WHOSE ROLE IS IT ANYWAY? INTER-SERVICE COMPETITION AND THE DEVELOPMENT OF INTERMEDIATE-RANGE BALLISTIC MISSILES

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This thesis examines the Defense Department's (DoD) management of surface-to-surface missile development in the early Cold War, building to the Army's Jupiter intermediate-range ballistic missile (IRBM) pursuit. During these efforts, emerging missile technology challenged the DoD's ability to mitigate inter-service competition and duplicative efforts. Although the Army articulated the potential of long-range missile use, it failed to justify why it should be the service to develop and operate said weapons. Instead, the Army leveraged ambiguous wording in the 1950 and 1954 missile agreements and applied its land-combat function broadly, encroaching on perceived Air Force missions. This resulted in multiple services competing for finite resources and capitalizing on the then unforeseen advantages of immature technology, ultimately resulting in redundancy. This research finds that the DoD's management of missile development in the 1950s strained a dwindling defense budget, limited the modernization of conventional capabilities, and exacerbated tenuous relationships amongst the service branches. While based in historical research, these findings have enduring applications, as they illuminate the dangers of ambiguous wording in a restrictive policy document, and challenge the Joint Chiefs of Staff's and similar service-based committee's efficacy as organizations for managing emerging technology. These findings are particularly applicable to current DoD policy formulation, given that the Cold War IRBM controversy mirrors the current inter-service tensions regarding missile development.

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

WHOSE ROLE IS IT ANYWAY? INTER-SERVICE COMPETITION AND THE DEVELOPMENT OF INTERMEDIATE-RANGE BALLISTIC MISSILES, by Major Brennan Deveraux, 162 pages.

This thesis examines the Defense Department's (DoD) management of surface-to-surface missile development in the early Cold War, building to the Army's Jupiter intermediate-range ballistic missile (IRBM) pursuit. During these efforts, emerging missile technology challenged the DoD's ability to mitigate inter-service competition and duplicative efforts. Although the Army articulated the potential of long-range missile use, it failed to justify why it should be the service to develop and operate said weapons. Instead, the Army leveraged ambiguous wording in the 1950 and 1954 missile agreements and applied its land-combat function broadly, encroaching on perceived Air Force missions. This resulted in multiple services competing for finite resources and capitalizing on the then unforeseen advantages of immature technology, ultimately resulting in redundancy. This research finds that the DoD's management of missile development in the 1950s strained a dwindling defense budget, limited the modernization of conventional capabilities, and exacerbated tenuous relationships amongst the service branches. While based in historical research, these findings have enduring applications, as they illuminate the dangers of ambiguous wording in a restrictive policy document, and challenge the Joint Chiefs of Staff's and similar service-based committee's efficacy as organizations for managing emerging technology. These findings are particularly applicable to current DoD policy formulation, given that the Cold War IRBM controversy mirrors the current inter-service tensions regarding missile development.

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ACRONYMS

EO	Executive Order
DoD	Department of Defense
GMC	Guided Missile Committee
INF	Intermediate-Range Nuclear Forces
ICBM	intercontinental ballistic missile
IRBM	intermediate-range ballistic missile
JCS	Joint Chiefs of Staff
NSC	National Security Council
SAC-ODM	Science Advisory Committee to the Office of Defense Mobilization
SIGMB	Special Interdepartmental Guided Missiles Board
TCP	Technological Capabilities Panel
WSEG	Weapons Systems Evaluation Group

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CHAPTER 1

INTRODUCTION

Military modernization is an expensive endeavor. Even the world's wealthiest nations are limited in the development of advanced technological capabilities. Resources are finite; for example, the Navy's investment into aircraft may well take money away from its shipbuilding or the Air Force's pursuit of aircraft. This inherent opportunity cost creates a natural competition for scarce resources in which separate military services become proponents of their respective ways of warfare. However, when this inter-service competition creates redundancies, militaries become inefficient. In the context of developing military equipment, efficiency is best understood as the creation of a desired capability or piece of equipment with minimal waste of essential resources that include time, money, facilities, and manpower. Emerging technology can shed light on the challenge of efficient innovation, as the impact of immature technology on the battlefield is fundamentally hard to predict. As follows, effectively delineating responsibility for emerging technology to capitalize on technological innovation, while avoiding unnecessary effort duplication, is an enduring problem for any military organization.

For the United States, the early Cold War epitomizes this type of inefficient competition as the individual military services fought for relevancy in a fiscally restrained environment with an unclear vision of future warfare. Given that the military capabilities of the time were directly linked to the United States' ability to maintain an advantage over its new competitor, the Soviet Union, any missed opportunities associated with inefficient modernization decisions had strategic implications. Missile development—the emerging technology of the time—encapsulates these modernization

challenges. A 1962 declassified U.S. Army Ordnance Missile Command report eloquently noted that military services "occupied the role of 'bidders' seeking developmental responsibilities. Each was sure that it had the best proposal, which fostered a highly competitive spirit."[1] This inter-service competition culminated in 1956 with the Army's pursuit of the Jupiter missile—an intermediate-range ballistic missile (IRBM) with a 1,500-mile goal range.[2] This missile development choice created tension between the Air Force and the Army regarding service functions—codified responsibilities, missions and tasks.[3] Clearly, an understanding of the Jupiter missile's development and its associated controversy likely illuminates underlying issues with inter-service competition and inefficient innovation policies concerning emerging technology.

[1] James Grimwood and Frances Strowd, "History of the Jupiter Missile System," (Declassified Government Report, History & Reports Control Branch Management Services Office, U. S. Army Ordnance Missile Command, Redstone Arsenal, AL, July 27, 1962), http://heroicrelics.org/info/jupiter/jupiter-hist/History%20of%20the%20Jupiter%20Missile%20System.pdf, xi

[2] Dwight Eisenhower, *Mandate for Change, 1953-1956: The White House Years* (Garden City, NY: Doubleday & Company, 1963), 456. There are many definitions for IRBM. Notably, President Eisenhower understood IRBM as a missile with ranges between 1200-1500 miles. Because the missiles that the Army and the Air Force were developing had the same intended range, the accepted IRBM definition does not impact the research. In this context, IRBM is simply a reference to the pursuit of the 1,500-mile missile.

[3] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 165, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

Research Question

This thesis examines the following question: How did the DoD's management of missiles as an emerging technology impact the Army's pursuit of the 1,500-mile range Jupiter missile between 1955 and 1956?

Three supplementary questions support this research question: First, how did the Jupiter missile fit into the Army's established and adjusted service functions? Second, what restrictions did the DoD establish to manage surface-to-surface missile development in the 1950s, and how were they created? Third, what prompted Secretary of Defense Charles Wilson to clarify roles and missions in 1956, subsequently ending the Army's Jupiter missile project?

Claim

This research asserts that the Army capitalized on the DoD's ambiguous guidance regarding missile development to pursue the Jupiter IRBM—a weapon that the service struggled to operationally justify. Facing a crisis of mission and competing for limited resources, the service then heavily invested in emerging missile technology and broadly interpreted its service functions and missile-development responsibilities. In turn, the Army's continual missile range extensions created duplicative efforts that were products of sustained inter-service competition. Unfortunately, the Joint Chiefs of Staff (JCS) could not resolve these conflicts internally, and the secretary of defense—initially unable and subsequently unwilling—did not settle the matter until November 1956. In this regard, the DoD's management of missile development in the 1950s strained a dwindling defense budget, limited the modernization of conventional capabilities, and fractured an already tenuous relationship amongst the services.

Importance of the Research

Although a historical study of 1950s missile development, culminating with the Army's Jupiter IRBM pursuit, this work is also an analysis of emerging technology management. In addition to adding to the Cold War's historical literature, this research has the potential to influence current inter-service roles regarding emerging technology. Significantly, because the Cold War missile development challenges mirror the ongoing Army and Air Force inter-service tensions regarding post-Intermediate Nuclear Forces (INF) Treaty missile development, this thesis' findings are uniquely applicable to current DoD policy development.[4] Additionally, gaining a historical understanding of the original inter-service missile race provides the requisite context for understanding the current service arguments over missile development. Once again, as the United States deals with potential effort duplication among the services, historical lessons can be drawn regarding missile-development responsibilities.

In a broader context, the potential for enduring lessons regarding emerging-technology management are relevant and applicable to modern militaries worldwide. A November 2020 Congressional Research Report, "Emerging Military Technologies: Background and Issues for Congress," details the strategic importance emerging

[4] The United States of America and the Union of Soviet Socialist Republics, Treaty on the Elimination of Their Intermediate-Range and Shorter-Range Missiles (INF Treaty), U.S. Department of State, accessed September 24, 2019, https://2009-2017.state.gov/t/avc/trty/102360.htm. The bilateral treaty between the United States and the Soviet Union removed tactical-nuclear weapons from the country's inventories with the destruction of nearly 3,000 missiles—846 American and 1,846 Soviet. Instead of limiting nuclear weapons production, the treaty eliminated IRBMs as a specific surface-to-surface delivery system. With this diplomatic action, the need for IRBMs disappeared, and with it, the inter-service competition surrounding them. The treaty's 2019 termination allows the services to develop missiles that have been banned for thirty years.

technology has in the age of Great Power Competition.[5] In the report, Kelley Sayler—advanced technology and global security analyst—details the political and strategic implications that emerging technologies such as artificial intelligence, autonomous weapons, and hypersonic weapons can have on the United States' relationship with China and Russia. Importantly, Sayler explains the challenges emerging technology presents to the DoD:

> The implications of emerging technologies for warfighting and strategic stability are difficult—if not impossible—to predict, as they will be a function of many factors, including the rate of technological advancement in both the United States and competitor nations, the manner in which emerging technologies are integrated into existing military forces and concepts of operation, the interactions between emerging technologies, and the extent to which national policies and international law enable or inhibit their development, integration, and use.[6]

Overall, the management of emerging technology will undoubtedly have strategic implications for the United States.

However, this examination of service function adaptability and potentially inefficient military modernization practices cannot fully provide answers to assist the DoD in solving the complex problem of managing emerging technology. Specifically, this thesis does not create or test a model for emerging technology management, nor will it attempt to rewrite history by proposing what Secretary Wilson "should have" done in the 1950s. Instead, historical analysis of missile-development policy can help shape the

[5] Kelley Sayler, *Emerging Military Technologies: Background and Issues for Congress*, CRS Report No. R46458 (Washington, DC: Congressional Research Service (CRS, 2020), https://fas.org/sgp/crs/natsec/R46458.pdf.

[6] Ibid., 24.

DoD's current management of emerging technology by identifying underlying and potentially timeless issues.

Scope

To isolate underlying themes within the Army' Jupiter missile pursuit, this research is scoped in several ways, the first of which is timeframe. While the Army's actual pursuit of the IRBM transpired from July 1955- November 1956, the factors that led to the service's decision appear nearly a decade earlier. Therefore, this project starts on 26 July 1947 with President Truman's creation of the Military Establishment and service functions' codification. Additionally, because the research focuses on the Army's pursuit of the missile, not the missile's eventual employment, the study ends on 26 November 1956. This date reflects Secretary Wilson's clarified service roles and missions via a memorandum which restricted the Army's ability to pursue an IRBM.

Additionally, the project is also scoped in purpose; opening the timeframe up beyond the Jupiter missile's specific years potentially creates clarity issues, particularly as significant historical events are not addressed because they do not relate to the Army's pursuit of the IRBM. Likewise, this expanded period could result in unnecessary analysis of events that would detract from understanding the Army's Jupiter missile pursuit. In this sense, there is a direct correlation between depth of analysis and time proximity to the Jupiter missile. Specifically, there is a conscious choice to keep the research domestically focused. While the Soviet Union and general Cold War politics were a driving factor for military innovation and adaptation, the intent is to understand the Army's actions within the DoD framework. Similarly, the Korean War and the general forward-basing of the military undoubtedly altered decision-making at the executive

level, yet without a direct tie-in to the Jupiter missile, these factors do not enhance the argument regarding the Army's decisions. However, events that directly impacted missile development are explored, as these international issues provide necessary context. This includes the 1949 study to determine an air offensive's feasibility against the Soviet Union and the 1955 IRBM catalyst brief on the Soviet surprise attack threat. Additionally, while the Army may have had indirect or abstract motivations for its IRBM, this research focuses exclusively on the battlefield implications that the service articulated as its underlying development justification.

Lastly, the thesis is scoped by focusing on a specific military service: the Army. While direct analysis of the Army's pursuit of the Jupiter is framed through the DoD's emerging technology management, the research's central theme for analysis is the Jupiter case study. While all the services vied for missile-development responsibilities and had their own respective projects, these efforts provide minimal context to understanding the Army's pursuit of the Jupiter. These other service projects are addressed where directly applicable to understanding missile responsibilities, keying in on ambiguity or any impact on the Army. This includes the Army's attempt to purchase the Navy's Regulus missile in 1953 and the inter-service debates that followed. Similarly, numerous inter-service disputes occurred between 1947 and 1956, and while important in their own right, their study warrants its own project and falls outside the scope of this thesis. Therefore, while often noted, these similar issues are not examined in detail unless they specifically support the analysis of the Army's pursuit of the Jupiter missile. For example, while inter-service competition between the Navy and the Air Force in 1948 is outlined in terms

of assessing service functions, this choice aims to illuminate the ambiguity of service functions, not to study inter-service competition as a broader subject of research.

Literature Review

The breadth of literature covering this period facilitates detailed research as scholars and historians have studied the early Cold War in-depth and approached the period from myriad perspectives. Additionally, much of the documentation around the events have been declassified by the U.S. government, allowing them to serve as the foundation of this thesis. To better understand the sheer volume of information on the Jupiter missile project and its surrounding context in this thesis, the literature is divided into three distinct sections that mirror the chapters they support.

1947-1952: The Foundation for Missile Development

Service Functions

The historical service functions are public records; thus, primary source documents such as the Key West and Newport Agreements and the 1950 DoD Guided Missile Directive drive this section. Richard Wolf's book, *The United States Air Force: Basic Documents on Roles and Missions*, is an essential research tool for reviewing these key sources.[7] The book is a collection of 37 essential government documents that influenced Air Force roles and missions. According to Wolf, the compilation's purpose is to provide a "useful reference work that contains primary source documents not easily

[7] Richard Wolf, *The United States Air Force: Basic Documents on Roles and Missions*, Air Staff Historical Study (Washington, DC: Office of Air Force History, United States Air Force, 1987), https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

obtainable elsewhere."[8] Although many of these documents are not relative to researching IRBMs, a select few are vital, including Secretary of Defense Wilson's 1956 range-restriction memorandum. Wolf, an Air Force Staff historian, provides a short essay for every primary source document, helping readers understand the historical context that led to decisions and policy.

In contrast to the specific impact of service functions, Samuel Huntington's "Interservice Competition and the Political Roles of the Armed Services," takes a more holistic approach to understanding inter-service competition.[9] He analyzes military competition's beginnings, emphasizing oversight—both military and political—and how it impacts efficiency. One unique conclusion Huntington reaches is that "interservice competition tended to weaken the military as a whole but to strengthen the military services."[10] Although Huntington's article is limited in its specifics on IRBMs, his overarching analysis on inter-service competition in the early-Cold War era remains essential to understanding modernization motivations.

In a broader context, the JCS historical series provides a unique understanding of decision-making at both the executive and DoD levels regarding IRBMs. Additionally, this series offers insights into key leaders' minds and their respective responses to policy changes. Each book's foreword explains the purpose behind the JCS directive to capture its history: "An account of [JCS] activity in peacetime and during times of crisis

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[8] Wolf, *The United States Air Force,* vii.

[9] Samuel Huntington, "Interservice Competition and the Political Roles of the Armed Services," *The American Political Science Review* 55, no. 1 (March 1961): 40–52.

[10] Ibid., 44.

provides, moreover, an important series of chapters in the military history of the United States."[11] The second volume of the series, written by historian Kenneth Condit, analyzes the JCS from 1947 to 1949, highlighting the beginnings of inter-service competition over service functions.[12] Specifically, chapter five of this book outlines the challenges associated with the Key West and Newport agreements and their impact on service roles and missions.

Similar to the JCS historical series, the Office of the Secretary of Defense also aimed to "provide a permanent and comprehensive historical record," through the publication of a "thorough, objective, critical, and analytical history."[13] This historical series mirrors the JCS series, and several books are relevant to missile-development ambiguity. In particular, historian Steven Rearden's book, *The Formative Years 1947-1950*, provides a useful assessment of service-function development and adaptation.[14] In addition to analyzing the Key West and Newport conferences, Rearden offers a detailed analysis of early inter-service groups, such as the Armed Forces Special Weapons Project and the Weapons Systems Evaluation Group (WSEG). Important to this thesis, Rearden

[11] Kenneth Condit, *The Joint Chiefs of Staff and National Policy 1947-1949*, History of the Joint Chiefs of Staff, vol. 2 (Washington, DC: Office of Joint History, Office of the Chairman of the Joint Chiefs of Staff, 1996), v.

