavy bombers were not the most appropriate for these missions due to their high altitudes of flying making them potentially less able to visualize what was occurring on the ground during bombing runs. The noted advantages of

[513] Maj. Edward L. Jenkins, "How to Win Wars by Ground-Air Cooperation," *Military Review* Vol. XXIII, No. 11 (Feb 1944), 54.
[514] Jenkins, "How to Win Wars by Ground-Air Cooperation," 56.
[515] Schlight, *Help From Above*, 43-44.

heavy bombers was their ability to bring down massive amounts of firepower on the enemy. However, after analyzing their usage during the Spring Offensive of 1945 in Italy it was decided that in order to maximize their effectiveness that bombers required extra work, such as giving bombardiers and navigators extra intel data on the bombing area, and that additional safety protocols needed to be followed in order to minimize risks of friendly fire.[516]

The experiences of the 1st Armored Division during the summer of 1944 illustrated an organic adaptation process that was actively underway during the Italian campaign. There were attempts from a top down and bottom up involving senior and midlevel officers to improve the effectiveness of CAS. This involved the holding of conferences at their Corps headquarters in order to encourage the sharing of tactical experiences in order to help diffuse best practices that was learned under fire during the Division's advance on Rome. Of particular note was that these conferences involved a strong mix of midlevel officers who were directly involved in ground support operations. A direct outcome of the conferences was to increase the use of ground liaison officers to better coordinate with their forward air controller counterparts, such as ensuring more consistent updates on the positioning of ground forces.[517] The division also experimented with the use of airborne forward controllers as a result of these discussions. Core lessons that were learned and integrated as a result of this process was to place greater emphasis on avoiding friendly fire; this was primarily achieved via increasing coordination between forwarded placed ground units and pilots using VHF Radios. Further, it was felt that an officer who understands aviation terminology should be the one who personally guides the attacking aircraft to their targets, while the local ground commander needed to have ensured the clear identification of both the target location as well as the positions of his friendly forces. [518]

The Second World War: Northern Europe

One of the central objectives for the Allies during the course of the war was launching a massive seaborne invasion of France, and preparation for this task began in earnest as early as 1943 as the U.S. began to shift significant forces from North America to their staging grounds in

[516] Lt. Col. J. W. Perkins, "Use of Heavy Bombers on Tactical Missions," *Military Review* Vol. XXVI, No. 2 (May 1946), 18-22.
[517] Headquarters, IV Corps "Report on Close Air Support of the 1st Armored Division, 26 June to 3 July 1944," 1944, AFHRA K626.4501-2.
[518] Headquarters, IV Corps "Report on Close Air Support of the 1st Armored Division, 26 June to 3 July 1944."

the United Kingdom. In terms of tactical airpower, the 9th Air Force was the largest deployed force to this area, and it began undergoing a considerable readiness process prior to the invasion, which included integrating as many lessons learned from the campaigns in Italy and North Africa as was possible into its own operational methods. This was undertaken in order to allow U.S. tactical aviation to be as effective as possible as soon as U.S. forces were on the beachheads in France. Part of this process involved undergoing combined arms joint exercises with Army ground forces while in the U.K. However, one of the most significant preparatory measures was the development of a formal exchange program for officers serving in the Italian campaign to come to the U.K. to assist in the preparations, and in turn allowed officers of the 9th Air Force to gain operational experiences serving in Italy for a time, thus creating a formal pathway for the networked diffusion of ideas and techniques concerning tactical aviation and air support from past operations to impact future operations.[519]

Essentially, the broader organizational structure for tactical air support during the invasion of France in 1944, followed by the invasion of Germany, was an extension of the system that had developed more fully during the previous Italian campaign. Under this system, air command groups subordinate to the Ninth Air Force were linked to various armies: the IXI TAC was paired with the First Army; XIX TAC with the Third Army; and XXIX TAC linked to the Ninth Army.[520] Following the Normandy landings on 6 June 1944, the U.S. Army began what began as a fierce battle to liberate France. Senior tactical aviation officers felt at this point, they had a reasonably firm understanding of the basics of effective operational methods thanks to the adaptation process from the earlier periods of the war paired with refinement from mid-war field exercises and joint training in the U.S. and U.K..[521] This was likely best exemplified by the experiences of XIX TAC under the command of General Otto Weyland, that formed half of the air-ground team along with General George Patton's Third Army. They had formed the team in the U.K. in the months prior to the invasion, where they emphasized joint training, and after a series of field exercises and reflecting on operational experiences from the earlier war campaigns, instituted a series of changes in their approach to CAS. These changes included: increasing the amount of air liaison officers to three times more than what was called for in the

[519] Schlight, *Help From Above*, 44-45.
[520] Futrell, *Ideas, Concepts, Doctrine*, 174.
[521] Quesada, "Tactical Air Power," 41.

existing procedures; secured newer portable radios for their air controllers in order to allow them to operate more smoothly in the front lines; and overall shortened the request time for air support operations. These changes were largely due to the receptive flexibility of both Weyland and Patton, who both not only were willing to work together in a very cooperative manner, but both officers maintained an attitude that was very acceptive of the process of adaptations.[522]

During the first few months of the post invasion period, XIX TAC and the Third Army had demonstrated very effective CAS. These early combat experiences were able to demonstrate to TAC's leadership some early lessons for their CAS system. Much of the fighting after the beachhead was gradual, with the U.S. forces getting bogged down by fierce German resistance, but nonetheless maintained a gradual advance. These battles showed that there needed to be an increase in the number of Air Liaison officers per armored division, in part because these divisions would frequently subdivide into two or three different armored columns, which widened the demand for the liaison officers. Communication during these early France engagements also proved to be unsatisfactory, particularly where Allied forces advanced at too quickly of a pace, also another problem was that the radio channels would quickly become overwhelmed by the number of active users, reducing their functionality. Positively, these early engagements showed the strong effectiveness of P-47 Thunderbolt aircraft for the CAS role, particularly their strafing runs which were shown to be lethal against both German armor as well as infantry clusters.[523]

XIX TAC operations in August 1944 demonstrated further effectiveness of their CAS system, which had continued to be revised as the U.S. forces gradually advanced across France. The XIX TAC senior command viewed the CAS adaptation process to be very successful and cites it specifically as unfolding at a rapid pace.[524] Beginning 1 August 1944 Patton's armored and infantry columns began to smash their way through German lines, and a large part of this process was the air support provided by XIX TAC. The armored columns had between 10-14 tanks equipped with VHF radios in order to keep in continuous communications with the aviation support. The supporting fighter aircraft maintained readiness in the general area of the columns, standing by to be called in for a quick strike upon request. These fighters would remain

[522] James Kelly Morningstar, *Patton's Way: A Radical Theory of War* (Annapolis, MD: Naval Institute Press, 2017), 83-84.
[523] XIX Tactical Air Command, "Twelve Thousand Fighter-Bomber Sorties," Undated, AFHRA K537.04A
[524] Headquarters, Army Air Forces, "Air-Ground Teamwork on the Western Front," Undated, AFHRA K537.04C.

with the columns until relief aircraft arrived, thus maintaining a constant flow of continuous air support during daylight hours.[525] The system of air support for armored columns relied on continuous dialogue between pilots, flight leaders, and the Air Support Party radios down on the ground. A developed standard tactic involved having a fighter act as a recon screen ahead of the column to identify threats and defensive entrenchments, which were then radioed back to the advancing column which then carried out an assault. Each individual column of tanks was assigned their own Air Support Party. While centralized command and control of the column was overseen by a provisional Tactical Control Group that was directly under the XIX TAC headquarters, this was an ad hoc development in order to better streamline air strike requests. The results of this column support CAS was absolutely devastating on the enemy; by the end of August 1944 XIX TAC had destroyed: 5058 enemy motor vehicles, 466 panzers and armored cars, 2956 railcars, 222 gun positions, and 163 naval vessels. This was achieved with the XIX TAC following, per General Weyland's guidance, the three main phases of tactical doctrine; air superiority was first achieved, followed on by necessary interdiction strikes, and then the CAS was provided to the armored columns.[526] One of the main constraining factors during the advance in August was its speed. To offset this, there was a direct telephone line always between Patton and the XIX HQ, and in addition General Weyland personally flew forward every other day for personal conferences with Gen. Patton or his Chief of Staff. The mood in the XIX TAC headquarters remained highly enthusiastic during the advance, with official documentation referring to their teaming with the Third army as "Uncle Sam's "Secret Weapon"".[527]

As U.S. forces continued to advance in France, additional lessons learned occurred regarding the use of CAS. For example, during the liberation of Brest, CAS was identified as being particularly useful during urban combat. This would sometimes include the use of napalm to drive out enemy troops. Fighter bombers in particular were proven to be the most effective aircraft for air support during urban combat as their ability to fly low allowed for more flexible targeting along roads and neighborhoods. Official XIX TAC reports described them as "in effect, street fighting with P-47s".[528] Weather remained an important factor in determining the outcome

[525] Headquarters, Army Air Forces, "Air-Ground Teamwork on the Western Front".
[526] "Ground-Air Teamwork in France," *Military Review* Vol. XXV, No. 2 (May 1945), 43-45.
[527] XIX Tactical Air Command, "Twelve Thousand Fighter-Bomber Sorties".
[528] XIX Tactical Air Command, "Tactical Air Operations In Europe".

of CAS; snow and rain reduced visibility to such an extent that it became very difficult to successfully identify friendly and enemy units, and thus the risk for friendly fire was considerably elevated during periods of poor visibility. Napalm had been identified as being the most effective weapon during night operations, in part due to its illuminating effect. The use of strafing from the 50 caliber guns of fighterbombers were also viewed as being highly effective for CAS due to their flexibility and accuracy, while carpet bombing strikes from medium and heavy bombers was confirmed to be often wasted unless friendly ground forces were in a position to physically follow-on after the strike, otherwise enemy forces would simply reoccupy the positions they had abandoned during the bombing.[529] The CAS provided by XIX TAC would go on to contribute to decisive victories at Loire and Moselle, the latter of which saw the surrendering German General, Botho Elster, personally request that General Weyland be present at the surrender ceremony due to the role that CAS had played in influencing his decision, where he was quoted as saying "[k]eep the *Jabo* off my men".[530]

By the end of 1944 U.S. forces were operating highly effective CAS, yet continued to refine the processes when time and space allowed. As more operational experience was gained by units and officers, continued internal reassessment of techniques occurred. For example, as the use of fighter-bombers increased, it became apparent that dive-bombing techniques needed to be improved. Fighter-bombers were carrying out high numbers of daily operations, and it was determined that there needed to be a formal review of training processes in order to further develop best practices. As a result of this combat experience, there was a decision made to develop new standardized processes with regards to dive bombing and the use of rockets.[531] Even into November of 1944, U.S. Forces continued to adjust the command and control processes to better utilize CAS, for example equipping the Combined Operations centers at forward headquarters were equipped with VHF equipment in order to better connect and coordinate with forwarded air controllers, and allowing command to be better shaped by near real time intelligence updates.[532] Further, during this period, there was a constant exchange of

[529] XIX Tactical Air Command, "Tactical Air Operations In Europe"; XIX Tactical Air Command "Intelligence Summary 29 Sep 1944" 1944, AFHRA K168.8104.82; XIX Tactical Air Command, "Tactical Air Power".
[530] *Jabo* was short for *Jagdbomber*, the German word for fighter-bomber; XIX Tactical Air Command, "Tactical Air Operations In Europe."
[531] Office of the Director of Training, "Dive Bombing and Rocket Firing: Preliminary Report on Training Techniques," 5 Jan 1945, AFHRA K168.7104-62.
[532] XIX Tactical Air Command, "Tactical Air Operations In Europe".

sending officers with combat experience back to the U.S. to assist with training new pilots. This allowed for more accurate training processes, as well as the ability to diffuse ideas via informal socializing.[533]

Multiple late war operations were clear demonstrations of the power of the refined U.S. CAS system; for example, during the Battle of the Bulge in the Ardennes, which involved the final German offensive of the war. The fighting in the Ardennes was one of the few times that CAS had been employed primarily in a defensive operation, as the majority of U.S. combat during the war had occurred in an offensive context. Weather had constrained its usage in the battle due to poor visibility issues as a result of heavy snow paired with the German use of concealment and camouflage. XIX TAC continued to work in close coordination with the Third Army in providing CAS primarily for its armored units and inflicted heavy losses on the attacking German panzers.[534] This effective usage of CAS continued as the U.S. and its allies would regain the initiative and entered into the final offensives of the war while pushing into Germany, which included the final assaults on the Siegfried Line as well as the Springtime 1945 assaults across the Rhine. U.S. airpower was able to lay waste to the final reserves of the Wehrmacht, wiping out much of the remaining German heavy artillery positions. One of the most lethal and final CAS operations of the war occurred when the Third Army pushed across the Saar River in the late Spring of 1945; this caused a mass daylight retreat of the broken German defending forces, leading to an onslaught of U.S. tactical airpower support, with official reports describing the destruction as "a fighter-bomber's paradise".

By VE day on 8 May 1945, the AAF had ended their European combat operations a changed organization. Tactical aviation had not been the main focus of the AAF during the fighting in the European heater, rather than had been the strategic air war which had been fought by heavy bombers against German industrial targets. This strategic air campaign was where the majority of AAF resources and personnel and intellectual attention had been dedicated. The organization first and foremost wanted to promote the achievements of the "Mighty Eighth", the Eighth Air Force, when discussing its role during the war in Europe.[535] However, a reasonable

[533] Capt. J. B. L Rusb, "The Air-Ground Team," *Military Review* Vol. XXV, No. 12 (March 1946), 8-11.
[534] The Ninth Air Force, "Operational History of the Ninth Air Force Book 1: Battle of the Ardennes," 1945, AFHRA K533.01-2.
[535] For more on the Eighth Air Force, and U.S. Second World War strategic bombing efforts against Germany see, Tammi Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American ideas about strategic bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2002); Donald L. Miller, *Masters of the*

argument could be made that biggest impact that U.S. airpower had in contributing to the defeat of Nazi Germany was in the form of tactical aviation supporting the advance of its ground forces across the deserts of North Africa, the winding narrow roads of the Italian interior, and finally across the fields, forests and towns of Northern Europe. The AAF underwent a fairly grueling adaptation process regarding its air support. CAS in North Africa began as a failure, especially compared to their German counterpart's skillful tactical aviation capabilities. In response, U.S. aviators, particularly those midlevel officers serving in the front lines, began aggressive attempt to reform U.S. tactical aviation, including CAS. This lesson learned process was supported by senior tactical aviation commanders. The CAS used during the Sicilian and Italian operations was a clearly demonstratable improvement to the poorly handled North African Operations. However, lessons continued to be learned, and finally the combat across Northern Europe finally demonstrated a reasonably effective CAS system. Simply put, the AAF had undergone a fairly successful adaptation process for CAS by the end of the war.

The Post-War Era

At the end of the Second World War the AAF was faced with a series of fairly significant challenges. First and foremost it had to process and assess its recent wartime experiences. The visions of Douhet, with strategic heavy bombers bringing about a rapid end to the war through a series of decisive overwhelming destructive strikes from the skies, had failed to materialize. While the strategic air campaign against Germany had certainly contributed to the end result of the war, it had lasted years rather than days or weeks, and had been unable to end the war on its own. It had taken a truly combined arms approach to defeat Nazi Germany, with naval and ground forces playing major roles themselves. However, the surrender of Japan following the dropping of the new atomic bombs on Hiroshima and Nagasaki had given new life to the vision of the power of strategic bombing, as well as being on the cusp of revolutionizing global politics.[536] Still, the AAF as an organization seemed poised to have an internal debate over the nature of airpower based on their wartime experiences which would

Air: America's Bomber Boys Who Fought the Air War Against Nazi Germany (New York, NY: Simon and Schuster Inc, 2007).

[536] For more on the assessment of strategic bombing and emerging global Nuclear Revolution see, Bernard Brodie, *War and Politics* (New York, NY: Macmillan, 1973); Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed (New York, NY: Palgrave Macmillan, 2003).

have profound impacts on the future of the organization, and in particular, the future of CAS. Debates surrounding the wartime experience, however, were not the only issue the organization was contending with in the immediate post-war period. There was also the defence unification debate as well as the issue of service independence of the Air Force from the Army. In addition, there was also growing debates over budget allocations during the demobilization phase, and how the air force would be structured during this new atomic age.

The organizational assessments of the role of CAS in the immediate post-war period were relatively positive by the proponents of tactical airpower. Formal unit campaign analysis documents published fairly glowing narratives that detailed the adaptations of CAS in a very positive manner. The Ninth Air Force and XIX TAC published official assessments that praised the role of CAS as being essential to the defeat of the German War machine in Northern Europe. These unit centric assessments detailed how they increased and enhanced cooperation with ground forces, and overviewed the more technical growth in CAS capabilities, such as improvements to bombing techniques and attack tactics.[537] Even the AAF headquarters' internalized assessment of CAS was very positive when assessing combat from Northern Europe. The AAF headquarters official report on air-ground teaming even suggested the wartime experience had the potential to fundamentally alter organizational theories of tactical aviation, writing that, "[b]orn of resourcefulness and necessity cradled in the African desert, the lusty infantry quickly grew into a creature of bone and sinew until, when Normandy was invaded, it had been a smoothly functioning striking force of terrific power, destined to change many tactical theories therefore accepted as axioms".[538] Even a senior commander with the Eight Airforce, Lieutenant General Ira Eaker, after the end of war had felt that a central lessons learned from combat was that the three phase concept of tactical aviation of air superiority, interdiction strikes followed by CAS had worked incredibly effectively, though he fundamentally rejected the Army's push for a more decentralized organization of CAS.[539]

Many of the senior Tactical Aviation officers such as General Spaatz and General Quesada tended to have a fairly sober degree of self-reflection regarding the AAFs contributions to the outcome of the Second World War; Spaatz in particular had viewed the

[537] See for example, XIX Tactical Air Command, "Tactical Air Operations In Europe".
[538] Headquarters, Army Air Forces, "Air-Ground Teamwork on the Western Front," 1.
[539] Lt Gen Ira C. Eaker to Commanding General, Army Air Forces 2 July 1945, AFHRA K168.7104-89.

defeat of Nazi Germany as the result of air, naval and ground force combined arms. Others in the AAF agreed, such as those serving in the Air Force educational institutions, with many instructors agreeing that early visions of air war by the first generation of airpower theorists such as Douhet did not exactly come into being, and that there was likely value in jointness among services in combined arms centric operations.[540]

In 1946 the AAF formally established TAC at Drew Field in Florida as a sub command structure in order to maintain and develop tactical aviation capabilities. However, the community of tactical aviators sympathetic to the idea of further integration of CAS into the organization's primary approach to war found themselves fundamentally constrained from forming networks that could be effectively bring about wider organizational change. Competing organizational interests and internal narratives simply proved to be too powerful to overcome. The midlevel officers, who were convinced of CAS' impact during the combat operations of the Second World War, were unable as a result to form any influential networks, and the sympathetic senior officers were unable or at times even unwilling to try and free those more junior officers of those constraints.

The AAF established the Tactical Air Force Development Program (TAFDP) in 1946 to explore issues relating to TAC, such as the potential procurement of new aircraft, training and the development of doctrine. This process however was disjointed, lacking a central focus and direction from senior leadership. A sign of things to come was that it was directed to oppose any encroachment from the ground forces element of the Army into tactical aviation, which would include opposition to the development of any sole purpose CAS centric aircraft, and emphasizing the AAF's vision of three phases of tactical aviation missions.[541] The TAFDP did lead in part to one of the earliest postwar attempts to codify the CAS lessons of the Second World War, which was the publication of an updated doctrinal manual, *FM 31-35 Air-Ground Operations* in 1946. Overall, the manual was highly influenced by the Northern European tactical air lessons more so than anything from the Pacific theatre. The new manual also mostly focused on command and control issues. This doctrine was a fundamental rejection of the Army ground force's decentralized preferences for CAS, where aircraft would be assigned to specific ground units. Rather, the 1946 *FM 31-35* was clearly driven by a desire to reinforce an aviator's perspective on

[540] Futrell, *Ideas, Concepts, Doctrine*, 147, 166-168.
[541] Schlight, *Help From Above*, 57.

tactical airpower, and thus it outlined a highly centralized process where requests for CAS were formally sent up the chain of command until they finally reached an air commander who would maintain the ability to control which mission received priority, which aircraft were used in response, and the methods of the attack. The new manual outlined the details of command and control of CAS missions, which would be controlled by air officers at a Joint Operations Centre which would receive requests, and would then issue orders through the Tactical Air Control Centre that oversaw the tactical aircraft over the battlespace and the presence of Tactical Air Control Parties who maintained the coordination with ground units via the role of forward air controllers.[542]

Despite these post-war doctrinal updates it became clear that organizationally, tactical aviation matters were soon to become a peripheral interest at best, and at worst a near forgotten afterthought. A central focus of the organization that developed in this period was the drive towards organizational independence from the Army and finally from the unencumbered air arm that Douhet and Billy Mitchell had advocated for several decades prior. This push towards independence encouraged organizational unity, and the rallying around certain unified visions of airpower, and it was during this process where strategic airpower once again captured the imaginations of the majority of AAF personnel. Part of this embrace was the renewed desire to fully separate themselves conceptually from the Army's vision of air support, which emphasized tactical aviation above all else, thus making it easier to justify organizational independence. However, there was also a genuine belief in the power of strategic airpower. Elements of this belief would even come to capture the minds of senior Tactical Aviation officers such as Quesada, who was selected by AAF command to be among the forefront of justifying an independent air force based first and foremost around a Strategic Air Command (SAC). Quesada was chosen to be one of the faces of this process as it was thought that his tactical aviation background would add credibility to the pro strategic airpower arguments.[543] The AAF began to shift resources away from TAC during this period. For example, during the demobilization phase and the budget cuts that occupied with this process, the AAF prevented TAC from holding any major joint exercises to work on CAS and other types of tactical aviation during 1946; it did not

[542] War Department, *FM 31-35 Air-Ground Operations* (Washington, DC: Government Printing Office, 1946).
[543] Quesada, "Tactical Air Power," 45; Schlight, *Help From Above*, 54-55.

attempt something similar with strategic air assets.[544] Although the postwar doctrine did well in codifying some of the later wartime adaptations, it lacked sufficient room to incorporate emerging trends such as new jet technologies, nor was it well suited to foster a joint approach to CAS by being less than receptive to the preferences of ground forces. Thus, the new doctrine failed to adequately set up CAS for further integration into the organization given the variety of upcoming changes in terms of technology, politics and military preferences.

There was a massive TAC brain drain during this period as well, as thousands of officers with tactical combat experience from earlier in Northern Europe would leave the organization to return to the civilian world and thus TAC was at risk at becoming too top heavy as many midlevel and junior officers left the serivice. At the very minimum TAC was able to survive during this early post-war period, though it certainly was constrained from being able to grow. TAC was essentially placed on the defensive against powerful organizational interests and ideational preferences which favored strategic airpower, and this would be a considerable obstacle to fostering the institutionalization of Second World War lessons learned beyond what it was able to codify in the 1946 updated doctrine.[545]

Those interested in tactical aviation matters such as CAS found themselves in a difficult position to try and gain footholds within wider organizational narratives. General Quesada was at the forefront of this by publishing articles in service journals outlining the success of Second World War CAS adaptations and he tried to make a case for the importance of supporting TAC in the post-war period, yet even he concluded in these pieces that strategic airpower was likely going to absolutely dominate the future of operations. General Weyland offered similar sentiments during this period.[546] A handful of other officers attempted to participate in this minimalist discourse. Colonel John Hansborough made an interesting case in an Army centric publication, *The Military Review*, that it would be better for all involved in CAS if the Army ground forces simply accepted the Air force position of having coequal air and ground commanders during the process, where cooperation via mutually acceptable negations would lead to the most impactful uses of CAS in future, and warned the reader that in peacetime there

[544] "Resume of Individual, Unit and Joint Training Activities Covering Tactical Air Operations for 1946-1950," 1951, AFHRA K168.15-43.
[545] Caroline Frieda Ziemke, "In the Shadow of the Giant: USAF Tactical Air Command in the Era of Strategic Bombing, 1945-1955," (PhD Dissertation, The Ohio State University, 1989), 34-38.
[546] Maj Gen. E. R. Quesada, "The Tactual Air Command Today," *Military Review* Vol. XXVII, No. 6 (Sep 1947), 3-9; Quesada, "Tactical Air Power".

were risks that this cooperation could fall by the wayside.[547] Major W. A. Smith echoed those calls for strengthening air and ground coordination with an article entitled "Planning for Concerted Action in the Air-Ground Effort".[548] Another Colonel, Jules Gonseth made a pitch regarding the merits of tactical aviation, but admitted that unfortunately it remains conceptually misunderstood among the majority of his fellow aviators.[549] A pattern amongst the few attempts to develop a pro-TAC narrative within organizational service journals was that the authors tended to admit they were fighting an uphill battle, and also often could not deny the draw and interest that strategic airpower held. Further, TAC advocates in the AAF were fighting a two front war; firstly, they continued to advocate for the AAF's preferred vision for CAS against the Army's competing vision, and they themselves were also trying to justify CAS and Tactical Aviation's wider importance to their fellow aviators, the majority of whom had clearly become obsessed with strategic airpower.

The popular organizational narratives that dominated the immediate postwar period were centered on the push towards organizational independence, and the growing importance of strategic airpower. Ultimately, these two perspectives were married to one another, as according to their proponents, the most effective way of delivering and controlling strategic airpower was via an independent air force. General Spaatz, who at this point was one of the most famous senior AAF officers, published an article soon after the end of the Second World War arguing first and foremost for the establishment of an independent Air Force.[550] This vision was found throughout the organization, and it was very actively promoted. For example, Air University hosted airpower enthusiast Alexander Seversky for a public lecture on the nature and future of airpower as his views aligned with the majority of faculty members. Seversky would go on to lecture that strategic airpower, especially when paired with atomic weapons, was fundamentally the most important national security tool that can be used to counter the growing threat of the Soviet Union, argued that "[i]n the atomic age, as before, the physical source of an enemy's power will have to be destroyed before he collapses", and that "[t]he next war will be fought in the air. The side which will first assume effective control of the skies, over the enemy nation, and

[547] Col. John. W Hansborough, "The Air-Ground Problem," *Military Review* Vol. XXVI, No. 6 (Sep 1946), 69-72.
[548] Maj. W. A. Smith, "Planning for Concerted Action in the Air-Ground Effort," *Military Review* Vol. XXVIII, No. 3 (June 1948, 17-20.
[549] Col. Jules. E Gonseth Jr., "Tactical Air Support for Army Forces," *Military Review* Vol. XXXV, No. 4 (Ju55 1946), 3-16.
[550] Gen. Carl Spaatz, "The Future of the Army Air Forces," *Military Review* Vol. XXVI, No. 4 (July 1946), 3-10.

thus destroy its ability to deliver atom bombs, will win".[551] This vision of war that was being promoted at the heart of the intellectual hub of airpower thinking in the U.S. at the time, was clearly a rehashing of the older theories of Douhet, and pairing them with the new technological advances in jet aircraft and atomic weapons. This was a powerful vision and a seductive one to a community of young officers who were already socialized to prefer strategic bombing over tactical applications of airpower as a result of the established organizational culture of the AAF.