[12] Ibid.

[13] Steven Rearden, *The Formative Years 1947-1950*, History of the Office of the Secretary of Defense, vol. 1 (Washington, DC: Historical Office, Office of the Secretary of Defense, 1984), i.

[14] Ibid.

also devotes a section to analyzing the impacts of the WSEG's most influential report, a study on the feasibility of an offensive air operation against the Soviet Union.[15]

Service Identities

An essential aspect of assessing service function development and adaptation is understanding how the services viewed their respective purposes, particularly in the absence of coherent strategies. Carl Builder's *The Mask of War: American Military Styles in Strategy and Analysis* helps illuminate the underlying drivers of service decisions and competition.[16] Builder's work is simply foundational for understanding military culture. Notably, he argues that the military services, "while composed of many, ever-changing individuals, have distinct and enduring personalities of their own that govern much of their behavior."[17] This argument is important for assessing service function competition; for example, Builder's assessment of the Navy as an organization defined by "its independence and stature," provides context to the service's attempts to maintain strategic missions and develop aircraft independent of Air Force oversight.[18] Builder claims that "the most powerful institutions in the American national security arena are the military service . . . not the Department of Defense or Congress or even their commander

[15] Rearden, *The Formative Years 1947-1950*, 405–10.

[16] Carl Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore, MD: The Johns Hopkins University Press, 1989).

[17] Ibid., 3.

[18] Ibid., 31.

in chief, the president."[19] While Builder's assessment is holistic to the services and covers a broad period, his insights provide perspective into the decisions the services and the numerous defense secretaries made in the early Cold War.

In 2019, the Rand Corporation expanded on Builder's work in *Movement and Maneuver: Culture and the Competition for Influence among the U.S. Military Services*.[20] The authors—Rebecca Zimmerman, Kimberly Jackson, Natasha Lander, Colin Roberts, Dan Madden, and Rebeca Orrie—analyze "organizational influences at the military service level and the types of responses they typically engender when the services are under pressure."[21] Importantly, this project is an attempt to understand "how the military would respond and adapt to major shocks, such as major policy shifts or watershed events."[22] Similar to Builder, these Rand authors provide context regarding how individual services understand their respective roles in a potential conflict, and how this results in competition over resources and service functions.

For the Army specifically, Walter Kretchik's book, *U.S. Army Doctrine: From the American Revolution to the War on Terror*, provides a detailed analysis of Army doctrine

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[19] Builder, *The Masks of War*, 3.

[20] Rebecca Zimmerman, Kimberly Jackson, Natasha Lander, Colin Roberts, Dan Madden, and Rebeca Orrie, *Movement and Maneuver: Culture and the Competition for Influence among the U.S. Military Services* (Santa Monica, CA: RAND Corporation, 2019), https://www.rand.org/pubs/research_reports/RR2270.html.

[21] Ibid., 2.

[22] Ibid., 16.

from the service's founding until the early twenty-first century.[23] Through his research, Kretchik, a Western Illinois history professor, strove to "ascertain the fundamental characteristics of army doctrine and to judge its impact in preparing the service to accomplish its missions in both domestic and foreign venues."[24] Relevant to this thesis is Kretchik's analysis of the development of post-World War II Army doctrine and the revisions to the service's operations manual. He outlines the differences between the 1944, 1949, and 1954 plans for conducting land operations, and assesses the impact missiles had on these transitions. Kretchik points to the "army leadership's grudging admission that regulating the chaos of war through doctrine required continually adjusting its tactical concepts to ever-changing technology."[25]

It is significant that one of the underlying motivations for the Army's missile pursuits centered on overcoming its reliance on the Air Force for close support and interdiction missions. As the Air Force gained service status in 1947, its identity was continuing to develop during the early Cold War. John Schlight's book, *Help from Above: Air Force Close Air Support of the Army 1946-1973*, explores the development of said identity and the challenges of differing service views regarding aircraft employment.[26] Schlight illuminates the general disagreements between the services over

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[23] Walter Kretchik, *U.S. Army Doctrine: From the American Revolution to the War on Terror* (Lawrence, KS: University Press of Kansas, 2011).

[24] Ibid., 4.

[25] Ibid., 161.

[26] John Schlight, *Help from Above: Air Force Close Air Support of the Army 1946-1973* (Washington, DC: Air Force History and Museums Program, 2003).

the most practical use of airpower, noting the Air Force's views on striking strategic targets close to an enemy's power versus the Army's desire to have the "aircraft to serve only as umbrellas over the ground troops."[27] He argues that for the Army, aircraft was designed to offer support to ground forces and their missions, while the Air Force viewed its mission as independent, and in the beginning of the nuclear age, the decisive form of warfare. For this thesis specifically, Schlight's analysis of the continual service tensions regarding close air support provides context to the Army's frustration with Air Force support, and the justification behind the Army's continual push for overlapping capabilities through missile development.

The Rise of Missiles

Although the WSEG is not examined in detail in this thesis, it was a prominent inter-service organization and directly impacted the inter-service missile competition. A valuable source for understanding this organization and its impact on the JCS is John Ponturo's "Analytical Support for the Joint Chiefs of Staff: The WSEG Experience, 1948-1976."[28] Ponturo—a research analyst at the Institute for Defense Analyses—conducted his research to "assess the factors that affected WSEG's usefulness as a source of analytical support for the JCS" and to "derive lessons from the WSEG experience that

[27] Schlight. *Help from Above,* xiii.

[28] John Ponturo, "Analytical Support for the Joint Chiefs of Staff: The WSEG Experience, 1948-1976," IDA Study S-507 (Institute for Defense Analyses: International and Social Studies Division: Arlington, VA, July 1979), https://apps.dtic.mil/dtic/tr/fulltext/u2/a090946.pdf.

may be of value in providing for such support in the future."[29] In his report, Ponturo covers nearly thirty years of the organization through analysis of the WSEG's actions and interviews with essential employees; the report also contains the WSEG's initial establishment directive from December 1948.[30] Ponturo analyzes the organization's development over time, from an essential element of a relatively small DoD to a more diverse research body.

Likewise, one of the most significant events during this period was the signing of the 1950 missile-development agreement. Jacob Neufeld's *The Development of Ballistic Missiles in the United States Air Force 1945-1960* is key to unpacking how missiles were developed in the Air Force.[31] His in-depth report—an official history of the U.S. Air Force—covers the initial conception of missiles and how the Air Force viewed them. Importantly, Neufeld examines the lead-up to Secretary of Defense Louis Johnson's approval of the 1950 missile agreement, to include the establishment and study conducted by the Special Interdepartmental Guided Missiles Board (SIGMB).[32]

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[29] Ponturo. "Analytical Support for the Joint Chiefs of Staff," ix.

[30] U.S. Secretary of Defense, "December 1948 Directive: Weapons Systems Evaluation Group," in *Analytical Support for the Joint Chiefs of Staff: The WSEG Experience, 1948-1976* (Arlington, VA: Institute for Defense Analyses: International and Social Studies Division, 1979), C1–3, https://apps.dtic.mil/dtic/tr/fulltext/u2/a090946.pdf.

[31] Jacob Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, General Histories (Washington, DC: Office of Air Force History, United States Air Force, 1990).

[32] Ibid., 54–55.

1953-1954: The Inter-Service Missile Competition

The Army's Missile Pursuits

Paramount in assessing the service's pursuit of the Jupiter missile is understanding the Army's vision of future warfare and its operational missile requirements. Historian Andrew Bacevich's *The Pentomic Era: The U.S. Army between Korea and Vietnam* is the foundational literature for understanding the Army during this period.[33] Bacevich, a Boston University history professor and retired Army Colonel, illuminates the Army's challenges during the Eisenhower presidency. He notes that "new technology, changing views of the nature of war, and the fiscal principles of the Eisenhower administration, produced widespread doubts about the utility of traditional land forces."[34] Bacevich details the Army's struggle to define its new role on the battlefield, and more importantly, how it attempted to reinvent itself both through force restructuring and the rapid innovation and employment of new nuclear delivery systems. Of note, Bacevich argues that the Army did not embrace this mission. He argues that the service privately and publicly criticized the nuclear warfare concept, which was a framework in which the Army was not the primary actor.

Brian Linn builds on Bacevich's work with his book, *Elvis's Army: Cold War GIs and the Atomic Battlefield*, by providing a detailed analysis of the U.S. Army's early-Cold War transitional period, and conducting a more thorough review of the Army's

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[33] A. J. Bacevich, *The Pentomic Era: The U.S. Army between Korea and Vietnam* (Washington DC: publisher, 1986).

[34] Ibid., 3.

challenges during this time.[35] Linn, a Texas A&M history professor, identifies critical tasks the service needed to accomplish to maintain its relevancy. Importantly, he details the Army's growing vision of the nuclear battlefield and its impact on how the service would fight a future war, which is essential for understanding the Army's missile pursuits. Linn identifies the Army's struggle to find an identity—an underlying theme of the period—which likely impacted both inter-service competition and missile development.

In addition, from an artillery-specific perspective, Janice McKenney analyzes the innovation and adaptation of indirect-fire capabilities since its founding in her book *The Organizational History of Field Artillery 1775-2003*.[36] Although the document is limited in analysis, it provides an excellent framework for U.S. indirect-fire adaptability. McKenney argues that "with technological breakthroughs in the development of nuclear warheads, the Army, which stood the most to lose with the downgrading of its conventional forces, made a special effort to share prominently with the other services in the development and employment of missiles and rockets."[37] Her work outlines the Army's tactical nuclear weapons specifications and timelines, providing detailed analysis on specific delivery systems that predated the Jupiter missile projects, such as the Corporal and Redstone missiles. McKenney's overarching examination of artillery

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[35] Brian Linn, *Elvis's Army: Cold War GIs and the Atomic Battlefield* (Cambridge, MA: Harvard University Press, 2016).

[36] Janice E. McKenney, *The Organizational History of Field Artillery 1775-2003*, Army Lineage Series (Washington DC: Center of Military History, 2007).

[37] Ibid., 209.

innovation and development puts the IRBM inter-service competition period into a broader historical perspective.

In terms of missile development, this two-year period was heavily influenced by the Army's gradual extensions of its missile requirements and the development of the 1954 missile agreement. Robert Watson describes the actions that shaped the JCS decisions regarding missile development in his book *The Joint Chiefs of Staff and National Policy 1953-1954*.[38] Specifically, Watson emphasizes the resurgence of inter-service competition regarding service functions, and explicitly addresses the disagreement over the development of guided missiles. His analysis of the 1953 Regulus missile controversy and the subsequent adjustments to the JCS missile-development agreement is essential for understanding the Army's eventual pursuit of the Jupiter missile. As a complement to Watson's research, Elliot Converse's book, *Rearming for the Cold War 1945-1960*, provides a unique assessment of the Army's purchase of the Regulus missile from the Navy.[39] Converse conducted a historical review of Army acquisition and research and development. In particular, he illuminates the Guided Missiles Office's challenges and the relationship that its director, Kaufman Keller, had with the services.[40]

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[38] Robert Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, History of the Joint Chiefs of Staff, vol. 5 (Washington, DC: Office of Joint History, Office of the Chairman of the Joint Chiefs of Staff, 1998).

[39] Elliot Converse III, *Rearming for the Cold War 1945-1960*, History of Acquisition in the Department of Defense, vol. 1 (Washington, DC: Historical Office, Office of the Secretary of Defense, 2012).

[40] Ibid., 118.

The Technological Capabilities Panel

While missiles had a growing level of importance in the early 1950s, the Technological Capabilities Panel (TCP) directly tied missiles—particularly intercontinental ballistic missiles (ICBM) and IRBMs—to the national strategy. Richard Damms' article "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite,'" provides an in-depth analysis of the TCP's founding and its impact on the relationship between science and strategy.[41] Damms details the challenges of integrating science and technology into both the Truman and Eisenhower administrations' policies. He concludes that while after WWII "American science was becoming increasingly militarized," the TCP set the foundation for an independent science advisory committee to the White House and the National Security Council (NSC).[42] The TCP assessed the growing threat of the Soviet Union and made clear, tangible recommendations to the president, many of which facilitated policy decisions in the subsequent months, directly impacting IRBM development.

Adding to the understanding of the TCP and its impact on the role of science and research in shaping policy is David Snead's *The Gaither Committee, Eisenhower, and the Cold War*.[43] While President Eisenhower formed the Gaither Committee after Secretary

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[41] Richard Damms, "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite,'" *Diplomatic History* 24, no. 1 (Winter 2000): 57–78.

[42] Ibid., 59.

[43] David Snead, *The Gaither Committee, Eisenhower, and the Cold War* (Columbus, OH: Ohio State University Press, 1999).

Wilson clarified missile-development responsibilities, Snead—a history professor at Liberty University—assesses the TCP as a foundational organization for the Gaither Committee and others like it. Significant to this thesis, Snead articulates the TCP's planning assumptions and conclusions:

> The Killian committee concluded that advances in delivery capabilities posed a greater threat than improvements in nuclear weaponry . . . with the imminent emergence of virtual equality in the field of nuclear weaponry, advances in delivery systems became pivotal in the military balance of power between the Soviet Union and the United States."[44]

As a result, missiles—an alternative nuclear delivery system—became essential to U.S. national security.

The influence of the TCP highlights the important role scientists played in shaping Cold War policy. Sarah Bridger, a history professor at Cal Poly, adds a unique perspective to the challenges scientists faced in this endeavor in her book *Scientist at War: The Ethics of Cold War Weapons Research*.[45] Although her book only briefly addresses the TCP and the strategic rise of missiles, Bridger provides a historical look at the militarization of science and the ethical considerations of innovation and policy recommendations.

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[44] Snead, *The Gaither Committee, Eisenhower, and the Cold War,* 37.

[45] Sarah Bridger, *Scientist at War: The Ethics of Cold War Weapons Research* (Cambridge, MA: Harvard University Press, 2015).

1955-1956: The Jupiter Missile Controversy

The IRBM Race

A small number of books provide a broad understanding of IRBM inter-service competition and therefore, heavily influence this thesis. Michael Armacost's book, *The Politics of Weapons Innovation: The Thor-Jupiter Controversy*, is a prime example of books in this category, and a key source for any Jupiter missile study.[46] Similar to this thesis, Armacost approaches the problem through the lens of inter-service competition. He provides a detailed analysis of the political aspects of weapons innovation during the 1950s, and recognizes the services themselves as political actors. Although his emphasis is on the bureaucratic interworking that drove innovation, his analysis is vital to understanding the "why" behind IRBM development. This thesis builds on Armacost's analysis by framing the problem institutionally, as opposed to focusing on the services as primary actors. Specifically, the present study emphasizes how the executive branch and the DoD impacted inter-service competition through service functions and decision-making concerning emerging technology.

For the Jupiter project specifically, the 1962 U.S. Army Ordnance Missile Command report "History of the Jupiter Missile System," is a crucial piece of literature.[47] Written by James Grimwood and Frances Strowd, the report—declassified in 1978—provides a historical narrative of the challenges of inter-service competition in the 1950s. Grimwood and Strowd establish a developmental timeline from the Army's

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[46] Michael Armacost, *The Politics of Weapons Innovation: The Thor-Jupiter Controversy* (New York, NY: Columbia University Press, 1969).

[47] Grimwood and Strowd, "History of the Jupiter Missile System."

identification of a capability need through actual Jupiter Missile production. Importantly, they outline how defense policy changes directly impacted the development process.

It is important to note that missiles were not developed simply as a novel technology, but instead served a strategic purpose. For IRBMs specifically, it is imperative to place the weapon's development within the context of its intended purpose and planned deployment. Gates Brown's *Eisenhower's Nuclear Calculus in Europe: The Politics of IRBM Deployment in NATO Nations* adds to the IRBM literature in this way. Brown's focus is the strategic importance of IRBMs, specifically how they were deployed in the broader U.S. strategy. Brown casts a favorable light on IRBM effort duplication, as strategically, it led to the rapid missile production and capitalized on emerging technology. Although he mainly emphasizes the European theater and the importance of IRBM deployment—outside the scope of research on inter-service competition—Brown also holistically discusses its impacts on the services, specifically its effect on their respective relevancy and morale. Brown details the motivations of the services as it relates to missile development, arguing that the IRBM competition "was not just a technical discussion but also a disagreement at a fundamental level concerning which service was primarily responsible for national security, the Army or the Air Force."[48]

[48] Gates Brown, *Eisenhower's Nuclear Calculus in Europe: The Politics of IRBM Deployment in NATO Nations* (Jefferson, NC: McFarland & Company, Inc. Publishers, 2018), 69.