The pro strategic airpower narratives that continued in this post-war period had clearly captured the imaginations of officers and even those outside of the organization. The sheer amount of strategic airpower articles, speeches, and related conferences grossly dwarfed any attempts at forming pro-TAC networks and narratives. The *Air University Quarterly Review* remained dominated by strategic airpower discourses. Officer and academic James L. Cate wrote a reflective article on pre-Second World War aviation matters, where he acknowledged that the driving vision of U.S. military aviation since its formative period was strategic bombing.[552] Officers such as Colonel Thomas Moore praised the power of advanced technology that would finally allow Billy Mitchell's visions of bombing to come into fruition, and advocated that the newly established USAF needed to focus on this mission.[553] The emphasis of the strategic bomber mission for the new USAF was a popular topic among officers in this period. Colonel Dale Smith tied the power of atomic weapons with strategic airpower in his article "Operational Concepts for Modern War", where one of his main conclusions was that there was to be few roles for ground forces in future wars.[554] Colonel Frederick Calhoun wrote that a military revolution had occurred thanks to the power of airpower. Calhoun's views, very much in line with many of his fellow officers at this time felt that airpower had even usurped Clausewitz's theory of war, writing that no longer did the U.S. have to defeat the field forces of the enemy in order to achieve its political ends.[555] Colonel Frank Pancake advocated that one of the most important elements of military affairs in this new era was the importance of targeting data and

[551] Alexander P. de Seversky, "A Lecture on Air Power," *Air University Quarterly Review* Vol 1, No. 2 (Fall 1947), 41.
[552] James L. Cate "Development of Air Doctrine, 1917-41," *Air University Quarterly Review* Vol 1, No. 3 (Winter 1947), 23-40.
[553] Col. Thomes E. Moore, "Employment of Strategic Air Power," *Air University Quarterly Review* Vol 1, No. 4 (Spring 1948), 57-66.
[554] Col. Dale O. Smith "Operational Concepts for Modern War," *Air University Quarterly Review* Vol 2, No. 2 (Fall 1948), 3-11.
[555] Col. Frederick E. Calhoun, "Air Power and Principal of War," *Air University Quarterly Review* Vol 2, No. 2 (Fall 1948), 37-47.

intelligence capabilities in order to maximize the effectiveness of strategic bombing strikes.[556] These pro strategic airpower sentiments were also echoed by some of the organization's most senior members, such as General Hoyt Vandenberg, who joined the growing network of pro-strategic airpower advocates and began writing opinion pieces in national magazines and newspapers where he argued that atomic weapons paired with airpower had redefined the nature of warfare.[557]

The Air Force formally gained organizational independence from the Army following the passing of the 1947 National Security Act under the Truman Administration. This was not a particular surprise to many, as senior AAF leadership had essentially secured a de facto agreement regarding independence with their Ground Forces counterparts during the Second World War. The influence of the USAF on national security policy skyrocketed during this period, as that same legislation led to defence unification, where the departments of the Navy, Army and Air Force would be under a single Department of Defense, and with this the Chief of Staff of the newly independent USAF would sit equally with his Naval and Army counterparts as part of the Joint Chiefs of Staff to the President.[558]

The independence of the USAF had thus cemented strategic air power proponent's central objectives for the military airpower, and they were able to assert their absolutely dominant control within this new organization. The establishment of SAC in 1947 was to become the main focus of the organization's doctrinal thinking and technological investments. SAC was perfectly positioned to not only internally dominate the USAF, but to assert a huge amount of external influence within the wider U.S. military. SAC's rise in prominence was occurring during the wider context of post Second World War demobilization, and SAC's perceived ability to threaten the Soviet Union with long range bombers immediately appeared to be an attractive area to shift defence investments, in order to cut them elsewhere. SAC's ability to deliver the awesome power of the atomic bomb to just about any coroner of the globe via bombers had captured the minds and budgets of the U.S. defence community.[559] SAC

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[556] Lt. Col. Frank R. Pancake, "The Strategic Striking Force," *Air University Quarterly Review* Vol 2, No. 2 (Fall 1948), 48-56.
[557] Gen. Hoyt S. Vandenberg and Stanley Frank, "The Truth About Our Air Power," *Saturday Evening Post* (17 February 1951), 20-21.
[558] For more on USAF independence see, Herman S. Wolk, *Reflections on Air Force Independence* (Washington, DC: Air Force History and Museum Program, 2007).
[559] Deaile, *Always At War*, 71-78.

strengthened its position within the USAF by aggressively fostering a strong normative identify that was based on the power of the bomber, atomic weaponry, and strategic airpower thinking. SAC was quickly becoming the premier weapon of the U.S military and should be at the immediate forefront of any sort of national security strategy.[560] SAC's vision of war was that of the strategic air bombing offensive, which would either outright destroy the enemy or deter them from taking any action. SAC proponents argued that it alone had the ability to target and destroy all the key industrial, political and military sites in the Soviet Union, and thus it alone could deliver the absolute physical and psychological destruction of the enemy. New technologies that were now constantly progressing, such as jet engine aircraft, would allow SAC members to build off their previous wartime experiences bombing Nazi Germany in a more advanced and destructive way.[561]

SAC became the main driver of USAF procurement and war plan development during the late 1940s during the rising tensions in Europe with the Soviet Union. TAC during this period would become an organizational afterthought. The head of SAC at the time General George Kenney, even publicly announced that it would be the USAF that would be the real tip of the spear should hostilities break out – where heavy bombardment (strategic strike) would be delivered first from the air. To help the USAF fulfill this vision, the premier major procurement project for the recently independent organization was a huge investment into a new long-range strategic bomber, the B-36 Peacemaker. This was the idealized weapon system to fulfill the desires of the strategic airpower fundamentalists who were not only at the senior levels of the organization, but were found throughout the ranks of its entire officer corps. General Vandenberg would whenever possible during this time, promote the idea that the "bomber always got through".[562] Most of the earliest major USAF field exercises were focused on a strategic air offensive. Broiler-Frolic was a series of exercises from August 1947 through March 1948 which simulated a major atomic bombing offensive, that would then be followed on by a conventional bombing campaign. It was simulated to prepare the USAF for war over the skies of the Soviet Union, where it would seek to destroy its major infrastructure such as power plants and military bases. The USAF in conjunction with the Joint Chiefs of Staff would develop major

[560] Deaile, *Always at War*, 101-102.
[561] Kaplan, *To Kill Nations*, 22-30.
[562] Futrell, *Ideas, Concepts,* Doctrine, 222-223, 254.

war plans based around strategic bombing; the Halfmoon-Fleetwood-Trojan war plans were all based around a decisive strategic air attack, rather than any sort of combined arms approach.[563]

During this period, leading into the lead up to the Korean War, there were some further attempts to develop CAS, despite the overall emphasis of the USAF being near completely focused on strategic airpower. During October and November of 1947 TAC participated in Combine III, which was intended to promote joint operations, including CAS, between the USAF and Army. However, Combine III and similar exercises had limited successes; senior USAF leadership remaining unconvinced of the importance of TAC and of CAS, with most officers remained focused on strategic airpower issues, and even the Army felt the USAF was seeking to undermine its TAC contributions. General Quesada, as head of TAC in 1947, had hoped these field exercises would be a public relations boon for the command, as it continued to have poor retention with its officers who were either leaving the military or moving on to SAC, and even TAC's equipment at this time was having problems being maintained due to lack of resources. While Combine III received some positive feedback from public observers, Quesada ultimately was unable to build off of it, and TAC continued to organizationally decline.[564] TAC would even lose its major command status in 1948, being reduced by General Vandenberg as head of the USAF down to being a subordinate command of the Continental Air Command. Symbolically this was a humiliation for the few remaining TAC proponents in the wider organization. Vandenberg had become suspicious of TAC being too friendly with the Army, and was concerned it would undermine USAF independence. Quesada's eventual replacement as head of TAC, Major General Robert Lee, remained committed to the uphill battle of promoting tactical airpower issues, but was simply unable to accomplish much given his lack of resources and the outright hostility from the senior pro-SAC USAF senior leadership.[565] The few attempts by the late 1940s to try and promote TAC in wider organizational narratives tended to fall on deaf ears, and often reflected the severely reduced position of tactical air interests. For example, Col. William Wise wrote an article entitled "Future of the Tactical Air Power", where rather than promoting the refinement of CAS techniques, his piece was largely a plea to the wider USAF community of the usefulness of the basic functions of TAC. Col. Wise's pessimistic argument

[563] William S. Borgiasz, *The Strategic Air Command: Evolution and Consolidation of Nuclear Forces, 1945-1955* (Westport, CI: Prager, 1996), 13-15.
[564] Ziemke, "In the Shadow of the Giant," 45-50.
[565] Ziemke, "In the Shadow of the Giant," 73-75.

event admitted that SAC had essentially conquered the organization and that TAC's wider utility in the atomic age was limited, writing that TAC "can have little place in the decisive phases of modern warfare of global proportions".[566] Essentially, by 1949 the USAF viewed TAC as a functional anachronism. It represented in the view of the majority of USAF officers a symbol of a bygone era, where airpower was forced to play a supporting role to ground forces due to technological and bureaucratic limitations. Under this view, TAC was unable to contribute anything of substance to the new visions of future war, in which strategic airpower was what mattered the most.[567]

The Korean War

The Korean War caught the USAF by complete surprise. This was not the great power total war scenario that had captured the minds of its officers and doctrine in the half decade following the end of the Second World War. Rather than fighting over the skies of Europe or the Soviet Union itself, the USAF was forced to focus on the strategic periphery in Asia. It was also to be a limited war scenario, with major constraints on target selections, and thus the USAF was unable to strike at the allies of North Korea, such as the Soviet Union or China, out of fear of escalating the war. Further, North Korea itself was a very poor and underdeveloped country with few truly strategic targets. Rather, the most pressing need for aviation from the outbreak of the war was tactical, especially CAS. Yet, TAC itself was also very unprepared for the war given its lack of prewar resources, and the loss of personnel and organizational prestige. TAC was a token force heading into the war, and needed to turn to its earlier Second World War experiences as a guide.

The early successes of the North Korean Army exacerbated this situation, as over the first six months of the war, not only had they demonstrated strategic surprise by catching the U.S. off guard to the very start of the war, there emerged a genuine concern that the communist forces would be victorious. This placed a considerable amount of pressure on tactical aviation to help prevent this from occurring, and hopefully be able to contribute in a major way to a victory.[568]

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[566] Col. William H. Wise, "Future of the Tactical Air Force," *Air University Quarterly Review*, Vol 2, No. 4, (Spring 1949), 35.
[567] Furtell, *Ideas, Concepts, and Doctrine*, 108-109.
[568] James A. Winnefeld and Dana J. Johnson. *Joint Air Operations: Pursuit of Unity in Command and Control, 1942-1991* (Annapolis, MD: Naval Institute Press, 1993), 39-40.

As a means of better coordinating CAS and other tactical aviation missions, the military established a joint operations centre in July of 1950. The early war issues related to continued poor communications between air, ground, and naval units, as well as lingering conceptual issues over the processes of CAS.[569] The lack of significant pre-war joint training between TAC aviation and the ground forces of the Eighth Army led to disjointed attempts at air support, and this hampered effective coordination. Ground forces during these early months of the war identified communications issues as playing the leading role in this problem; there were formal requests made for more TAC air control jeeps and radio communications technicians as well as more forward air control units. However, this request was declined. The USAF did not want to support any requests or decisions that would lead to a decentralized CAS process.[570]

By the fall of 1950 things were beginning to improve in terms of CAS. USAF and ground forces had more time to improve coordination among air and ground units, and aviators out of necessity had refamiliarized themselves with the merits of tactical aviation. A central focus of the USAF during this period was preventing the piecemealing of aviation units through being assigned to ground forces units. Further, the USAF also remained stubborn that a centralized TAC system under the leadership of an aviator was needed for effective tactical aviation. In order to improve coordination, internal lessons learned documents were drafted and distributed in order to maximize best practices as quickly as possible.[571] USAF reports also found that in order to best maximize CAS effectiveness, the USAF would need to utilize the three phases of TAC that it had followed during its Second World War Doctrine, *FM 31-35*. The USAF found that ground force commanders were too fixated on immediate CAS missions conducting as quickly as possible, without taking into consideration the importance of interedition and air superiority missions.[572]

One of the most important USAF figures for tactical aviation during the Korean War was General Otto Weyland, who was given command of TAC after the war began. Weyland, at this point, was a very well respected figure in the USAF community due to his Second World War combat experiences; he remained a proponent of effective CAS practices, but also publicly

[569] Winnefeld and Johnson. *Joint Air Operations*, 43-44.
[570] "Report 25 June – 15 August 1950," AFHRA K168.7104-63; "5th Air Force to X Corps," 28 Oct 1950, AFHRA K168.7104-63
[571] "Air Coordination, Korean Campaign October 1950 (Tipton Report)," 1950 AFHRA, K168.7104-50.
[572] "Control of Air Operations in the Korean Campaign," 9 Oct 1950, AFHRA K168.710450.

supported the importance of SAC, which endeared him to the rest of the senior USAF leadership. One of Weyland's earliest major decisions in Korea for TAC was to balance CAS operations with the other TAC missions; this led to him supporting a major TAC interdiction campaign behind the current front lines in order to engage in deep strikes against valuable North Korean tactical targets.[573] Weyland also remained supportive of many of the official USAF TAC related positions, including making the case against assigning specific air units to specific ground units. Weyland acknowledged there were also differences between the Second World War and Korean operations for TAC. For example, Weyland noted that during European operations in Northern Europe, fighter bombers assigned to certain armored columns made more sense as those advances were continuous, which was not the case in Korea which had more defensive operations.[574]

The Army continued to express dissatisfaction with TAC and CAS. A particularly large area of contention between the Army and the USAF was the role of USMC CAS. The Army observed that at one point during the war, USMC aviation units were able to take as little as 10 minutes to get bombs on target and were able to loiter over the battelsapce for an average of 73 minutes, while USAF CAS often took as much as 40 minutes to launch a CAS strike, and its aircraft tended to loiter over the battlespace for only around 30 minutes. Further, USMC aviation would often fly from as close as 800-1600 yards away from the front lines, while the USAF aircraft frequently operated as far as three miles away during a CAS mission.[575] Army officers continued to critique the USAF TAC, particularly their continued preference for centralized CAS systems. However, Weyland did acknowledge that CAS could be improved, and dedicated considerable time and effort into increasing effectiveness, though would refuse to budge on the issue of centralization.[576] One of the areas that was changed to develop increased CAS effectiveness was training for Tactical Air Control party personnel. They were given increased instruction on topics like Army front line operations and small unit tactics, and further participated in an increased number of joint exercises and maneuvers.[577] Weyland's broad assessment of USAF CAS during the first half of the war was that it had gotten the job

[573] Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953* (Lawrence, KS: University Press of Kansas, 2000), 33-34.
[574] Gen Otto Weyland to Gen. Matthew B. Ridgway 9 July 1951 AFHRA, K168.7104-50.
[575] Crane, *American Airpower Strategy in Korea, 1950-1953*, 61-62.
[576] Crane, *American Airpower Strategy in Korea, 1950-1953*, 111.
[577] "Briefing on Training for Tactical Air Operations," Undated, AFHRA K168.15-43

done during engagements when pressure was at its highest, and that CAS had been provided in time against some of the fiercest enemy offenses and had successfully prevented multiple envelopment attempts by the communists.[578]

An early lesson of the war was that tactical aviation had an important role to play in any combined arms operations. Even the senior USAF leadership had come to acknowledge this and restored TAC as a major command in December 1950. Tactical aviators such as Brigadier General Homer Sanders, a former veteran of XIX TAC during the Second World War, took this opportunity to remind his fellow aviators of this realty. In an article published during the middle of the war, General Sanders wrote that "[a]ny statement indicating too much emphasis on strategic air operations at the expense of tactical air operations or vice versa is foolhardy".[579] With a renewed purpose, TAC officers began to experiment and continue to refine CAS practices in order to better contribute to the war effort. Officers had found that medium and heavy bombers remained poorly suited for CAS missions unless their targets were particularly dense concentrations of enemy troops. Strafing attacks from fighters were in turn identified as being some of the most effective. For example, an adaptation from the 16th Fighter Interceptor Squadron was to develop a new SOP of CAS strikes to involve a 'double tap', where after an initial strafing run, they would then make a second strafing run a few minutes later after leaving the area to wipe out survivors of the first attack. Pilots also identified napalm as showing highly positive results once friendly fire risks had been mitigated.[580]

The USAF continued to undergo internal assessments of best practices and to diffuse the results to frontline forces via official lessons learned documents. CAS was identified as being particularly effective at helping to plug gaps in the front lines when facing assaults from numerically superior enemy units, until follow on forces could be brought in to secure territory, with a report stating that "our Tactical Air Power was used – as sandbags supporting a leaky dyke".[581] Pre-operational planning was determined to be one of the most important factors in effective CAS. Eventually, the view of the USAF was that while coordination was undeniably

[578] Gen Otto P. Weyland, "The Air Campaign in Korea," *Air University Quarterly Review* Vol 6, No. 1 (Fall 1953), 3-28.
[579] Brig. Gen. Homer L. Sanders, "Tactical Air Operations in Retrospect and Prospect," *Air University Quarterly Review* Vol 4, No. 3 (Spring 1951), 38.
[580] Robert F. Futrell and Albert F. Simpson, "Air War in Korea: II," *Air University Quarterly Review* Vol 4, No. 3, (Spring 1951), 47-78.
[581] "Tactical Air Power," Undated, AFHRA K168.15-43 V.18, 27.

poor during the first phases of the war, they had managed to develop a more than satisfactory degree of coordination by the midpoint of the war, with reports noting that "Air-ground teamwork for achieving the maximum in close support has been refined in the Korean war to a degree unmatched".[582] Further, reports also stated that

> close support for ground troops in the Korean war is being performed with a degree of effectiveness previously existing only in theory. And this refinement has been born out of necessity. It has been created by Air Force and Army men working as one service with sound of enemy guns, to fill gaps which hard facts in the field have indicated must be filled now.[583]

This view was reflected too by Army field commanders such as General Walton Walker who was quoted as saying, "[n]o commander ever had better air support than has been furnished the Eight Army. If it had not been for the air support that we received from the Fifth Air Force, we would not have been able to stay in Korea".[584] Key to this increase in coordination between air and ground units were improvements made to the communications system, including the radio networks. By improving the radio communications network, forward air controllers moving across the battlespace in jeeps were better able to keep in direct contact with pilots in the skies above as well as commanders coordinating the missions back at headquarters.[585]

By the end of the War, it was felt that the USAF had adopted a more effective CAS practices than it had when the war began. Some lingering issues remained. There were still disagreements between the Army and TAC over frequency of CAS strikes and over the merits of TAC's three phases of tactical aviation. In an article reflecting on TACs wartime experiences, General Weyland noted that by the end of the war around 30% of all TAC sorties were for CAS, which was a considerable increase from what had occurred during the Second World War where only around 10% of AAF flights had been on CAS missions. Weyland noted that this large number of CAS flights had prevented other mission from taking place, such as interdiction strikes when they perhaps should have happened instead. Nonetheless, with an obvious eye

[582] "Tactical Air Power," 31.
[583] "Tactical Air Power," 31.
[584] "Tactical Air Power," 32.
[585] "Tactical Air Power," 37-38.

towards the post-war period debates about doctrine and resources that were to come, Weyland argued in his article that "I believe strongly in all-out close air support of ground forces when they are engaged in major operations to achieve decisive objectives"[586] Weyland also acknowledged the clear influence that Second World War combat operations and the adaptations that occurred had played on CAS missions in Korea, stating during a 1953 lecture at the Army War College that "[w]e find, therefore, that the concepts and doctrine of joint air-ground operations were developed largely during World War II".[587] Weyland's views on CAS was torn between his desire to further expand the role of tactical aviation within the wider USAF but also to maintain and publicly support the official positions of the service. During his lectures, Weyland argued that CAS was at its most impactful during periods of decisive combat against major enemy movements, and was much less useful during periods of passive defence. He went on to say that, "[c]lose air support is not a cure-all for all the trials and tribulations of the ground soldier. However, we in the Air Force, should, can, and do create the conditions whereby our comrades on the ground can go into battle under the most favorable conditions for success".[588] Weyland still maintained the view that the pinnacle of CAS was XIX TAC's support of the Third Army's armored columns during the Second World War. Still, technologies such as jet aircraft and atomic weapons had created an environment in which tactical aviation still needed to adjust to and rediscover its relevancy in a clearer manner. Nonetheless, the looming influences of SAC and of presidential policies that favor strategic airpower would continue to pose challenges for tactical aviation moving forwards. [589]

The life or death situations faced by the U.S. military during periods of war had once again brought CAS back into the forefront of an organization that otherwise would mostly prefer it, that could be ignored. The USAF found it had in many ways to re-learn how to conduct effective CAS operations or else risk potentially contributing to the defeat of the US and its allies. Similar problems from the Second World War had reemerged, including contested debates over command and control of CAS as well as technical problems with communications and the selectin of appropriate aircraft for TAC missions. Still, TAC did its job, primarily under the

[586] Gen Otto P. Weyland, "The Air Campaign in Korea," *Air University Quarterly Review* Vol 6, No. 1 (Fall 1953), 27.
[587] Gen. Otto P. Weyland, "Air Power and Its Tactical Applications,", Lecture, Army War College, Feb 1953, AFHRA K168.7104-46.
[588] Weyland, "Air Power and Its Tactical Applications".
[589] Weyland, "Air Power and Its Tactical Applications".

leadership of General Weyland who was able to draw heavily from his highly successful combat experiences of the Second World War, paired with renewed organizational lessons learned analysis during the ongoing Korean conflict to develop and adapt USAF TAC to produce effective CAS for its Army counterparts.

The Shadow of Vietnam

The reaction within the USAF community to the cessation of hostilities in Korea was complicated. Once again, Douhet's and Billy Mitchell's vision of war had not come to pass. The Communist North was not bombed immediately into submission, and like during the Second World War, tactical aviation had arguably played a more impactful role during the war. Yet some in the USAF sought to immediately dismiss the results as a historical aberration. This view, held by many officers, felt that the USAF had reacted properly to the challenge of war by bringing down massive amounts of firepower on strategic targets of the enemy where it mattered the most on strategic targets, and that against most other opponents it would have likely had a more decisive impact. They dismissed the actual war outcome as the product of very specific time and place, on conditions that had a low probability of repeating elsewhere, such as an inability (or reluctance) to strike at targets in China. Under this view, CAS contributions were largely ignored as being less relevant to the likely future wars to come. CAS to these pro strategic bombing officers was something that was needed due to these particularly unique circumstances for the Korean conflict, and that was it. These officers would push the USAF to forget about CAS much as they also wished to forget about the war in Korea.[590] Positively for the USAF was that the Korean War led to an increase in allocated budgetary expenditure for the organization, which it could then use to spend on further strategic air assets. Following the end of the war, the USAF shifted its focus strategically and conceptually back towards the Soviet Union. The USAF became obsessed with the possibility of a future major total war that would be fought in Europe, and against the Soviet Union where a massive conventional and atomic bombing campaign would be required to win the war.[591]

The organizational narratives that tended to dominate the post-Korean War period were highly reminiscent of the years following the Second World War. The USAF was an

[590] Futrell, *Ideas, Concepts, Doctrine*, 339.
[591] Borgiasz, *The Strategic Air Command*, 24-27.

organization that remained fixated on strategic airpower, as well as looking to the potential for new technologies to help it improve its strategic air capabilities. It was not an organization that was interested in shifting focus to enhancing tactical aviation. Articles in the *Air University Quarterly Review* continued to mirror these trends. Colonel Robert Richardson published an article "Atomic Weapons and Theater Warfare" which reflected the priorities of the USAF in this new post-war age. Colonel Richardson described the importance of SAC as the main counter to the Soviet Union, with long range bombers and nuclear weapons being the most important tools at the US military's disposal.[592] Other articles covered the importance of bombers, and new trends in its equipment. [593] The USAF also started to promote the ideas of civilian thinkers in the national security community who offered analysis that aligned closely with the importance of SAC. The most prominent of these figures was strategist Bernard Brodie, who wrote articles for USAF publications that discussed the importance of Douhet's views on airpower to contemporary USAF strategy and doctrine.[594]

The majority of organizational narratives during the post Korea period remained fixated on the power of technology and its ability to shape the future of the organization. This fixation primarily concerned the wider strategic airpower implications of the technology, rather than tactical airpower uses, which were seen internally as being less shaped by technology. One of these technological fixations was the integration of guided and ballistic missiles into the organizations. This was conceptualized by many officers as being an extension of the wider SAC vision of airpower and war, just another means of fulfilling Billy Mitchell's views. For these officers not only would the bomber 'always get through' but so would the ballistic missile.[595] The USAF community also became fixated on space related issues during this period, which was largely a reactionary response to the Soviet's launching the Sputnik satellite in 1957. This directly led to considerable Congressional investment in the USAF missile program, as well as other space related areas. During this period USAF personnel began to discuss the concept of

[592] Col. Robert C. Richardson III, "Atomic Weapons and Theater Warfare," *Air University Quarterly Review* Vol 7, No. 3 (Winter 1954-55), 3-24.
[593] "The Strategic Bomber," *Air University Quarterly Review* Vol 6, No. 2 (Summer 1955), 88-137.
[594] Bernard Brodie "The Heritage of Douhet," *Air University Quarterly Review* Vol 6, No. 2 (Summer 1953), 64-69.
[595] For examples of this discourse see, Col. Edward N. Hall, "Air Force Missile Experience," *Air University Quarterly Review* Vol 9, No. 3 (Summer 1957), 34-68; Brig. Gen. Charles M. McCorrle, "Command and Control of Ballistic Missiles," *Air University Quarterly Review* Vol 9, No. 3 (Summer 1957), 69-77 Lt. Col. William L. Anderson, "Organizing and Manning Ballistic Missile Units," *Air University Quarterly Review* Vol 9, No. 3 (Summer 1957), 78-85; Gen. Thomas S. Power, "SAC and the Ballistic Missile," *Air University Quarterly Review* Vol 9, No. 4 (Winter 1957-58), 2-30.

"Astro Power".[596] This new focus largely overwhelmed most of the other organizational narratives for a period of time, essentially restricting TAC related topics from taking hold. Interested officers flooded service journals with articles conceptualizing different aspects of space topics, such as: how the USAF could operate in space; the biological impacts on human officers in space operations; a variety of technical issues; and the uniqueness of the physical environment and what that meant for how operations would unfold in space.[597] Other officers such as Lieutenant Colonel Burt Rowen pushed for further investment in new space related procurement projects, such as the X-15 concept which was to be an experimental rocket powered space plane.[598] Officers such as Lieutenant Colonel Singer and Brigadier General Homer Boushey during this period argued for the USAF to help the construction of manned military bases on the moon.[599] While other officers such as Major Paul Bartlett, and Major Relf Fenley, attempted to directly link Astro-Power with strategic bombing by proposing the USAF be involved in the development of a manned orbital bombardment weapons system, describing it as a "bomber satellite".[600] As the decade came to a close, a new technological trend emerged that helped add to the wider technocentric narratives within the organization, which was of the potential of nuclear propulsion for the USAF and its future procurement options.[601]

The organizational rhetoric that was centered around emerging technologies and strategic uses of airpower was in turn driven by the Presidential policies and national security strategy of

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[596] Quarterly Review Staff, "The USAF Reports to Congress," *Air University Quarterly Review* Vol 10, No. 1, (Spring 1958), 30-60.

[597] For examples of this space discourse see, Brig. Gen. Don D. Flickinger, "Air Force Human-Factors Program for Developing Manned Space Operations," *Air University Quarterly Review* Vol 10, No. 2 (Summer 1958), 7-16; Hubertus Strughold, "Basic Factors in Manned Space Operations," *Air University Quarterly Review* Vol 10, No. 2 (Summer 1958), 29-46; Col. John P. Stapp, "Biodynamics of Manned Space Flight," *Air University Quarterly Review* Vol 10, No. 2 (Summer 1958), 47-52; Quarterly Review Staff, "The Spiral Toward Space," *Air University Quarterly Review* Vol 10, No. 3 (Fall 1958), 10-21.