In turn, David Schwartz's *NATO's Nuclear Dilemmas* adds to the strategic perspective of IRBMs development.[49] While this historical work covers a significant period, Schwartz dedicates a chapter to analyzing the deployment of missiles in Europe. Similar to Brown, Schwartz assesses the strategic deployment of IRBMs, however, he incorporates the ways in which the NATO situation shaped the missile conversation. In discussing the competition between the Army and the Air Force, he places significant blame on Secretary Wilson. Specifically, Schwartz argues that "time and again the decision to choose between the two services was postponed," because "Wilson had no stomach for such a difficult choice."[50] This is distinct from Brown's assessment, which heavily analyzes the decisions through President Eisenhower's perspective.

Decision-Making

While President Eisenhower allowed his defense secretaries to manage inter-service missile development, he prioritized their development and approved the DoDs IRBM development plan—albeit begrudgingly. The book *Foreign Relations of the United States, 1955-1957*, provides the briefs and general communications that influenced President Eisenhower's understanding of the strategic situation with the Soviet Union and his decisions regarding IRBMs.[51] The book is a compilation of 174 official

[49] David Schwartz, *NATO's Nuclear Dilemmas* (Washington, DC: The Brookings Institution, 1983).

[50] Ibid., 63.

[51] John Glennon, William Kingman, David Patterson, Llana Stern, eds., *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), https://history.state.gov/historicaldocuments/frus1955-57v19.

documents and is publicly available through the U.S. State Department website. The combination of these documents aims to "furnish an accurate and comprehensive record of basic U.S. national security policy doctrine," during the early part of the Cold War.[52] These vital primary source documents include numerous NSC meeting transcripts, State Department memorandums, diary entries, and DoD briefs to President Eisenhower. Significant documents included are the TCP surprise attack brief, the NSC follow-up discussion, and the DoD's IRBM development plan. Equally important, it captures essential meetings between the president and the JCS discussing inter-service disagreements, as well as an individual meeting between Eisenhower and Army Chief of Staff Maxwell Taylor to understand the Army's Jupiter missile justification.

In addition to official records, President Eisenhower personally captured the crucial moments of his first presidential term in *Mandate for Change, 1953-1956: The White House Years*.[53] This firsthand account provided key details for this thesis, as the president reflects on his decisions regarding IRBM development and prioritization and his reluctant support of Secretary Wilson's decisions. Additionally, Eisenhower candidly discusses his relationship with the JCS and the challenges he faced with individual officers. Finally, he offers clarity to his strategic thinking, justifying his decisions and offering detailed reflections providing the reader an understanding of how the president viewed problems within the greater context of the early Cold War.

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[52] Glennon et al., *Foreign Relations of the United States*, v.

[53] Eisenhower, *Mandate for Change.*

From an academic perspective, Chester Pach's and Elmo Richardson's revised book, *The Presidency of Dwight D. Eisenhower*, adds to the understanding of Eisenhower's decisions.[54] They analyze the nation's shifting perception of Eisenhower over time and present a moderate perception of the president as a leader. Importantly, the authors look at President Eisenhower's leadership style; specifically, his interest in delegating authority and staffing his cabinet with "many individuals with managerial experience in business and finance . . . who he believed could exercise disinterested leadership."[55] This understanding of Eisenhower as a manager provides necessary context for his interactions with Secretary Wilson regarding missile development effort duplication. Fred Greenstein's *The Hidden-Hand Presidency: Eisenhower as Leader* builds on this point by directly analyzing Eisenhower's leadership style.[56] Together, these books provide a background, which helps explain many of Eisenhower's decisions, particularly as it pertained to allowing his staff the freedom to make decisions and his hands-off approach to internal DoD decisions.

While most of the literature focuses on the president's role in IRBM development, Richard Leighton's *Strategy, Money, and the New Look: 1953-1956* provides insight into

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[54] Chester Pach and Elmo Richardson, *The Presidency of Dwight D. Eisenhower*, American Presidency Series (Lawrence, KS: University Press of Kansas, 1991).

[55] Ibid., 33.

[56] Fred Greenstein, *The Hidden-Hand Presidency: Eisenhower as Leader* (New York, NY: Basic Books, Inc., Publishers, 1982).

Secretary of Defense Charles Wilson's decision-making process.[57] Wilson was the most important actor in the Jupiter Missile controversy, and this book analyzes his decision to restrict the Army's missile role on the battlefield. Robert Watson adds to this assessment in the fourth JCS history book, *Into the Missile Age: 1956-1960*.[58] This volume details the growth of surface-to-surface missiles, including the build-up to and reception of the controversial range restrictions that Secretary Wilson applied to the Army.

In addition to Eisenhower and Wilson, numerous senior Army officers who were essential to the service's Jupiter pursuit wrote books shortly after retiring. One of the most important of these was Army Chief of Staff General Maxwell Taylor's *The Uncertain Trumpet*.[59] Written in 1960, Taylor critiques Eisenhower's New Look strategy and offers numerous solutions to better the military, including the Army's reacquisition of the Jupiter program, and captures some of the challenges consensus-based organizations face in making decisions regarding contentious issues. He argues that "one of the 'quick fixes' which we should adopt at once is a revival of the Jupiter IRBM program," with "its allocation to the Army as a mobile field weapon."[60] Additionally, Taylor provides insight into his time on the JCS, illuminating several policy development

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[57] Richard Leighton, *Strategy, Money, and the New Look: 1953-1956*, History of the Office of the Secretary of Defense, vol. 3 (Washington, DC: Historical Office, Office of the Secretary of Defense, 2001).

[58] Robert Watson, *Into the Missile Age: 1956-1960*, History of the Office of the Secretary of Defense, vol. 4 (Washington, DC: Historical Office, Office of the Secretary of Defense, 1997).

[59] Maxwell Taylor, *The Uncertain Trumpet* (New York, NY: Harper & Brothers, Publishers, 1960).

[60] Ibid., 142.

processes. As Taylor explains, the JCS "have all the faults of a committee in settling important controversial matters. They must consider and accommodate many divergent views before action can be taken."[61]

Likewise, Army General James Gavin captures his personal experiences from the missile race in his book, *War and Peace in the Space Age*, detailing the rise of missiles and the shifting debate over their application. Interestingly, when discussing the evolution of missiles, he notes that "the political-military dilemma in the late forties slowly evolved into a technological dilemma by the mid-fifties."[62] Significant to this thesis is Gavin's understanding of the expanding nuclear battlefield. He explains that "due to the range and destructiveness of missiles today, the world has shrunk, in a tactical sense, to a small tactical theater. Most of the NATO region is in the forward area of the front lines."[63] Because Gavin served as the head of Army research and development leading up to the Army's Jupiter pursuit, his work provides insight into the Army's desire to continually extend missile ranges and the service's assessed requirement for theater-support missiles.

Personal Experience

It is important to note that although the research in this thesis is a synthesis of primary and secondary source documents, the analysis is also shaped by professional and

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[61] Taylor, *The Uncertain Trumpet*, 93.

[62] James Gavin, *War and Peace in the Space Age* (New York, NY: Harper & Brothers, Publishers, 1958), 169.

[63] Ibid., 146.

academic experiences. For example, as a field artillery officer, training and combat experience provide a unique background for assessing the Army's need for missiles. This experience includes commanding rocket artillery units and the employment of precision-guided rockets in combat, and in turn, has driven my scholarly research, which explicitly explores artillery training and employing rockets.[64]

Additionally, my previous academic research in innovation and adaptation provides a lens for assessing the Army's modernization choices, best represented in my previous thesis from the Naval Postgraduate School in Strategic Studies, entitled "Lessons Learned and Unlearned: U.S. Field Artillery Since the End of WWII."[65] This work assessed external drivers of innovation for U.S. indirect-fire capabilities, measuring the impact of technology, combat experience, and external threats on modernization priorities. Primarily, an identified conclusion that "apart from the immediate pressures of active conflict, external threats are the primary driver of adaptation," means that future

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[64] Brennan Deveraux, "Responsive Rockets Through Proactive Airspace Management," *Fires: A Joint Professional Bulletin for US Field & Air Defense Artilleryman* (May 2017): 33–37; Brennan Deveraux, "The HIMARS Liaison: How to Improve Deep Fires Integration through Personnel," *Fires: A Joint Professional Bulletin for US Field & Air Defense Artilleryman* (March 2016): 26–29; Brennan Deveraux, "Enhancing Rocket Artillery Certification with the Trainer Pod," *Fires: A Joint Professional Bulletin for US Field & Air Defense Artilleryman* (May 2019): 38–40; Brennan Deveraux and Rich Farrell, "Going the Extra 1,000 Miles: Preparing a Field Artillery Brigade for a Near-Peer Adversary," *Fires: A Joint Professional Bulletin for US Field & Air Defense Artilleryman* (July 2018): 48–50; Brennan Deveraux, Sean Skelly, and Evan Fowler, "Strengthening Light HIMARS for Multi-Domain Operations," *Fires: A Joint Professional Bulletin for US Field & Air Defense Artilleryman*, (November 2018): 22–23.

[65] Brennan Deveraux, "Lessons Learned and Unlearned: U.S. Field Artillery since the End of WWII," (Master's Thesis, Naval Postgraduate School, Monterey, CA, June 2020), https://calhoun.nps.edu/bitstream/handle/10945/65502/20Jun_Deveraux_Brennan.pdf?sequence=1&isAllowed=y.

assessments of "why" a service modernizes will inherently assume an external threat is the most critical factor. Overall, these professional and academic experiences create a unique perspective from which to analyze the Army's potential need, or lack thereof, to develop the Jupiter missile. Therefore, a combination of a unique approach to the problem and relevant professional and academic experiences allows this thesis to contribute to the already diverse and expansive literature on inter-service competition related to the Army's development of the Jupiter missile.

CHAPTER 2

1947-1952: THE FOUNDATION FOR MISSILE DEVELOPMENT

While this research focuses on missile development during President Eisenhower's first term, 1953-1957, the foundation of inter-service missile competition dates back almost a decade earlier. In the five years following the DoD's establishment in 1947, the services continuously updated their defined functions and struggled to delineate responsibility for emerging technology such as missiles. An examination of this five-year period reveals three points, which are specific to understanding the Jupiter missile controversy. First, the initial DoD structure required a consensus-based approach to decision-making, which often led to ambiguous verbiage. Second, service functions naturally overlapped, a structure that was exacerbated by unforeseen technological innovation. Last, while the JCS and similar service-based committees attempted to delineate missile-development responsibilities, senior service members could not subordinate their respective service interests. To provide the requisite background information for understanding the Army's Jupiter missile pursuit, this chapter analyzes the development of service functions and assesses the services' early attempts to mitigate inter-service missile competition.

The Defense Department and Service Functions

The Military Establishment

On 26 July 1947, President Truman signed into law the 1947 National Security Act, creating the Military Establishment and fundamentally altering the relationship

between the services.[66] President Truman was adamant that the post-WWII era's strategic complexities required a reorganization of the defense establishment to create a unity of effort. Truman was a proponent of service unification, calling for a "unified direction of land, sea and air forces" in a 1945 special message to Congress.[67] The president understood that technological advancements had blurred the line between the services' traditional responsibilities, and continued development would create an inter-service dependency. He noted to Congress that "the boundaries that once separated the Army's battlefield from the Navy's battlefield have been virtually erased."[68]

Although the National Security Act did not unify the services, it did start the process toward a unified effort. In fact, the changes provided the services "authoritative coordination and unified direction under civilian control but not to merge them."[69] Expanded further, this "unified direction" included "effective strategic direction of the armed forces and for their operation under unified control and for their integration into an efficient team of land, naval, and air forces."[70] Service unity of effort was a central theme

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[66] U.S. President, "National Security Act, 26 July 1947," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 63–83, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

[67] U.S. President, "Special Message to the Congress Recommending the Establishment of a Department of National Defense," (Letter to Congress, Harry S. Truman Library, Washington, DC, December 19, 1945), https://www.trumanlibrary.gov/library/public-papers/218/special-message-congress-recommending-establishment-department-national.

[68] Ibid.

[69] U.S. President, "National Security Act, 26 July 1947," 64.

[70] Ibid.

to the new military establishment, which was particularly important for the eventual pursuit of missiles—a weapon system that would span traditional land, sea, and air domains.

The Secretary of Defense

While the JCS had proved a successful concept in WWII, President Truman was not confident that the services could achieve this unity of effort through the JCS alone. In his 1945 message to Congress, President Truman explained that the JCS approach "was better than no coordination at all, but it was in no sense a unified command."[71] Truman continued, noting that the JCS was "a committee which must depend for its success upon the voluntary cooperation of its member agencies."[72] However, he argued that as the strategic situation changed, resources became limited, and modernization efforts overlapped, "unanimous agreements will become more difficult to reach."[73] This prescient comment calls attention to the underlying problem with inter-service competition and a consensus-based approach to decision-making in a resource-constrained environment. It also foreshadows the problems the DoD faced in its early years, including the lack of centralized decision-making, which exacerbated inter-service missile competition through the 1950s.

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[71] U.S. President, "Special Message to the Congress Recommending the Establishment of a Department of National Defense."

[72] Ibid.

[73] Ibid.

The secretary of defense, a position created in the 1947 National Security Act, was essential to mitigating inter-service competition. The new position became "the principal assistant to the President in all matters relating to the national security."[74] The act assigned the position responsibility to establish programs for the services, provide direction and authority, and key to this thesis, to "take appropriate steps to eliminate unnecessary duplication or overlapping" efforts.[75] However, the secretary of defense's tasks carried caveats that strengthened the independent services, allowing them to maintain their autonomy and subvert the secretary's authority.[76] The services were "administered as individual executive departments by their respective Secretaries and all powers and duties relating to such departments not specifically conferred upon the Secretary of Defense," and retained by the service secretaries.[77] As a consequence, inter-service competition continued at the executive level, as each service competed for resources and responsibilities as individual departments, not as a single military establishment. Accordingly, John Ponturo argues that in its original design, the secretary of defense "was essentially an overall coordinator imposed on powerful and cohesive Service departments."[78] Therefore, while the new position of secretary of defense created

[74] U.S. President, "National Security Act, 26 July 1947," 69.

[75] Ibid., 69–70.

[76] Ibid., 70.

[77] Ibid.

[78] Ponturo, "Analytical Support for the Joint Chiefs of Staff," 7.

service oversight, this new relationship's nature meant that the services still had to resolve contentious issues through compromise and inclusion.[79]

Codified Service Functions

To reduce the potential overlap of service efforts in the post-war era, President Truman codified service functions into law in Executive Order (EO) 9877—a supplementary order to the 1947 National Security Act.[80] These published service functions were the foundation of the armed forces, as they provided the services an outline that shaped their training, manning, and equipping priorities. The Army was explicitly assigned to prepare forces and develop weapons "for the effective prosecution of war," emphasizing seizure, defense, and occupation of land areas.[81] The Navy was assigned to prepare forces for "operations at sea," explicitly for the "control of vital sea

[79] U.S. President, "National Security Act Amendments of 1949," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 191–200, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf; U.S. President, "1953 Reorganization Plan Number 6," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 249–50, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf. Notably, this position was strengthened in 1949 and again in 1953, providing the secretary centralized control of the Defense Department. These changes are not specifically addressed because they do not adjust service functions. Together, they gave the secretary the authority to resolve contentious inter-service issues. However, no significant action was taken at the Defense Department level until late 1956 when Secretary of Defense Charles Wilson clarified service functions.

[80] U.S. President, "Executive Order 9877, 26 July 1947," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 87–90, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

[81] Ibid., 87–88.

areas, the protection of vital sea lanes, and the suppression of enemy sea commerce."[82] The Air Force, designated as the "strategic air force of the United States," was assigned to train and develop its service to establish "local air superiority where and as required," and to provide "air support to land forces and naval forces."[83] Thus, the initial establishment of service functions delineated obvious responsibilities, focusing the Army to land, the Air Force to air, and the Navy to sea. However, overlap between the initial functions existed, particularly regarding aircraft.