[598] Lt. Col. Burt Rowen, "Human-Factors Support of the X-15 Program," *Air University Quarterly Review* Vol 10, No. 4 (Fall 1958-59), 31-39; Quarterly Review Staff, "The Spiral Toward Space," *Air University Quarterly Review* Vol 10, No. 3 (Fall 1958), 10-21.

[599] Brig. Gen. Homer. A Boushey, "Blueprints for Space," *Air University Quarterly Review* Vol 11, No. 1 (Spring 1959), 16-29; Lt. Col. S. E. Singer, "The Military Potential of the Moon," *Air University Quarterly Review* Vol 11, No. 2 (Summer 1959), 31-53.

[600] Maj Paul V Bartlett, and Maj Relf A. Fenley, "The Case for a Manned Space Weapon System," *Air University Quarterly Review* Vol 10, No. 4, (Fall 1958-59), 40.

[601] For examples of this nuclear propulsion discourse see, Gen. Thomas D. White, "Nuclear Propulsion and Aerospace Power," *Air University Quarterly Review* Vol 11, No. 3 and 4 (Fall and Winter 1959), 3-8; Maj. Gen. Donald J. Keirn, "The USAF Nuclear Propulsion Program," *Air University Quarterly Review* Vol 11, No. 3 and 4 (Fall and Winter 1959), 13-19; Col. Jack L. Armstrong, "Nuclear Missile, Rocket, and Auxiliary Power Program," *Air University Quarterly Review* Vol 11, No. 3 and 4 (Fall and Winter 1959), 20-25.

the Eisenhower Administration. The Joint Chiefs in the wake of Korea had viewed the war as a unique situation that was unlikely to reappear again, and their eyes shifted back towards the European theatre as the main front of the Cold War where the Soviets themselves had been developing massive nuclear capabilities. President Eisenhower held a personal belief in the awesome power of atomic weaponry, sensing that the U.S. was on the leading edge of not just a new technologically orientated revolution in military affairs, but rather a fundamental revolutionary moment in global politics. This led him to place nuclear weapons at the forefront of his National Security policy and strategy, where he felt that nuclear weapons (by extension nuclear deterrence) would be the first and foremost defence of the U.S. homeland. He felt that the horrific violent threat of a U.S. nuclear retaliatory attack would deter any overt Soviet military aggression. This belief was supported by Secretary of the Treasury George Humphrey, who saw it as a key means of saving the U.S. money as it continued to reform its defence policy post-Second World War and Korea. This was the other pillar of the U.S. embrace of nuclear weapons – it was seen as a force multiplier and in turn the ability to save a considerable amount of the government's treasury as the Administration began to orientate attention and resources to focusing on domestic economic growth. This presidential policy for national security became known as "New Look" which was embraced by the USAF senior leadership and officer corps as it allowed them to embrace its idealized vision of airpower and shape the future of the organization as they saw fit.[602]

The New Look era continued to inflame interservice rivalry dynamics between the USAF and the rest of the military. The USAF had come to view the USN as its main bureaucratic rival in terms of competition over missions and budgetary allocations. The focal point of the clash with the USN concerned which organization would oversee the nuclear deterrence mission. Since the end of the Second World War, the USAF was the service which had largely dominated command and control of nuclear weapons within the wider U.S. military. However, during the latter portion of the 1950s, the USN was rapidly emerging as a threat to that bureaucratically dominant position concerning military's nuclear mission. The USN had created an entirely new platform during this period, the ballistic submarine, which was capable of launching multiple intermediate ranged nuclear armed ballistic missiles. In order for the USAF to maintain control over the nuclear deterrence mission it had to continue emphasizing the importance of SAC. By

[602] Futrell, *Ideas, Concepts, Doctrine*, 419-433; Borgiasz, *The Strategic Air Command*, 35-36.

focusing on the organization's strategic bombing mission, the senior service leadership was able to make a case to the Eisenhower Administration and the civilian national security bureaucracy that the USAF should continue to receive a considerable portion of the overall U.S. national defence budget.[603]

Civilian influence over defence policy matters and the direction of national security strategy had been steadily increasing following the end of the Second World War, and this trend increased steadily post-Korean War. The USAF leadership had been keenly aware of the importance of civilian influence, helping to establish the RAND Corporation thinktank in the late 1940s in order to influence the development of defence policy. Civilian members of the U.S. strategic community were less concerned with internal dynamics of the individual service branches but were very interested in the power of nuclear weapons. The internal doctrinal and strategic debates of a military organization were likely too technical for many civilians to properly understand in depth; however, one did not need to have military expertise to understand the sheer power of nuclear bombs and missiles thanks to the captivating images of the horrific damages inflicted on Hiroshima and Nagasaki during the Second World War. Nuclear power by the 1950s had captured the minds of wider U.S. society. This interest in nuclear weapons among the civilian strategic community was further emboldened by the fact that U.S. NATO allies also viewed U.S. nuclear weapons as the best way to secure their borders against the threat of the Soviet Union. USAF leadership was quick to understand this situation, and in turn developed arguments specifically for this civilian audience that emphasized the importance of SAC's bombers, arguing that it was only the USAF which could truly threatened to destroy the Soviet Union by using nuclear weapons to their fullest potential. These arguments were largely successful, as the USAF was able to convince the Eisenhower Administration that SAC was one of the most important tools of the U.S. national security strategy, and by 1954 the USAF was receiving almost 50% of total annual U.S. defence spending.[604]

[603] Kaplan, *To Kill Nations*, 130-132, 140-143.
[604] Phillip S. Meilinger, *Bomber the Formation and Early Years of Strategic Air Command* (Maxwell, AB: Air University Press, 2002), 292-299, 313.

Very little organizational attention was given towards TAC during the latter half of the 1950s. TAC's successful operational performance during the Korean War had essentially saved it from going through extensive cuts that could have nearly eliminated its existence, however it remained underfunded and underdeveloped. The "New Look" had undercut interest in conventional combat, thus there was little organizational interest or available resources for CAS. It was during this period that TAC turned more towards exploring the development its own nuclear weapons program for tactical operations in order to continue to prove wider relevance. On occasion there were a few attempts to revive interest in CAS, such as the 1955 field Exercise Sagebush which occurred as an attempt to help foster better coordination between TAC and Army ground units, yet neither side was able to come to an agreement as to the wider lessons to draw from it.[605] Later in 1955 the USAF published an updated capstone doctrine, *AFM 1-2 Basic Doctrine*, where it laid out a vision of airpower that was primarily strategic in nature, and held little relevancy for CAS and tactical aviation.[606] A joint document was produced between TAC and the Army in 1957, entitled *Joint Training Directive for Air-Ground Operations*, that sought to better coordinate future training exercises and procedures, yet offered little guidance on the doctrinal differences between TAC and the Army; nor did it make a considerable impact within the wider USAF.[607] Overall, this period did not involve much doctrinal writing or ideational movements for TAC.

Although the USAF in the years following the end of the Korean War was being shaped by a fervent interest in strategic bombing and captivated by emerging technologies, there remained a limited degree of interest in some tactical aviation related matters. First and foremost was that the Koran War had renewed the study of limited wars. Much of this study, however, did not really focus much on the role of CAS, or even other elements of tactical aviation. Some studies were of the French experience in French-Indochina, where a new conceptual puzzle of how to apply airpower against insurgencies was being identified.[608] While some officers such as Colonel William Reid made the case for a renewed focus on tactical airpower, arguing that the French experiences in Indochina showed that poor tactical uses of airpower could severely

[605] Ziemke, "In the Shadow of the Giant," 176-177. 250-251.
[606] Department of the Air Force, *AFM 1-2 Basic Doctrine* (Washington, DC: Government Printing Office, April 1955).
[607] Schlight, *Help From Above*, 213.
[608] Quarterly Review Staff, "The Korean War Speaks to the Indo-Chinese War," *Air University Quarterly Review* Vol 7, No. 1 (Spring 1954), 44-62.

undermine a campaign, and reminded the readers that U.S. TAC had performed adequately well during the Korean intervention.[609] A 1956 assessment of the state of tactical air power by members of Air University found that tactical aviation likely held a higher degree of relevancy for deterrence during threats of limited wars. This assessment noted that General Weyland had testified to Congress that the USAF needed more combat ready aircraft than what it had at the start of the Korean War, and even in the post-war period there was an overall lack of organizational capabilities for fighting limited wars. In the view of General Weyland, "any armed conflict in the near foreseeable future will in all probability be of the brush-fire or limited type, and that for the reason that as long as we maintain a strong strategic Air Force that has the power to deter a major war, that any war in the foreseeable future would be of a limited nature".[610] However, even Weyland was bound by the constraints of organizational primary interests, and would also testify that the greatest need for TAC was investment in things like supersonic bombers to increase its mobility, rather than any type of aircraft that could specialize in CAS.[611]

One of the few USAF service journal articles that touched on the specifics of CAS during the post Korean period was by a Major Robert Brotherton, who wrote in 1959 about "Close Air Support in the Nuclear Age". Major Brotherton argued that both the combat experiences of the U.S. military during the Second World War and more recently in Korea had clearly demonstrated the value of investing in CAS. Brotherton admitted that CAS remained a work in progress for the USAF, that it still had not developed a fully effective system, and he recommended further joint development with the Army as well for allowing for more flexibility among mission selection. Brotherton concluded with a plea to fellow aviators that CAS "must be given a fair test by openminded individuals".[612] General Weyland at the very end of the decade remained a proponent of tactical aviation. In the past, Weyland usually presented the official USAF position on issues when engaging in public discourse, such as promoting the independence of the service, but as the decade came to a close his vocabulary became bolder in support of CAS and TAC. Weyland would later testify to the Congressional Appropriations Committee on these issues

[609] Col. William M Reid, "Tactical Air in Limited War," *Air University Quarterly Review* Vol 8, No. 2 (Spring 1956), 40-48.
[610] "U.S. Air Power Today" *Air University Quarterly Review* Vol 6, No. 2 (Fall 1956), 61-78.
[611] "U.S. Air Power Today," 65.
[612] Maj. Robert G. Brotherton, "Close Air Support in the Nuclear Age," *Military Review* Vol. XXIX, No. 1 (Apr 1959), 35.

calling for more investments in CAS and TAC, highlighting the overall operational effectiveness of the USAF's air superiority, interdiction and CAS process of tactical aviation during war.[613] In a February 1959 presentation at the Air War College, Weyland argued that SAC was far more useful for great power deterrence rather than for operational utility in limited wars, and that limited wars were far more likely to occur in future. Weyland concluded his talk with a relatively stern swipe at the current USAF leadership, arguing that "if the Air Force continues to shrink tactical resources in order to pour dollars and manpower inflexibly into a basically single-objective Total War System, I am very much afraid this vital and invaluable USAF limited war capability may die on the vine".[614]

Conclusion

The AAF/USAF's experience with CAS during the Second World War is an example of a fairly successful adaptation process that fundamentally failed to become significantly institutionalized during the post-war period. Prior to the start of the Second World War, the AAF was a relatively new organization that had developed an incredibly strong normative preference for how war should be fought, and how military aviation should be organized. This vision of warfare was centered on the power of technology and of the strategic application of airpower, which in turn had essentially shunned tactical aviation operations such as CAS as being unworthy of significant attention. This view was challenged very quickly after the U.S. formally entered the Second World War, where it found itself facing off against a powerful and battle hardened enemy. The AAF's severe deficiencies in tactical aviation were immediately exposed during the opening battles of the North African campaign, where German forces performed skillful applications of CAS and its role in combined arms. This external shock was a clear demonstration to the leadership of the AAF and the wider U.S. military that it was facing a life or death situation of potential defeat if it did not improve its operational effectiveness.

The CAS adaptation process gradually began following the wreckage of U.S. forces at Kasserine Pass. AAF CAS adaptation was a joint effort between the junior and midlevel officers who watched first hand on the front lines how ineffective CAS was, along with some

[613]Gen. Otto P. Weyland, "Outline of Briefing Before the Sub Committee on DOD Appropriations of the Appropriations Committee," 23 Feb 1959, AFHRA K168.7104-63.
[614] Gen Otto P. Weyland, "Air War College Presentation," 18 Feb 1959, AFHRA K168.7104-47.

sympathetic senior leadership, such as Generals Quesada and Weyland who took personal interest in CAS and listened to the lower chain of command in how to better improve it. Eventually lessons learned experiences became better documented, accumulated, analyzed and distributed via official reports. Also, by the efforts of the junior and midlevel officers, as well as senior officers, taking the initiative to write articles in service journals like the *Military Review* that had documented their contributions to the adaptation process in hopes of educating and connecting with a wider network of open minded officers. This resulted in better written doctrine by the mid-war period which in turn led to better operationalize of CAS.

By the time the U.S. forces invaded Italy, they were conducting better CAS than they had in North Africa, but they still continued to learn operational lessons. These experiences were observed and diffused to U.S. forces in the U.K. awaiting the invasion of France via lessons learned reports as well as officer exchanges to units serving in Italy. Later, as U.S. Forces fought their way across France and into Germany they had essentially completed the final elements of successful adaptation to improve the operational effectiveness of CAS and develop a working system for its implementation that could be widely distributed. The best example of AAF CAS effectiveness during the war was ultimately the experience of XIX TAC under General Weyland working in conjunction with General Patton's Third Army. In review of tactical aviation's wartime contributions, it would be accurate to state that U.S. CAS had played a crucial role in the combined arms defeat of Nazi Germany on the Northern European front.

The organizational structure of the AAF played a role in facilitating the continuation of the CAS adaptation. Since the AAF was structurally part of the Army, senior ground force commanders maintained a degree of influence over decision making, especially among deployed forces. This gave AAF officers who were focused more on tactical aviation matters such as CAS more time and space to allow for experimentation and diffusion of new ideas.

However, during the post-war period, this successful adaptation failed to be institutionalized, or to fundamentally change the wider organization in any significant way. This failure can be attributed to different influential factors that constrained the adaptation to innovation process. The attempts to form pro-CAS networks of junior and midlevel officers along with sympathetic senior officers to guide its institutionalization failed to come into fruition. In reality, a counter-network of officers with opposing views developed quicker and in larger numbers. This counter-network was of midlevel and senior officers who were zealous

supporters of strategic airpower and pushed the organization themselves to overwhelmingly focus on developments relating to their interests. This counter-network of strategic airpower advocates also actively attempted to undercut the development of tactical aviation capabilities within the organization. This counter-network held various institutional advantages, such as having more supporters at the very senior leadership levels of the organization, as well as the counter-network was much more in line with the prewar developed organizational culture of the AAF and its idealized vision of what war should be and how it should be waged. This counter-network built off this institutionalized advantageous position to constrain the outputs of the smaller pro-CAS network, such as limiting further development of CAS doctrine, preventing allocation of resources to enhance tactical aviation matters, and overall ensuring that the organization was focused on strategic airpower matters.

The AAF became the USAF in 1947, in part using the importance of strategic airpower to justify its organizational independence, and thus the resource allocation within the organization moving forward was always going to fall in line with that position. Tactical aviation managed to continue to be part of the organization, but only barely. Some doctrinal development occurred, such as updating its main CAS field manual in 1946, but otherwise many conceptual doctrinal issues remained unsolved. The demotion of TAC as a formal major command in 1948 was a humiliation for CAS advocates, and a symbolic indication of the organizational disinterest in any and all aviation matters outside of strategic airpower. Organizational independence allowed the majority of senior officers who were focused on SAC to restrict promotion opportunities for pro-TAC officers, essentially blocking one of the adaptation to innovation pathways from unfolding.

The Korean War breathed new life into CAS and tactical aviation in the USAF. Once again, the U.S. military found itself in a very precarious position after the communist forces caught the U.S. by surprise and at several times threatened the U.S. with specter of defeat. This pressure allowed a window for CAS to demonstrate its operational value. Gradual improvements were made based on early war lessons learned. Eventually a more refined CAS process was able to be utilized by the end of the war, and saw very positive battlefield results. Conversely, strategic airpower had seemingly failed to live up to prewar expectations, and had not delivered a quick end result as many of its proponents had promised.

Yet in the 1953-1960 period, a familiar pattern reappeared. A pro-CAS and pro-tactical aviation network within the organization failed to fully materialize. While a counter-network that

was vehemently pro strategic airpower formed once again. The ideational attention of the organization would near fully pivoted to the realm of high technologies, continuing to focus on strategic airpower as well now space and nuclear power. This was not an intellectual environment that was welcoming of looking to the past for inspiration, even including past successes such as Second World War tactical aviation. The very concept of combined arms with a large CAS contribution seemed to be almost primitive under the prevailing organization view of airpower. Rather, the organization was being driven forward by officers who wanted the USAF to lead U.S. national security into a brave new age of strategic airpower, which would also help secure a larger share of the national defence budget. CAS represented an obstacle to this, and needed to be undercut and to remain underdeveloped. CAS found few champions within the organization, and those it had were nowhere near enough to majorly change the USAF into a pro-CAS service branch.

Chapter 6: The Navy

> You think that your empire is confined to your allies, but I say that of two divisions of the world accessible to man, the land and the sea, there is one of which you are absolute masters, and have, or may have, the dominion to any extent you please. Neither the Great King nor any nation on earth can hinder a navy like yours from penetrating withersoever you choose to sail.[615]
>
> Thucydides, History of the Peloponnesian Wars

The USN is often characterized as being very conservative by its embrace of tradition, yet it is also an organization that is tied to the transformative power of technology.[616] Navies cannot operate without technology that is frequently evolving to varying degrees. Thus, the Navy is in many ways an organization linked to processes of change. Visually this can be observed via the evolution from the USN's original sail powered wooden frigates which were purchased in 1794, to the later emergence of coal-powered ironclads such as the *Monitor* during the Civil War (1861-1865).[617] However, one of the most far reaching and revolutionary changes in the history of the USN was the emergence of aircraft carriers as the primary platform of its fleet.[618] Naval aviation had initially started at the most primitive level in 1910 when a civilian pilot, Eugene Ely, launched a plane from the *USS Birmingham* and later with the USN procuring its first official aircraft the following year. By 1914 the USN had established its first aviation institution, a pilot training school with a meager seven aircraft. The USN's First World War experience demonstrated to the organization that aviation had a larger role to play in naval warfare than just as a novelty, yet it would not be until the interwar

[615] Thucydides, Quoted in, Capt. J. M. Scammell, "Thucydides and Sea Power," *Proceedings* (May 1921), https://www.usni.org/magazines/proceedings/1921/may/thucydides-and-sea-power
[616] For a history of the USN see, Symonds, *The US Navy: A Concise History*.
[617] For a history of the transformative impact of the Ironclads on the U.S. Navy see, William H. Roberts, *Civil War Ironclads: The U.S. Navy and Industrial Mobilization* (Baltimore, MD: Johns Hopkins University Press: 2007)
[618] For a history of early carrier development and its impact on the Navy see Norman Polmar, *Aircraft Carriers: A History of Carrier Aviation and Its Influence on World Events, Volume 1: 1909-1945* (Washington, DC: Potomac Books, 2006).

era when aircraft carriers were first introduced as an auxiliary platform.[619] Internal debates over the nature and role of naval aviation and carriers would follow; even as the U.S. entered the Second World War, it had still not completely settled on the exact function and role of carriers. Combat operations from 1941-1945 would settle that debate, and the carrier entered the Cold War as the central platform of the service, and would remain so moving forward thanks to a lengthy institutionalization process within the organization.

This chapter begins with an overview of the USN as an organization on the eve of the U.S. entry into the Second World War by discussing its major internal organizational narratives and norms, as well this section will outline the USN's doctrinal position and preferred operational methods. The second section discusses the USN's major combat experiences in the Pacific theatre during the Second World War. Thirdly, the immediate postwar period will be explored, examining initial organizational attempts to process its combat experiences and navigate its way through the geopolitical and technological shifts of the early Cold War. The fourth section will focus on the USN's combat experiences during the Korean War, demonstrating its views of carriers remained largely unchanged since the end of the Second World War. The fifth section overviews the final integrative efforts of the USN to transform the organization into one centered around carriers as its primary platform during the late 1950s. The chapter concludes demonstrating the USN's attempts to institutionalize its carrier lessons of the Second World War was an overwhelming successful adaptation to innovation process. This was largely in part due to the efforts of junior and midlevel officers to help drive the process along with the impact of other factors.

The United States Navy in 1941

In early December of 1941, as the *Kidō Butai (*1st Air Fleet) of the Imperial Japanese Navy (IJN) was steaming towards Pearl Harbor, the USN was in the midst of undergoing an organizational expansion. President Roosevelt and his Administration had made the USN one of the focal points of its rearmament efforts as it prepared for its inevitable entry into the

[619] Thomas C. Hone, "Interwar Innovation in Three Navies: U.S. Navy, Royal Navy, Imperial Japanese Navy," *Naval War College Review* Vol. 40, No 2 (1987), 71-72.

ongoing global war. The year prior, in July 1940, Congress had formally authorized the largest naval appropriation in USN history as part of the Two Ocean Navy Act which was intended to allow the USN to hold the capabilities to fight two major conflicts simultaneously in the Pacific and Atlantic Oceans.[620] Battleships remained the primary platform of the fleet, with 17 of them fully constructed by the Battle of Pearl Harbor; conversely, the fleet had 7 Carriers and a single escort carrier along with a large assortment of cruisers, destroyers, submarines, minesweepers, and various auxiliary vessels.[621]

The USN of 1941 was largely untested in battle. The First World War had presented an opportunity for some in the service to gain some combat experience, in particular those from the surface fleet community that saw action in anti-submarine operations and convoy protection.[622] During the First World War, while fighting in the Atlantic the USN managed to cement a basic understanding that aviation had a role to play in modern naval warfare, yet there was a lack of consensus over how much resources should be allocated towards it at the expense of other naval priorities.[623] Since the USN had not fought any major fleet versus fleet engagements nor had it participated in any amphibious landing operations, there remained a degree of uncertainty about its preferred operational methods. In particular, there remained considerable lingering questions over how its untested platforms such as aircraft carriers should be used during the upcoming battles across the Pacific.

The USN of the 1940s possessed a strong normative identity and organizational culture that was shaped by the writings and influences of 19th Century naval theorist, Alfred Thayer Mahan.[624] Mahan developed a philosophy of seapower which emphasized gaining command of the sea through the destruction of the enemy's main battle fleet, which occurred either by a decisive engagement or from forcing them to stay anchored in harbour. As such, Mahan

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[620] Symonds, *The US Navy*, 77.
[621] "US Ship Force Levels 1886-present," *Naval History and Heritage Command* (2023), https://www.history.navy.mil/research/histories/ship-histories/us-ship-force-levels.html.
[622] For an overview of the USN during the First World War see, Lisle A. Rose, *America's Sailors In The Great War: Seas, Skies, and Submarines* (Columbia, MO: Missouri University Press, 2016).
[623] Hone, "Interwar Innovation in Three Navies: U.S. Navy, Royal Navy, Imperial Japanese Navy," 71-72.
[624] Mahan was not the only naval theorist known to officers during this time. The other main naval strategist was Sir Julian Corbett, a British naval officer. Corbett, like Mahan also stressed the importance of sea control, however his theory focused less on the role of offensive firepower and decisive battles; instead Corbett emphasized the dispersal of fleets, the use of blockades and close cooperation/coordination with land forces. Nonetheless, USN officers continued to pay greater attention to the U.S. born Mahan. Corbett's views on maritime strategy are found here, Julian Corbett, *Some Principles of Maritime Strategy* (London: Longmans, Green & Co., 1911).

stressed the importance of firepower from ships of the line, which would be maximized via the strategic concentration of force along with emphasizing tactical ingenuity. The Mahanian approach to seapower was ultimately built upon achieving complete supremacy in naval operations against opponents as the result of aggressive offensive actions. This view originated from a study of England's historical global rise, where Mahan connected its growth in economic power and global prominence to its naval power. According to Mahan, the U.S. had a natural inclination towards naval power due to its geography of being bordered by the Atlantic and Pacific oceans and thus should seek to build a large fleet.[625] Reference to Mahanian viewpoints could be found directly and indirectly across the writings of USN officers during this period, especially in the USN's primary professional service journal *Proceedings*. For example, a lieutenant published an article concerning modern naval strategy in which they began the piece essentially paraphrasing Mahan, writing that "[t]he first requirement of a fleet is to destroy that of the enemy in battle, and the first requirement of Naval Strategy is both to prepare for and to seek this battle".[626] While some officers began to even take Mahanian concepts and apply them to modern technological trends, such as the rise of carriers and aviation, arguing that his seapower philosophy continues to remain relevant despite these changes.[627]

The USN was also shaped by wider historical sets of naval traditions. These traditions can be traced to the navies of the ancient world, although Great Britain's Royal Navy was likely the biggest influence. These can be found within different sets of common naval terminology such as "gun deck". The traditional naval rituals, disciplines, ceremonies and professional ethos helped foster a sense of commonality among the officer corps. These traditions have been shaped by the geography of naval affairs, that takes place across the globe's vast oceans that physically separates naval units from their military counterparts on land. Individual captains and crews remain in a state of quasi-isolation as they travel across the oceans, relying on self-resiliency to solve encountered problems; this has influenced a flattening of command hierarchies, empowering captains and their officers to have a degree of

[625] Alfred Thayer Mahan, *The Influence of Sea Power Upon History: 1660-1783* (Williamstown, MA: Corner House Publishers, 1978); Gat, *A History of Military Thought*, 450-465.
[626] Lt. E.M. Eller, "Naval Strategy," *Proceedings* Vol 65, No. 7 (Jul 1939), 945.
[627] Capt William D. Puleston, "A Re-Examination of Mahan's Concept of Sea Power," *Proceedings* Vol. 66, No. 9 (Sep 1940), 1221-1236.

freedom to approach problem solving as they saw fit. Since ships and their captains were often left to their own survival over long periods of time, there developed a culture of adaptability within navies. However, despite this physical isolation, ships would also operate in fleets and groups in coordinated fashion, with captains and crews of multiple ships attempting to synchronise during complex operations across vast geographic areas, thus biasing navies towards adopting and operating as part of a network-centric structure. The uniqueness of the oceanic environment pushed navies towards expeditionary and offensive minded thinking as often ships find themselves operating half a world away from their homelands. Ships do not operate at a stand still like an army unit in a trench or fort, rather ships remain in a constant state of physical mobility, which amplifies this bias towards offensive action.[628] This is evident from multiple periods in USN history, such as 19th Century expeditionary operations against Barbary Pirates, Commodore Perry's Expedition to Japan, as well as the naval operations during the Spanish-American War.[629]

Aside from the emphasis on traditions, the USN was also largely shaped by its relationship with technology. Brought together, these dual influences biased officers towards embracing a sort of conservative-technocentrism. A significant number of the officers in the service had an engineering or scientifically minded educational background which helped to foster this embrace of technology. When faced with a challenge, these officers would often first and foremost develop a response based around technology or scientific means, yet their dueling conservatism often limited adoption of more radical or unorthodox changes which would significantly challenge the predominant organizational views on the issue.[630] This organizational bias towards moderate adaptability was in turn supported by formal structures within the USN. For example, the General Board (1900-1951), which was a senior advisory group for the service, actively sought to foster a culture of experimentation and openness to change.[631] There was also a wider shift towards professionalization happening within the USN, which in turn led to a merit-

[628] For an overview of these traditional elements of naval culture see, John T. Kuhen, "U.S. Navy Cultural Transformations, 1945-1971: The Jury is Still Out," in Peter R. Mansoor and Williamson Murray, eds., *The Culture of Military Organizations*, 351-377; Roger W. Barnett, *Navy Strategic Culture: Why the Navy Thinks Differently*, (Annapolis, MD: Naval Institute Press, 2009); Peter Karsten, *The Naval Aristocracy: The Golden Age of Annapolis and the Emergence of Modern American Navalism* (New York, NY: The Free Press, 1972).
[629] This notion is reflected by USN officers of the 1940s, for example, Lt. Waldo Chamberlain, "The Tradition of the Offensive in the United States Navy," *Proceedings* Vol. 67, No. 10 (Oct 1941), 1375-1384
[630] John T. Kuehn, *Agents of Innovation: The General Board and the Design of the Fleet that Defeated the Japanese Navy* (Annapolis, MD: Naval Institute Press, 2008), 23.
[631] Kuehn, *Agents of Innovation*, 21.

based promotion system for officer development that allowed for the more rapid rise of skilled younger officers. This professionalization bias helped to foster the learning culture within the officer corps by expecting greater technological knowledge from its officers. In turn, this had several other tangible effects such as increased emphasis on problem-solving orientated field exercises and an expansion of Naval War College attendance.[632]

The other element connecting the organization to the influence of technology was the predominance of platforms in the service. The USN was subdivided into a series of communities, each one based around a particular function. Following the First World War, the USN consisted of subcultural groups of the surface warfare community, submariners, and aviators. These were all essentially subdivided based on the physical environment in which they operated. This in turn allowed them to each develop certain normative and sub-organizational preferences.[633] The battleship officers remained the dominant group in the surface community by 1941. Battleships were seen as the primary platform of the USN, thus they held the strongest grasp on influencing the organization. However, there remained groups of officers from other organizational communities who were pushing for gradual shifts to allow for newer influences such as the rising importance of aviation.[634]

The USN of 1941 was also shaped by the "treaty period", which refers to the 1920-1937 duration of the United States being a signatory of the Washington Naval Treaty that placed limits on certain naval armaments, such as the size and number of battleships. The U.S. participation in the treaty formally ended in 1937 once the Japanese formally withdrew their support of the treaty. The treaty allowed for carriers to increase the prominence of their organizational position as the treaty's restrictions mostly only applied to battleships and cruisers, thus incentivizing the USN to invest more in carrier procurement. The USN, in response to these restrictions, converted the hulls of heavy cruisers that were in the early stages of construction into carriers.[635] The treaty also placed limits on overseas naval base construction, which further pushed the USN to look to carriers to provide forward air support.[636] This trend was openly acknowledged by some senior

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[632] Trent Hone, *Learning War: The Evolution of Fighting Doctrine in the U.S. Navy, 1898-1945* (Annapolis, MD: Naval Institute Press, 2018), 30-33, 122.
[633] Barnett, *Navy Strategic Culture*, 78; Kuhen, "U.S. Navy Cultural Transformations," 353.
[634] William M. McBride, "Challenging a strategic paradigm: Aviation and the US Navy Special Policy Board of 1924," *Journal of Strategic Studies*, Vol 14, No. 1(1991), 73; an example of this battleship fixation among officers is, Lt. Commander James E. Hamilton, "Battleships," *Proceedings* Vol. 6, No. 8 (Aug 1940), 1130-1137.
[635] This included the USS *Lexington* (CV-2) and USS *Saratoga* (CV-3).
[636] Kuehn, *Agents of Innovation*, 26-33.

officers, who had analyzed how militaries across the world were increasing their aviation capabilities, although others in the office corps continued to doubt the ability of carriers to conduct the broad range of sea control operations.[637]

The influence of the treaty system, along with the steady evolution of aviation technology, inspired a series of organizational discourses within the USN. Many in the service had noted during the leadup to 1941 of the increasing application of airpower to naval affairs in tactical engagements, and the overall application of carrier striking power.[638] Progressive thinking officers such as Lieutenant J. C Hubbard and Commander Logan Ramsey had speculated on the use of aviation for sea control operations, arguing that it was likely that future fleet engagements would involve an element of air-control as part of any operation. However, Lieutenant Hubbard remained skeptical of any radical changes in naval affairs due to aviation, arguing that "[t]he bulwark behind which naval power rests still remains in the battle line ships".[639] However, there remained a healthy divergence of viewpoints about the role carriers, and which platform should come to dominate the service. In a *Proceedings* article, Lieutenant Frankling Percival reflected on this divide, noting there remained disagreements over the preferred size of carriers, with some advocating that aviation units should be only used with smaller carriers, and that battleships should remain a key focus of modern fleets.[640] External voices also joined this discourse, such as civilian academic and strategist Bernard Brodie who expressed open skepticism about the role of carriers in war, outright arguing that the battleship will remain the decisive platform of the USN fleet.[641]

Although there remained considerable debate within the USN surrounding the role of carriers, the platform had nonetheless spent the years preceding 1941 rising in organizational prominence. This process had been driven by advancements in aviation technology, along with a series of wargame exercises during the 1920s and 1930s. These exercises demonstrated to senior USN leadership that the tactical usages of carriers offered a flexibility that battleships lacked due

[637] For examples of pro aviation perspectives see, Adm. W. H. Standley, "The Future of Arms Limitations," *Proceedings* Vol. 62, No. 10 (Oct 1936), 1391-1396; for examples of skeptical perspectives of carriers see, Adm. Arthur Japy Hepburn, "The United States Fleet," *Proceedings* Vol. 62, No. 10 (Oct 1936), 1443-1446.
[638] For example, E.E. Wilson, "Air Tactics and Aircraft Design," *Proceedings* Vol. 61, No. 12 (Dec 1935), 1767-1771.
[639] Lt. J. C. Hubbard, "Aviation and Control of the Sea," *Proceedings* Vol. 62, No. 1 (Jan 1936), 37; Cmdr Logan C. Ramsey, "Air Power is Sea Power," *Proceedings* Vol. 67 No. 7 (Jul 1941), 921-926.
[640] Lt. Franklin G. Percival, "The Future Fleet," *Proceedings* Vol. 77, No. 8, (Aug 1941), 1076-1087.
[641] Bernard Brodie, *Sea Power in the Machine Age*, (Princeton, NJ: Princeton University Press, 1941), 43.

to the range and mobility of aircraft.[642] In part, these wargame exercises had been the result of the increased role of the Naval War College in the development of USN thinking about operations and doctrinal development. The most prominent of these wargames was the Fleet Problems series that occurred annually from 1929 through to 1940 and attempted to represent the cumulative changes of yearly fleet training.[643] The Fleet Problem exercises of the late 1930s had demonstrated that although carriers were growing in importance, there still remained considerable questions regarding how best to utilize them during combat operations. In particular there were questions over the coordination of the faster new generation of carriers with older, slower surface vessels, which led some to worry about the vulnerability of carriers during defensive situations.[644]

The position of carriers in the USN of 1941 had been the result of incremental and evolutionary changes of the preceding years, and this resulted in an unsettled doctrinal role. The IJN was viewed as the most likely opponent of any future war involving the USN, which led to a spur in strategic thinking. This envisioned future war would be fought over a long distance across the Pacific, and would require some degree of airpower to secure victory.[645] The USN was also thinking about how best to protect the oversees territorial possessions of the U.S., such as Guam and the Philippines. The USN position was that carrier aviation in a future war was to have different roles such as reconnaissance for the fleet as well as being used in raids against enemy naval and shore-based targets. The central war plan against the IJN was War Plan Orange, which was centered on moving the fleet to the Western Pacific as the U.S. Army and Marine Corps captured islands, and then after sea control had been established, finalizing the defeat of Japan with a total blockade of its homeland. Battleships were identified as the most important element of this war plan, as the majority of USN senior leadership had been battleship captains and admirals, and so had developed a normative bias towards their role. Battleships were seen as being able to deliver the most firepower of any ship, and were essentially the platform most

[642] Geoffrey Till "Adopting the aircraft carrier: The British, American, and Japanese case studies," in Murry and Millett eds., *Military Innovation in the Interwar Period*, 191-126; Barry Watts and Williamson Murray "Military intervention in Peacetime," in Murry and Millett eds., *Military Innovation in the Interwar Period*, 369-415.
[643] One of the most influential of these wargames was Problem X which occurred in 1930 and had demonstrated to USN leadership that carriers were capable of engaging in more aggressive offensive actions, and showed the potential of a carrier strike force's firepower. Hone, *Learning War*, 126-133, 139.
[644] Clark G. Reynolds, *The Fast Carriers: The Forging of an Air Navy* (Annapolis, MD: Naval Institute Press, 1968), 18.
[645] Lt. Cmdr. J.A. Lee, "Between Wars in the Far East," *Proceedings* Vol. 65, No. 1 (Jan 1939), https://www.usni.org/magazines/proceedings/1939/january/between-wars-far-east; Percival, "The Future Fleet".

likely to help operationalize Mahan's philosophy of seapower and therefore USN doctrine reflected their importance.[646]

USN doctrine on the eve of Pearl Harbor had not been radically impacted by the growth of carriers and naval aviation in the preceding decades. In 1934, the USN released the doctrinal manual *Fleet Tactical Problems 143 War Instructions*, which had outlined the role of carriers as the mobile air bases of the fleet and emphasized flexible and adaptative approaches to tactical problems.[647] Despite publications like *War Instructions*, the USN doctrinal views were principally informal and decentralized. This approach towards warfighting emphasized the idea of Mission Command, allowing ship captains and smaller units the ability and opportunity to approach objectives by whatever means a local commander best saw fit. This in turn meant that there were fewer restrictions on the role of carriers and aviation.[648]

USN doctrine remained first and foremost focused on the destruction of the enemy fleet and maintaining control of the seas. USN leadership, however, remained to a degree uncertain about the particularities of carriers in operations, but still accepted there was to be some sort of role for carriers in modern naval warfare. It was clear to senior USN leadership that the fleet would need an air force. Nonetheless, there was overall a sense of conservatism towards the potential of carriers, likely driven by an adherence to naval traditionalism that muted visions of the role of airpower in future wars.[649]

The Second World War

As the air armada of the IJN's 1st Air Fleet began to drop its bombs on Pearl Harbor on 7 December 1941, it immediately presented a visually symbolic challenge to the organizationally dominant position of battleships in the USN. Film footage and pictures of the battle were distributed across the country, and indeed the world. This was an event that not even the most ardent battleship admiral could deny as a challenge to the organization's doctrine and force

[646] For overviews of the USN and War Plan Orange see, Edward S. Miller, *War Plan Orange: The U.S. Strategy to Defeat Japan, 1897-1945* (Annapolis, MD: Naval Institute Press, 2007); Michael K. Doyle, "The U.S. Navy and War Plan Orange, 1933-1940: Making Necessity a Virtue," *Naval War College Review* Vol. 33, No. 3 (1980), 49-63.
[647] Department of the Navy, *War Instructions: Fleet Tactical Problems 143* (Washington, DC: Government Printing Office, 1934).
[648] Hone, *Learning War*, 136, 156.
[649] Geoffrey Till "Adopting the Aircraft Carriers," 191, 220-221.

structure.[650] It was the start of the USN's carrier adaptation process, which would continue gradually as the war moved across the Pacific, eventually cumulating in the emergence of the carrier Task Forces (TF) as the main force structure and related doctrine as the primary operational tool of the USN. The adaptation process would be gradual, and would involve a degree of trial and error over much of the war. Eventually, driven by first hand operational experience, the officers of the USN identified, analyzed, and distributed the necessary lessons learned in order to lead to doctrinal and structural reorganizations centered on the role of carriers that eventually helped lead to victory against Japan.

The IJN had struck its first blow of the war against U.S, battleships. The immediate response of the USN to Pearl Harbor was turn to its carriers, which had fortunately not been in harbour during the battle, to take the lead in the immediate defence of Hawaii against any further IJN offensive actions. Carriers had thus begun to cement the foundations of their continued organizational rise by being a core part of Chief of Naval Operations (CNO) Earnest J. King's strategy against Japan from the start of the war. King conceptualized a further use for carriers by launching a series of raids against Japanese outposts in the central and south Pacific during the development of a U.S. counter-offensive against Japan, which would involve capturing Pacific Islands as the USN advanced. This would occur while the USN built up its forces via new ship constructions and moving resources in from the Atlantic fleet. The first such carrier operation was a series of raids launched by the USN carriers *Lexington*, *Saratoga*, and *Enterprise* to raid the Gilbert and Marshall Islands. Overall, these early USN operations did not represent any dramatic shift in the use of carriers or doctrine. These raids and early moves were already an established part of CNO King's 'fleet in being' strategy for the Pacific, intended to hinder and harass the Japanese until major fleet engagements could be achieved.[651]

An issue constraining early war USN carrier usage was that the majority of the Admiralty had little background in aviation or carrier command. By 1942 only Vice Admiral William F. Halsey Jr. was the most notable carrier officer in the Pacific. The lack of carrier experience amongst many admirals in the Pacific did, however, create a new opportunity for carrier captains to have more influence with the TF commanders; Captain Frederick Sherman of the *Lexington*

[650] Thomas C. Hone, "Battleships vs. Aircraft Carriers: The Pattern of U.S. Navy Operating Expenditures,1932–1941," *Military Affairs* Vol. 41, No. 3 (October 1977), 139–40.
[651] Clark G. Reynolds, "The U.S. Fleet-in-Being Strategy of 1942," *The Journal of Military History* Vol. 58, No. 1 (1994), 109-112.

and Captain Marc Mitscher of the *Hornet* were some of the most prominent of the carrier captains during the early war period.[652]

Following the initial U.S. raids against Japanese assets, the first major battle involving USN carriers was the Battle of Coral Sea, 4-8 May 1942. The IJN attempted to capture Port Moresby in New Guinea as part of its offensive to threaten the Australian homeland. Here, the USN prioritized the defence of Australia before eventually launching a full counter-offensive against the IJN. The USN lacked significant carrier capabilities at this stage of the war, for example during the previous month of April, there was only the carrier TF 17 was out to sea.[653] The battle unfolded in a cat and mouse type fashion with the USN and IJN carrier forces both using their own sets of limited and frequently inaccurate intelligence data to locate one another. The first major USN air wave launched from the carrier, *Yorktown* on 4 May was over 60 planes in size but inflicted little damage on the IJN fleet, sinking only a small number of support ships. The Admiral in command of the *Yorktown*, Frank J. Fletcher, expressed concerns that IJN and USN aircraft would simply neutralize one another's carriers. Over the next few days USN and IJN aircraft would strike their opposing fleets, with the USN carriers operating several kilometers apart and hence were less effective supporting one another.[654]

Eventually, the battle would result in damage to the *Yorktown* plus the sinking of the USN carrier *Lexington* along with 69 destroyed aircraft and other losses; the IJN suffered similarly with a light carrier sunk and several other support ships sunk or damaged and around 90 aircraft destroyed. The battle proved to be a tactical success for the IJN given the successful sinking of the *Lexington*, yet overall the battle was a strategic defeat given the IJN was forced to end their offensive and cruise back to safer waters. This saved Australia from the threat of invasion and the U.S. lines of communication and supply remained undisrupted. The performance of USN carriers demonstrated they were capable of sinking enemy vessels in major combat situations and were capable of destroying dozens of enemy aircraft in defensive situations; there nonetheless still remained issues concerning the defence of carriers as well as best practices when it came to maneuver in combat. The USN efforts were also hampered by only having two carriers available for the operation, and were also lacking in support surface

[652] Reynolds, *The Fast Carriers*, 24-25.
[653] Milan Vego, *Major Fleet-versus-Fleet Operations in the Pacific War, 1941-1945* (Newport, RI: Naval War College Press, 2016), 1-9, 44.
[654] Vego, *Major Fleet-versus-Fleet Operations in the Pacific War, 1941-1945*, 51-65.

vessels such as destroyers. Overall, while some successes were achieved, the battle was another shock moment and signal to the USN carrier captains who fought it, along with the senior Admirals who studied the results, that more work was needed to be done to maximize the effectiveness of carriers.[655]

The Midway-Aleutians Operations of May-June 1942 was the most influential of the early-war USN engagements when it came to adapting its carrier doctrine. The battle led to a shift in thinking about the role of carriers, pushing the organization further towards adapting to increase combat effectiveness. This battle was another defensive operation for the USN, as the IJN's central objective was to seek out a decisive engagement and destroy the main USN fleet. During the planning of the operation, USN Commander-in-Chief, Pacific Fleet, Admiral Chester W. Nimitz, was driven by an intent to maximize the long-range striking power of carriers via the usage of a fast carrier strike force. This would involve a multicarrier composition of the *Enterprise*, *Hornet* and *Yorktown*. Essentially, Nimitz's strategy was to use the USN carriers in a quasi-Mahanian fashion to bring about the overwhelming firepower of carrier aviation against the IJN fleet at the decisive point.[656]Notably, many of the key USN officers during the combat phase of the operations had deep backgrounds in aviation, such as Captain Miles Browning who served as the chief of staff for TF 16. This allowed the USN to have a firmer and tangible understanding of the potential and limitations of combat aviation during the fighting.[657]

The Battle at Midway unfolded as a clash of carriers and their aircraft rather than of ships of the line firing broadsides at one another. The initial USN attack on 4 June involved a long-distance air strike, which included a wave of 60 aircraft from the *Enterprise* and *Hornet*. This initial air attack was far from a satisfactory performance as it took the USN carriers almost a whole hour to get their first wave of aircraft into the air, and coordination of strikes remained a problem. Further, the early USN air attacks failed to inflict considerable damage on any of the IJN capital ships, although they did manage to force the IJN carriers to reposition, thus limiting their ability for counter-attacks. USN follow on attacks proved to be more successful, leading to the sinking of four IJN major carriers. The USN air attacks were constrained by lack of

[655] Douglas V. Smith, *Carrier Battles: Command Decisions in Harm's Way* (Annapolis, MD: Naval Institute Press, 2006), 72-74.
[656] For an overview of the Midway see, Jonathan B Parshall and Anthony P. Tully, *Shattered Sword: The Untold Story of the Battle of Midway* (Washington, DC: Potomac Books, 2007).
[657] Vego, *Major Fleet-versus-Fleet Operations in the Pacific*, 120.

coordination, as some of the more successful attacks succeeded by chance as the timing of groups of USN dive and torpedo bombers ended up attacking in sync even though it had not been planned that way. By the end of the battle, the USN had suffered noticeable causalities, including considerable losses to its torpedo bombing squadrons and the sinking of the *Yorktown*, while the IJN lost four fleet carriers and two battleships as well as other vessels.[658] Overall, the battle was still an overwhelming victory for the USN; the IJN's carrier losses were devastating to their ability to conduct future major operations, and the battle marked the end of the final IJN offensive in the Pacific. Moving forward, the USN would no longer fight defensive engagements, shifting now fully to offensive action until the conclusion of the war.[659]

The internal USN interpretation of the battle was profound. It gave proponents of the increased role of carriers in fleet structures and operations a considerable piece of evidence to push for changes as it represented a shock moment for the majority of officers. These officers argued that it was now undeniable that it was the carrier, not the battleship, which should be the backbone of the modern USN fleet, and that the striking capabilities of carrier aviation were far superior to the firepower of other surface ships. For example, representing midlevel officers, a Lieutenant Commander John. A. Collett published a pro-carrier article in *Proceedings* reflecting this view, using bold language in an attempt to win over any remaining carrier skeptics. Collett wrote that "[n]o other type of ship in existence today can approach such a performance and no other type of ship is in any way a match for an aircraft carrier", and "[t]he role of the battleship as a weapon with which to win naval battles at sea *a la* Jutland has practically vanished".[660] Other articles published after Midway further discussed the growing relevancy of carrier TFs and how the combat experiences of the Pacific theatre were demonstrating more and more dominance of carriers in naval warfare.[661] By the summer of 1942 carrier officers, due to their increased participation during these early war battles, had gained considerable experience with combat operations and found themselves being promoted up the chain of command. Former Carrier captains would now go on to command TFs, meaning that now it was the men who

[658] Vego, *Major Fleet-versus-Fleet Operations in the Pacific*, 134-147.
[659] Smith, *Carrier Battles*, 142- 144.
[660] Lt. Cmdr. John A Collett, "The Aircraft Carrier – The Backbone of Aero-Sea Warfare," *Proceedings* Vol. 68, No. 12 (Dec 1942), 1742-1743.
[661] For example, Henry Woodhouse, "The Importance of Naval and Air Task Forces in Global Warfare," *Proceedings* Vol 68, No. 6 (Jun 1942), 789-799.

understood the dynamics of aviation who would be leading USN combat operations heading into 1943.[662]

Following the victory at Midway, the U.S. attempted to quickly open the offensive stage of their strategy by August of 1942. This was to involve a series of surprise joint operations around the southern Solomon Islands at Guadalcanal involving USN TFs, as well as Marine and Army units.[663] These operations allowed for the USN to further gain tactical and operational lessons learned regarding the use of carriers. The carrier support for the amphibious landings phase of operations demonstrated the need for reassessment of carrier tactics. At Guadalcanal, carriers were unable to use their mobility to fullest effect and there remained internal organizational debates about if carrier TFs should be single or multicarrier in structure. Captain Arthur Davis of the *Enterprise* noted too that there remained issues with air support operations due to the inexperience of the majority of their pilots; dive bombing in particular had issues with accuracy as many pilots made their dives too shallow.[664]

Further lessons learned during the Guadalcanal operation identified that there remained coordination problems among TF ships; and that there was difficulty processing combat data in a timely manner, as ship commanders found themselves swamped with incoming data and lacked the structures and relevant staff to properly analyze and use the information in a way to help ongoing operations. There were also constant disruptions of ship to ship communications. The reasons for most of these problems was the result of local commanders having unfamiliarity with their units as the speed of operations prevented them from developing that knowledge, as well as not developing effective battle-plans in advance of the combat phase. Overall, this operation helped to further expose flaws in prewar conceptions of operational planning, methods and doctrine. It was becoming clearer that the USN needed to improve carrier coordination and usage in battle.[665]

The next major fleet engagement was the Battle of Santa Cruz in October 1942. Similar, to the other major early naval battles of the Pacific theatre, this was a fight primarily between

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[662] These men included: Capt DeWitt C. Ramsey of the *Saratoga*; Capt. Charles P. Mason of the *Hornet*; Capt. Arthur C. Davis of the *Enterprise*; and Capt Forrest P. Sherman of the *Wasp*; *Reynolds*, *The Fast Carriers*, 30.
[663] For an overview of the Guadalcanal operation see, Alan Schom, The Eagle and the Rising Sun: the Japanese-American war, 1941-1943 Pearl Harbor through Guadalcanal (New York, NY: W. W. Norton, 2004).
[664] USS Enterprise, "Report of Support of Guadalcanal-Tulagi Landings," 1942, Box 967, WW2 Operational Reports, RG 38, NARA.
[665] Hone, *Learning War*, 205-208.

carrier groups, as ships of the line did not come within gun range of one another. The battle was largely another learning experience of trial and error for USN carriers. It remained clear that existing doctrine and operational methods needed improvement. Captain Osborne B. Hardison, the commander of the *Enterprise* during the battle, reflected in official reports of the relative inexperience of his battlegroup. In particular, when it came to the aviators under his command, he stated they "had never before been embarked as a group in a carrier and its carrier experience as a group consisted only of the qualifications and refresher exercises conducted of some five days immediately prior to departure".[666] Captain Davis observed that rapid travel to battle areas had prevented mid-transit training of his pilots, arguing that "it is very evident we must never let up in training of our groups, especially replacement groups".[667] The *Enterprise* torpedo plane attacks in particular were felt to need improved training, with this observation made clearer by the observable superior skill of the IJN torpedo plane attacks.

The Santa Cruz operation also helped to further identify that intelligence data needed to be improved for carrier TFs, with officers feeling there needed increased emphasis on quickening access to intel briefings prior to attacks. Captain Arthur Davis advocated that as soon as an enemy carrier had been identified and located that it be attacked with full U.S. strength, rather than reserving assets for secondary potential strike targets. One of the main findings of the battle was that there were advantages in multi-carrier groups as opposed to single carrier TFs, as multi carrier groups allowed for joint defensive support and larger attack strength.[668]After Action reports indicated that the combat experiences of the preceding months had led to increased efficiency of carrier air operations; the reports noted that the USN aviators "have gone through the most rigorous and exacting trials imaginable within this short period. They are now veterans, tried and seasoned by actual combat, whose skill, determination and valor are outstanding".[669]

During the autumn of 1942 the USN began to actively review its operational effectiveness in the Pacific, in an attempt to integrate lessons learned from earlier war engagements. This process was directly overseen by Admiral Jack Fletcher who was reporting to Nimitz; the findings were then distributed among all Pacific aviation commanders, carrier

[666] USS Enterprise, "Report of The Battle of Santa Cruz October 26, 1942," Nov 1942, Box 967, WW2 Operational Reports, RG 38, NARA, 12.
[667] USS Enterprise "Report of The Battle of Santa Cruz October 26, 1942," 12.
[668] USS Enterprise "Report of The Battle of Santa Cruz October 26, 1942," 12-19.
[669] USS Enterprise "Summary of the Enterprise Air Group Operations," 15 Nov 1942, Box 968, WW2 Operational Reports, RG 38, NARA.

captains, and TF commanders. Heavily involved in this process were the former carrier captains of the early war period, such as Rear Admiral Frederick Sherman, the former commander of the *Lexington* during the Battle of Coral Sea. Sherman was a strong advocate of promoting changes to the methods of carrier defence as well as endorsing multi-carrier TFs, although on the whole the officer corps of the USN remained largely divided, even after the Battle of Santa Cruz, over the optimal size of carrier TFs.[670]

Heading into 1943, one of the largest internal debates of the carrier captains and TF commanders of the Pacific theatre concerned the issue of centralization versus dispersion during multi-carrier operations as well as how best to coordinate multi-carrier flight operations. These debates involved midlevel officers as well as involving senior leaders such as Nimitz and Vice Admiral Halsey. During this period of organizational self-reflection, recently promoted aviation commander, Admiral Frederick C. Sherman, along with his chief of staff Captain Herbet Duckeworth and the *Enterprise* head of air operations Lt. Commander Robert Dixon, came together to help solve these debates. This group of officers took the initiative to organize a series of exercises near Hawaii to demonstrate that a multi-carrier TF could have effective close coordination while launching and recovering aircraft in a synchronized manner. The carriers during the exercises were equipped with new VHF high frequency radios and new radar systems that streamlined the coordination process. The carriers were also now equipped with the Combat Information Centers to assist captains and flight commanders process the incoming operational and intelligence data. This learning experience helped to confirm the operational lessons of many carrier officers and would influence shifts in USN TF tactics.[671]

The USN leadership began to accumulate the most important combat lessons learned from frontline officers and then widely diffused them across the service via a series of official reports that became known as *Battle Experience Bulletins*, which were written "to promulgate reliable information concerning actual war experience" and "to the end that divergent views may be reconciled and complete analysis made".[672] In 1943 the *Bulletins* had analyzed the experiences of the Solomon Islands operations and its central finding was the significance of the

[670] Hone, "Replacing Battleships with Aircraft Carriers in the Pacific in World War II," *Naval War College Review* Vol 66, No. 1 (2013), 59-60.
[671] J B. Lundstrom, *Black Shoe Carrier Admiral: Frank Jack Fletcher at Coral Sea, Midway, and Guadalcanal* (Annapolis, Md.: Naval Institute Press, 2006), 497-498.
[672] Headquarters, United States Fleet "Battle Experience: Solomon Islands Actions October 1942," 1943, Box: 16 Records of Naval Operating Forces RG 313, NARA, 1.

offensive power of carrier TFs. It noted that carrier TFs had the ability to maximize their striking power offensively due to their speed and mobility to gain surprise, and ultimately achieve decisive action against IJN units. The report concluded that carrier TFs needed to be used as the offensive driver of the USN war effort as it advanced further across the Pacific.[673] The *Bulletins* represented the intersection of junior, midlevel and senior officers in the adaptation process. Here, the combat experiences earned by junior and midlevel officers serving on ships and planes was accumulated and analyzed by other junior and midlevel officers who were serving as analysts, and senior officers ultimately would approve the findings of these lower ranking officers for distribution across the organization.