It is notable that Truman's wording in EO 9877 left room for interpretation, particularly for the Air Force and the Navy. Truman directed the Navy to coordinate its air aspects with the Air Force regarding basing and aircraft procurement; however, he caveated this guidance, noting that this coordination was only required when economical and efficient.[84] Truman went on to note that "the Navy will not be restricted as to types of aircraft maintained and operated" to accomplish its functions.[85] Given this imprecise wording, the services were left to their own devices in interpreting the president's intent. Richard Wolf flags this point, noting that EO 9877 "set the stage for some conflicts over roles and missions between the Navy and the Air Force, each of which interpreted conflicting guidance to best suit its own purposes."[86] As a result, before technological

[82] U.S. President, "Executive Order 9877, 26 July 1947," 88.

[83] Ibid., 90.

[84] Ibid., 88–89.

[85] Ibid., 89.

[86] Wolf, *The United States Air Force*, 85.

innovations such as missile technology brought clarity issues with service functions to the forefront, there was a natural overlap of responsibilities. Not surprisingly, less than a year after President Truman officially codified service functions, the services assembled to adapt and clarify them.

Service Function Overlap

In January 1948, inter-service conflict arose over service functions to the point where outgoing Chief of Naval Operations Admiral Chester Nimitz publicly expressed his concern regarding the Navy's strategic air role. Nimitz singled out the Air Force's reliance on forward-basing, arguing that aircraft carriers provided a unique strategic capability of a mobile "airfield" that allowed the Navy to project air power globally.[87] Fundamentally, aircraft had proved a natural overlap between the services. However, technology was just the means to an end; the underlying issue was the strategic mission, which carried a large slice of the shrinking DoD budget, and ultimately meant more money in an increasingly austere time. Missiles would eventually exacerbate these underlying issues, requiring their own responsibility corollary to the service function agreements.

In order to address confusion regarding service functions, Secretary of Defense James Forrestal worked directly with the service secretaries and the JCS to redraft EO 9877.[88] Steven Rearden explains that after Truman established functions, the services still needed to resolve "differences over roles and missions, division of available funds,

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[87] Condit, *The Joint Chiefs of Staff and National Policy 1947-1949*, 89.

[88] Ibid., 91.

kinds of military forces needed and their management, and, of course, the kind of organization required to deal with these problems all remained to be worked out."[89] During this time, the future of warfare, and the services respective role in it, was unclear: the service chiefs' major issue was how much each service would cooperate versus operate independently with its own respective air, land, and sea forces.[90] Air Force Chief of Staff General Carl Spaatz and Army Chief of Staff General Omar Bradley expressed their aversion to operation duplication, arguing for integrating each services' respective capabilities. On the other hand, Chief of Naval Operations Admiral William Fechteler maintained a similar argument to that of Nimitz, contending that the Navy had a unique mission and its ability to project power via land, air, and sea should not be restricted.[91]

In addition to generally limiting the Navy's air capabilities, General Spaatz argued that the Air Force should oversee Navy aviation units because it had the primary air mission.[92] Bradley and Fechteler disagreed with this "veto power" regarding capability development.[93] In March 1948, after continual conflict across the services regarding these problems, Forrestal gathered the Joint Chiefs at a conference in Key West, Florida, with the goal of resolving service function disputes.

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[89] Rearden, *The Formative Years 1947-1950*, 29.

[90] Condit, *The Joint Chiefs of Staff and National Policy 1947-1949*, 93.

[91] Ibid., 93–95.

[92] Ibid., 94–95.

[93] Ibid.

Amending Service Functions: The Key West Agreement

Under the guidance of Secretary of Defense Forrestal, the services reached an agreement on service functions. Shortly after, President Truman revoked EO 9877, and Secretary Forrestal signed into policy the "Functions of the Armed Forces and the Joint Chiefs of Staff," colloquially known as the Key West Agreement. In general, the service functions were clarified as opposed to altered. Secretary Forrestal resolved the strategic air dispute between the Navy and the Air Force by delineating the Air Force's primary function as "responsible for strategic air warfare."[94] However, the Navy was not excluded from air operations. In fact, one of the approved Navy missions entailed a naval air component to "conduct air operations as necessary for the accomplishment of objectives in a naval campaign."[95] While this distinction seems straightforward, it was vague enough to remain open to interpretation regarding equipment modernization. George Watson explains that under these more defined roles, "the Navy was not prohibited from attacking any targets, inland or otherwise, to accomplish its mission."[96] If desired, it followed that the new service function language allowed the Navy to interpret its requirements broadly.

Significantly, Secretary Forrestal also assigned the services "collateral functions" to help address mission overlap and promote service cooperation. He defined collateral function as providing forces to "support and supplement the other Services in carrying

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[94] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," 163.

[95] Ibid., 161.

[96] George Watson, *The Office of the Secretary of the Air Force 1947-1965*, General Histories (Washington, DC: Center for Air Force History, 1993), 69.

out their primary functions, where and whenever such participation will result in increased effectiveness and will contribute to the accomplishment of the over-all military objectives."[97] In this way, the Navy was to "be prepared to participate in the over-all air effort," and "to conduct close air support for land operations."[98] Similarly, Forrestal assigned the Air Force the collateral function "to interdict enemy sea power through air operations," and "to conduct antisubmarine warfare."[99] Inadvertently, while attempting to offer clarification, Forrestal also created responsibility overlap, and allowed the services to interpret intent. Robert Watson argues this point, noting that the "Key West Agreement, at least as it was applied in practice . . . seemed to allow opportunity for the Services to multiply their tasks for their own aggrandizement, in disregard of the principle of unification."[100] In essence, while the agreement resolved certain disputes, the solutions were laced with ambiguity.

Essentially, the agreement's potentially broad application meant that misinterpretations could create unnecessary effort duplication. While the "joint" mindset created through the collateral functions had value, the services could easily abuse the permissive policy. Although Nimitz provided a sound argument for the Navy's operational aircraft requirements, his reasoning did not warrant an entirely separate Air Force. According to Condit, Forrestal addressed this specific point, noting that "the Navy

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[97] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," 162.

[98] Ibid., 162–63.

[99] Ibid., 164.

[100] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 177.

would retain its air power . . . and would be responsible for determining the means required to carry out naval missions. But this authority could not be used to justify creation of a naval strategic air force."[101] Given this situation, clarity was a significant challenge in developing service functions, as being overly restrictive or too vague could create problems. As technology changed and the U.S. strategy evolved, resolving this dilemma required a continual reassessment of service functions. In sum, opportunity cost and overlapping service functions became the underlying themes of the eventual inter-service missile competition.

While Secretary Forrestal made progress with the Key West Conference, evolving technology and an unclear strategy left the services in competition. Steven Rearden emphasizes this point, explaining that "until the actual cooperation matched the resourcefulness of the semantic compromises, there could be no genuine harmony or teamwork, and no true resolution of the more troublesome roles and missions questions."[102] Although the Key West Conference was a landmark success, the chiefs reassembled a few months later to reassess unresolved contention points. At the forefront of these issues was control and influence over nuclear weapons.

Addressing Atomic Warfare: The Newport Agreement

Nuclear weapon development had the potential to become a controversial inter-service issue because of the weapon's strategic implications and the associated funding, therefore, the atomic warfare issue lingered after the Key West Conference. As Rearden

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[101] Condit, *The Joint Chiefs of Staff and National Policy 1947-1949*, 95.

[102] Rearden, *The Formative Years 1947-1950*, 397.

explains, there was a general understanding by the services that "atomic weapons would play a central role in war planning, that atomic forces would receive high priority, and that the division of funds among the services would be greatly affected by this priority."[103] At the time, however, the Air Force was the only service with a nuclear weapon delivery capability, and it was in the process of rapidly expanding its atomic bomber fleet from 30 aircraft to 200.[104] Given the combination of delivery capabilities and the strategic air function assignment, the Air Force chief at the time, General Spaatz, logically concluded that his service should be the primary nuclear force in the U.S. military, although the Navy vehemently disagreed. In fact, before he retired, Spaatz openly fought for the Air Force to have exclusive control of all nuclear weapons.[105] The other service chiefs adamantly rebuked this claim. In particular, the Navy fought the Air Force's assertion, arguing that a single service should not have control over atomic weapons.[106] As Rearden explains, from the other service's perspective, there was an "Air Force tendency to think of atomic and strategic bombing as one and the same."[107] Therefore, the Air Force could interpret its assigned function's vagueness, and it would continue to fight for dominance in the nuclear arena. This general Air Force attitude

[103] Rearden, *The Formative Years 1947-1950*, 397.

[104] Ibid., 397.

[105] Condit, *The Joint Chiefs of Staff and National Policy 1947-1949*, 97.

[106] Rearden, *The Formative Years 1947-1950*, 397.

[107] Ibid., 399.

regarding nuclear weapons contributed to the service's eventual apprehension toward Army and Navy missile pursuits.

Secretary Forrestal, discouraged by the JCS's inability to resolve their issues, enlisted two retired officers—General Spaatz and Admiral John Towers—to help him assess the Navy's and Air Force's nuclear warfare requirements.[108] According to Richard Wolf, Spaatz and Towers agreed that the Key West document was satisfactory. However, he explains that the officers "conceded that varying interpretations were possible," and each argued on behalf of their respective services controlling nuclear weapons.[109] Despite this progress, just six months after the Key West Conference, Secretary Forrestal reassembled the JCS once again to amend service functions and clarify any remaining unclear terms.

At this second conference, held at the Naval War College in Newport, Rhode Island, Secretary Forrestal worked to alleviate any concerns regarding the Air Force's attempt to control the future of nuclear weapons. To quell the Navy's fear of Air Force monopolization of atomic capabilities, the chiefs agreed to alter the meaning of "Primary Mission" as it related to service functions thustly: "the exclusive responsibility and authority in a given field do not imply preclusive participation."[110] This verbiage implied that if deemed necessary for its mission, each service could pursue any capability.

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[108] Wolf, *The United States Air Force*, 179.

[109] Ibid.

[110] John Ohly, "Newport Agreement, 23 August 1948," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 182, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

Beyond merely opening the door to other services, the adjusted definition also required the assigned service to "take into account the contributions which may be made by forces from other services."[111] While this inclusive language theoretically promoted teamwork and a unity of effort, it ultimately led to redundancy and waste in a resource-constrained competitive environment.

By choosing to ensure no service was left out of the nuclear arena, Forrestal left wide room for interpretation and allowed all services to assess their modernization needs through a nuclear lens. Importantly, missile technology advancements in the years that followed this conference created new nuclear delivery systems that allowed all the services to incorporate nuclear weapons into their respective warfighting doctrine. While not articulated by Army leadership, the permissive definition of "primary mission" established at the Newport Conference allowed the service to develop missiles duplicating the Air Force's interdiction mission. In contrast, Air Force leaders, including Chiefs of Staff General Hoyt Vandenberg and General Nathan Twining, as well as Secretary of the Air Force Donald Quarles, generally ignored this definition and argued against Army missile projects, given service function overlap. Over the following years, missile technology developments and a reduced budget exacerbated these tenuous inter-service relationships.

Inter-Service Missile Development

Although missiles were an emerging technology in the late 1940s, their military potential had been apparent since WWII; in addition, missile development was not

[111] Ohly, "Newport Agreement, 23 August 1948," 182.

always contentious. In April 1946, according to Jacob Neufeld, the Army and Navy "issued a joint statement supporting a comprehensive national guided missile program, including joint procurement, testing, and training."[112] However, the national missile program did not come to fruition. In the years that followed, the services struggled to delineate missile-development responsibilities in order to avoid effort duplication and service function overlap.

The Guided Missile Committee

In 1947, Dr. Vannevar Bush, the director of the Research and Development Board, established the Guided Missile Committee (GMC) as one of the first organizations to manage missile development. Bush assigned the organization to be "responsible for the preparation of an integrated national program of research and development in the field of guided missiles and for coordination of the work of the three military departments to this end."[113] However, as already discussed, inter-service competition and service function ambiguity were prevalent in this period. Elliot Converse argues that the GMC's effectiveness was "unquestionably hamstrung by contests between the services."[114] In particular, the Army demanded that its members present the "policy line" on contentious

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[112] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 51.

[113] Programs Division, Editorial Branch, U.S. National Military Establishment, *Research and Development Board: History and Functions* (Washington, DC: The National Military Establishment, 1948), 4, https://ia800702.us.archive.org/13/items/researchdevelopm00u/researchdevelopm00u.pdf.

[114] Converse, *Rearming for the Cold War 1945-1960*, 30.

issues.[115] Converse expands on this concept, writing that the Army "made a considerable effort to ensure that its officers and civilians serving . . . on its committees and panels knew exactly the position to take on matters that came before them."[116] This is not unexpected, as first and foremost, committee members were representatives of their respective service. However, by not empowering its representatives to deviate from the service narrative, committees and panels were combative rather than collaborative. This raised and continues to raise questions about the efficacy of joint-level organizations to elevate the military's priorities over the individual interests of services. Significantly, this challenge to subordinate service interests perpetuated over the next decade.

In addition, members of the GMC were not effective in accomplishing the organization's mission. The senior Air Force officer on the Research and Development Board—General Joseph McNarney—echoed this sentiment in a 1948 organizational assessment for Secretary of Defense Forrestal.[117] According to Converse, General McNarney "pointed to the total of 35 different guided missiles of all types being developed by the services and the failure of the board's committees to confront such apparent duplication as" a significant problem to a unified development plan.[118] This lack of action was exacerbated by the fact that committee members filled their role as additional part-time duties, and as Converse notes, "on average, committees and panels

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[115] Converse, *Rearming for the Cold War 1945-1960*, 31–32.

[116] Ibid., 31.

[117] Ibid.

[118] Ibid.

met only five days a year."[119] While the GMC did not directly impact the Army's pursuit of the Jupiter missile, it set a precedent for an internal missile development focus over joint or complementary modernization efforts. By the end of the 1940s, missiles grew in strategic importance, as resistance to the assumptions regarding an air offensive against the Soviet Union began to emerge.

The Feasibility of an Air Offensive: WSEG Report Number 1

In April 1949, President Harry Truman engaged the Joint Staff, and newly appointed Secretary of Defense Louis Johnson, regarding the feasibility of an offensive air operation against the Soviet Union.[120] The JCS subsequently directed its new research organization, the WSEG, to undertake this research endeavor. Secretary Forrestal had activated the WSEG in December 1948 and outlined its mission as follows:

> The purpose of the Group is to provide rigorous, unprejudiced and independent analyses and evaluations of present and future weapons systems under probable future combat conditions—prepared by the ablest professional minds, military and civilian, and the most advanced analytical methods that can be brought to bear.[121]

The decision to include the words "unprejudiced" and "independent" is significant. It demonstrated an acknowledgment of the challenges associated with subordinating service interests, and the potential inter-service competition could have in analyzing developing technology. In January 1950, the WSEG briefed Secretary Johnson and President Truman on its conclusions regarding the air offensive against the Soviet Union. A month later, it

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[119] Converse, *Rearming for the Cold War 1945-1960*, 34.

[120] Ponturo, "Analytical Support for the Joint Chiefs of Staff," 51–53.

[121] U.S. Secretary of Defense, "December 1948 Directive," 1.

published its findings in "WSEG Report Number 1: Report on Evaluation of Effectiveness of Strategic Air Operations."[122]

The JCS did not officially endorse the WSEG's findings, but they did acknowledge their importance for planning purposes; however, the JCS recommended to the president that the report not be made public.[123] This lack of support is likely because the WSEG report did not offer favorable conclusions regarding the potential air bombardment of the Soviet Union. As Ponturo explains, "the report was generally pessimistic as to the probability that offensive strategic air operations could be carried out on the scale called for in existing emergency war plans."[124] The report highlighted numerous logistical constraints, such as aerial refueling and reliance on forward basing.[125] Indeed, the report validated many of the Navy's concerns outlined by Admiral Nimitz years prior. However, Rearden argues that "while it weakened many of the claims made by the Air Force, the WSEG study failed to confirm the Navy's basic contention that strategic bombing was highly overrated and unreliable."[126]

More devastating than the logistics issues were the WSEG's findings regarding the military's inability to identify and address Soviet anti-air capabilities.[127] As Rearden

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[122] Ponturo, "Analytical Support for the Joint Chiefs of Staff," 74.

[123] Rearden, *The Formative Years 1947-1950*, 409.

[124] Ponturo, "Analytical Support for the Joint Chiefs of Staff," 74.

[125] Ibid.

[126] Rearden, *The Formative Years 1947-1950*, 410.

[127] Ibid., 409.

explains, the "WSEG calculated a bomber attrition rate of 30 to 50 percent."[128] This realization elevated the importance of missiles as an alternate nuclear delivery platform. In this context, if there was competition regarding nuclear weapons control, the delivery method now influenced the decision. In other words, competition over nuclear primacy was now expressed in competition over delivery means, which was potentially an existential concern for the Air Force. As Converse notes, "by the end of the decade, the missile was beginning to compete with the airplane in strategic importance."[129] By this time, the services no longer viewed aircraft as the sole military answer to the Soviet problem, and as technology evolved, instead pivoted to diversifying their ability to deliver nuclear weapons. In turn, less than two months after the WSEG published its findings, the JCS briefed Secretary of Defense Johnson on their proposed delineation of missile-development responsibilities.[130]

Establishing Guided-Missile Responsibilities

As 1950 approached, the JCS presented a joint recommendation to Secretary of Defense Louis Johnson, which outlined its proposal for assigning responsibilities for guided missiles.[131] Secretary Johnson, frustrated with the inter-service missile

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[128] Rearden, *The Formative Years 1947-1950*, 409.

[129] Converse, *Rearming for the Cold War 1945-1960*, 260.

[130] U.S. Secretary of Defense, "March 1950 Memorandum: Assignment of Responsibility for Guided Missiles," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 209–18, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

[131] Ibid.

competition, directed the Air Force to review current missile projects across the services before approving the JCS memorandum.[132] By ordering this review, Johnson demonstrated an acknowledgment of an eventual capability overlap and an appreciation of its problems. According to Neufeld, Johnson contended that "although more than one service might demonstrate a legitimate requirement for a missile, it was not necessary for all the services to develop that missile."[133] This statement is fundamental for understanding the missile competition, and in a broader context, emerging technology management. Over the next few years, Army leadership regularly promoted the importance of long-range missiles with continually adjusted range requirements. However, the service often failed to justify why the Army should be responsible for the new weapon's employment. Simply put, while missiles became essential to the Army's vision of the future battlefield, the service routinely failed to justify its argument for jurisdictional control of the new technology. This was particularly true as the ranges extended from under 100 miles to over 1,000.

Following Secretary Johnson's guidance, Secretary of the Air Force Stuart Symington formed the SIGMB to review current projects and create a joint missile program.[134] However, inter-service competition limited the SIGMB as soon as the organization began its task, and Symington could not subordinate his individual service interests to provide Secretary Johnson an unbiased assessment. Neufeld calls attention to

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[132] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 54.

[133] Ibid.

[134] Ibid.

the ineffectiveness of the SIGMB, noting that when the organization finally completed its report, it "was a complex document containing long lists of disagreements."[135] He goes on to note that in the report, "the Air Force charged that the Army and Navy were illegally developing surface-to-surface missiles with ranges beyond 500 miles," which Symington claimed the Air Force should own because the "missiles belonged in the strategic class."[136] Markedly, Symington was using range to determine service function; however, as previously discussed, the Navy was not precluded from developing such munitions. Additionally, in the Key West Agreement, Forrestal directed that the Army had "primary interest in all operations on land," and was responsible "to defeat enemy land forces."[137] It is therefore evident that Symington's assertion was grounded in his specific interpretation of assigned service functions.

The review of active missile projects, and the position Secretary Symington took regarding service function encroachment, emphasized the importance of clarity between the services regarding missions. Because missiles were emerging and immature technology, their use complicated service function interpretations. However, because missiles are tools with which a multitude of missions could be achieved, defining development priorities was a requirement for mitigating unnecessary effort duplication.

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[135] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 55.

[136] Ibid., 54.

[137] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," 159.

The 1950 Missile Agreement

Ultimately, Secretary Johnson did not act on the SIGMB report, and eventually approved the JCS missile-responsibilities proposal. One of the essential aspects the chiefs agreed upon was that it did not make sense to assign "responsibilities for the entire guided missile field" to a single service.[138] In the proposal, the JCS declared that missiles would "be employed by the Services in the manner and to the extent required to accomplish their assigned functions."[139] This wording left ample room for interpretation, and was reminiscent of the verbiage in the initial adaptations of service functions at the Key West and Newport Conferences just a few years prior. In this way, the services could frame any missile modernization objective through the lens of their broadly defined roles and missions.

By approving the joint memorandum, Secretary of Defense Johnson categorized the new weapons as air-to-air, surface-to-air, and the most pertinent to this research, surface-to-surface.[140] The JCS proposal divided missile-development responsibilities between the services based on the capabilities that the new weapon extended. For the Air Force, this meant "surface-launched guided missiles which supplement, extend the capabilities of, or replace Air Force aircraft (other than support aircraft)."[141] In contrast, the Army gained responsibility for "surface-launched guided missiles which supplement,

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[138] U.S. Secretary of Defense, "March 1950 Memorandum," 210.

[139] Ibid.

[140] Ibid.

[141] Ibid., 211.

extend the capabilities of, or replace the fire of artillery."[142] Additionally, they shared a responsibility for missiles that would "supplement, extend the capabilities of, or replace, support aircraft."[143] Significantly, by establishing an overlapping responsibility, inter-service competition influenced missile development from the onset.

Although this division of effort may have seemed clear when written, services could easily have misinterpreted it—intentionally or unintentionally—because a missile was neither an airplane nor artillery. Armacost furthers this point by noting that "the guided missile was not a direct derivative of either the airplane or of field artillery . . . it had the characteristics of both."[144] He explains that the unique nature of guided missiles at the time, and the potential rapid technological advancements they promised, "implied no obvious jurisdictional assignment."[145] However, since the JCS ignored previously presented concrete definitions based on range, and instead divided missile types using abstract terms regarding services' usage intent, room was left for interpretation and potential disagreements. Symington, in particular, used range as a means of categorizing a missile's function. In contrast, by not addressing range issues, Johnson exacerbated inter-service missile competition. In fact, just three years after the 1950 missile agreement, the Army's pursuit of a missile with a 500-mile range sparked a significant

[142] U.S. Secretary of Defense, "March 1950 Memorandum," 210.

[143] Ibid., 211.

[144] Armacost, *The Politics of Weapons Innovation*, 9.

[145] Ibid.

inter-service dispute. This issue is assessed in the following chapter through a case-study analysis of the Regulus missile controversy.

As Secretary Johnson did not explicitly outline restrictions, the services could then take advantage of ambiguity, focus solely on their respective priorities, and apply favorable meanings to their assigned missile responsibility. This was in stark opposition to the unity of effort for which senior leaders such as President Truman and Secretary of Defense Forrestal had been fighting. Armacost explains this point, noting that "the services considered their primary and overriding mission to be the destruction and defeat of their enemy counterparts. This stimulated service hopes for self-sufficiency in weapons."[146]

Because Secretary Johnson did not outline clear definitions for missile types, the Army could develop missiles with any range capability if the service could justify its use. This idea is examined further in the following chapter via an analysis of the Army's missile requirements on its perceived future battlefield. Overall, the 1950 missile agreement did little to delineate development responsibility, allowing the services to pursue missile development with almost no restrictions. Indeed, the debate regarding missile ranges as the determining factor continued over the following years. For example, in 1951, U.S. Air Force Chief of Staff General Hoyt Vandenberg recommended emplacing range restrictions on Army missiles, proposing, according to Watson, that the "Army be restricted to surface-to-surface missiles to be used within the combat zone of opposing armies, which he defined as within 50-75 miles on both sides of the line of

[146] Armacost, *The Politics of Weapons Innovation*, 38.

contact."[147] The Air Force continued to pursue similar range restrictions over the following years, and this argument eventually proved fundamental to Secretary of Defense Charles Wilson's 1956 decision regarding the Jupiter missile.

Conclusion

The decisions and agreements from 1947 to 1952 set the conditions for the inter-service missile competition. While these agreements clarified service functions, the consensus-based approach and inclusive language created ambiguity. This allowed the services to interpret the DoD's guidance to suit their own needs. Additionally, the codification of these functions illuminated a natural overlap between the services, something exacerbated by emerging technology. While the JCS and similar service-based organizations attempted to mitigate effort duplication through missile development restrictions, these attempts underscore the inability of service representatives to subordinate their service interests for the betterment of the DoD. While a missile agreement was signed in 1950, the vague missile development responsibilities the JCS outlined created an environment for effort duplication through the categorization of missiles as extensions or replacements of artillery or aircraft. Because each service could loosely apply missiles to their assigned functions, and DoD policies emphasized inclusion, inter-service competition ensued for resources in a shrinking budget.

Just as technology advanced enough for missile projects to transition from concepts to actual equipment on the battlefield, a new administration took office, adding a new dynamic to the inter-service missile competition. In turn, competition spiked in

[147] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 180.

Eisenhower's fiscally conservative first term. The following chapters analyze the Army's missile requirements and the inter-service missile competition from 1953 to 1956 to understand the Army's pursuit of the Jupiter missile and Secretary of Defense Charles Wilson's 1956 decision to clarify service functions.

CHAPTER 3

1953-1954: THE INTER-SERVICE MISSILE COMPETITION

While IRBM development did not become a contentious topic until 1955, the decisions regarding missile responsibilities and service functions from 1953-54 set the conditions for the eventual inter-service IRBM race. An examination of the decisions in this two-year period illuminates three essential factors for understanding the Army's Jupiter missile pursuit. First, although the New Look concept accelerated the Army's pursuit of missiles, in 1950, the service had established this operational need. However, while the Army's justified missile-support requirements created tension with the Air Force, the most significant foreseeable requirement did not exceed 750 miles—half the range of the Army's eventual 1955 Jupiter missile proposal. Second, Secretary of Defense Charles Wilson's decision not to address missile responsibilities in his 1954 directive demonstrates a deliberate avoidance of controversial issues such as the Army's 1953 attempted Regulus missile purchase. Last, the JCS's choice to use ambiguous wording in the 1954 missile-responsibility agreement points to a continual problem that service representatives had subordinating their service interests to resolve contentious issues. This chapter assesses the Army's identified missile requirements and then analyzes the Regulus missile controversy to understand the development of the 1954 adaptations to service functions. The chapter concludes with an examination of the rising Soviet threat and the creation of the TCP.

The Army's Missile Requirements

The Impact of the New Look

Although the Army's missile pursuits predate President Eisenhower taking office, the president's emphasis on nuclear weapons in the New Look strategy intensified the Army's modernization efforts. In the declassified top-secret document, NSC 162/2, the NSC normalized the use of nuclear weapons, stating clearly that "in the event of hostilities, the United States will consider nuclear weapons to be as available for use as other munitions."[148] Additionally, the NSC reinforced that "every effort should be made to eliminate waste, duplication, and unnecessary overhead in the Federal Government."[149] As this became an essential factor for inter-service missile competition, Secretary Wilson faced the challenges of delineating missile responsibilities and adjudicating the service squabbles regarding overlapping capabilities. Hence, the development of nuclear weapons created an avenue for the services to vie for their share of a dwindling budget. Simultaneously, the report alluded to an air offensive's limitations and the importance of diverse delivery capabilities, indirectly elevating the importance of missile development. As Armacost explains, "the major new technology was guided missile delivery systems," and "the service which mastered the most advanced

[148] National Security Council (NSC), "NSC 162/2: Report to the National Security Council by the Executive Secretary, October 30, 1953," in *Foreign Relations of the United States, 1952–1954, National Security Policy*, vol. 2 (Washington, DC: United States Government Printing Office, 1984), 593, https://history.state.gov/historicaldocuments/frus1952-54v02p1/d101.

[149] Ibid., 594.

technologies could expect corresponding reward when funds were distributed."[150] For the Army, a service that was finally beginning to field missiles to combat units, this strategic shift provided a reason to adapt the service for nuclear warfare. As Brian Linn explains, "whether intended or not," the New Look "provided a justification for the army's vision of the tactical atomic battlefield."[151]

Given this transition away from massive conventional forces, the Army's role on the future battlefield was unclear. As Armacost notes, "while the organizational survival of the Army was scarcely threatened, its future status was obviously jeopardized" under the New Look strategy.[152] Brian Linn explains the challenges that the Army's nuclear proponents faced in transforming the Army for a new type of warfare:

> The atomic army theorists faced three essential problems. The first was to prove the army was still relevant in the Cold War. The second problem was how to transform the army's existing doctrine, organization, equipment, and personnel to fight on the atomic battlefield. The last problem was how to reverse the army's decline in prestige and funding, win public and political support, inspire those who wore its uniform and restore the service's preeminent role in national defense.[153]

In short, missiles became a significant component for solving these problems. While Army leadership remained divided on the role of nuclear weapons for a future conflict, the service adapted to the nuclear battlefield.

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[150] Armacost, *The Politics of Weapons Innovation*, 33.

[151] Linn, *Elvis's Army*, 85.

[152] Armacost, *The Politics of Weapons Innovation*, 268.

[153] Linn, *Elvis's Army*, 74.

The Nuclear Battlefield

General James Gavin—the 1954 Army assistant chief of staff for plans and operations—was one of the Army's most senior nuclear proponents, arguing that nuclear weapons had fundamentally transformed ground warfare.[154] According to Linn, Gavin believed that "the very threat of nuclear attack eliminated the enormous supply depots, massed armor columns, and huge troop concentrations that had characterized modern warfare: mobility, shock, and dispersion would be the essential characteristics of the atomic battlefield."[155] For these reasons, missiles—the Army's primary means of nuclear delivery—were a necessity. Gavin argued that the depth of battlefield had grown ten-fold, and "if our fire power was to have adequate range," then there was an operational "need for the replacement of conventional artillery with missiles."[156] For leaders like Gavin, missiles were an operational requirement which provided extended range and destructive capacity to support the Army's envisioned future battlefield.

Notably, the nuclear battlefield required the Army to adjust its operations doctrine. Walter Kretchik notes this transition, stating that "the Army was not obsolete, it simply had to adapt to the challenges of modern warfare . . . devising a tactical scheme for its forces not only to survive a nuclear attack, but to fight one offensively using nuclear weapons."[157] While nuclear weapons required a dramatic doctrinal shift for the

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[154] Linn, *Elvis's Army*, 77.

[155] Ibid.

[156] Gavin, *War and Peace in the Space Age*, 137–38.

[157] Kretchik, *U.S. Army Doctrine*, 168.

Army, land forces still served a significant role in any future conflict. Kretchik summarizes the way the Army's maneuver warfare fit into the nuclear battlefield:

> Army combat units would lay hidden until the decisive moment, poised to rush forward in columns once the nuclear fires created holes within the enemy positions. The shock of instant nuclear eradication was expected to instill terror within the now-fleeing enemy survivors. American mechanized forces would then drive through the breach, mopping up pockets of resistance and pursuing the fractured enemy to the point of annihilation.[158]

However, to avoid catastrophic losses under this new type of warfare, the Army had to increase its ground units' dispersion. Andrew Bacevich focuses on said warfare's secondary effects, explaining that "the area encompassing such operations necessarily would be much greater than equivalent forces had occupied in earlier wars."[159] In short, the nuclear battlefield forced the Army to fight on a deeper scale than it had previously experienced, requiring extended artillery ranges, and creating logistical challenges. According to Armacost, General Gavin emphasized this aspect of the nuclear battlefield, anticipating "a battlefield of great depth; a war of dynamic tempo; and the need for weapons of unprecedented range, accuracy, and firepower."[160]

In addition to justifying the Army's role on the future battlefield, missiles enabled the service to maintain its tactical independence from the Air Force. As Bacevich explains, missiles provided the Army the ability to "strike targets deep in an enemy's rear, a capability that nothing—not darkness, nor weather, nor enemy defenses—could

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[158] Kretchik, *U.S. Army Doctrine*, 174.

[159] Bacevich, *The Pentomic Era*, 68.

[160] Armacost, *The Politics of Weapons Innovation*, 35.

stop."[161] This is significant because at the time, there was a general hesitation against joint operations. Kenneth Condit sheds light on this aversion, claiming "there was an understandable disinclination on the part of any Service to rely on the others for support, leading to efforts to possess, or at least control, as many as possible of the weapons and forces needed to discharge assigned missions."[162] However, while missiles provided the Army clear advantages, they also created a tactical burden.

A Tactical Burden

Because missile technology was immature, many of the Army's missile systems were large and had limited mobility. In turn, missiles were vulnerable to enemy counterfire and dismounted forces—a deadly problem that cannon artillery units experienced in the Korean War.[163] Generally, there exists an inverse relationship between range and mobility regarding artillery employment. Stated simply, the closer an artillery piece is to enemy forces, the more the soldiers must move the weapon to avoid

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[161] Bacevich, *The Pentomic Era,* 74.