In general, the year 1943 saw considerable progress in carrier adaptations. Carriers by this point were cementing their role as the primary platform in the fleet and were leading USN forces during all of the major battles in the Pacific. However, issues would still remain, as units were continuing to discover new lessons, particularly over more technical and tactical issues. Carrier captains were particularly concerned about defensive operations; a problem, for example, was attempting to provide air coverage of units which had crippled vessels, as having to stay in a particular area to maximize protective air cover severely reduced the speed and mobility advantages that fast carriers possessed.[674] Other carrier captains remained focused on enhancing and refining the tactical capabilities of its aviation squadrons during carrier raids in order to better prepare for major engagements. This focus was on things such as low-altitude torpedo bombing against surface ships, or other types of tactical learning like air support strafing runs and night operations.[675]

The primary changes the USN undertook by the end of 1943 are centered on the emergence of the carrier TF as the main striking force of the fleet. The TF consisted of different smaller task groups, each one built around multiple carriers and multiple support vessels including destroyers, cruisers and fast battleships. This was a clear, formalized shift from the old battleship era. The new *Essex Class* carriers were the most technologically advanced carriers in the fleet's history; they represented a triumph of U.S. technology and engineering. Paired to

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[673] Headquarters, United States Fleet "Battle Experience: Solomon Islands Actions October 1942."
[674] USS Enterprise "Action Against Japanese Air Forces Attacking Task Force Eighteen Off Rennel Island, January 29-30, 1943," 26 Feb 1943, Box 968, WW2 Operational Reports, RG 38, NARA.
[675][675] For examples, see, USS Bunker Hill "Reports for Attack on Kavieng Shipping, 25 December, 1943," 5 Jan 1943, Box 837, WW2 Operational Reports, RG 38, NARA; USS Bunker Hill "Aircraft Action Reports Fighting Squadron Eighteen Nov 18-23," 1943, Box 873, WW2 Operational Reports, RG 38, NARA.

these technical and organizational changes were reforms with regards to personnel, as many within the service throughout 1943 began to push for more officers with aviation backgrounds to serve on command staffs. In turn, an overall attitude shift occurred towards changing strategy, which pushed the service to be more aggressive about using the striking power of carrier TFs in offensive actions.[676] The other major change during 1943 was the development of *Pac-10*, issued in June of 1943, which served as the major new battle doctrine for the USN in the Pacific. It had been written based on the groundwork of the lessons learned *Bulletins*, and other earlier doctrinal publications and task force instructions*; Pac-10* was an attempt to centralize and streamline these various documents. The central theme of *Pac-10* was that the carrier TF had to approach operational challenges with maximum flexibility, that battle plans had to be developed to the specifics of each situation. Essentially, *Pac-10* was emphasizing the principles of mission command.[677] Military service journals began to publish articles highlighting the changes in naval affairs that had been taking place across 1943, describing that the age of the battleship had largely ended, and that carrier led groups were now what dominated naval operations.[678]

The first six months of 1944 saw the USN carrier TFs primarily focus on offensive raids against Japanese shipping and military strongpoints in the Central Pacific. The overall purpose was to maximize the effectiveness of carrier aviation in weakening the IJNs airpower capabilities in an attritional strategy, while also disrupting the shipping lanes between the Japanese home islands and its overseas bases.[679] Overall, the strike operations involving carrier fighter sweeps proved to be highly effective. One of the biggest examples of this was Operation Hailstone, which occurred 17-18 February 1944 around Truk Island. Here, carrier TFs engaged in a large air and surface attack against IJN assets, leading to a large number of sunk vessels, especially Japanese merchant shipping. The operation was viewed as a considerable success, and internally was seen as a very effective example of carrier operations.[680]

The Battle of the Philippine Sea, June 1944 was the definitive battle of USN carriers during the war. Here, USN carrier TF 58 was able to demonstrate the advances in operational methods and force structures which they had spent the first few years of the war improving. USN

[676] Reynolds, *Fast Carriers,* 45, 53.
[677] Hone, "Replacing Battleships with Aircraft carriers in the Pacific in World War II," 56-68.
[678] For example of this sentiment see, Hyman Roudman, "The Evolution of New Fleet Tactics," *Military Affairs* Vol. 7, No. 4 (1943), 197-201.
[679] Vego, *Major Fleet-versus-Fleet Operations in the Pacific War, 1941-1945*, 191-193.
[680] USS Bunker Hill, "Action Report Truk Operations," 1944, Box 874, WW2 Operational Reports, RG 38, NARA.

multicarrier TFs were able to coordinate a series of complex aviation operations in close synchronization, which led to overwhelming effects against the IJN forces; the Japanese lost 373 fighter aircraft compared to a mere 24 USN aviation losses. The battlespace occurred over a massive range of land and sea, with U.S. aircraft striking some targets at nearly their absolute maximum geographic range of hundreds of miles. Across multiple instances during the battle, U.S. carriers detected waves of attacking IJN aircraft, processed the data in their Combat Information Center, and then rapidly massed air cover for interception in the skies above to overwhelming effects. The USN air defence system made it so only a single Japanese pilot managed to land a direct hit on a USN carrier. Such a lopsided victory became known as the "Great Marianas Turkey Shoot". USN carrier aviation would also sink two IJN fleet carriers plus one light carrier. This was a decisive and overwhelming victory that ended the IJNs ability to conduct large scale carrier operations in future.[681] During the battle USN carriers relied on their speed, mobility and range, and fought using the striking power of their aircraft. They had achieved both air and sea control by completely destroying the enemy forces with maximum firepower. This operation represented both the USNs idealized vision of warfare via the carrier centric adaptations which had been undergoing since 1942. This battle was arguably the most impressive and decisive naval engagement of the entire war and was an absolute triumph of USN carrier aviation and of the carrier TFs.

The self-assessment of USN TF carrier commanders for the Battle of Philippine Sea was overwhelmingly positive. The commander of the *Bunker Hill*'s Air Group noted that, "[f]rom the time of the receipt of the contact report, until the return of the attack group, the ship's personnel turned in a superb performance. There was no lost time or confusion in disseminating last minute information."[682] The *Bunker Hill* after action reports of the battle noted that their pilots' hit rate on enemy targets was well above expected performances. There were various technical lessons learned, with reports observing that the use of photography proved to be very important for increasing dive bombing accuracy as it allowed pilots to learn from their earlier strikes.[683] Aside from the fleet to fleet combat, the USN carriers had also engaged in effective air support for

[681] Ian W. Toll *The Conquering Tide: War in the Pacific Islands, 1942-1944* (New York, NY: W.W. Norton and Company, 2015), 77-87.
[682] Bunker Hill, "Action Report, Carrier Air Group Eight Attack on Japanese Battle Fleet 20 June 1944," 1944, Box 876, WW2 Operational Reports, RG 38, NARA.
[683] Bunker Hill, "Action Report, Carrier Air Group Eight Attack on Japanese Battle Fleet 20 June 1944."

amphibious landings in the form of CAS and interdiction strikes. Overall, the striking power of the *Bunker Hill* was assessed as being very effective against enemy land-based assets.[684]

The final major fleet engagement of the war, the Battle of Leyte Gulf, was one of the largest naval battles in history, involving hundreds of vessels and over 200 000 personnel. This battle, which consisted of a series of smaller unit engagements, was the cumulating point of the USN sea control efforts in the Pacific. The battle demonstrated the superiority of the USN's carrier TFs and the combat doctrine which it had developed. Multiple carrier TFs maximized their striking power to full effect, sinking the remaining major elements of the IJN.[685]

With the majority of the IJN now lying at the bottom of the Pacific Ocean, the remaining major USN operations shifted focus inland. Sea control had now been firmly established across the wider Pacific; what remained was to land forces in the Philippine and several key islands before the final defeat of Japan was to be secured. During these shore centric operations, newer lessons were identified for the carrier TFs. For example, during the operations at Luzon it was analyzed that there was an increased need for more effective offensive deep inland strike operations in order to fully neutralize the remaining Japanese airfields; part of this was defensive in nature as Japanese suicide aircraft attacks were growing in lethality and the USN sought to destroy as many on the ground before they could take off. Escort carriers were identified as fighting hard during defensive operations, with highly capable crews and pilot groups, yet ultimately needed more aircraft for sufficient air cover. Defensive fighter coverage was now an artform for USN carriers, as almost 90 Japanese aircraft were neutralized attempting to attack the TF during amphibious landings. It was concluded that carrier TFs were essential to protecting any attacking amphibious force given the threat of land based Japanese suicide aircraft.[686]

The final operations of the Pacific theatre involved carrier TFs providing air support for amphibious landings and then ongoing support for further inland operations at Iwo Jima and Okinawa. In both operations, carrier aviation used its striking power to bombard shore based defensive entrenchments, and then continued to provide air support as the fighting continued.

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[684] Bunker Hill, "Action Report for the Period 6 to 27 June 1944," 1944, Box 876, WW2 Operational Reports, RG 38, NARA.
[685] William B Hopkins, *The Pacific War: The Strategy, Politics, and Players That Won the War* (Minneapolis, MN: Zenith Press, 2008), 261-270.
[686] Seventh Fleet "Action Report – Luzon Attack Force, Lingayen Gulf – Musketeer Mike One Operation," May 1945, Box 46, WW2 Operational Reports, RG 38, NARA.

They were also required to perform a defensive function of air cover against Japanese suicide plane attacks.[687]

During the final few months of the war many in the USN began reflecting on the overall lessons of the war, and began to speculate on the relevancy of those lessons for future war situations. This occurred via official reports, as well as updated doctrine manuals such as *Current Tactical Orders and Doctrine US Fleet, USF 10B* released in May 1945. That publication included many tactical lessons that were to be institutionalized; for example, it standardized the processes of destroyer screening against submarines for the carrier TFs. It also standardized some of the carrier TFs newer approaches to flight operations. It noted that during defensive operations that carrier TFs should be tactically concentrated to allow for most effective fighter direction and coverage, including maximum anti-aircraft fire from all weapons and mutual support between heavy ships. Regarding offensive operations, it allowed for more flexibility for commanders based on operational context, stating that "[c]arrier task groups should remain tactically concentrated. The closeness of this concentration should, of course, be determined by the need for maneuvering searoom when conducting flight operations, whether offensive or routine, and for defence while under air attack".[688] While articles in *Proceedings* continued to cement the core position of carriers in the service, arguing that battleships had been usurped and that carrier procurement and construction must be a main focus of the post-war period.[689] Lieutenant William H. Hessler identified carriers as being the primary platform of the future fleets, and that the duality of carriers being able to provide air and sea control would be essential for US national security in the years to come.[690]

The USN experience in the Pacific Theatre during the Second World War was one of gradual adaptation. Early engagements sent a clear signal to USN senior leadership, as well as the wider officer corps that carriers were playing a larger role in modern naval affairs. Further, early USN engagements had demonstrated that pre-war carrier operations methods were largely insufficient. These lessons were gradually accumulated, analyzed, and then distributed. This

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[687] Hopkins, *The Pacific War*, 291-297; James D. Hornfischer, *The Fleet at Flood Tide: America At Total War in the Pacific, 1944-1945* (New York, NY: Bantam Books, 2016), 399-403.
[688] United States Fleet, Headquarters of the Commander in Chief, *Current Tactical Orders and Doctrine US Fleet, USF 10B* (Washington, DC: Government Printing Office, 1945), World War II Operational Documents, ISCARL, https://cgsc.contentdm.oclc.org/digital/collection/p4013coll8/id/4782/#:~:text=Current%20Tactical%20Orders%20and%20Doctrine%2C%20U.%20S.%20Fleet%20(USF%2010B),of%20forces%20in%20any%20fleet.
[689] Donald Mitchell, "Building A Seven Seas Navy," *Proceedings* Vol 71, No. 5 (May 1945), 507-513
[690] Lt. William H. Hessler, "Naval Power in Tomorrow's World," *Proceedings* Vol 71, No. 4 (Apr 1945), 369-380.

process was largely impacted by the advocacy of networks of junior and midlevel officers, including carrier captains and air group commanders pushing for more influence on doctrinal development and seeking to change how the USN approached combat operations with carriers; these midlevel officers were in turn actively supported by similar minded senior officers. Combined, these networks pushed the organization into a series of gradual adaptations that would eventually cumulate in force structural and doctrinal changes. By 1944 the dominant force of the USN was the carrier TF, which overwhelmingly demonstrated their power during the Battle of Philippine Sea. The USN ended the war a changed organization. It was now centered around a different platform, and had won the greatest victory in its history with a fundamentally changed doctrine.

The Post-War Era

The power of the USN was on full display during the closure of the Second World War as the Japanese government delegation formally signed the surrender documents standing on the deck of the battleship *Missouri* surrounded by a massive naval flotilla. The USN was at the largest size in its history, with over 12, 000 combat ships, 41, 000 planes and about 3.4 million personnel. Like the other services, the USN would be faced with similar challenges during the first months and years that followed the end of the war; mass demobilization would need to be managed, budget cuts would inevitably be on the horizon, and the organization would need to find a new main purpose and strategic focus. While uneasy tensions were growing between the West and Soviet Union, the communist navy remained relatively small, especially in comparison to the USN. The Soviet surface fleet had a mere three incomplete battleships, seven heavy cruisers, two light cruisers and 60 destroyers by 1946, meaning the USN was essentially peerless as it entered the early Cold War era.[691] Normatively, the USN of the post-war period was even more technologically orientated than it had been during the prewar era. The more conservative traditionalism of the service had been diluted heavily during the course of the Pacific war, which saw an influx of new personnel and technologies. By the end of the war there was a stronger

[691] James D. Hornfischer, *Who Can Hold the Sea: The U.S. Navy in the Cold War 1945-1960* (New York, NY: Bantam Books, 2022), 8, 52; George W. Baer, *One Hundred Years of Seapower: The U.S. Navy, 1890-1990* (Stanford, CA: Stanford University Press, 1993), 276-280.

sense of organizational progressiveness towards naval issues, manifesting in a way that technology was primarily at the forefront of solutions to the organization's future challenges.[692]

Officers reflecting on the Second World War combat experiences came to monopolize the majority of internal organizational narratives during the post-War period. A considerable level of this discourse was focused on the role of carriers during the war. The professional service journals such as *Proceedings* were filled with articles such as "World War II and the Changing Conception of Sea Power" that acknowledged that carriers were now the primary platform of the fleet.[693] Many of these articles reflected on individual battles such as the Battle of Santa Cruz and Guadalcanal, where carrier TFs and the power of naval aviation were noted as playing decisive roles in securing U.S. victory.[694] The Battle of the Philippine Sea was one of the more popular battle topics where articles written by junior and midlevel officers identified it as a triumph of carrier TFs, where units such as TF 58 were described as utilizing speed, mobility and long-range striking power of their air squadrons for strategic effects. Carriers were described in these various articles as playing the leading role in destroying the enemy surface fleets and gaining sea control. These articles describe the advantages of carrier mobility and long range in comparison to other naval assets, and generally stated that no other naval force structure could now compete with the firepower of a carrier TF.[695] Even amphibious-landing centric battles such as the battle of Tarawa were promoted as being examples showcasing the power of carriers, USMC commanders such as Lieutenant General Julian Smith published an article arguing that carriers were necessary for such operations to succeed.[696] Other officers, such as Commander James Seton Gray, discussed tactical changes relating to carriers, including the development of night fighting capabilities by carrier aviation over the course of the war.[697]

Many of the USN service journal articles that reflected on the experiences of the Second World War specifically examined the emergence of the carrier TF as the main force structure of

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[692] Kuhen, "U.S. Navy Cultural Transformations, 1945-1917," 355-357.
[693] Fletcher Pratt, "World War II and the Changing Conception of Sea Power," *Proceedings* Vol. 72, No. 1 (Jan 1946), 1-11.
[694] Walmer Elton Strope, "The Decisive Battle of the Pacific War," *Proceedings* Vol. 72, No. 5 (May 1946), 627-641.
[695] See, Lt. J. Periam Danton, "The Battle of the Philippine Sea," *Proceedings* Vol. 71 No. 9 (Sep 1945), 1023-1027; Adrian O. Van Wyen, "The Battle of the Philippine Sea," *Proceedings* Vol. 77, No. 2 (Feb 1951), 157-169.
[696] Lt. Gen Julian S. Smith, "Tarawa," *Proceedings* Vol. 79, No. 11 (Nov 1953), *1163*-1175; see also, Lt. Cmdr. Richard C. Drum, "Hail to the Amphibian – Implementer of Victory," *Proceedings* Vol. 72, No. 3 (Mar 1946).
[697] Cmdr. James Seton Gray, Jr. "Development of Naval Night Fighters in World War II," *Proceedings* Vol. 74, No. 7 (Jul 1948), 847-851.

the fleet. E.B. Potter, a professor at the U.S. Naval Academy, argued that the fighting against the IJN demonstrated that the carrier TFs were near invulnerable to air attacks. Noting that frequently the Japanese would attempt to strike at the U.S. carrier groups, and always failed to achieve any decisive strategic effect, he argued that the USN's anti-air capacities were simply far too much for IJN aircraft to handle, noting that "[n]o fleet in history had ever been subjected to such a vicious or so long- sustained an attack. The valid assumption is that no other type of fleet could have remained afloat under similar conditions"[698]. Eugene E. Wilson, who had served with the very first carrier TF of the USN, argued in a *Proceedings* article that members of the service had to accept that the battleship had been replaced by the carrier as the strongest striking weapon of the fleet.[699] Lieutenant William H. Hessler in the months following the surrender of Japan claimed that the carrier TFs during Second World War constituted a revolution in naval affairs more so than any other new naval technology, even compared to submarines and torpedoes, writing that the TFs demonstrated a "new pattern of sea warfare has been the product of American ingenuity and initiative".[700] Lieutenant Hessler outlined how the carrier as a platform entered the war completely untested in battle, stating that "[t]he United States Fleet had its own experience in peacetime maneuvers over 12 or 14 years, and its own theoretical doctrine, to guide it in the use of carriers and their aircraft. That was about all".[701] However, Lieutenant Hessler notes that by 1944, after a gradual lessons learned process, the USN had developed a means to use carriers for their most lethal effect, that the TFs had transformed into the most powerful and modern fleets in naval history, starting that "[a]s it exists in 1945, the Carrier Task Force represents naval power on a scale hitherto not even approached by any power in any war - except by comparison with the British Grand Fleet of 1915 and in terms purely of volume of surface fire".[702]

The educational institutions of the USN became hubs for discourse related to carrier operations and the Second World War, as well as fostering the integration of lessons learned across the service. Admiral Raymond Spruance, who had commanded the Fifth Fleet during the

[698] E.B. Potter, "The Navy's War Against Japan: A Strategic Analysis," *Proceedings* Vol. 76, No. 8 (Aug 1950), 837.
[699] Eugene E. Wilson, "The Navy's First Carrier Task Force," *Proceedings* Vol. 76, No. 2 (Feb 1950), 158-169.
[700] Lt. William H. Hessler, "The Carrier Task Force in World War II," *Proceedings* Vol. 71, No. 11 (Nov 1945), 1271.
[701] Hessler, "The Carrier Task Force in World War II," 1275.
[702] Hessler, "The Carrier Task Force in World War II," 1276.

fighting in the Pacific and thus had extensive operational experience with carriers, became president of the Naval War College (NWC) in 1946. One of his first moves in the role was to establish the Second World War Battle Evaluation Group to study the major lessons of the war. This Evaluation Group would involve many officers with carrier operational experience, and produced a series of analytical studies on most of the major carrier battles of the war. The general intention of this NWC study group was to think about how the combat lessons of the Second World War could be utilized in the current global strategic environment in which the Soviet Union was emerging as the main geopolitical threat to the United States.[703] As early as 1946, USN carrier and aircraft related lessons had changed the curriculum of the NWC. When it came to the staff of the NWC qualified naval aviators for the first time were now assigned to various positions in order to assist in the case study problem solving skills of students related to carrier and aviation issues.[704] The carrier influenced changes entered into the NWC curriculum in different ways, including conferences, guest lectures and wargaming. The very first NWC wargame exercise of the postwar era was Operation Problem 5, which took place in October 1945. It largely replicated the conditions of the late war Pacific theatre, with an IJN like opponent being the objective to destroy. The simulated combat represented the USNs carrier orientated doctrine that had ended the previous war.[705]

However, the most direct method of integrating the lessons of the Second World War into the NWC was through guest lectures by officers who were now available to discuss their various wartime experiences. The majority of these lecturers had served as midlevel officers during the war, and were primarily captains. This process had started during the final moments of the Second World War; for example, in May 1945 Captain Bern Anderson lectured at the NWC how the carrier TFs were highly adaptable and able to respond to any mix of IJN tactics. Captain Anderson noted that the striking power of carrier TFs was considerable, they had the ability to destroy threats based on land or at sea.[706] After the war ended, other captains such as George Montgomery lectured at the NWC about how the role of carrier aviation was the most important naval lesson learned of the war and of the overall importance of the carrier TFs to the modern

[703] Hal M. Friedman, "Digesting History: The U.S. Naval War College, the Lessons of World War II, and Future Naval Warfare," *Historical Monographs*, 17 (2010), xxiii-xxiv.
[704] Capt. Thomas M. Shock, "The Naval War College, 1946," *Proceedings* Vol. 72, No. 10 (Oct 1946), 1333-1339.
[705] Hal M. Friedman, *Blue versus Orange: The U.S. Naval War College, Japan, and the Old Enemy in the Pacific, 1945-1946* (Newport, RI: Naval War College Press, 2013), 190-191.
[706] Friedman, "Digesting History," 88.

fleet. Another Captain, Fred Dickey, noted that by the end of the Second World War the USN had essentially defined the new role of the carrier TF for the fleet. Captain Dickey argued that although it was newer technology, carriers were merely extensions of the older principles of seapower theory, and that in the current age, aviation would conduct the bulk of offensive firepower operations during naval battles.[707] In April 1947, Captain James Lane argued at the NWC that the likely future of the USN would be primarily expeditionary orientated and that the Second World War combat experiences had firmly established the carrier TF as its main force structure, which would remain the case moving forward into the post-war period. Captain Lane described modern naval warfare as being fought over great distances, where much of the fighting, as it had taken place during the previous war, would be fought out of sight of opposing fleet's capital ships, and that aviation would deliver the decisive blows.[708]

Senior officers also participated in these NWC lectures. Admiral Thomas Kinkaid presented on how Second World War battles like at Leyte Gulf demonstrated that naval forces could not rely on land-based air support, and thus carriers would always be needed for air coverage. Admiral Spruance himself would even go on to lecture in July 1946 on the broader carrier adaptation process that occurred from 1942 into 1944. Spruance, in his lecture noted that the mobility of carrier was essential to modern naval warfare.[709]

The U.S. Naval Academy also underwent a series of formal institutional changes in order to better reflect the combat experiences of the USN during the Second World War. An aviation instructor at the Naval Academy, Lieutenant Commander Frank Hertel, described the many carrier and aviation centric reforms that had occurred to the curriculum in a *Proceedings* article. The study of aviation issues at the Academy had been growing steadily since the Second World War, and more specifically that it was the first-hand operational experiences of officers which was the largest driving factor in this process. This led to the establishment of a distinct Department of Aviation at the academy, whose core faculty was then staffed with midlevel officers with operational experience from the recent war. The aviators at the Academy developed a new program that involved sending students to serve on an aircraft carrier for three months in order to learn first-hand how to fight on a carrier. By 1946 advances in aviation technologies as

[707] Friedman, "Digesting History," 161-163.
[708] Friedman, "Digesting History," 241.
[709] Friedman, "Digesting History," 141.

well as growing interest in the subject across the USN led to much larger aviation classes and the establishment of broader courses on related subject matter. The study program for aviation students at the Academy would also involve highly detailed case study reviews of Second World War carrier battles and operations.[710]

One of the major focuses of the USN during the later 1940s had to do with interservice rivalries, and the role of the organization in post-war U.S. national security strategy. The USN found itself on the defensive in a very bitter interservice dispute over budgetary allocations and missions. The newly independent USAF emerged during this period as the main rival. USAF Chief of Staff, General Carl Spaatz, was even on public record in 1947 challenging whether or not the U.S. military needed to maintain a regular navy in this new age of airpower. More specifically, the USN viewed the USAF as a threat to the continued existence of naval aviation as a major organizational capability, and moreover, the USN was seeking to secure a role for the service in the overall nuclear warfare mission in U.S. national security strategy.[711] The USN senior leadership was supportive of the idea of a strategic air offensive to maximize the effectiveness of nuclear weapons, however they differed considerably about the particulars of that strategy with the USAF. Here, the USN rejected the idea that only an air war was needed, and instead they argued that naval and ground elements would remain relevant for future wars. Further, the USN disagreed with the USAF over targeting, with the USN feeling that a nuclear war should first and foremost be directed against military and energy infrastructure targets more so than civilian population centers.[712] The impact of the atomic bomb was a common topic of discourse in the USN's service journals, with most authors identifying atomic bombs as an important weapon for the future relevancy of the organization, but largely perceiving that the weapons would not be overly disruptive of existing force structures.[713] For example, Captain W.

[710] Lt. Cmdr. Frank M. Hertel, "The Naval Academy and Naval Aviation," *Proceedings* Vol. 74, Vol. 1 (Jan 1948), 37-41; Earl W. Thomson, "Learning at the Naval Academy – The Academic Departments and their System of Instruction," *Proceedings*, Vol. 74, No. 4 (Apr 1948), 435-451.
[711] Jerry Miller, *Nuclear Weapons and Aircraft Carriers: How the Bomb Saved Naval Aviation* (Washington, DC: Smithsonian Institution Press, 2001), 27-28.
[712] Jeffrey G. Barlow, *From Hot War to Cold: The U.S. Navy and National Security Affairs*, 1945-1955 (Stanford, CA: Stanford University Press, 2009), 176.
[713] For example, John Phillips Cranwell, "Sea Power and the Atomic Bomb," *Proceedings* Vol. 72 No. 10 (Oct 1946), 1267-1275; Walmer Elton Strope, "The Navy and the Atomic Bomb," *Proceedings* Vol. 73, No. 10 (Oct 1947), 1221-1227.

D. Puleston argued that atomic weapons would simply enhance the role of carrier TFs which in turn would continue to be the leading force structure of the service.[714]

In March 1948, the Chiefs of Staffs of the different service branches of the military met in Key West Florida to settle the issue of roles and missions, which had been left in a state of ambiguity following the enactment of the 1947 National Security Act and the creation of an independent USAF. During these negotiations the most contentious issue concerned USN aviation, as the USAF was seeking primacy over all airpower related matters. Eventually an agreement was struck that maintained USN aviation and secured its role in striking shore-based targets with atomic weapons if the missions required. Later, at the next joint service conference in August 1948, it was further confirmed that the USN would maintain the right to use atomic weapons and participate in any future U.S. strategic air offensive.[715] Proponents of USN nuclear capabilities noted that sea-based nukes would give more flexibility to strategists, and in turn would likely draw attention of enemy targeting away from the US homeland.[716] Thus the role of carriers was secured beyond their standard sea control missions in US national security strategy.