[162] Kenneth Condit, *The Joint Chiefs of Staff and National Policy 1955-1956*, History of the Joint Chiefs of Staff, vol. 4 (Washington, DC: Office of Joint History, Office of the Chairman of the Joint Chiefs of Staff, 1998), 77.

[163] D. M. Giangreco, "Artillery in Korea: Massing Fires and Reinventing the Wheel," in *Korean War Anthology* (Fort Leavenworth, KS: Combat Studies Institute, 2003), 1–21. While the Korean War is outside the scope of the research, Giangreco's work highlights the challenges of artillery during the war. He emphasizes explicitly how the limited mobility and ranges of systems at the time put artillery units into precarious positions, many of which led to cannons being destroyed, abandoned, and even occasionally captured and used against U.S. Forces. Thus, as artillery doctrine was evolving in the 1950s, the Army's experiences in Korea likely reinforced the need to develop weapons at echelon and long-range systems capable of influencing the entire battlefield without needlessly exposing artillery units.

its destruction. In contrast, the farther the weapon can fire projectiles, the less the unit is required to move it. Additionally, artillery units are in a continuous battle with enemy artillery units—indirect fire is an offensive capability best suited for the destruction of, and is most vulnerable to, other indirect fire assets. As follows, as enemy artillery ranges improve for survivability, so must friendly artillery capabilities. Armacost explains that "extensions in range of artillery support weapons was simply a response to deeper enemy tactical targets and the need to deploy from less vulnerable rear positions."[164] Therefore, according to developing Army doctrine and the Army's vision of the future battlefield under New Look, missiles that extended the range of conventional artillery were essential.

A Theater-Support Missile

For missile development specifically, the Army took a three-pronged approach in creating weapons for varying missions; the development plan was based on its assessed service needs with minimal DoD restrictions. In the 1950 missile agreement, the JCS had agreed that the Army's missiles would supplement or replace artillery, allowing the service to interpret its future artillery requirements broadly.[165] As a result, the Army created three missile categories based on varying support priorities, with corresponding ranges to distinguish them: 5-35 miles for corps support, 20-150 miles for army support,

[164] Armacost, *The Politics of Weapons Innovation*, 94.

[165] U.S. Secretary of Defense, "March 1950 Memorandum," 210–11.

and 150-750 miles for theater support.[166] Army doctrine eventually captured this delineation in missile type with only slight adjustments, categorizing the Army's missiles as short-, medium-, and long-range (see Appendix A for pre-Jupiter Army missiles in each of these categories).

The potential for capability and equipment overlap between the Army and the Air Force increased as missile technology progressed. Significantly, the Army's identified theater support requirement, out to 750 miles—a range it had yet to achieve—potentially encroached on the Air Force's interdiction mission. As Bacevich describes, "the Army used such an expansive concept of the tactical battlefield as to collide with cherished Air Force prerogatives."[167] However, before the Army began developing a new theater-support missile—having minimal success achieving long ranges with its first attempt—the service requested purchase of a 500-mile capable missile from the Navy, triggering an inter-service missile competition and calling attention to the problems of the 1950 missile-responsibility memorandum.

The Regulus Missile Controversy

Although overall missile development was not inherently contentious between the services, as technological advancements fostered increasingly complex missile programs, the distinction regarding the intended use of these weapon began to blur. Robert Watson notes that early "projects were readily separable by function, but as the state of the art

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[166] John Bullard, "History of the Redstone Missile System," Historical Monograph (Historical Division, Army Missile Command: Redstone Arsenal, AL, October 15, 1965), 22, https://apps.dtic.mil/dtic/tr/fulltext/u2/a434109.pdf.

[167] Bacevich, *The Pentomic Era*, 82.

advanced and the range and maneuverability of missiles increased, it became harder to disentangle functional responsibilities."[168] Essentially, as the Army began pursuing more complex missiles, the Air Force contended that the Army was infringing on its service functions.

The Services Debate the Regulus

Inter-service missile competition between the Army and the Air Force spiked in January 1953, when the Army requested the DoD's permission to purchase the Navy's Regulus missile. Markedly, at the time, all three services were developing surface-to-surface missiles with comparable ranges—the Army Redstone, the Navy Regulus, and the Air Force Matador.[169] The Regulus was a surface-to-surface missile with a 500-mile maximum range, providing the Army an interim capability until it finished developing its Redstone theater-support missile. Secretary of Defense Wilson initially kept the matter at the JCS level in order to allow the services to internally resolve the issue.

The JCS members were split on the decision to approve the Army's Regulus missile purchase: Chief of Staff of the Army Joseph Collins and Chief of Naval Operations Admiral William Fechteler approved the purchase, while Air Force Chief of Staff General Hoyt Vandenberg opposed it.[170] General Collins justified the Army's request to the group, arguing, according to Watson, that the service "must have missiles under its own control in order to accomplish its mission," and that "experience with

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[168] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 179.

[169] Converse, *Rearming for the Cold War 1945-1960*, 394.

[170] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 181.

Regulus would provide a basis for evaluating similar missiles under development and perhaps for eliminating some."[171] That being said, the Air Force was not convinced. According to Watson, Vandenberg "asserted that Regulus, with a maximum range of 500 miles, could in no sense be regarded as an extension of artillery."[172] Thus, from the Air Force's perspective, the Army did not meet the JCS's intent embodied in the 1950s responsibilities memorandum. Despite this, the potential for inter-service project sharing was expressly considered and documented in the original memorandum, and the Air Force's argument further identified the problems with the agreement's verbiage.

Applying the 1950 Missile Agreement

In crafting the initial proposal on delineating missile responsibilities, the JCS foresaw the eventuality of project sharing along with the potential of effort duplication. In fact, the inclusive language the chiefs chose provided the Army the tools to request access to the Navy's missile projects. The chiefs outlined in the 1950s guided-responsibility memorandum that "new weapons developed by the programs of the several Services will be considered available for employment by any Service which requires them in the discharge of its assigned functions."[173] The language also stated that each service makes its own determination—pending JCS approval—whether or not they require access to developing weapons.[174] After assessing the need for theater-support

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[171] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 181.

[172] Ibid.

[173] U.S. Secretary of Defense, "March 1950 Memorandum," 211–12.

[174] Ibid., 212.

missiles, the Army was justified in its request to access the Regulus missile. Additionally, the chiefs put the onus on the developing service to share its growing technological knowledge, which likely mitigated effort duplication. The memorandum's wording charges that the service "with primary responsibility for development of a weapon shall invite the participation of any other Service having an operational interest in the weapon."[175] Regarding the Regulus missile, the 1950 missile-responsibilities agreement supported Army and Navy cooperation, although, the Air Force's argument went beyond the Army's access to the Navy's project. Instead, the Air Force contended that the Army was choosing to misinterpret the language of its assigned missile responsibilities.

While the JCS designed the 1950 missile-responsibility memorandum around the services' assigned functions, the broad and loose language did not account for details such as range or target type. The Army gained the responsibility to develop missiles to "supplement or extend the capabilities of, or replace the fire of artillery."[176] However, to what extent the Army could "extend" its artillery was not specified or even addressed. While the Air Force could express its concern over the Army's development or purchase of a missile with a 500-mile range, the Air Force was not qualified to assess artillery's role on the battlefield. It was the Army's primary function to "organize, train, and equip" for "combat operations on land" to "defeat enemy land forces."[177] As previously discussed, as the land-warfare service, the Army made its strategic assessment regarding

[175] U.S. Secretary of Defense, "March 1950 Memorandum," 212.

[176] Ibid., 210.

[177] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," 159.

indirect-fire needs in a future conflict and determined a service requirement for theater-support missiles.[178] As described, within the context of the previously agreed upon responsibilities, the Army's pursuit of a 500-mile range missile, whether its own or the Navy's, was justified. While the Air Force may have been frustrated with the situation and could make similar justifications for their respective missile project, it was the combination of vague wording and an emphasis on inclusion in the original missile-responsibility memorandum that enabled the Regulus conversation. The Air Force's problem was not the Regulus missile or any individual missile the Army was developing; the Air Force's issue instead was the 1950 missile-responsibility agreement. In turn, the JCS could not reach a consensus on the Regulus purchase, and the matter reverted to the DoD.

Regulus Resolved

Instead of making a determination on the Regulus missile, Secretary of Defense Wilson transferred the problem to his department's director of guided missiles, Kaufman Keller. Regarding this decision, Jacob Neufeld argues that the Air Force was critical of the Guided Missiles Office and not hopeful of a favorable resolution because of Keller's "close association with the Army Ordnance Department."[179] Additionally, because Keller only served in his position part-time, his deputy, Army General Kenneth Nichols,

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[178] Bullard, "History of the Redstone Missile System," 22.

[179] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 92.

maintained influence over the organization.[180] However, General Nichols served as the Army's Director of Guided Missiles, and as the service representative on several inter-service committees, and was therefore incredibly experienced with nuclear weapons and the controversies regarding delineating guided-missile responsibilities.[181]

Although Keller addressed the Regulus missile controversy, he avoided the problems regarding service responsibilities. In June 1953, Keller denied the Army's request to purchase the missile, primarily because it was still in the development phase.[182] According to Elliot Converse, Keller "thought the Army could learn as much as it needed about Regulus by observing the Navy program."[183] Nonetheless, Keller's decision left the situation open to a reevaluation when the Regulus was complete.[184] Consequently, although the Regulus controversy was resolved, missile responsibility remained open to interpretation.

In considering these factors, in can be argued that the underlying problem regarding the Army's purchase of the Regulus missile was not individual Army capabilities and their development, but the policy that facilitated them. The Regulus controversy was the first significant contentious application of the 1950 missile-responsibility memorandum and provided an opportunity for the DoD to clarify intent

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[180] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 92.

[181] Ibid.

[182] Converse, *Rearming for the Cold War 1945-1960*, 118.

[183] Ibid.

[184] Ibid.

and establish a precedent. Instead, Keller's decision, supported by Secretary Wilson, sidestepped the issue. Converse argues this point, noting that "in avoiding the roles and missions controversy surrounding missiles, Keller joined a large group of senior defense officials who for years had been either unwilling or unable to resolve the issue."[185] Unfortunately, service function issues did not end after the Regulus missile controversy. In fact, the Regulus debate foreshadowed a similar inter-service argument between the Army and the Air Force three years later, resulting in the Jupiter missile controversy.

Based on the successful development of the service missile programs, Keller recommended that Secretary Wilson dissolve the Guided Missile Office, so the Regulus decision was one of its terminal actions.[186] Watson indicates the importance of this decision, stating: "the position was abolished on 12 November 1953, as part of a reorganization in which authority to approve missile programs was delegated to the Secretaries of the Military Departments."[187] Nevertheless, as the Regulus missile controversy demonstrated, the 1950 JCS missile agreement was too equivocal; to mitigate inter-service missile competition required the JCS to readdress its missile-development agreement.

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[185] Converse, *Rearming for the Cold War 1945-1960*, 118.

[186] Neufeld, *The Development of Ballistic Missiles in the United States Air Force 1945-1960*, 92.

[187] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 393.

Clarifying Service Functions

Reassessing Guided Missile Responsibilities

In June 1953, after the Regulus Missile Controversy, the JCS reopened the conversation on missile responsibilities. For surface-to-surface missiles specifically, the tension primarily existed between the Army and the Air Force, and the respective service chiefs expressed their opinions on drafting a new agreement. Arguing on behalf of the Army, General Collins emphasized that missiles were a fundamental aspect of achieving the Army's primary functions, quoting both the 1947 National Security Act and the Key West Agreement.[188] For the Army, missiles were considered essential regarding the "conduct of prompt and sustained combat operations on land," and to specifically "defeat enemy land forces."[189] According to Watson, General Collins argued that "future battlefields . . . would be poorly defined and would embrace targets many miles behind the enemy's rear; hence the range of Army missiles could not be arbitrarily restricted."[190] However, while this reasoning supports the need for long-range missiles, it does not necessarily reinforce the Army's claim of jurisdictional assignment. Stated another way, while the Army correctly described the role of missiles on the future battlefield, it did not propose an argument that demonstrated why the Army, and not the Air Force, should be the service developing and operating said missiles.

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[188] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 182.

[189] U.S. Secretary of Defense, "Key West Agreement, 21 April 1948," 159.

[190] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 182.

At the time, General Nathan Twining had recently taken over as the Air Force chief of staff, and presented the Air Force's opinions on the matter. Twining proposed that the Army could develop surface-to-surface missiles, but only if the missile reinforced current conventional artillery weapons or directly supported maneuver operations.[191] Significantly, while this approach did not expressly preclude long-range missiles, it did restrict missiles based on target selection. Watson emphasizes this point, explaining that General Twining set a clear distinction between the service targets, proposing that the Air Force would develop missiles to "interdict enemy land forces, to isolate the battlefield, and to gain air supremacy."[192]

While it appeared that a compromise between the services was close to being realized, the chiefs were slow to address the matter for numerous reasons. In reflecting on his personal experience on the JCS, General Maxwell Taylor, 1955-59 Army chief of staff, explained the challenges of resolving contentious issues by committee. Taylor noted that the JCS always sought unanimity, "since one dissenting Chief can prevent action on an issue for long periods, it is difficult to force consideration of matters unpalatable to one or more of the services."[193] Taylor elaborated, stating:

> Civilian superiors often express acute discontent over receiving split papers which they must then decide, the Chiefs have often been inclined not only to spend excessive time in seeking compromises but even to sweep controversial issues under the rug, where they lie dormant for indefinite periods.[194]

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[191] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 182.

[192] Ibid.

[193] Taylor, *The Uncertain Trumpet*, 94.

[194] Ibid.

Consequently, as missile restrictions were one of the most contentious inter-service issues, it is unsurprising that the matter was tabled at the JCS level. However, at the same time the JCS discussion was occurring, Secretary of Defense Wilson was assessing service functions for clarity.

Defense Department Directive 5100.1: Wilson's Avoidance of Missiles

In March 1954, Secretary of Defense Wilson published DoD Directive 5100.1, which was a direct revision of the 1948 Key West Agreement.[195] In the first section of the directive, Wilson set the new tone for the department, establishing that "no function in any part of the Department of Defense . . . shall be performed independent of the direction, authority, and control of the Secretary of Defense."[196] While the individual service functions remained unchanged, Secretary Wilson did limit the JCS's responsibility, removing the chiefs' role in directing combat operations and elevating their respective service secretaries' authority.[197]

Wilson's 1954 clarification of services did not directly impact the missile competition between the Army and the Air Force; however, because the Regulus missile controversy had just occurred, and the matter was brought to the Defense-Department level, his decision to avoid addressing missile-development responsibility was deliberate.

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[195] U.S. Secretary of Defense, "Department of Defense Directive 5100.1, 16 March 1954," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 253–73, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

[196] Ibid., 255.

[197] Ibid., 271–73.

While Wilson asserted his authority to clarify functions, the overlap that led to effort duplication regarding missile development remained. Given that Wilson's directive did not address missile-development responsibilities, if a change was to occur, the JCS had to address the contentious issue.

The 1954 Missile Agreement

In rehashing service missile-development responsibilities, the JCS once again utilized a consensus-based approach, which resulted in both compromise and ambiguity. In June 1954, the JCS appointed an ad hoc committee to examine the original 1950 missile-responsibility directive and draft an updated version.[198] The committee consisted of a flag officer from each service with extensive missile experience: for example, the Navy representative, Rear Admiral John Sides, was the director of the Guided-Missiles Division in the Office of Naval Operations and had previously served as Keller's Navy deputy in the Guided Missiles Office.[199] Additionally, the Air Force member, Major General Samuel Brentnall, was the assistant deputy chief of staff for Air Force guided missiles and had also served in the Guided Missiles Office.[200]

In drafting the new missile agreement, the JCS directed the ad hoc group to focus on said vague and non-specific areas. According to Watson, they were to recommend a

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[198] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 184.

[199] Charles Lewis, "Biography: Admiral John Harold 'Savvy' Sides (1904-1978)," Find a Grave: Memorials, accessed February 25, 2021, https://www.findagrave.com/memorial/3431134/john-harold-sides.

[200] U.S. Air Force, "Biography: Major General Samuel Robert Brentnall," United States Air Force Biographies, accessed February 25, 2021, https://www.af.mil/About-Us/Biographies/Display/Article/107650/major-general-samuel-robert-brentnall/.

change if "a task might be performed in two or more ways, or a single weapon could accomplish more than one task," but were told by the JCS to keep the spirit of the original directive, "since it was based on the sound premise that missile responsibility should follow assigned Service functions."[201] While the committee intended to address the contentious points, the JCS provided the members limited guidance to do so, and in turn, ambiguity persisted. One month after beginning the undertaking, the three-person committee submitted a draft of updated missile responsibilities to the JCS.[202]

Despite the fact that the committee addressed specific issues regarding surface-to-surface missiles, it failed to do so clearly. While the services generally accepted that strategic intercontinental missiles would be the Air Force's responsibility, it was harder to reach a consensus on the more nuanced missions.[203] Major General Harry Roper—the Army committee member—and General Brentnall were able to reach compromises and agreements, but they only marginally reduced the ambiguity that plagued the first directive. For example, the members compromised that the Army would focus its missiles on "tactical targets of interest to the ground commander," and Brenthall pushed to clarify that these "targets" were on the "battlefield."[204] This led to the services separating missile responsibilities by the levels of war, with the Air Force managing strategic operations and the Army tactical operations.

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[201] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 184.

[202] Ibid.

[203] Ibid.

[204] Ibid.

Most significantly, vague terms such as "tactical target" and "battlefield" were not defined, and range restrictions were excluded. The new proposal, which was approved by Deputy Secretary of Defense Robert Anderson in November 1954, remained similar to the 1950 memorandum it replaced, which allowed for continued misinterpretation. Watson sheds light on the glaring ambiguity of the finalized agreement, noting that "the Army would be allowed surface-to-surface missiles for use against tactical targets within the zone of Army combat operations, a rather elastic phrase that was left conveniently undefined."[205] Once again, while the JCS's intent was likely clear, abstract verbiage left room for interpretation. Additionally, without any mention of range restrictions, the Army could justify theater support missiles at increasingly extended ranges as long as the intended target was "tactical." Just one year later, this was the Army's fundamental argument when the service submitted its IRBM proposal.

Continual use of abstract and undefined terminology, coupled with a requirement to reach a consensus, demonstrated the services' inability to internally resolve contentious issues. This fundamentally calls into questions whether it is realistic to expect military representatives to subordinate their respective service interests in favor of DoD betterment. More specifically, accepting a minor or non-existent role regarding emerging technology would be a hard choice for a senior officer to make, given that it would drop the service in prestige and budget. Predictably, less than a year after the 1954 missile agreement was signed, the outgoing and incoming Army Chiefs of Staff General Matthew Ridgway and General Taylor faced this challenge. Extremely long range

[205] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 185.

missiles outside of the Army's theater-support requirements became a national priority, and to develop one required a very loose interpretation of the 1954 agreement. The catalyst for this rise in the strategic importance of missiles was the threat of a Soviet Union surprise attack.

The Technological Capabilities Panel (TCP)

In the first years of the Eisenhower administration nuclear technology advanced exponentially, and the United States was not the only superpower to make substantial leaps with its missile projects. As Richard Damms explains: "No sooner had the New Look been adopted . . . than several developments seemed to undermine the implicit assumption of American superiority in science, technology, and nuclear weaponry."[206] In March 1954, President Eisenhower met with the Science Advisory Committee to the Office of Defense Mobilization (SAC-ODM), to discuss the growing threat of a nuclear attack by the Soviets. Eisenhower challenged the SAC-ODM to analyze ways the United States could reduce the threat of a surprise attack from the Soviet Union. According to Damms, Eisenhower hoped to have the SAC-ODM provide the government a strategic assessment, which was to be led by Dr. James Killian, to guide a weapons development program "untainted by narrow service interests."[207] Killian subsequently divided the project into three focus areas to steer the newly formed TCP (see Table 1). David Snead details the importance of this decision:

[206] Damms, "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite'," 61.

[207] Ibid., 65.

> The creation of these three panels reflected key assumptions that guided the steering committee. First, it viewed offensive and defensive weapons as integrated components in the defense of the United States. Second, it believed that continental defenses, ranging from early warning to anti-aircraft weapons, were inadequate. Finally, it recognized that the acceleration of Soviet technological developments increased U.S. vulnerability.[208]

Ultimately, this comprehensive view influenced the TCP's approach to its research and shaped its conclusions.

Table 1. Technological Capabilities Panel Focus Areas		
	Focus Area	Chairman
Panel 1	U.S. Offensive Capabilities	Marshall Holloway
Panel 2	U.S. Continental Defense	Leland Haworth
Panel 3	U.S. Intelligence Capabilities	Edwin Land

Source: Created by author from David Snead, *The Gaither Committee, Eisenhower, and the Cold War* (Columbus, OH: Ohio State University Press, 1999), 36.

Not insignificantly, President Eisenhower believed that research on the topic might illuminate unnecessary defense projects, which justified his continual efforts towards fiscal conservatism. As Damms explains: "Eisenhower hoped that Killian and other technical advisers would strengthen his hand in resisting calls from the military services and their allies for major increases in defense."[209] Ironically, the TCP report eventually did the opposite, sparking a massive inter-service missile competition.

[208] Snead, *The Gaither Committee, Eisenhower, and the Cold War*, 36.

[209] Damms, "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite'," 58.

Developing the Report on Soviet Surprise Attack

Strategically, Killian organized a team of scientists for the TCP that according to Damms, "collectively . . . represented the elite of the nation's evolving military-industrial-academic complex."[210] The panel undertook an intensive study over the following months to assess the Soviet problem in-depth. Damms best summarizes the complexity of their research endeavor:

> Killian and the TCP interpreted their mandate broadly, examining the problem of surprise attack within the larger framework of overall offensive and defensive power. During four months of intense activity, the steering committee and its project teams conducted over three hundred meetings, undertook field trips to such major military installations as the headquarters of the Strategic Air Command and the Air Defense Command, and met with dozens of top government officials from the White House, Pentagon, State Department, CIA, AEC, and other agencies.[211]

Overall, the TCP completed an extensive report, and at the beginning of 1955, Killian and his team had the chance to directly brief President Eisenhower on their findings. Consequently, the organization's presentation would serve as the catalyst to the inter-service missile race and the Army's Jupiter pursuit.

Conclusion

The first two years of the Eisenhower administration set the stage for the eventual Jupiter missile controversy; the Army began transitioning missiles from the testing stage to creating actual missile battalions in the force, demonstrating the service's technical capacity. Additionally, based on its established operational requirements, the Army

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[210] Damms, "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite'," 67.

[211] Ibid.

worked to extend its missile ranges out to 500 miles because there was a belief that the future battlefield "zone of operations" required the processing of targets in-depth.[212] Simply put, the ambiguous wording in the 1950s missile-responsibility agreement directly led to inter-service tension and overlap—brought to the forefront by the Regulus missile controversy. Secretary of Defense Wilson did not address the underlying service function debate regarding missiles, and the JCS once again imposed its own restrictions. However, while the JCS updated service missile responsibilities, the organization's continued delineation of missions through abstract and undefined terms such as "tactical targets" and "zone of Army combat operations" brought attention to the organization's inability to resolve missile issues at its level. Given the absence of actual development restrictions, when the TCP identified a strategic need for IRBMs at the beginning of 1955, the Army was both willing and able to compete for the opportunity to develop what became the Jupiter missile.

[212] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 185.

CHAPTER 4

1955-1956: THE JUPITER MISSILE CONTROVERSY

From 1955 to 1956, inter-service competition regarding missile responsibilities between the Army and the Air Force culminated. This two-year period is significant as it spans the entirety of the Army's Jupiter missile pursuit, from the scientific community's identification of IRBMs as strategically important in March 1955 to Secretary Wilson's November 1956 service function clarification memorandum. Analysis of events surrounding IRBM decisions during this period provides insight into the challenges associated with managing emerging technology, and also illuminates three significant factors regarding the Army's Jupiter missile pursuit. First, the Army broadly interpreted the vague language in the 1954 missile-responsibility agreement to pursue an IRBM that it could not operationally justify. Second, via clear missile restrictions, Secretary of Defense Wilson demonstrated his position's centralized authority regarding weapon modernization. Last, the effects of effort duplication became apparent to military leaders and President Eisenhower. This chapter examines the rise of IRBMs as a strategic necessity, the Army's Jupiter pursuit, and the Air Force's attempt to restrict said missile pursuit. The chapter concludes with an analysis of Wilson's service function clarification memorandum.

The Rise of IRBMS

Meeting the Threat of Surprise Attack

As directed by President Eisenhower in 1954, Dr. James Killian and the TCP compiled a detailed report on the growing Soviet threat. In February 1955, the

organization submitted "Meeting the Threat of Surprise Attack" to the White House for review.[213] One month later, Killian and his team briefed their significant findings to President Eisenhower and the NSC.[214] Senior military leaders, including the service secretaries and chiefs, were all in attendance and heard firsthand the TCP's unfiltered recommendations regarding weapon modernization priorities.[215]

In its report, the TCP compared the United States' and the Soviet Union's nuclear delivery capabilities, and assessed the way modernization would adjust the parity between them.[216] This structure illuminated the vulnerabilities the United States could address to deter a potential Soviet strike while also maintaining a strategic advantage. According to the TCP, successful missile development was imperative for U.S. security. In particular, the panel identified that ICBM development would "profoundly affect the military posture of either country."[217] The research organization then recommended that the NSC "formally recognize the present Air Force program for the development of an

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[213] Technological Capabilities Panel, "Report by the Technological Capabilities Panel of the Science Advisory Committee, Washington, February 14, 1955: Meeting the Threat of Surprise Attack," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 41–56, https://history.state.gov/historicaldocuments/frus1955-57v19/d9.

[214] J. Patrick Coyne, "Memorandum of Discussion at the 241st Meeting of the National Security Council, Washington, March 17, 1955: Report to the President by the Technological Capabilities Panel," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 63–68, https://history.state.gov/historicaldocuments/frus1955-57v19/d17.

[215] Ibid.

[216] Technological Capabilities Panel, "Report by the Technological Capabilities Panel of the Science Advisory Committee."

[217] Ibid., 44.

[ICBM] as a nationally supported effort of highest priority."[218] Killian and his team emphasized the importance of ICBMs and noted that the missile should "continue to receive the very substantial support necessary to complete it at the earliest possible date."[219] After detailing the potential nuclear crisis with the Soviet Union, the TCP identified extremely long-range missiles as a strategic necessity. Sarah Bridger further analyzes the ways in which the TCP's conclusions elevated the strategic importance of missiles, noting that "most crucially, the panel predicted that by the end of the decade, the age of the bomber would wane and the age of intercontinental and intermediate range missiles would begin."[220] Although ICBM development became a major priority, the technology was immature, which required an interim solution.

In terms of the Jupiter missile specifically, the TCP's recommendation for a 500-mile range missile—eventually designated as an IRBM—was the report's essential aspect.[221] While ICBMs were the priority, this secondary missile proposal was a more feasible short-term goal. As Michael Armacost notes, "while no specific military requirement existed at the time for" an IRBM, "a consensus emerged within the circle of influential scientific advisers that a missile with this range could be developed, with a reasonable certainty of success, in time to meet the challenge of new Soviet missile

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[218] Technological Capabilities Panel, "Report by the Technological Capabilities Panel of the Science Advisory Committee," 46.

[219] Ibid., 48.

[220] Bridger, *Scientist at War*, 15–16.

[221] Technological Capabilities Panel, "Report by the Technological Capabilities Panel of the Science Advisory Committee," 48.

capabilities."[222] Importantly, the TCP advised that decision-makers consider both land- and sea-launched variants of the IRBM.[223]

Guidance for Wilson

In August 1955, five months after receiving the TCP presentation, the NSC reconvened to discuss potential recommendations.[224] At the session, Secretary Wilson acknowledged that the DoD had previously decided not to pursue a 1,500-mile missile, and he appeared pessimistic about the weapon's potential.[225] On this note, Wilson warned that the DoD had too many active projects and that "big rockets cost twice as much or more than a plane, and can only be used once."[226] However, based on the TCP's findings, Wilson informed the NSC that there were five potential IRBM development plans that he was assessing for feasibility and planned on briefing his recommendations in December.[227] President Eisenhower acknowledged the IRBM December follow-up

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[222] Armacost, *The Politics of Weapons Innovation*, 51.

[223] Technological Capabilities Panel, "Report by the Technological Capabilities Panel of the Science Advisory Committee," 48.

[224] James Lay and Robert Johnson, "Memorandum of Discussion at the 257th Meeting of the National Security Council, Washington, August 4, 1955: Recommendations of the Report to the President by the Technological Capabilities Panel of the Science Advisory Committee," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 95–108, https://history.state.gov/historicaldocuments/frus1955-57v19/d30.

[225] Ibid., 101–2.

[226] Ibid., 101.

[227] Ibid.

meeting and offered executive guidance regarding the new missile.[228] While the president wished to develop some IRBMs as a "threat and a deterrent," he did not "want to produce them in quantity" as the United States could not "fight that kind of war."[229] Even though the president only viewed IRBMs as a minor addition to the military arsenal, he recognized their strategic importance. After his presidency, Eisenhower reflected on the challenge that Wilson faced in developing these new missiles:

> It became clear that the matter of developing ballistic missile was urgent . . . and our development programs were promptly accorded the highest priorities. While it was easy to direct the Defense Department to go full speed ahead, it was not so easy to devise the best organization of the missile program itself.[230]

Ultimately, before Secretary Wilson briefed the department's IRBM plan in December, he had to determine which service would develop the new missile.

The Defense Department's IRBM Development Plan

The Army's Changing Requirements

Since neither Secretary of Defense Wilson nor the JCS established any concrete restrictions on missile development in the 1950 or 1954 missile agreements, the Army was free to interpret its missile needs. However, Armacost points out that while the JCS "never specifically restricted the range of Army surface-to-surface missiles" in the 1954 memorandum, based on the wording, the other services "presumed that [the Army] would

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[228] Lay and Johnson, "Memorandum of Discussion at the 257th Meeting of the National Security Council," 101.

[229] Ibid.

[230] Eisenhower, *Mandate for Change*, 456.

develop and deploy only tactical" missiles.[231] Ultimately, the JCS's choice to use non-specific terms such as "tactical targets" and "zone of Army combat operations," allowed the services to glean the intent of the terms differently.[232] Regarding IRBMs, Robert Watson points out that "the Army might seem excluded under the 1954 agreement, but that service was soon to contend that the 'zone of combat operations' was in fact deep enough to justify use of 1,500-mile missiles."[233] Although General Matthew Ridgway was the Army Chief of Staff when the 1954 agreement was made, General Maxwell Taylor took over the position in June 1955, prior to the Army's Jupiter missile pursuit. Then and now, there remains the potential that unspecific wording may be interpreted differently not just between services, but also within a service. Given the services consistent turnover of leadership, ambiguous language inherently limits any policy's effectiveness and longevity. Stated simply, as each respective service chief is replaced on the JCS, policy with unclearing wording is likely to understood differently.

While tactical missiles remained an Army development priority, with the first Corporal medium-range missile units established in 1955, the service continued to make strides toward its theater-support missile requirement. James Grimwood and Frances Strowd details the challenges of maintaining fire support across a large and fluid battlefield, underscoring that "airlifted assaults over great distances might characterize Army operations, and the transport" of Army missiles "might pose a serious logistic

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[231] Armacost, *The Politics of Weapons Innovation*, 82.

[232] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 185.

[233] Watson, *Into the Missile Age*, 160.

problem."[234] Consequently, extending the range of Army missiles then limited the requirement to move them. Grimwood and Strowd reached a similar conclusion, arguing that "the launching of a long-range ballistic missile from a relatively rear area might prove quite effective as well as economical."[235] Quick to capitalize on the newfound strategic importance of long-range missiles, the Army Staff queried the Army's missile scientists at Redstone Arsenal in March 1955 regarding the feasibility of creating a 1,000 to 1,500-mile capable missile.[236]

By the time of this assessment, the Army had conducted numerous test flights of its Redstone missile—the service's first attempt at a theater-support missile. Headed by Dr. Wernher Von Braun, the Army's team at Redstone Arsenal was confident that they could repurpose the missile's parts and apply its experience to achieve ranges upward of 1,000 miles.[237] Despite the team's confidence, while the Army had the technical knowledge to extend the range of its missiles, there was no new assessment to justify extending its established 150- to 750-mile theater-support missile requirement. Therefore, without an actual requirement, and in order to justify its technical pursuit, the service had to determine how far to push the boundaries of its undefined "tactical battlefield." Without any restrictions and a general lack of faith in the Air Force's willingness to provide support to land operations, the Army had no reason to limit the expansion of its

[234] Grimwood and Strowd, "History of the Jupiter Missile System," 5–6.

[235] Ibid., 6.

[236] Ibid.