The most public display of this interservice rivalry was the so-called 1949 "Revolt of the Admirals" which involved a number of USN admirals, including Fleet Admirals Chester Nimitz and William Halsey, as well as a number of other active duty and retired senior officers publicly clashing with USAF counterparts as well as members of President Truman's administration. This 'Revolt' was intended to stop a series of proposed significant budget cuts. The Truman Administration sided with the USAF over budget demands, which in turn led to a cancellation of the proposed *United States* class of aircraft carriers from being constructed in the postwar period, while also shifting defence expenditures so the USAF could procure new strategic bombers. The USN officers were fighting for the role of the carrier and its aviation capabilities in the emerging Cold War global strategic environment. These officers clashed with USAF and senior civilian policymakers while trying safeguard the interest of the USN, and continue the institutionalization of lessons learned from the Second World War. Given the high stakes of the dispute, these naval officers were willing to use any and all tactics to support their cause, including the leaking of documents to the public. While this dispute proved to be a net loss for the USN in terms of

[714] Capt. W. D. Puleston, "The Probable Effect on American National Defense of the United Nations and the Atomic Bomb," *Proceedings* Vol. 72 No 8 (Aug 1946), 1017-1029.
[715] Barlow, *From Hot War to Cold*, 185-190.
[716] Miller, *Nuclear Weapons and Aircraft Carriers*, 36.

budget, it nonetheless managed to secure a new future development plan for a new next generation carrier, thus safeguarding carrier aviation's future in the fleet, which in turn preserved the institutionalization of the Second World War adaptations.[717]

The USN as an organization spent much of the late 1940s focused on the integration of new technologies into the service. Nuclear weapons were the most revolutionary of these, however, there remained other technological fixations including jet aircraft and the next generation of carriers. Most officers were drawn to the advantages of the technologically advanced jet aircraft in comparison to their older propeller counterparts. Jets were viewed as being a natural evolution that would enhance the striking power of carriers, and essentially enhance the wider lessons the organization had learned during its previous combat operations against Japan. However, the transition to jet aircraft would still involve some smaller hurdles to overcome, such as preparing older carriers to be able to launch and receive jets. Lieutenant Commander Malcom Cagle in a *Proceedings* article entitled "The Jets are Coming" exemplified the USN's technological optimism, speculating that "the time may not be distant when the carrier pilot will fly back to the carrier, punch a button in the cockpit, and have an electronic brain bring him home".[718] The USN operated its first jet, the McDonnell F1H Phantom, in 1947. However, the transition to jets was when it became clear the Soviet Union's military was investing in their own jet aircraft development and there was an emerging concern among USN officers that their carrier interceptors would be at risk of not being able to meet intruding Soviet aircraft.[719]

As the decade came to a close, many in the USN community began to speculate regarding future international security challenges, and what role would the navy have to play in response to these threats. Many eyes turned towards the Soviet Navy, which had historically lacked significant numbers of surface vessels. However, the Office of Naval Intelligence developed an assessment that the Soviets were intending on investing heavily in surface fleet capabilities for future operations for different regions, including the Arctic, Baltics, Black Sea, and Pacific.[720] Even junior officers such as Lieutenant P. W. Rairden shared this sentiment in service journals,

[717] For overviews of the Revolt of the Admirals and the surrounding incidents see, Keith McFarland, "The 1949 Revolt of the Admirals," *Parameters* Vol. 11, No. 2 (1980), 53-63; Jeffrey G. Barlow, *Revolt of the Admirals: The Fight for Naval Aviation, 1945-1950* (Washington, DC: Naval Historical Center, 2001).
[718] Lt. Cmdr. Malcom W. Cagle, "The Jets are Coming," *Proceedings* Vol. 74 No. 11 (Nov 1948), 1349.
[719] Robert C. Rubel, "The U.S. Navy's Transition to Jets," *Naval War College Review* Vol. 63, No. 2 (2010), 49-59.
[720] Barlow, *From Hot War to Cold*, 160-161.

noting the Russians had historically been a seafaring people, and will likely come to contest the control of the oceans in years to come.[721]

Other officers speculated on future war. Captain Ernest M. Eller, a veteran of carrier combat against Japan, observed in their article, "Will We Need a Navy to Win," that modern naval warfare was centered on the idea of "winged seapower" where carriers were key to sea control. Captain Eller noted that the USN's combat experiences of the Second World War had laid the groundwork of what would come, where carrier TFs had emerged as the dominant force in naval war and this would remain true against any future conflict against the Soviets.[722] Captain W. D. Puleston further advocated that any organizational changes in the USN should be focused on keeping carriers relevant to U.S. national security strategy. According to Captain Puleston, this would require future investments in carrier aviation to keep them on par with land-based aircraft; ultimately any future war would depend on air superiority over land and sea, and that the USN needed to be prepared for such a task.[723] Other service journal articles such as "Naval Power and the American Destiny" discussed changing trends in naval affairs, such as the impact of atomic weaponry, but noted that carriers would likely survive any nuclear exchange due to their mobility to spread out anywhere across the globe; further that any future war with the Soviets would not be a quick war, which would require traditional naval objectives to be met, such as sea control.[724]

The USN by the end of the 1940s had retained and continued to institutionalize the carrier centric doctrine and preferred operational approaches that it had developed over the course of the Second World War. This was largely in part due to the strong consensus between junior and midlevel officers as well as senior leadership regarding the significance of carriers. Junior and midlevel officers created active advocacy and information networks concerning the impact that carriers had made on naval warfare, both sharing their combat experiences during the previous war as well as strongly advocating for institutional changes to better accommodate carriers. Senior leadership embraced this position, agreeing to protect carriers from interservice threats, as well as being convinced that carriers had indeed reshaped the character of naval

[721] Lt. P. W. Rairden, Jr., "Soviet Seapower," *Proceedings* Vol. 74, No. 1 (Jan 1948), 61-67.
[722] Capt. Ernest M. Eller, "Will We Need a Navy to Win," *Proceedings* Vol. 76, No. 3 (Mar 1950), 237-247.
[723] Capt. W. D. Puleston, "Dimensions and Characteristics of a Future War," *Proceedings* Vol. 76, No. 6 (Jun 1950), 591-601.
[724] James K. Eyre, Jr. "Naval Power and the American Destiny," *Proceedings* Vol. 77, No. 3 (Mar 1951), 297-307.

warfare. This consensus would help shape the USNs development of war plans during this postwar period. The USN developed contingency plans that any future war would involve a carrier led air campaign against primarily land targets; USN strategists felt it would be a protracted campaign, in which the navy would undertake its traditional mission of sea control, help secure forward positions, and then help shift ground forces to needed areas. These plans would require further investments in new carriers, including a larger carrier platform that would be able to carry the aircraft needed to deploy atomic weapons. Overall, the USN officers continued whenever possible to amplify the relevancy of carriers as an independent global strike force.[725]

The Korean War

The Korean War was a very different strategic and operational challenge for the USN in comparison to the Second World War. The North Korean's lack of any major surface fleet meant there would be no repeating of the great carrier versus carrier battles that characterized the previous conflict. Sea control, the primary mission of the USN was essentially thus guaranteed from the very start of the hostilities. This pushed the USN into having to play a peripheral role during the war. The Korean War would be fought predominantly on the land and in the air. The Navy would conduct some amphibious landing operations, including most famously at Inchon in 1950, as well as some anti-mine operations. However, the largest contribution of the USN to combat operations came in the form of carrier aviation contributing to tactical and strategic air operations.

USN kinetic operations during the Korean War began 3 July 1950 as fighter groups launched from USN carriers hit various North Korean targets. These strikes set a pattern that would continue throughout the war, of USN carriers striking at shore-based targets. The very first USN air strikes were conducted by Second World War era F4U Corsair propeller fighters. Jet aircraft were still in their transitionary period for carrier use due to a series of technical issues relating to safely landing on a carrier, thus it was more practical to predominately use propeller powered aircraft. Several carriers were deployed as part of the USNs TFs, including, *Valley*

[725] Baer, *One Hundred Years of Seapower*, 292.

Forage, *Triumph*, and *Philippines Sea*. USN carrier aviators soon found themselves conducting CAS strikes in support of US Army and USMC units as fighting on the ground intensified.[726]

The North Korean Navy had a mere 45 ships, the majority of them just smaller vessels such as torpedo boats. This meant the biggest threat to USN vessels were sea mines or shore-based guns. The Chinese also had almost no major naval presence either, giving the USN carriers freedom of operation.[727] One of the single largest USN combat operations of the war was in support of the amphibious UN forces landing at Inchon in September 1950. Here, carrier TF 77 played the leading USN role in providing fighter cover, CAS and interdiction strikes in support of the landing and follow-on combat. In particular, the USN aircraft were fairly effective in the provision of CAS, often strikes were able to occur within minutes of being requested by ground force commanders. The landing resulted in a decisive UN forces victory against the communist forces and in many ways reflected the successful amphibious operations of the Second World war during the USN's offensive drive across the Pacific. This was a type of operation that was ultimately familiar to USN officers, and something in which they could excel at executing.[728]

As the war in Korea continued, internal assessments began to develop among USN officers concerning the relevancy of the operations to the wider organization. Lieutenant Commander Joseph Howard argued that carriers remained a key part of U.S. national security strategy in this new Cold War era, as they had the flexibility to move quickly into hostile areas and providing striking power. Howard noted that amphibious landings needed carrier aviation as air support in this scenario that could not be replicated any other way; fundamentally, land-based aviation was limited if there were no immediate nearby airbases.[729] Korean War operations sparked a considerable spike in interest in limited war scenarios among USN officers, such as, Commander H. H. Seim who argued in their article "The Navy and "Fringe" of War" that conflicts like Korea had shown how limited wars are of considerable relevance to the USN.[730] Other articles argued that carrier TFs were particularly useful during Asia-pacific operations due the geography being conducive to strikes from the sea.[731]

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[726] Hornfischer, *Who Can Hold the Sea*, 207-209.
[727] Baer, *One Hundred Years of Seapower*, 322.
[728] Hornfischer, *Who Can Hold the Sea*, 244-247, 268.
[729] Lt. Cmdr. Joseph L. Howard, "The Navy and National Security," *Proceedings* Vol. 77 No. 7 (Jul 1951), 749-753.
[730] Cmdr. H. B. Seim, "The Navy and "Fringe" of War," *Proceedings*, Vol 77. No. 8 (Aug 1951), 835-841.
[731] For example, see, William H. Hessler, "Air-Sea Power on the Asian Perimeter," *Proceedings* Vol. 77 No. 10 (Oct 1951), 1019-1027; Peter Marsh Stanford "Limited War: A Problem in Maritime Defense," *Proceedings* Vol. 77, No. 12 (Dec 1951), 1311-1317.

The gradual introduction of jet aircraft during the war also attracted attention from active duty officers. For example, Commander Harvey Lanham published a piece entitled "The Jets Come of Age" in which he discussed the constraints and successes of integrating jets into ongoing operations. Lanham had personally led the first carrier strike against Pyongyang in 1950 and was highly supportive of the potential of jets for future USN operations. Commander Lanham felt that the Korean operations had firmly cemented the role of jets within the service, essentially ending any lingering debates, writing that "the blasting roar of jet tail pipes and the chattering of 20 millimeter guns was heard in every part of Korea".[732]

The situation on the ground in Korea was a stalemate by July of 1951. Carrier aviation would remain active for the remaining duration of the war, engaging in a mix of tactical aviation support via CAS and interdiction strikes, as well as some strategic air operations directed at a mix of targets such as power plants and bridges. Most notably, on 11 July 1952, carrier aviation from the *Princeton* and *Bon Homme Richard* participated in one of the largest air raids of the war, which targeted industrial targets in Pyongyang, the North Korean capital. Many of these mid to late war strike operations, with aircraft launched from carrier TFs, would hit a mix of inland targets such as industrial sites, as well as direct military targets along the coastlines with emphasis on supply and billeting areas, as well as communist command and control centres.[733]

The official USN lessons learned assessments of the impact of carriers on the war showed mixed results. At one-point, significant numbers of carrier aviation strikes took the form of interdiction raids against the communist field forces, with the intention of spearheading an offensive effort against the enemy. Eventually this interdiction campaign was stopped as intelligence assessments suggested that attacks against Communist communication lines during these interdiction efforts was largely ineffective. Carrier strikes then shifted more towards the provision of CAS for frontline forces. Aside from attempts at focusing on interdiction strikes, there were next to no major carrier related adaptations over the course of the war. The broad operational methods used continued to reflect the ones developed during the Second World War when carrier TFs used their striking power to hit at Japanese inland targets during the capturing of islands during the advance across the Pacific. The official USN analysis of carrier TFs during

[732] Cmdr. Harvey P. Lanham, "The Jets Come of Age," *Proceedings* Vol. 77, No. 4 (Apr 1951), 376.
[733] Commander, US Pacific Fleet, "Korean War: U.S. Pacific Fleet Operations Evaluation Report No. 5," Box: 277, Records of Naval Operating Forces, RG 313, NARA. 2-5-2-8.

the Korean war bluntly reported that, "[t]here was no major change in any aspect of carrier operations"[734].

Although major adaptations had not occurred during the Korean War, the USN still managed to identify a number of smaller lessons. Many of these were related to technical issues relating to the maintenance or launching of aircraft. For example, some of these smaller lessons identified included: improving the landing of aircraft during poor weather; understanding the range and detection abilities of enemy radar systems; improving carrier TF air defence capabilities, especially target acquisition and designation; and improvements to VHF voice channel communications between ships and aircraft.[735] Some of the most significant lessons learned assessments had to do with technical elements related to launching of aircraft, particularly given the high and continuous volume of carrier launches on a daily basis causing wear and tear on carrier equipment, with an official USN assessment noting that, "[t]he tempo of high speed carrier operations, over the past 2/5 years, with insufficient availability, resulted in rapid, progressive deterioration of ship's plant and plane handling equipment".[736]

The overall assessment of the USN war effort was that the Korean War had not altered the organization's position on carriers. The USN assessment of the Korean War demonstrated a fairly nuanced understanding of the circumstances and context of the war. It acknowledged that the conditions were not ideal to utilize the major strengths of carriers, particularly their maneuverability. The lack of significant strategic targets in the North also limited the ability of airpower to deliver any sort of decisive action as well. This meant the USN was constrained to mostly providing combined arms support for ground forces, which it did so enthusiastically and without objection Although the U.S. had failed to achieve a decisive victory as it had during the Second World War, the USN lessons from its peripheral combat experiences was that the striking power of the carrier TFs, even as it integrated new technologies such as jets, remained relevant to limited war situations. The Korean War experience of the USN demonstrated that carriers had a role to play in different types of conflicts, as lessons learned documents noted "[t]he effectiveness of jet aircraft for close air support operations has been proven in thousands

[734] Commander, US Pacific Fleet, "Korean War: U.S. Pacific Fleet Operations Evaluation Report No. 5," 3-1.
[735] Commander, US Pacific Fleet, "Korean War: U.S. Pacific Fleet Operations Evaluation Report No. 5," 3-5.
[736] Commander, US Pacific Fleet, "Korean War: U.S. Pacific Fleet Operations Evaluation Report No. 5," 3-5.

of sorties. Both prop and jet types play important roles in naval aviation, each suitable for particular missions".[737]

The Shadow of Vietnam

With the Korean War drawing to a close, the USN, like the rest of the U.S. military, was looking towards the future, and speculated on the next round of strategic challenges. The USN continued on the pathway it had been on during the late 1940s, which involved organizing the fleet around the force structures and doctrine that had led to overwhelming success during its war against Japan in the Pacific. Guiding this was the legacy Mahanian philosophy of securing sea control and bringing overwhelming firepower against the enemy. By this point, the Soviet Union had emerged as the main geopolitical rival of the U.S., and so it became the strategic fixation of USN. The USN at this time was preparing for potential future combat in the Pacific, but also the Mediterranean and North Sea in order to be able to strike at Soviet targets. This required a fleet that could sink any Soviet counterparts, but also the ability for "over-the-shore" operations against the majority of Soviet targets, which were inland. The carrier TFs was identified as the best tool to achieve these goals, as the U.S. had essentially spent much of the Second World War developing the "over-the-shore" operational method.[738] During this period, U.S. alliances, particularly NATO, began to play a larger role in developing USN strategy. In the advent of an outbreak of war with the Soviet Union, the USN would need to be able to maintain sea control in order to bring ground forces to Europe and strategically contested regions like the Middle East, while also striking at Soviet inland targets. The USN leadership did not believe this was going to be a quick fight, rather with NATO involved, it would likely be a longer, protracted conflict that required sustained sea control.[739]

In order to meet these challenges, the Navy attempted to technologically modernize its primary platform, the carrier. This led to the development, and procurement of the new *Forrestal* class of carriers, which were intended to carry out the legacy Second World War style combat operations against bluewater surface fleets as well as inland targets, and also to serve in a deterrence capacity which was now required of the U.S. military during the Cold War. The new

[737] Commander, US Pacific Fleet, "Korean War: U.S. Pacific Fleet Operations Evaluation Report No. 5," 5.
[738] Baer, *One Hundred Years of Seapower*, 344.
[739] For more on the USN and NATO during the 1950s see, Joel J. Sokolsky, *The United States Navy and NATO 1949-80* (Annapolis, MD: Naval Institute Press, 1991).

carriers were physically large enough to handle the new generation of jet-powered bombers that could carry nuclear weapons. These new carriers had a carrying capacity of up to 80 aircraft, including 24 nuclear armed bombers. This platform choice pleased both senior officers as well as their midlevel counterparts such as Captain W. D. Brinckloe, who viewed these new vessels as essential to modern naval operations and publicly voiced their support for their integration into the service. These captains viewed the *Forrestal* class as being the natural extension of the Second World War carrier TF, though noting the newest iteration had considerably more firepower.[740]

The Korean War helped expediate the development of the *Forrestal* class by helping to reinforce in the minds of senior military and civilian leadership of the importance of carriers for supportive shore-strike and air support capabilities during future wars. The popular perception within the U.S. military community was that naval air support during the war was important to U.S. ground force's combat effectiveness. Further, in terms of public perceptions, the *Forrestal*'s ability to conduct nuclear strikes due to being able to physically carry aircraft equipped with nuclear weapons allowed the USN to overcome any remaining opposition to their acquisition. Modernized carriers would allow the USN to remain relevant to a full spectrum of operations from limited wars like Korea to great power conflicts with the Soviet Union, either through a conventional focus on sea control or through nuclear strikes. Critics of the USN in the civilian defence bureaucracy and from the USAF interservice perspective lost the ability for further critiques. Internally, the USN was also drawn to increase their carrier investments due to being able to claim a larger budgetary share for the organization by justifying their procurement. By the early 1960s, this highly successful procurement campaign would add six *Forrestal* carriers to the service, and maintained an overall fleet of 26 carriers of different classes.[741]

Connected to the development of a new generation of carriers was the development of new jet aircraft. The USN of the 1950s had a number of jet aircraft in service. The F7U *Cutlass* introduced July 1951 was an early carrier-based fighter-bomber, and the F-8 *Crusader* was introduced in March 1957 to serve as an air superiority fighter for carriers. These were considerably more capable than the older, slower propeller planes that had fought in the Second World War. However, one of the major procurement projects was the development and eventual

[740] Capt. W. D. Brinckloe, "The Forrestal-Class Attack Carrier," *Proceedings* Vol. 84, No. 7 (Jul 1958),114-148
[741] Baer, *One Hundred Years of Seapower*, 335.

introduction of the A3D *Skywarrior,* which was designed and built to serve as the prime striking vehicle of the new *Forrestal* class of carriers. The A3D was a jet bomber, capable of carrying nuclear bombs, and the *Forrestal* was the first carrier that was large and strong enough to accommodate an aircraft of this size and power. The A3D was an incredibly advanced piece of aviation technology, and impressed NATO allies with its capabilities. The introduction of the A3D secured the USN's role in the nuclear age, and managed to increase the already overwhelming firepower capabilities of carrier TFs.[742]

Networks of officers overwhelmingly advocated for the integration of jet aircraft, largely due to their technological superiority. Commander Paul. W. Gill and Commander Richard A. Teel coauthored an article, "A Brighter Future for Carrier Aviation", in order to advocate for jets in the USN and to educate fellow officers about the multiple benefits of their use during operations. Gill and Teel argued that jet technology was fundamentally very radical, but had allowed carriers to go beyond even the capacities that had allowed them to dominate the fighting of the Second World War, and that the new *Forrestal* class of carriers should help to overcome the lingering technical difficulties encountered by early jets on older generations of carriers.[743] Lieutenant W. J. Aston argued that the *Forrestal* class would become the pride of the navy, and should be embraced by all those in the USN community who were supportive of aviation. According to Aston, the USN was entering a new age of carrier-jet aviation.[744] While Lieutenant Commander John Anthony demonstrated in another article that jet aircraft were essential to the modernization process of the USN in order for it to thrive in the new Cold War era.[745] Other officers participated in the pro carrier jet-aviation narratives, with some pointing to historical usages of maritime aviation as a guide for this new technology while others advocated fixing certain jet-centric issues with carriers, such as improving their catapults for launching aircraft in a smoother way.[746]

While the USN continued to prepare for its role in countering the Soviet Union, officers networked and engaged in a degree of self-reflections of earlier operations in order to look for

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[742] Jerry Miller, *Nuclear Weapons and Aircraft Carriers: How the Bomb Saved Naval Aviation* (Washington, DC: Smithsonian Institution Press, 2001), 99-104, 109.
[743] Cmdr. Paul W. Gill and Cmdr. Richard A. Teel "A Brighter Future for Carrier Aviation," *Proceedings* Vol. 79, No. 11 (Nov 1953), 1177-1184.
[744] Lt. W. J. Aston, "Jet Age Carrier," *Proceedings* Vol. 82, No. 5 (May 1956), 529-539.
[745] Lt. Cmdr. John F. Anthony, "Heavy vs. Light Jet Attack," *Proceedings* Vol. 84, No. 12 (Dec 1958), 92-95.
[746] Lt. Dorothy L. Small, "Catapults Come of Age," *Proceedings* Vol. 80, No. 10 (Nov 1954), 1112-1221; Lt. Cmdr. H.M. Dater, "Aviation and Seapower," *Proceedings* Vol. 80, No. 4 (Apr 1954), 427-435.

guidance to the future. The Second World War remained a topic of discussion during these narratives; articles appeared in *Proceedings* reflecting on the role of carriers in amphibious landing operations, while some officers such as Captain T. U. Sisson reminded readers that the Second World War had demonstrated how naval warfare had shifted towards joint-air sea power due to the power of carriers, which was further confirmed during the Korean War. Captain Sisson noted that these earlier conflicts showed how the mobility of carriers allowed for higher effectiveness of sea and air control, which could then be applied in future to important regions like the Mediterranean, where land air bases simply could not match the impact of carriers.[747] The Korean War in particular was a common area of discourse among officers following the 1953 stalemate. Commander Malcolm Cagle highlighted the flexibility of carrier aviation during air raids, noting that they were particularly effective when hitting strategic targets, and pushed back against the USAF assertions that heavy bombers were the only effective platform for strategic air usage. Further, Cagle also argued for the relevancy of carrier TFs in limited war scenarios, noting that the Korea war proved that carriers could be flexible in terms of operational usage and could be used against a variety of future threats.[748] Gerald Wheeler, a professor at the Naval Academy and veteran Second World War naval aviator, echoed these sentiments in an article, "Naval Aviation in the Korean War", where he argued that naval aviation operations in Korea demonstrated the relevancy of carrier striking power during limited war scenarios, that by "[s]triking vigorously at the enemy's communications, naval aviators exercised aerial command where it hurt the most – in the Communist backyard".[749] While George Miller, another Second World War veteran who had previously served on cruisers, published an article claiming that operations had confirmed that carriers had made a revolutionary impact on naval warfare, and held extra value by possessing the capability to strike at sea and deep inland targets. Miller further reminded readers that it was carriers which were 'the tip of the spear' in Korea by leading the U.S. amphibious landings efforts at Inchon in September 1950.[750]

[747] Lt. Gen Julian S. Smith, "Tarawa," *Proceedings* Vol. 79, No. 11 (Nov 1953), 1163-1175; Capt. T. U. Sisson, ""In Any Operation" – Aircraft Carriers," *Proceedings* Vol. 81, No. 3 (Mar 1955), 257-267.
[748] Cmdr. Malcolm W. Cagle, "Post Interdiction Carrier Operations in Korea," *Proceedings* Vol. 83, No 7 (Jul 1957), 699-712; Cmdr, Malcolm W. Cagle, "Sea Power and Limited War," *Proceedings* Vol. 84, No. 7 (Jul, 1958), 23-27.
[749] Gerald E. Wheeler, "Naval Aviation in the Korean War," *Proceedings* Vol. 83, No. 7 (Jul 1957), 765.
[750] George H. Miller, "Sea Power of Tomorrow," *Proceedings* Vol. 78, No. 9 (Sep 1952), 959-968.

One of the overriding focuses of the USN community during the 1950s was the power of atomic bombs and its relevancy for naval affairs. This fed into the technological centric culture of the USN. With many of the officers coming from engineering and scientific backgrounds, atomic technology was a natural trend for those officers to be drawn towards. This focus was driven by a variety of different factors: firstly, was the strategic advantage of using nuclear weapons, as it was impossible for officers to deny their impact after observing their use to end the war against Japan; secondly, it was a priority of the Eisenhower Administration within the wider national security strategy of his administration under the New Look strategy; and lastly, from a bureaucratic political perspective, it was a clear way for the USN to secure a higher budgetary share in interservice competition with the other services of the military. Officers such as Commander C.S. Arthur helped guide the USN towards navigating the shifts at the national security level, by advocating that carrier aviation was the perfect complement for the Eisenhower Administration's national security strategy. Commander Arthur noted how USN carriers would be able to be used in defensive situations in order to prevent Soviet bombers from mounting a future offensive, as well as being able to strike directly at Soviet airfields from the seas, and ultimately advocated for increasing the number of carrier TFs in the fleet.[751]

Commander Laurence Green also contributed to this nuclear orientated rhetoric, arguing in a published article, "A Case for the Attack Carrier in the Missile Age" that the doctrine and force structure that had become the backbone of the USN in the post Second World War era, the carrier TF, was the perfect match for the integration of nuclear weapons into the U.S. military. Commander Green pointed out that carriers could handle a dual role of conventional operations as well as playing a central role in nuclear deterrence. Green concluded his piece reminding the readers that "future war will, to a degree, be different from those we have experienced. However, future wars will also have many points of similarity, the most striking of which is that he who controls the sea controls a powerful weapon in support of ultimate success."[752] In the eyes of most USN officers, carriers would remain the primary platform of the fleet in this new nuclear age. Even as the decade came to a close, officers such as Lieutenant Michael McNevin continued to echo the rhetoric that carriers were to play the leading role for the USN at securing sea control

[751] Cmdr. C.S. Arthur, "General Eisenhower's Elephants," *Proceedings* Vol. 78, No. 1 (Jan 1952), 45-49.
[752] Cmdr Laurence B. Green, "A Case for the Attack Carrier in the Missile Age," *Proceedings* Vol. 84, No. 7 (Jul 1958), https://www.usni.org/magazines/proceedings/1958/july/case-attack-carrier-missile-age.

as well as contributing to the USNs role in nuclear deterrence. It was clear, though, that by the end of the 1950s many USN officers were strategically looking inland to a higher degree than to the bluewater oceans when thinking of threats and how to overcome the challenges of future wars.[753]

When it came to nuclear issues, the pro-carrier network would even extend to members of the Eisenhower Administration. James H. Smith, the Assistant Secretary of the Navy, endorsed the role of carriers in the service, and identified them as being a key part of U.S. strategic nuclear capabilities, arguing they were able to serve as floating nuclear strike bases, and that their mobility around the globe separated them from other nuclear centric elements of the U.S. military. Smith had formed his pro carrier views during the Second World Wars where he served on multiple carriers in the Pacific theatre. Secretary Smith dismissed claims that carriers were vulnerable to nuclear strikes themselves, and argued that their offensive capabilities were essential to gaining the advantage in the new nuclear age which was biased towards offensive strategic action.[754]

During the late l950s, carrier TFs remained at the forefront of organizational narratives surrounding future war and contingency operations. While nuclear weapons were identified across the officer corps as being essential to the future of the USN, there also remained a strong belief from both senior and midlevel officers in the traditional conventional usages for carrier TFs. Admiral Robert Carney argued that the flexibility of carriers made them relevant for any sort of operation, from limited wars on the strategic periphery to serving alongside NATO allies, and that their striking power had the ability to physically reach otherwise unavailable targets. Admiral Carney further advocated that U.S. national security strategists would need conventional strike capabilities in the future, not just nuclear ones.[755] This emphasis on the shore strike capabilities of carrier TFs was also shared by many Captains, such as Vadym Utgoff, who also argued that the strategic focus of the USN would be inland targets, which reflected the current global security environment.[756] The Soviet Union was a large, land based territory, and moreover many of the strategic hotspots around the world did not have any local bluewater naval threats.

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[753] Lt. Michael T. McNevin, "An Atom-Age Navy," *Proceedings* Vol. 85, No. 10 (Nov 1959), 40-49.
[754] James H. Smith, Jr., "Mobile Sea Base Systems in Nuclear Warfare," *Proceedings* Vol. 81, No. 2 (Feb 1955), 131-135.
[755] Adm Robert B. Carney, "The Principles of Sea Power," *Proceedings* Vol 79. No. 8 (Aug 1953), 817-827; Adm. Robert B. Carney, "Principles of Sea Power," *Proceedings* Vol. 81, No. 9 (Sep 1955), 967-985.
[756] Capt. Vadym V. Utgoff, "The Future of the Navy," *Proceedings* Vol. 84, No. 8 (Aug 1958), 73-81.

Other officers such as Lieutenant George Steele, a Second World War veteran, focused on the role of nuclear propulsion for future carrier development, arguing that the power of nuclear energy would come to influence the USN as much as the atomic bomb. Lieutenant Steele published an article, "Nuclear Energy and Sea Power" which was a call to the wider network of similar thinking officers and sympathetic external readers to urge Congress to continue to invest in further developing this technology.[757] Other officers were concerned about the pressures that new generations of carriers would place on the logistics of carrier TFs and that in order to maintain the maximum effectiveness of the TFs the USN would need to match investments in carriers with further investments in their logistical support systems.[758]

One of the biggest influences on the role of carriers and the USN during the atomic age was the leadership of Admiral Arleigh Burke, who served as CNO during the period 1956-1961. Burke was a captain during the Second World War, where he spent part of the time serving as Chief of Staff to the commander of TF 58, which was the 5th Fleet's carrier force. His views on the potential and power of carriers were shaped considerably by his experiences during the Battle of the Philippine Sea in June 1944, where carriers from TF 58 relied on their mobility and striking power to devastate the IJN. It was the largest carrier aviation operation of the Second World War, resulting in the sinking of three IJN carriers, and was a history defining moment for the power of the modern aircraft carrier at war.[759]

Burke had a keen understanding of bureaucratic politics, and the interrelationship between the military services and Congress regarding funding. Immediately after becoming CNO he began an active lobbying campaign directed against civilian politicians, highlighting the perceived growing threat of Soviet Sea power, with an intention of protecting the USN budgetary share against the USAF. Burke's vision of naval power was very much centered on carriers, and he was not afraid to cut costs in other areas to preserve the necessary budget available to keep them as the priority of the fleet; this would involve mothballing many of the UNS battleships during the late 1950s in order to allocate more money towards carrier TFs. The Navy of the late 1950s was thus considerably changed from the version of itself in 1941 where battleships were

[757] Lt. George P. Steele, II, "Nuclear Energy and Sea Power," *Proceedings* Vol. 79, No. 12 (Dec 1953), 1314-1319.
[758] For example, see Capt. Arthur F. Spring, "Mobile Naval Support for Total War," *Proceedings* Vol. 81, No. 8 (Aug 1955), 907-916; Lt. Cmdr. Carl L. Henn, Jr. "Sustaining an Air-Atomic Navy," *Proceedings* Vol. 83, No. 5 (May 1957), 471-478.
[759] E.B. Potter, *Admiral Arleigh Burke* (New York, NY: Random House, 1990), 154-162.

firmly the primary platform of the fleet. Burke's view was that the future of the USN would be tied to nuclear technology, both in terms of weaponry as well as a main propulsion method, and while this was desired for strategic and operational reasons, it also significantly strengthened his inter-service rivalry position when staking out a share of the overall national defence budget.[760] Burke also valued promoting younger officers up the chain of command, which allowed them to bring about their knowledge of first hand operational experience to the senior levels of USN officers, and thus he had a formal leadership program to allow this to happen.[761]

Burke and senior USN leadership's central challenge during the late 1950s was how to offset the significant budgetary cuts by the Eisenhower Administration as they shifted resources away from the other services to the USAF to better fund SAC. Advancements in nuclear propulsion technology presented USN leadership with an opportunity to counter the dominant position of the USAF during this period. As a result, an initial focus of the USN during the late 1950s was the development of nuclear powered and armed submarines. This focus was in part driven by the efforts of Rear Admiral Hyman G. Rickover and his staff who emphasized the development of nuclear submarines as they saw advanced strategic relevancy in the platform due to their stealth capabilities.[762] USN planners also predicted the Arctic Ocean as a new area of operations for the USN's submarine force, which could be exploited further if the submarines were equipped with a functional ballistic missile as it would allow the USN to hit targets across the Soviet heartland.[763]

Burke identified the development of a submarine launched ballistic missile for the USN as one of the organization's top priorities; this became known as the Functional Ballistic Missile Program (FBM). The USN was not alone in focusing on missile development during this period, as the Army and USAF were also engaged in research and development in this area. Although there was a strategic rational to drive the development of the FBM, the USN was also highly motivated by bureaucratic interests. Burke and the senior USN leadership quickly understood that a submarine launched ballistic missile would quickly accelerate the USN's relevancy as part

[760] Ken Jones and Hubert Kelly, Jr. *Admiral Arleigh (31-Knot) Burke: The Story of a Fighting Sailor* (Annapolis, MD: BlueJacket Books, 2001), 184-185.
[761] Potter, *Admiral Arleigh Burke*, 430.
[762] Rickover would go on to be known as the "Father of the Nuclear Navy"; Theodore Rockwell, *The Rickover Effect: The Inside Story of How Adm. Hyman Rickover Built the Nuclear Navy* (New York, NY: John Wiley & Sons, Inc., 1995), 117-120.
[763] Rockwell, *The Rickover Effect*, 245-246.

of the Eisenhower Administration's national security strategy with regards to nuclear deterrence and strike capabilities against the Soviet Union. Essentially, USN officers felt that a nuclear armed submarine could either supplement or even partially replace SAC's long range bombers as part of the nuclear deterrence mission, especially given that submarines were seen as far less vulnerable to enemy defenses than bombers.[764]

The Navy had to navigate considerable bureaucratic constraints in order to develop its FBM. As the USN was the last of the services to begin developing an active ballistic missile program, Washington was initially reluctant to fund yet another program dedicated to nuclear weapons when the Army and USAF already were well under way with their own research and development in that area. USN leadership remained unsatisfied with that outcome and continued to make the case on strategic and operational grounds, pointing out that the stealth and mobility of submarines made them excellent platforms for the strategic deterrent mission. Further, newer technological improvements strengthened the USN case, which included the invention of solid-fuel rockets which allowed for smaller sized missiles to be developed that could better fit on a submarine. USN officers had a firm understanding of the bureaucratic political dynamics at play and began laying the groundwork for the USN to bypass the USAF's attempts to maintain a quasi monopoly on the strategic deterrence mission.[765] USN officers undertook a network orientated lobbying attempt aimed at convincing members of the Eisenhower Administration along with key members of the civilian defence bureaucracy of the importance of the USN's submarine missile program. This included holding meetings with the Secretary of Defense Charles Erwin Wilson who was won over by the USNs arguments. This was a considerable victory for the USN as it allowed the service to further separate itself from the USAF and Army in terms of its participation in the deterrence mission, while also increasing the strategic firepower of the fleet.[766]

The outcome of this bureaucratic maneuvering was that Burke and senior USN leadership directed the Navy to begin to develop a new ballistic missile armed submarine (SSBN) platform that was armed with the USN's newly developed Polaris nuclear missiles. The USAF continued to oppose these programs, however the office of the Secretary of Defense continued to give full

[764] Potter, *Admiral Arleigh Burke*, 407-409.
[765] Sapolsky, *Polaris System Development*, 7-15.
[766] Potter, *Admiral Arleigh Burke*, 407-409.

approval.[767] The USN's research and development teams prioritized the technical development of SSBNs and rapid work was underway. The SSBN *George Washington* began sea trials in June of 1959 and successfully conducted missile tests in July of that year; the SSBN *Skate* would also successfully demonstrate the ability of submarines to operate in and around arctic icebergs while also helping to chart the Northwest Passage, further highlighting the operational flexibility of the SSBN platform by allowing the Navy to access new geographic locations.[768]

The USN's enthusiastic embrace of the new SSBN platform was also tied to the importance of the carrier TF to the fleet. USN leadership's understanding of the Eisenhower Administration's views on international relations interpreted a need for strategic flexibility. The USN wanted to maintain a broad range of operational capabilities, as Burke and many USN officers remained unconvinced that a nuclear exchange with the Soviet Union would be a quick and decisive affair and so there would always need to be ready for sea control operations. Burke sought to situate nuclear capabilities within a wider strategic context for the USN, which would also involve a focus on carrier capabilities. The emphasis on SSBNs allowed the USN to secure a larger share of budgetary resources and research and development approval from civilian leadership in Washington; the USN was able to use the civilian fascination with nuclear weapons as the main selling point to secure increased resources for the organization. Also, the USN continued to stress strategic flexibility, which allowed them to justify shifting internal resources to carriers as they allowed the USN to continue to preserve capabilities for many different missions, including sea control. Burke and the rest of senior USN leadership remained sensitive to the concerns of pro-carrier networks within the organization. While the Polaris missile was linked to the strategic use of nuclear weapons and deterrence, language describing their likely usage was focused on destroying naval relevant targets such as ports and enemy submarine pens. The USN strategic documents formally outlined how the Polaris' strategic utility would allow carriers the ability to focus on other missions.[769]

The Polaris armed SSBNs would lessen the need for carriers to carry the burden for the USN of being the primary nuclear strike option for the service. Instead, carriers would continue to

[767] Potter, *Admiral Arleigh Burke*, 407-409.
[768] For more on the technical development of SSBN submarines see, Richard G. Hewlett and Francis Duncan, *The Nuclear Navy 1946-1962* (Chicago, IL: Chicago University Press, 1974); Elliott V. Converse III, *The History of Acquisition in the Department of Defence: Rearming For The Cold War 1945-1960* (Washington, D.C.: Historical Office of the Secretary of Defense, 2012).
[769] Baer, *One Hundred Years of Sea Power*, 355.

focus on their traditional sea control and conventional shore-strike missions, which was a normative preference for the organization, while the SSBNs carried the workload on the service's deterrence contribution. Carriers thus were able to maintain the flexibility to join the deterrence mission when needed, or be used for other operations.[770] Even the most zealous of the pro-SSBN officers of the USN, such as Rickover, remained heavily pro-carrier in their sentiments; there was a near complete organizational consensus on the importance of preserving the position of carriers in the fleet.[771] The development and advocacy of SSBNs is thus best understood as being partly motivated to allow the USN to procure enough resources during its bureaucratic political battles with the other services against the backdrop of a changing national security strategy.

Burke believed in a "heavy fleet" concept that was to be centered around carrier TFs, which were in turn spearheaded by the new *Forrestal Class* carriers, five of which (the *Saratoga*, *Ranger*, *Independence*, *Kittyhawk*, and *Constellation*) were all procured for the fleet during his tenure as CNO. In 1961, the *Enterprise*, the largest carrier in history and the first to be fully nuclear powered was commissioned, truly symbolizing Burke's vision for the USN in the nuclear age. These new, larger carriers would maximize the impact of the established doctrine of the carrier TFs. Burke rejected the more apocalyptic visions of future war that were often promoted by the strongest advocates of strategic airpower in the military. Burke felt that a full and immediate nuclear exchange between the superpowers would not be worth fighting as there could be no clear winners; Burke like many others in the USN, predicted that any future war would be a drawn out and protracted conflict, in which the U.S. could and would use the geographic isolation of the U.S. to guide its strategy, and in which the USN would play a central role.[772]

In 1958 Burke released an internal vision document, entitled "The Navy of the 1970 Era**",** which was distributed widely across the USN officer corps. It was a study, overseen by Burke, regarding the current and future needs of the USN in order to assist in longer term planning. The wider distribution of it was part a signaling effort from the CNO's office to the wider network of carrier engaged officers in the service to help foster pro-carrier narratives and to push for further carrier related reforms within the organization. It projected the future of the

[770] Baier, *One Hundred Years of Sea Power*, 360-361.
[771][771] Rockwell, *The Rickover Effect*, 199-200.
[772] Jones and Kelly. *Admiral Arleigh (31-Knot) Burke*, 184-185, 187; Baer, *One Hundred Years of Seapower*, 345-349.

USN would be orientated towards carrier TFs, emphasizing their strike force capabilities against different kinds of targets. It advocated for increased investments into carrier development, arguing that there needed eventually to be 12 major carriers in the fleet. Overall, the study advocated that the most important thing about carriers was their operational flexibility, being able to be used in a large number of scenarios, stating that "[t]hese striking forces — while no less destructible than anything else on the face of this earth — will have a defensive capacity adequate for the most extreme degree of limited war."[773]

Although Burke was a strong supporter of a nuclear orientated fleet, he nonetheless remained also focused on the challenge of limited wars. This was particularly salient given the growing tensions in French Indo-China during the 1950s. Burke, however, felt that the force structures that would be used during a great power war, the carrier TF, was equally relevant to limited war scenarios, including those against smaller powers. The mobility and range of striking power from carrier aviation would, in the eyes of Burke, always have a major role to play in such conflicts. Carriers could be disbursed across the globe in a relatively short amount of time and on a relatively short amount of notice; carriers, according to Burke, were just as effective striking at coastal or inland targets as they were at countering enemy surface fleets. As new threats would emerge in the Third World, Burke felt USN carriers would be the 'tip of the spear' of the U.S. response. Burke noted that carriers did not have to rely on local allies and airbase infrastructure to launch its aviation assets, and that the majority of potential future hotspots were almost always accessible by the globe's oceans, essentially making carriers usable for the vast majority of future strategic crisis responses. Frequently, when making the case for the role of carriers in the nuclear age, Burke would point directly at USN operational experiences during the Second World War and Korea as evidence of the role of carriers and of their strategic flexibility.[774]

As the decade drew to a close, the officer corps across the ranks remained focused on promoting pro-carrier positions, a firm organizational consensus had been established. A common platform for these views remained service journals. Admiral H.D. Felt would write that "[w]e in the Navy think that naval forces and particularly Attack Carrier Task Forces are indispensable for all kinds of war. In recent years your Navy has had some pretty decisive

[773] Office of the Chief of Naval Operations, "The Navy of the 1970 Era," (Washington, DC: Department of the Navy, Jan 1958), https://www.alternatewars.com/Archives/Dreams/The_Navy_of_the_1970_Era_Jan_1958.htm.
[774] Jones and Kelly, *Admiral Arleigh (31-Knot) Burke*, 184-185; Baer, *One Hundred Years of Seapower*, 361.

influence on the course of world events. It has been there when it was needed and it has been ready for any kind of action."[775] Commanders such as Ralph Williams and Craig Hosmer both advocated for positions shared by CNO Burke regarding the relevancy of carrier TFs to operational flexibility as well as the important linkage of nuclear technology to the future of the USN.[776] In 1959, Captain Daniel Carrison argued that carriers had proven themselves as the main platform of the modern USN in his article, "The Role of the Navy in the Cold War", and that it would remain so in the years to come.[777] The predictive character of Captain Carrison's piece would prove to be highly accurate as the rest of the Cold War unfolded.

Conclusion

The USN's adaptations for carrier operations during the Second World War followed by its organizational institutionalization during the Cold War is another example of a highly successful adaptation to innovation process. The USN had, to a limited degree, certain assumptions about the potential for carriers in modern warfare during the period just prior to the U.S. entry into the Second World War. However, without the test of battle, those assumptions remained merely as operational hypothesis, and many in the service continued to assume that other platforms such as battleships would continue to play the dominant role in modern naval operations. The combat against Japan presented an opportunity for a series of wartime adaptations to unfold, that allowed for changes to carrier operations and the transformation of USN doctrine and force structures. The motivation of this change was fear of defeat driven by the shock of early wartime engagements. As the war continued, carriers demonstrated their lethality in naval operations, and USN officers quickly realized they needed to analyze. assess and ultimately change how they fought wars in order to best harness the power of the carriers and naval aviation. This was not an easy process; it took repeated battle experience, mid-war experimentation, networks of officers pushing for change, as well as officer assessment and agreement that pro-carrier adaptations needed to occur. The USN adaptation process also involved the distribution of lessons learned reports and periodically updated doctrine. By 1944,

[775] Adm. H. D. Felt "The Potential of Our Nuclear Navy," *Proceedings* Vol. 84, No. 1 (Jan 1958), 113.
[776] Cmdr Ralph E. Williams, "Task for Today: Security Through Seapower," *Proceedings* Vol. 84, No. 3 (Mar 1958), 23-30; Cmdr. Craig Hosmer, "Nuclear Power for the Navy," *Proceedings* Vol. 84, No. 5 (May 1958), 57-65.
[777] Capt. Daniel J. Carrison, "The Role of the Navy in Cold War," *Proceedings* Vol. 85, No. 6 (Jun 1959), 57-63.

the USN had transformed itself into one of the most lethal fleets in all of history and had crushed the IJN in an overwhelming victory.

The USN ended the Second World War as a changed organization. There were no normative barriers or constraints to the integration of the carrier related lessons learned. Several normative dynamics helped officers view carriers through a friendly lens. For example, they could be employed in a Mahanian fashion for maximizing firepower and securing sea control; and they also drew the interest of the engineering and scientifically minded officer corps who had a preferential bias towards newer technologies. This created an organizational environment that would be positively receptive to carriers. The institutionalization of the Second World War carrier adaptations began immediately in the post-war period. A strong network of junior and midlevel officers began an active discourse across the service, they filled the USN's professional service journals with article after article recounting the importance of carriers and the updated USN doctrine during the previous war; these officers also participated in other functions, such as lecturing about their experiences in the service's educational institutions. These educational institutions also underwent a series of reforms in order to assist in the institutionalization of the carrier related lessons learned in order to best diffuse them to the next generations of officers.

There remained no strong counter-networks or alternative organizational narratives in opposition to this carrier discourse. Senior officers had openly embraced the new role of carriers by the end of the war and granted considerable influence to carrier officers in the post-war period. The greatest threat to the integration of the lessons learned came in the form of bureaucratic politics, as the USAF attempted to monopolize control of nuclear weapons in the U.S. military. Emerging from this interservice competition was the suggestion that the USN, and by extension carriers, should not be equipped with nuclear weapons; however, this challenge was unsuccessful.

The Korean War presented a new challenge to the USN, as it was a limited war rather than total war scenario against an enemy that lacked any sort of surface fleet. It was thus very different from the fleet to fleet action that characterized the Second World War. Despite these differences, the USN found new uses for the doctrine and fleet structure formed during the adaptation process of the Second World War. Ultimately, the Korean war did not challenge any of the Second World War lessons learned, rather it reinforced them, and demonstrated new

usefulness in limited war scenarios. Further, it gave yet even more officers first hand operational experience in carrier warfare.

Post-Korean War networks of pro-carrier officers created an overwhelming narrative as they advocated for further expansion of carriers within the USN. At its core, this was a continuation of the lessons learned integration process of the Second World War adaptations. Officers would frequently even reference the Second World War when promoting carrier narratives. The Navy underwent some broader shifts during this time, yet none of these shifts would delay or constrain the final institutionalization of carrier adaptations into the service. The Soviet Union had emerged at this point as the main strategic objective and adversary of the USN, which further amplified the pro-carrier narratives in the service. Carriers were identified as the key platform by the officers of the USN to play a role in any nuclear war, via the integration of nuclear armed jet-powered bombers such as the *A3D Skywarrior* into carriers. Carriers also possessed conventional striking capabilities, which would be needed for any sort of protracted war scenario with the Soviet Union. The carrier TF became one of the main linkages of the USN to nuclear weapons in the 1950s. Further, carriers, in part due to operations in the Korean War, were identified by the USN as being the main area of contribution to future limited war scenarios. It was the striking power capabilities of the carrier task forces which could be sent to any hotspot region of the world and provide the U.S. with air cover and strike abilities. This represented a broader strategic shift that was occurring in the USN, as it began to look more inland and to coastlines as opposed to the bluewater oceans when conceptualizing targets for future carrier strikes.

The senior leaders of the 1950s, including CNO Admiral Arleigh Burke, were themselves carrier veterans of the Second World War, and were heavily influenced in their behavior and decision making by their earlier wartime experiences. Burke personally oversaw the introduction of the new, major *Forrestal* class of carriers into the service as well as the first nuclear power carrier. He promoted pro-carrier officers, and developed plans for the Navy that were all based around the continued integration of carrier TFs as the main force structure and operational unit of the USN. Burke also promoted the creation of a new platform, the SSBN, which allowed the USN to secure increased resources which in turn helped develop the fleet's carrier capabilities. As the 1960s emerged, it was clear that the USNs adaptation to innovation process for Second World War related carrier adaptations was completed. The USN was a changed organization,

which had learned and retained the lessons of war and ultimately this process could not have unfolded without the role of junior and midlevel officers.

Chapter 7: Conclusion

Guns and violence have the potential to override any theory, no matter how sound[778]
A U.S. Army Lieutenant

This research project addressed the question of how battlefield experience influences post-war organizational change of the U.S. military. This was an attempt to trace how battlefield adaptations are transformed into major innovations. In answering this question, the analysis fundamentally outlined the processes of 'bottom-up' military innovations. The analysis assumed that junior and midlevel officers were key conduits in this process, something that had been largely undervalued or ignored by the majority of the military change theoretical literature. Practitioners and theorists alike need a better understanding of the phenomenon of military organizational change due to its relevancy to military power and the overall behavior of militaries during periods of war and peace. There remains a need to understand why and how change occurs, as well as why it sometimes does not happen.

Each service branch of the U.S. military entered the Second World War in 1941, and were all required to play a major role in the conflict. Not only did the Marine Corps, Army, Army Air Force, and Navy all participate in major combat operation while under the same political, economic, and cultural conditions, they were all presented the opportunity to test their preferred operational methods and put into practice their warfighting hypotheses. In short, these wartime adaptations were not minor technical upgrades, but rather involved a fundamental reassessment of the organizational philosophy towards how warfare should be waged. This situation thus presented the ideal series of cases to explore in a comparative framework of how each service branch would respond to the need to adapt during wartime, and following the end of hostilities, how each service branch would respond to the challenge of institutionalizing those lessons. In three of those cases – Marine Corps, Army, and Navy – there was an overwhelming organizational success at institutionalizing the lessons of major combat operations. In one case, that of the Army Air Force/Air Force, the process ended in failure.

[778] Quoted in, P.W. Singer, *Wired for War: The Robotics Revolution and Conflict in the 21st Century* (New York, NY: Penguin Press, 2009), 179.

This study points to certain factors that are necessary for a successful 'bottom-up' innovation to occur. A major wartime adaptation is likely to unfold in response to the fear of battlefield defeat. In order for this wartime change to occur there needs to be a group of junior and midlevel officers who are convinced it is the right course of action and become committed to the change process. This change process will involve multiple elements, including analyzing recent combat experiences, disseminating knowledge via official and unofficial channels, and training new techniques. These junior and midlevel officers will also need the support of some senior officers to allow the necessary changes to be effectively implemented. For a major adaptation to successfully develop it will need to fit with the wider organizational culture, and conform to the preferred vision of war of the officers involved. To retain the lessons of the wartime adaptation into the post-war period, the junior and midlevel officers who directly participated in the adaptation process must continue their efforts while receiving the support of sympathetic senior officers via their consent and through promotions up the chain of command. If any of the above factors are not present, or are somehow disrupted, it is likely that the wartime adaptation will fail to be institutionalized during the post-war period.

In all four cases, regardless of the outcome, junior and midlevel officers remained highly influential variables in explaining the success or failure of the process. Senior officers would also play important roles in determining the success or failure, as would a diverse set of drivers and shapers. The four cases all involved a successful wartime adaptation, where the military organization underwent a significant change with how it waged war. For the majority of these cases the changes occurred because there emerged a genuine fear of defeat and strong concerns that continued ineffective combat techniques would lead to increased costs and causalities. Further, for the majority of cases, the battlefield changes conformed closely to their organizational cultural preferences, and also to their organizational idealized vision of warfare. Military organizations have strong collective understandings about their identity and their preferred courses of action, and any successful wartime change needs to conform, to a degree, to those preferences. During this adaptation phase, junior and midlevel officers helped to drive the changes during the war as they were the ones with the most frontline combat experience, and thus gained greater insight into what exactly was going wrong, and what needed to change. Senior officers also played an important part of this process, either by consenting to the necessary changes in some cases, and enthusiastically endorsing them in others.

During the post-war period for the three successful cases, junior and midlevel officers drove and shaped the process of bottom-up innovation through two pathways: these officers initially formed information and advocacy networks to drive the adaptation process during the war and then helped drive the institutionalization of the lessons of the adaptation process in the post-war period; the second pathway in the successful cases was that some of these junior and midlevel officers ascended up the chain of command during the post-war period and used their newfound authority to help further the institutionalization process. Senior officers continued to play an important role during this process, either by directly participating in the information and advocacy networks, or by rewarding the junior and midlevel officers who played important roles during the adaptation phases with promotions and granting them increased authority and influence to institutionalize the necessary changes during the post-war phase. In the case of failure to institutionalize the wartime adaptations, junior and midlevel officers who remained unconvinced of the need to retain the lessons of combat formed counter-advocacy and information networks that helped to derail the institutionalization process. Further, in the case of failure, senior officers did not reward pro-adaptation junior and midlevel officers with promotions and limited their ability to institutionalize the lessons learned in the post-war phase.

Theoretical Considerations

This analysis did not attempt to test a single theory of military organizational change. The phenomena of military change during periods of war and peace is seemingly far too complex to distill down to a single formula that can fundamentally explain every aspect of change. Instead, the analysis turned to a drivers and shapers framework to explain the wartime adaptation process and how those adaptations either successfully or unsuccessfully transformed into post-war innovations. These drivers and shapers do not impact the process of change in isolation, rather they interact with one another consistently at different stages. This group of drivers and shapers and their interactions guided the analysis to account for the multiple factors that ultimately influenced the change process. The evidence from the four case studies helps to gain a deeper understanding of how ‘bottom up’ innovations thus unfolds and illuminates newer perspectives on the causal factors that underpin military organizational change. It should be acknowledged that the findings of this analysis have limitations; they are the result of operations conducted by a large military power during a major international conventional war. Smaller powers conducting

operations of a different character may have differing results while undergoing changes. However, with this potential constraint in mind, the operational and geographic diversity of the cases studied will still likely hold some degree of relevancy to different states.

Theoretical Considerations and the Adaptation Process

Strategic, operational and tactical challenges were identified as being one of the primary drivers of wartime adaptation. Each service branch entered the war with an untested hypothesis of how war should be waged. For each case, their hypotheses were shaped by a variety of normative, ideational, bureaucratic, and historical factors. The Army's approach to combined arms remained constrained by their previous operational experiences of the First World War, where infantry-artillery teaming had played the decisive role, and in turn lacked an ideational understanding of how mechanization technology may have changed the character of warfare in ways that many conservative minded officers were unable to understand. Thus, the Army's hypothesis on how war should be waged lacked an appreciation of the role of armor in combined arms. In the case of the Marines, they had developed an ideational acceptance of the importance of CAS in the prewar period, but lacked any coherent system of how it could be operationalized in combat. The AAF had developed, in part due to ideational trends and organizational cultural dynamics, an aggressive hostility towards CAS and tactical aviation; the AAF's vision of war was drawn instead to the power of strategic airpower. The Navy had accepted that carriers were growing in importance to modern naval warfare, but also lacked a full understanding of how they should factor carriers into operational methods and strategy. In all four cases, their operational hypotheses were proven faulty when faced with the realities of combat, especially against capable opponents which then created challenges at the strategic, operational and tactical levels. The seeds of the adaptation were sown with these problematic pre-war perceptions as they essentially created the context of the need for change.

In all four cases, a shock event occurred that would cement in the minds of junior midlevel, and in some situations, senior officers, of the need for organizational change to occur in order to increase combat effectiveness to overcome the newly encountered strategic, operational and tactical challenges. The Marines' first major campaign of the war was at Guadalcanal, where the slow pace of the campaign, paired with several obvious difficulties with the initial ad hoc CAS system, exposed several immediate flaws in Marine Corps doctrine that

would need to be fixed as the war continued. For the Navy, the shock of the carrier based attack on Pearl Harbor, followed on by operational difficulties during the battles at Coral Sea and Midway, signaled to the officer corps that changes were needed. Officers from both the Army and AAF were able to observe the effectiveness of the *Wehrmacht* at combined arms in North Africa, which painted an immediate unfavorable comparison to the limited capabilities of the U.S., paired with the humiliating public defeat of Army and AAF forces at Kasserine Pass. This defeat was a clear signal to both organizations that how they were approaching operations needed to change. In short, shock moments created a window of opportunity for the adaptation process to begin. These moments could come from defeats or even victories in which the operational methods used were seen as deficient in the eyes of frontline officers.

The initial shock events were not the only events to spur on the adaptation process. Emerging strategic, operational and tactical challenges throughout the war remained key motivating factors in the change of operational methods. One of the main examples of this was the challenge that Army units faced in the *bocage* in France in 1944. By this point in the war, it had been established that the Army's combined arms methods needed further reform, but it was the pressures of the fighting in the hedgerows of France that spurred on the final elements of the process. Another example of this was the Marine aviation units in the Philippines. The Marine officers at this point in the war understood they faced a difficult operational challenge and needed a concerted effort to try and finalize the lessons learned effort that had been developing over the course of the war with regards to CAS. The genuine fear of defeat paired with the growing casualties of frontline units demonstrated the necessity to officers that more aggressive change was needed.

Another driver of the adaptation process was the role of new technology, which enabled the adaptations to occur at a more rapid pace. For example, the Army's procurement of the M4 Sherman medium tank allowed armor to play a greater role in combined arms as they were considerably superior in terms of capabilities compared to the Army's early war tanks. The Army's inferior early war technology had contributed to their inability to conduct combined arms effectively given their lesser armament, speed, and firepower. The AAF was able to conduct more effective CAS missions in France, in part due to wider access to advanced radio systems as well as newer aircraft such as the P-47 Thunderbolt. While the Navy was able to use the newer *Essex* class of carriers to fuller effects than the older, slower carrier platforms which

also held less planes. Technological changes allowed for new capabilities and more effective operational methods to be developed and implemented.

One of the most important drivers and shapers identified by this analysis was the role of junior and midlevel officers who led the adaptation process from the very start of the war and influenced how it unfolded as the war continued. Following the initial shock events, in all four cases, some of the first efforts to respond to the new challenges came from junior and midlevel officers forming the initial information and advocacy networks by drafting articles in service journals intended to share experiences and advocate for change. This service journal discourse would often intensify throughout the course of the war as more and more junior and midlevel officers gained operational experiences and sought to participate in the narrative of change. Further, junior and midlevel officers were the key data gatherers and analysts for official after action reports. These reports of different types were usually written by non-senior officers and frequently relied on combat interviews from lower ranking officers as they were the ones with the most hands-on field and combat experiences; senior officers back in the United States or even theatre headquarters did not have anything comparable in terms of primary experiences.

Beyond journal articles and official reports, junior and midlevel officers also physically networked and socialized. This allowed for face to face sharing of their operational experiences and for the diffusion of lessons learned to happen through informal channels. Sometimes this happened organically, without structures, other times senior officers helped facilitate the process. The Marines, for example, ensured that officers with frontline experience would have the opportunity to interact with officers who were waiting to have their first deployments. The AAF had a formal exchange program where officers who had gained fighting experience with CAS and tactical aviation in the Italian campaign were sent to the U.K. to help U.S. forces prepare for Operation Overlord, thus helping to ensure that the units that were heading to France could reap the benefits of learning from earlier campaigns. The Army found great success in fostering combined arms adaptations where infantry and armor units were given the time and space to interact, socialize and allow officers to build trust in and among the various units; the best example of this occurring was in the *bocage* in France.

The physical socialization and extended networking of junior and midlevel officers also occurred during mid-war training and educational exercises which helped to further drive and shape the adaptations. The Marines were among the most active of the case studies at this

process. The adaptation minded junior and midlevel Marine officers during the Philippines campaign drafted educational manuals and held a series of training lectures to ensure that all officers and personnel involved in the CAS process were able to understand the changes that were being implemented. In the case of the Marines, this educational socialization was a fully bottom up minded process, conceptualized and then operationalized by non-senior officers. The Navy saw groups of officers undertake the initiative to hold mid-war training exercises to test the viability of concepts and responses to lessons learned from earlier engagements. The Navy used these as key steps in its overall carrier adaptation process, assisting in the development of multicarrier TFs and allowing carrier captains to gain better coordination among one another and with their air operations commanders. The AAF and the Army underwent similar processes. In particular, the Army encouraged units to engage in mid-campaign exercises to build better coordination between the combat branches; for example, tanks and armor units trained extensively near the Anzio beachhead prior to the breakout in Italy in 1944. Further, in France during the fighting in and around the *bocage*, armor and infantry units benefited a great deal from having time and space to physically interact with one another, building trust and chemistry among the junior and midlevel officers.

However, senior officers would still play a role in driving and shaping this process. Sometimes they would join the networks via writing service journal articles. Some senior officers also gave either tacit or even direct consent to the adaptation process by allowing the distribution of after action reports to disseminate lessons learned. Even if these senior officers had not been the sources of the data used in the reports or even authored them, they still remained involved by being in the loop of the process. All of the services actively used the distribution of lessons learned reports and other documents to help diffuse knowledge and facilitate the adaptation processes. Overall, the networks of junior and midlevel officers, who were at times interlinked with sympathetic senior officers, remained present and a leading element of every stage of the adaptation process and led the way for change to occur. Senior officers also formally granted permission for mid-war doctrinal updates, meaning they remained aware of the adaptation process even if the majority of the labor was being conducted by lower ranking officers. Senior officers thus either directly participated in the adaptation process, or minimally consented to it unfolding; in both instances, this remained an important part of the adaptation process. In the case of the AAF, most of its most senior leadership had little interest

in the adaptations related to tactical aviation, as they were primarily focused on strategic bombing efforts. However, as the AAF was still under the organizational hierarchy of the Army and not yet an independent service branch during the war, senior Army officers provided cover for the CAS adaptations to eventually take place.

Thus, the interaction of the driving and shaping influences of junior, midlevel and senior officers was essential for maximizing the effectiveness of the adaptation. Without the consent and approval of senior leadership, the ability of pro-adaptation junior and midlevel officers would have been fairly constrained, and changes likely would have been confined to local units. Senior leadership's involvement in the process allowed for quicker and wider-spread acceptance and distribution of the central lessons of the adaptation. In turn, senior leadership would have been unable to oversee the adaptation process without the considerable efforts of the collective group of junior and midlevel officers. Overall, the interactions of junior, midlevel and senior officers demonstrates that the adaptation process involves a mix of collectivist and individualized inputs coming together for a common goal in order to fully succeed.

Culture remained a significant shaping force during the adaptation process for most of the cases and played a substantial role in influencing the interactions of junior, midlevel and senior officers. The Marine's bias towards frontline combat and being an infantry orientated organization made the development of CAS a logical extension for its airpower capabilities. CAS allowed Marine infantry to receive adequate firepower support that Army units were able to receive from tanks and heavy artillery units that the Marines lacked due to their emphasis on being a rapid expeditionary and amphibious orientated organization. While Marine aviators developed an appreciation for other deployments of airpower, such as air superiority missions in part due to their serving and training alongside naval aviators, they nonetheless remained dedicated towards their primary role of supporting the infantry. The Navy's focus on Mahanian interpretations of seapower created an ideational opening for the newer carrier technology to be absorbed into the organization's vision of warfare as it was a platform that would support that role. The Army's normative bias for mass and firepower also allowed for tanks to play a larger role in the service's approach to warfighting without clashing with organizational ideals. In the case of the AAF its organizational culture acted as a constraining shaper of the adaptation, however, the driver of operational imperatives remained so great of a challenge that officers felt the need to overcome the normative barriers in order to successfully adapt. Further, the role of

senior leadership and bureaucratic structures acted as a constraining force on the influence of the AAF's culture. The AAF remained under the Army's chain of command, where senior ground force officers retained considerable organizational authority, which gave a degree of cover for tactical aviation adaptations to unfold in spite of the AAF's normative bias against them. Culture made certain choices and courses of action of the junior, midlevel and senior officers during the adaptation process easier to accept and embrace due to their reflection of preexisting normative and ideational preferences of the service branches. The relationship of the adaptations to organizational cultural preferences would later go on to significantly shape the degree to which the lessons of the adaptations would be institutionalized or forgotten in the post-war period.

Other shaping factors remained influential on the adaptation process. Alliance dynamics influenced the AAFs assessment of CAS in North Africa by demonstrating that superior techniques could be utilized by the AAF emulating elements of the RAF's CAS operations. An unexpected shaping factor in the adaptation process, previously undervalued by the existing theoretical wartime adaptation literature, was the role of geography and terrain. The Army's combined arms adaptations were constrained following the North African Campaign by Italy's mountainous terrain, which physically prevented tanks from operating to their fullest extent. In the case of the Marines and CAS, their most far reaching adaptations occurred in the Philippines campaign, which was physically geographically distant from the other main Marine centric campaigns of the mid and late war period. Due to this physical separation, the junior and midlevel Marine officers had greater freedom for more extreme experimentation and testing when not under the direct oversight of senior centralized command. Future assessments of military wartime adaptation should play greater attention to how geographic factors can constrain or potentially encourage adaptation from unfolding.

The theoretical literature on wartime adaptation had identified civil-military relations and domestic politics as a shaping factor, however, this analysis found only very limited influence on the adaptation process. Civilian leadership did not appear to influence any internal organizational debates regarding operational methods. The most likely indirect shaping influence on the adaptation process from civilian sources would have been the defense bureaucracy's approval of certain technological procurements, such as the M4 Sherman and *Essex* class of carriers.

Theoretical Considerations and the Post-War Innovation Process

Once the hostilities of the Second World War came to an end, each service branch of the military had largely finalized their various adaptation processes, and thus had changed in a major way how they waged war. Whether or not they attempted to institutionalize the battle-earned knowledge that they had developed over the course of the war, or alternatively to forget it, depended on a variety of primary drivers and secondary drivers, as well as shaping factors.

The driving and shaping role of junior and midlevel officers was very much at the forefront of this institutionalization process. In the three successful cases of bottom-up innovations, the information and advocacy networks that had formed during the war to help drive and shape the various adaptations, remained a primary driver and shaping influence in the post-war period. In the Army, Navy, and Marine cases, officers reflecting over Second World War combat experiences in outlets like service journals came to monopolize the majority of internal organizational narratives and discourses, which in turn ensured the organizations remained focused on retaining the wartime adaptations. Essentially, these networks of officers kept the wartime adaptations at the forefront of their organization's ideational focus, thus establishing the opportunity for their institutionalization. In the failed case of the AAF, the majority of junior and midlevel officers became fixated on issues that were completely different from the Second World War CAS and tactical aviation adaptations. AAF officers thus formed counter-information and advocacy networks which focused on other issues like strategic bombing, nuclear weapons, and even space technologies, which obscured and constrained the ability of other officers to try and institutionalize some of the Second World War lessons.

Senior officers who were particularly convinced regarding the importance of the wartime adaptations would also join these information and advocacy networks, helping to diffuse the spread of pro-change positions within the organization, such as writing journal articles and attending formal and informal events discussing wartime experiences. By participating in the information and advocacy networks, senior officers helped to legitimize their relevancy to the service branch. In the case of the AAF/USAF senior officers also participated in the counter-networks helping to constrain and prevent change from occurring in the organization. Overall, the different networks of junior and midlevel officers, with the help of sympathetic senior officers became key variables in explaining both the success and the failure of institutionalization.

The networks of officers also helped oversee the institutionalization of the adaptations via the role of organizational educational institutions in the post-war period. The three successful institutionalization cases involved, to varying degrees, changes to the curricula of service educational centers to reflect the new understandings of operational methods that were the result of the wartime adaptation processes. These changes occurred in order to diffuse the knowledge of the adaptations to the next generation of junior officers. For example, in the case of the Navy, the Naval War College held a series of lectures for combat veteran officers to discuss the lessons of their wartime experiences. This not only served as an educational process, but also allowed for the physical socialization and networking of these combat veterans to interact with other officers, including ones who had newly joined the organization. In the case of the Army, combat veterans were appointed to serve as educational instructors at these institutions, which further allowed for joint infusion of their experiences into the educational system, while also allowing these officers to network with fellow officers, as well as mentor the next generation.

Formal operational assessments and their interaction with pro-institutionalization networks also served to further institutionalize the wartime adaptations. This often involved a group of officers being appointed to study the effects of operations to ensure the appropriate lessons were drawn. The Army underwent a series of different studies, some emerged from theater headquarters in the immediate aftermath of the war, while others occurred from Army educational institutions. The Marines established different review boards, including the Smith Board, to assess the needs of the organization, in part based on the earlier operational experiences. The Navy undertook a series of studies that were overseen by its educational centers. The failed case of the AAF/USAF saw the organization place far less emphasis on undertaking official studies of the impact of CAS and of tactical aviation, as the senior organizational leadership placed greater emphasis on strategic airpower lessons, which in turn received the bulk of post-war analysis.

The other pathway by which junior and midlevel officers played a primary role driving and shaping the institutionalization of Second World War adaptations was via post-war promotions up the chain of command. Senior officers played an important part in the unfolding of this pathway, as they were the ones who rewarded the junior and midlevel officers with promotions after being convinced of the importance of the battlefield changes. The junior and midlevel officers were able to spur their operational experiences into enhanced credibility within

their organizations in the peacetime period. There was a collective acceptance that their warfighting experiences was of considerable value, as they could build off that by enhancing the organization's combat effectiveness for future operations as well as diffuse their knowledge of combat to a new generation of officers. The prime example of this was from the Marine Corps case with Keith McCutcheon, who had served as a Lieutenant Colonel during the war, who was eventually promoted to greater positions of organizational authority. McCutcheon was acknowledged by his peer officers as well as those in senior command for his considerable wartime efforts in helping develop the Marine's CAS adaptations. In turn, McCutcheon was rewarded by being granted positions of authority, including being appointed to several review boards, such as the Smith Board, that had the purview to oversee changes made to force structure, procurement requests, and doctrinal development during the post-war period. Another prime example of this was the experiences of Arleigh Burke, who had served as a captain and served with a Carrier TF during part of the war, and was later appointed as Chief of Naval Operations during the 1950s. Burke was able to use his new position of organizational power to oversee several pro-carrier decisions as head of the Navy, including overseeing the procurement of new generations of carriers and broadly ensuring that the USN fleet of the Cold War would be fundamentally shaped by the combat lessons of the Second World War.

The failed institutionalization case of the AAF/USAF saw the promotion pathway unfold to a degree, where General Otto Weyland would hold several senior positions in the post-war period, including serving as head of TAC. Although motivated to institutionalize the lessons of the Second World War adaptations, Weyland faced too many constraining factors within the organization to be able to properly oversee the process to the fullest extent. These constraining factors included: counter-networks of junior and midlevel officers; more influential senior officers who held differencing ideas; the influence of civilian policy leadership; and overall competing bureaucratic politics. Senior AAF/USAF officers were a particularly influential constraining force on the promotion pathway, as they were able to emphasize promoting officers who held pro-strategic airpower views rather than pro-tactical airpower advocates. Senior AAF/USAF officers remained unconvinced of the importance of the wartime CAS adaptations, and thus limited the opportunities for pro-adaptation midlevel officers to eventually become generals in the postwar period.

Overall, the success of junior and midlevel officers as the primary driving and shaping factor of the adaptation to innovation process was significantly impacted by their interactions with senior officers. For the three successful cases of an adaptation transforming into a major innovation, senior officers actively participated in the information and advocacy networks pathway by joining the networks or boosting their relevancy. Senior officers also ensured the success of the promotion up the chain of command pathway. This demonstrates that the institutionalization of lessons learned involves an interactive mix of collectivist and individual actor actions in order to be successful. Consensus between a wide group of junior and midlevel officers as well as key individual senior officers is thus needed to lead to a successful institutionalization of a major wartime adaptation. In the case of the AAF/USAF's failure to institutionalize the lessons of the wartime adaptation, senior officers did not interact positively with junior and midlevel officers regarding the issue of integrating CAS changes and so the process was constrained, disrupted and the lessons of combat were forgotten.

The role of resources and bureaucratic interests remained an influential driving and shaping factor in the success or failure of the institutionalization process. For the three successful cases, the major wartime adaptations did not significantly challenge any ingrained bureaucratic interests for those service branches, which in turn allowed their retention to be a fairly smooth process as junior, midlevel, and senior officers had no reason to oppose their retention. Further, each of these services became convinced by the end of the war that the adaptations had changed their organization for the better, and thus began to prioritize and identify maintaining the legacy of the adaptation as a core organizational interest in of itself. The Army continued to prioritize the role of armor in terms of future technological procurements and force structural changes; the Navy did the same with carriers; and the Marines prioritized maintaining their CAS capabilities. The failed case of the AAF/USAF saw internal organizational bureaucratic dynamics become outright hostile to the idea of maintaining anything related to TAC. The AAF/USAF in turn opted to prioritize strategic airpower capabilities, and in that process identified CAS as an obstacle to such interests and so took actions to overcome it.

Bureaucratic interests were closely related to the role of senior civilian leadership and technology in the institutionalization process. This research found that civilian leadership played a minimal direct role in the institutionalization process for most cases. Many of these civilians had not fought on the frontlines during the war, and thus had no major opinion related to any of

the adaptations. As such, civilian leadership did not attempt to significantly wade into any of the internalized organizational debates about preferred operational methods during the post-war period. The one notable exception to involved the case of the Navy, where James H. Smith, a Second World War Navy combat veteran who served as Assistant Secretary of the Navy for the Eisenhower Administration and continued to support the Navy's attempts to develop carrier capabilities. Civilian senior leadership mostly influenced the institutionalization process via budgetary allocations, approving new major technological procurements, and by setting national strategy. The biggest civilian influence involved the growing interest in the role nuclear weapons in U.S. national security strategy; this was particularly true during the Eisenhower Administration. This civilian interest in the power of the atom helped push the AAF/USAF to focus on strategic airpower and invest in heavy bombers, as that was directly linked to atomic weaponry. Further, during the case of the Navy, decision making relating to the development of Polaris armed SSBNs and future carrier procurements were justified on the basis of aiding in the service's contribution to nuclear strike and deterrence capabilities.

Prevailing strategic, operational and tactical challenges played a significant factor in the successful institutionalization of the major adaptations. The Korean War in particular helped to further cement the lessons learned institutionalization process. For the three successful cases, the fighting in Korea was seen as confirming the need to retain the major lessons of Second World War adaptations. The Marines found that combat reinforced the vital importance of CAS for frontline combat; the Army understood that tanks were essential to successful combined arms coordination during offensive and defensive situations; the Navy, although it was largely to the periphery of Korean War combat, found that carrier shore strike capabilities were very useful in limited war scenarios. While in Korea, the USAF paid the price for its failure to further institutionalize CAS lessons of the Second World War. The USAF thus had to relearn the importance of CAS over the course of combat in Korea, yet quickly moved in the post-war period to forget those lessons yet again as they continued to clash with prevailing bureaucratic interests, ideational, and cultural organizational biases, and the role of counter-networks of junior and midlevel officers.

The perception toward strategic, operational, and tactical challenges of future wars in the early-Cold War period was also an influential factor in determining the success or failure of retaining the lessons of the Second World War adaptations. The views on these issues were also

tied to driving influence of alliance commitments. The Army identified central Europe as being the biggest challenge for the organization in this new period; this view was underscored following the 1949 signing of the North Atlantic Treaty as the Army was tasked with supporting fellow NATO states in their defence against potential Soviet invasion. The Army predicted the need for mass firepower and combined arms to offset the challenge of Soviet conventional military power, and thus tanks would be required to help meet this challenge. Following the Korean War, the Army also recognized protecting South Korea against any potential future communist aggression as an important goal and felt that armor-centric combined arms would remain relevant in this context as much as it would in central Europe. The Marines identified a need for rapid expeditionary operations in different theatres in this early Cold War era, including the need to rapidly deploy to places like Iceland, the Middle East, and parts of Asia, and thus it needed to maintain CAS capabilities to provide its deployed forces with the necessary firepower support. The Navy identified multiple roles for itself in this new global strategic environment. Although the Soviet Union lacked a major surface fleet at the beginning of the Cold War, it was felt by many officers it was just a matter of time until it built one. The Navy also identified that there would be the need for shore-strike capabilities across a broad range of hypothetical conflict scenarios, ranging from a major war against the Soviet Union in Europe, to limited war scenarios somewhere in Asia. The AAF/USAF's vision of the Cold War environment did not involve any major role for CAS, thus it remained banished from any major organizational efforts during this period. The AAF/USAF vision of future war was not conventional in character, rather it was of strategic bombers carrying atomic bombs to the heart of the Soviet Union. This AAF/USAF vision of future war was a manifestation of prevailing air power ideational currents dating back to the interwar era airpower theorists like Douhet and Billy Mitchell.

Culture played a significant role in shaping the institutionalization of the adaptations. The Marines, Army and Navy cases lacked any cultural clashes in relation to their adaptations because the changes all fit with their idealized vision of warfare. Thus, those three cases had an easier time institutionalizing the lessons in comparison to the AAF whose normative biases remained highly hostile to anything related to tactical airpower, which created a more hostile environment for the institutionalization of the adaptations. Cultural preferences shaped the intensity and focus of the information and advocacy networks consisting of junior, midlevel, and senior officers. When there was alignment between the organizational culture and adaptation,

then the size and efforts of the networks was significantly enhanced, and the outcome of the institutionalization process was more likely to be successful; when there was a divergence between the organizational cultural preference and adaptation then the intensity and effectiveness of the networks were lessened, and the potential failure of the institutionalization process was increased.

Lessons for Practitioners

Despite some academic predictions that conventional warfare was in decline during the 1990s and early 2000s, it remains a major challenge in the contemporary global strategic environment.[779] In 2020 the Second Nagorno-Karabakh War broke out between Armenia and Azerbaijan; this war was fought primarily between the conventional militaries of each country, involving armor engagements and aggressive usages of tactical airpower.[780] However, the February 2022 invasion of Ukraine by Russia represents the greatest conventional military conflict the world has seen since the Gulf War (1991). The fighting in Ukraine has been characterized by mass uses of armor and combined arms, and has involved hundreds of thousands of troops so far. The war in Ukraine has spiked a considerable rise in academic and practitioner interest in understanding the dynamics of conventional warfare.[781] There has also been considerable speculation around a potential major conflict occurring between China and Taiwan. Should a war breakout between China and the U.S. over Taiwan, there would be the potential for massive naval battles, amphibious landings and landbased warfighting.[782] It is thus incredibly important for active practitioners to understand the dynamics of modern conventional

[779] The majority of this sentiment was expressed as part of the 'New Wars' literature, for example, see Mary Kaldor, *New Wars and Old* (Stanford, CA: Stanford University Press, 2007).
[780] Zhirayr Amirkhanyan, "A Failure to Innovate: The Second Nagorno-Karabakh War," Parameters Vol. 52, No. 1 (2022), 119-134.
[781] For examples of this Ukraine War research discourse see, Stephen Biddle, "Ukraine and the Future of Offensive Maneuver," *War on the Rocks* 22 November 2022), https://warontherocks.com/2022/11/ukraine-and-the-future-of-offensive-maneuver/; Antulio J. Echevarria II, "Putin's Invasion of Ukraine in 2022: Implications for Strategic Studies," *Parameters* Vol. 51, No. 1 (Spring 2021), 21-34; Brian Michael Jenkins, "Consequences of the War in Ukraine: The End and Beyond," *RAND* (8 March 2023), https://www.rand.org/blog/2023/03/consequences-of-the-war-in-ukraine-the-end-and-beyond.html.
[782] For examples of speculation over China-Taiwan future conflict see, Bonny Lin and John Culver, "China's Taiwan Invasion Plans May Get Faster and Deadlier," *Foreign Policy* (19 April 2022), https://foreignpolicy.com/2022/04/19/china-invasion-ukraine-taiwan/; Lindsay Maizland, "Why China-Taiwan Relations are So Tense," *Council of Foreign Relations* (April 2023), https://www.cfr.org/backgrounder/china-taiwan-relations-tension-us-policy-biden; David A. Ochamanek and Michael O'Hanlon, "Preventing China from Taking Taiwan," *Rand* (9 Dec 2021), https://www.rand.org/blog/2021/12/preventing-china-from-taking-taiwan.html.

warfare, as well as understand if war occurs in future, how can armed forces best learn and retain the lessons of them. This research project has demonstrated that wartime learning, as well as the retention of those lessons during the post-war period is an incredibly complex process, and whatever can be done to streamline that process will be of considerable value to any military organization.

During wartime, senior officers should give particularly close attention to the experiences of frontline junior and midlevel officers. As a war continues, major trends should be clearer to spot looking at the experiences of a broader population of officers. Major adaptations do not emerge due to the experiences of just a few officers, but are the byproduct of wider experiences of a larger number of them. Analysis of after action reports and the dissemination of best practices is something that can absolutely help streamline the process. Senior officers should also facilitate structures that allow for the socialization of forward deployed officers and those who are still awaiting their initial deployment. Modern information-technology such as digital video chat software, and even e-mail and instant messaging applications, may likely expediate this process; however, the chance for physical socialization should be utilized whenever possible. During larger conflicts, units should adopt active programs that allow for officer exchanges that can allow officers to share their experiences across a wider range of officers, as well as potentially be exposed to the new ideas of others. Officers should likely pay particularly close attention to any early war engagement that has considerable negative perceptions, as the wider reaction to such a moment will likely contain the originating elements of larger changes. Further, frontline officers should be allowed the operational flexibility to engage in ad hoc experimentation to test new methods.

During the post-war period, senior officers should seek, when able, to retain and promote key lower ranking officers who managed to gain considerable combat experiences during the earlier war, and have them sit on post-war review boards or committees that review the organization's operational methods, doctrine, force structures and procurement plans. This will give greater probability that the earlier combat experiences will influence major organizational aspects in future. There should also be an active attempt to encourage the physical socialization of combat officers during this period in a setting where they are able to reflect on their wartime experiences; this can help facilitate the growth of networks of individual seeking to change the organization. Junior and midlevel officers should be actively encouraged to write about their

wartime experiences in service journals and other outlets, this encourages a cycle of knowledge diffusion and network formation which can help build stronger internal organizational narratives surrounding the issues of institutionalization of combat lessons. Senior officers should participate in these networks whenever possible, as it will add greater authority and credibility to the knowledge diffusion and institutionalization processes. It should be understood that the institutionalization process will not happen in an immediate period, it is something that will likely take years to fully unpack. Civilian leadership will have a poor understanding of the operational experiences of the earlier war as they were not physically involved; the challenge for officers who are supportive of institutionalizing the adaptations is they may need to be more active at marketing or selling the importance of these changes to policymakers as they consider things such as defence budget allocations or refinements to national security strategies.

Overall, the fundamental challenge of any military organization following the end of a major war is how best to enable and empower junior and midlevel officers, who are among the primary drivers of any major wartime adaptation, and who will be the ones who facilitate whether or not the lessons of combat are actually learned once the fighting ceases.

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