[237] Ibid., 3.

fire support capabilities on a nuclear battlefield. Even so, Army Chief of Staff General Matthew Ridgway, who retired in June 1955, was hesitant to propose extending the Army's theater support requirements.

General Ridgway suggested that instead of pursuing a new project, the Army should work to extend the Redstone missile's range to 500 miles—the Army's original goal range for the missile.[238] Armacost argues that "Ridgway's preference for a more modest extension in missile capabilities may have grown out of his awareness that acceptance of a new project is more likely if it can be 'sold' as a necessary modification of an existing program."[239] He goes on to state that Ridgway "may also have been attempting to meet an existing requirement" for theater-support missiles, "while averting a premature clash with the Air Force over the hitherto undefined limits of Army tactical missiles."[240] It can be ascertained that although the language in the 1954 missile-responsibility memorandum was vague and undefined, Army leaders like Ridgway understood its intent. Having personally experienced the backlash of the Regulus missile controversy, there is little doubt that Ridgway fully understood the Air Force's protective attitude regarding extremely long-range missiles. As a result, for the Army to continue down the IRBM path, Ridgway, or his replacement, had to interpret the vague language in the 1954 missile-responsibility agreement broadly.

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[238] Armacost, *The Politics of Weapons Innovation*, 48.

[239] Ibid. Notably, the Army used a similar line of reasoning in its continued pursuit of theater-support missiles in 1957, when it formally requested an exception to Wilson's restrictive policy. Chapter five covers this situation in detail.

[240] Armacost, *The Politics of Weapons Innovation*, 48.

In June 1955, Von Braun presented his team's assessment for building a 1,000-mile capable missile to the Armed Services Policy Council—an advisory board for the defense secretary.[241] The Redstone Arsenal team was confident in their ability and proposed that efforts on the Redstone missile shift to a new missile with a 1,000-mile range.[242] One month later, in July 1955, Von Braun again briefed the advisory committee, proposing that Redstone Arsenal instead develop the newly identified 1,500-mile range missile.[243] The Army had the technological capability to dramatically extend the range of its missiles, even if the service could only loosely justify the need. However, because no restrictions existed to prevent the Army from expanding their tactical requirements, the service officially vied to produce IRBMs.

The Defense Department's Plan

After the August NSC meeting, the DoD had three months to create and brief a formal IRBM development plan from its five potential options. According to Grimwood and Strowd, these distinct programs included "a by-product of the ATLAS ICBM program . . . a United States (US)-United Kingdom (UK) cooperative development program, a Navy ship-based ballistic missile, and the Navy TRITON missile."[244] While the DoD did not include the Army in any of the primary courses of action, the service continued to compete. In fact, the Army challenged the DoD's other IRBM options'

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[241] Grimwood and Strowd, "History of the Jupiter Missile System," 8.

[242] Ibid., 7.

[243] Ibid.

[244] Ibid., 10.

feasibility, contending that the ICBM by-product detracted from the Air Force's Atlas development, that the United Kingdom was inexperienced, and that the Navy's Triton missile was non-ballistic and therefore, could not effectively be repurposed.[245]

Based on the Army's experience and equipment, the service proposed that the Redstone Arsenal team should conduct the missile development.[246] While the other services recognized the Redstone Arsenal team's capabilities, the Air Force was not interested in giving up developmental control. In fact, the Air Force proposed that the Redstone Arsenal team be broken up and utilized across the services, a request that Secretary of the Army Wilbur Brucker rebuked.[247] In September 1955, Von Braun gained a direct audience with Secretary Wilson to outline the benefits of having the Redstone Arsenal Team develop an IRBM, which included an experienced team of scientists, viable facilities, and the repurposing of missile parts.[248] In October, the Army Staff made similar arguments to JCS Chairman Admiral Radford, and shortly thereafter, in anticipation of approval, Army Chief of Staff General Taylor directed the Army to begin the IRBM development plan.[249]

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[245] Grimwood and Strowd, "History of the Jupiter Missile System," 10–11.

[246] Ibid., 11.

[247] Ibid., 10.

[248] Ibid., 11.

[249] Ibid.

Wilson's Decision

The Army did not have to wait long for Secretary Wilson's final decision; in November 1955, in preparation for the December brief to the NSC, the DoD submitted its missile development recommendations.[250] The department eliminated most of the potential IRBMs and moved forward with only two projects, a surface- and a sea-launched IRBM variant.[251] Rosenberg argues that the inter-service competition for IRBM development approval ended "in the fashion of so many of the earlier missile disputes—in a compromise. It was a compromise not completely satisfactory to any of the services and, more significantly, not completely satisfactory as the solution to the problem at hand."[252] The first project—designated as IRBM number one—was a land-based Air Force program. The second project—designated as IRBM number two—was an Army-Navy joint project with the "dual objective of achieving an early ship-launched capability and also providing a land-based alternative to the Air Force program."[253] Markedly, before the services began IRBM development, the DoD had established the Air Force

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[250] Department of Defense, "Report on the Department of Defense Intercontinental Ballistic Missile and Intermediate Range Ballistic Missile Programs, November 30, 1955," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 161–66, https://history.state.gov/historicaldocuments/frus1955-57v19/d44.

[251] Ibid., 162–63.

[252] Max Rosenberg, "Plans and Policies for the Ballistic Missile Initial Operational Capability Program," (Declassified Government Report, USAF Historical Division Liaison Office: Washington, DC, February 1960), 23, https://media.defense.gov/2011/Mar/21/2001330258/-1/-1/0/AFD-110321-028.pdf.

[253] Department of Defense, "Report on the Department of Defense Intercontinental Ballistic Missile and Intermediate Range Ballistic Missile Programs," 162–63.

IRBM as a higher priority than the Army's. Although the numerical designation could be viewed as simple distinctions, recognizing the Army's effort as an "alternative to the Air Force" left little room for interpretation.

Additionally, Wilson assigned Secretary of the Navy Charles Thomas as chairman for the joint venture and assigned Secretary of the Army Brucker the subordinate role of vice-chairman.[254] With this act, Wilson made it clear that the second IRBM was first and foremost a Naval project. In fact, beyond the desired experience of the Redstone Arsenal team, the Army's authorization to develop the alternate land IRBM was proposed because "in the development of a missile for ship-launching it is necessary to go through a land-launched phase," thus minimal modifications could provide an alternate land-based missile.[255] Taking this into account, from the onset, the Army's IRBM project was designed to augment the Air Force as an accepted effort duplication.

Before briefing the DoD's missile plan, Secretary Wilson addressed some budgetary issues to the NSC regarding the new capabilities, noting "the various recent reports and recommendations, such as those of the Killian Committee, were putting a very expensive load on the budget of the Defense Department," and "according to the unilateral estimates of the Services, it would cost approximately $45 billion a year for some years" to build these capabilities.[256] With the 1957 established budget at $38.5

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[254] Department of Defense, "Report on the Department of Defense Intercontinental Ballistic Missile and Intermediate Range Ballistic Missile Programs," 163.

[255] Ibid., 163–65.

[256] S. Everett Gleason, "Memorandum of Discussion at the 266th Meeting of the National Security Council, Washington, November 15, 1955," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United

billion, both Secretary Wilson and JCS Chairman Admiral Radford expressed their concern to the NSC regarding the DoD's ability to meet expectations.[257] Missiles, in particular, complicated this issue (see Table 2). Shortly after submitting its report, the DoD presented its proposal to the president and the NSC.

Table 2. Estimated ICBM & IRBM Expenditures 1955-1957 (millions)			
	1955	1956	1957
ICBM	$156	$355	$582
IRBM	0	$89	$269

Source: Department of Defense, "Report on the Department of Defense Intercontinental Ballistic Missile and Intermediate Range Ballistic Missile Programs, November 30, 1955," in Foreign Relations of the United States, 1955-1957, National Security Policy 19 (Washington, D.C.: United States Government Printing Office, 1990), 166, https://history.state.gov/historicaldocuments/frus1955-57v19/d44.

Toward a Decision: Eisenhower and Dual-Track IRBMs

In December 1955, Deputy Secretary of Defense Reuben Robertson began the missile presentation by outlining the DoD's plan for the two IRBMs. Eisenhower was surprised by the DoD plan and questioned the lack of IRBM development progress since his July directive.[258] Significantly, the president officially elevated IRBMs to the same

States Government Printing Office, 1990), 146, https://history.state.gov/historicaldocuments/frus1955-57v19/d40.

[257] Gleason, "Memorandum of Discussion at the 266th Meeting of the National Security Council," 148.

[258] S. Everett Gleason, "Memorandum of Discussion at the 268th Meeting of the National Security Council, Camp David, Maryland, December 1, 1955," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington,

level of priority as ICBMs for research and development.[259] Eisenhower later reflected on this decision and the importance of emphasizing IRBM development:

> I realized that the political and psychological impact on the world of the early development of a reliable IRBM would be enormous, while its military value would, for the time being, be practically equal to that of the ICBM, since the former located on bases on foreign soil, could strike any target in Communist areas as well as could an ICBM fired from the United States.[260]

This realization aside, President Eisenhower had reservations about the dual-track missile development proposal, and he was reluctant to approve the duplicative effort.

Three weeks after the DoD presentation, on 21 December 1955, President Eisenhower formally approved the DoD's missile development plan, allowing the Army to pursue the Jupiter missile in earnest. In an official memorandum to Secretary of Defense Wilson, Eisenhower explained his approval as follows:

> It was with some qualms that I approved the plan of allowing three different Services to work on the problem of long-range ballistic missiles. This doubt was inspired not only by historical difficulties in achieving adequate coordination among the Services, but because of the uneasy feeling in my own mind that the August-to-November delay in issuing the necessary Defense directives in this matter had been occasioned by arguments among them as to who was to carry the responsibility. All this seemed to me to presage similar difficulties in the future. However, on your assurance that in the current plan all such differences were, and would continue to be, eliminated and that in your opinion two separate programs could be carried on simultaneously and with the resulting benefits of competition,

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DC: United States Government Printing Office, 1990), 169, https://history.state.gov/historicaldocuments/frus1955-57v19/d45.

[259] Gleason, "Memorandum of Discussion at the 268th Meeting of the National Security Council," 170.

[260] Eisenhower, *Mandate for Change*, 457. Notably, President Eisenhower understood an IRBM's definition as a missile with ranges between 1200-1500 miles.

> all to be achieved without mutual interference, I approved the system that the Defense Department suggested.[261]

Although Eisenhower authorized all the services to develop IRBMs, it appears that the president feared that the DoD was inefficiently handling the problem. Damms states pointedly: "Ironically, Eisenhower's decisions in the missile field fostered the very interservice rivalry that he had hoped to circumvent by turning to SAC-ODM in the first place."[262] Essentially, with these actions, President Eisenhower enabled the inter-service IRBM race.

The IRBM Race

Given Secretary Wilson's indecisive history and avoidance of missile disputes, the Army's successful creation of an IRBM could be directly associated with its operational employment, which was particularly applicable if the Army developed it before the Air Force. While this premise was faulty—with Wilson resolving the issue well before missile completion—it drove the competition between the services. As Watson explains, "the two development teams raced to be the first to produce a usable weapon" to support their respective service claims regarding IRBM usage.[263] In 1956, the race officially began in earnest, with the Air Force and the Army taking distinct IRBM development approaches. However, neither service made much progress with their

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[261] Gleason, "Memorandum of Discussion at the 268th Meeting of the National Security Council," 170.

[262] Damms, "James Killian, the Technological Capabilities Panel, and the Emergence of President Eisenhower's 'Scientific-Technological Elite'," 69.

[263] Watson, *Into the Missile Age*, 164.

respective missiles before Secretary of Defense Wilson clarified service functions in November 1956. The following section analyzes the Army's general approach and philosophy regarding the Jupiter missile.

The Army-Navy Endeavor

While the dual-use Army-Navy missile plan may have seemed a logical means to developing an alternate land-based IRBM, for both organizations, respective service-specific requirements hampered the missile's progress. Particularly, balancing Navy preferences created a challenge for the Army, as its project—the Jupiter missile—was a secondary objective to the directed sea-launched IRBM variant. As Grimwood and Strowd explain, the problems between the services "stemmed mainly from the reconciliation of requirements for the two services into a single missile."[264] The most significant of these issues revolved around fuel type. The Army's previous missiles, the Redstone and Corporal, utilized liquid fuel. Because the Army's Jupiter development plan relied heavily on its previous experience—and to some extent the repurposing of equipment from these missiles—logically, the Army intended to utilize liquid propellant for the Jupiter.[265] In contrast, Watson argues that the Navy preferred to design a missile that used solid fuel because it was "safer and more convenient to store and handle," offering significant advantages "for shipboard use."[266] In April 1956, Secretary Wilson

[264] Grimwood and Strowd, "History of the Jupiter Missile System," 32.

[265] Ibid., 32–35.

[266] Watson, *Into the Missile Age*, 162.

authorized the Navy to study the potential feasibility of utilizing solid fuel for the sea-launched IRBM.[267]

In addition to fuel, the two services were also at odds regarding missile size, because technological advancements in warhead miniaturization made smaller missiles possible. Grimwood and Strowd emphasize this point, noting that while the "Army could handle a rather lengthy weapon," because of ship limitations, "the Navy required a weapon as short as possible."[268] In sum, early into joint-IRBM development, it became clear that the Army's project was not the natural derivative of the Navy missile as was initially intended. Because the sea-based IRBM variant remained a DoD requirement, the Navy's project was never in jeopardy. However, the potential setbacks did not deter the Army from developing a land-based IRBM distinct from the Air Force.

The Jupiter Missile

The Army did not view the Air Force's IRBM—Thor—as a threat to the Army mission to conduct land warfare; instead, the Army appears to accepted this overlap and effort duplication. As Armacost notes, "the Army was not pursuing a quest for exclusive jurisdiction over the IRBM."[269] In contrast, because the Air Force was concerned with service function encroachment, the Army's authorization to develop an IRBM was considered a threat to its assigned missions. Further, A.J. Bacevich notes that to the Air Force, "successful Army missile initiatives could undercut the rationale for Air Force

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[267] Grimwood and Strowd, "History of the Jupiter Missile System," 126.

[268] Ibid., 32.

[269] Armacost, *The Politics of Weapons Innovation*, 96.

bomber or missile programs. Thus, the Air Force was determined that if the United States needed an IRBM, it would be its own candidate, Thor."[270]

In contrast, the Army envisioned the IRBM's military purpose as a mobile missile, which, as opposed to the Air Force's Thor, could be maneuvered around the battlefield and would be less vulnerable to a Soviet surprise attack.[271] General Gavin argued this point, contending that "all nuclear missiles should be highly mobile," pointing out that "the Germans learned this lesson in World War II, when their concrete bases were completely destroyed, while their mobile missile units were not harmed until overrun by our ground forces."[272] In 1958, Gavin reflected on the Army's goals for the new missile:

> I was responsible for developing the tactical characteristics of the Army's [IRBM], the Jupiter. It was designed to be as mobile as any piece of equipment in the present-day field army. It was designed for movement on highways to launching areas through all kinds of weather. Neither rain nor snow nor fog nor extremes of temperature can impair its launching. Furthermore, its over-all configuration is such that it can be stored in highway and rail tunnels.[273]

It should be noted that missile characteristics—mobile instead of fixed-site—do not fundamentally alter the role that the weapon is fulfilling.

Over the course of the year, the services remained in a direct IRBM competition, respectively assuming that their technological successes would warrant operational responsibility. Service function adjustments remained Secretary Wilson's authority, and

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[270] Bacevich, *The Pentomic Era*, 90.

[271] Armacost, *The Politics of Weapons Innovation*, 95.

[272] Gavin, *War and Peace in the Space Age*, 145.

[273] Ibid.

although the Jupiter was the "alternate" IRBM, there was nothing to suggest that Wilson planned on clarifying missile-employment responsibilities. In fact, the DoD set the precedence of non-decision regarding guided missiles. As Armacost notes, "the Thor-Jupiter controversy might have been rendered clearer by a Secretary of Defense confident of his grasp of the strategic issues and determined to provide legislative leadership in defense policy making."[274] Instead, Wilson's leadership approach fostered inter-service competition between the Army and the Air Force. Before Wilson eventually resolved the issue, and, to avoid similar effort duplication, President Eisenhower weighed in on the Army's Jupiter pursuit and provided his expectation for the JCS.

Questioning the Army's Jupiter Pursuit

On 22 March 1956, three months after issuing his IRBM guidance, President Eisenhower formally discussed his concerns regarding duplicative military efforts with the JCS.[275] The president noted that "since there were several programs designed to produce long-range or shorter-range missiles, the exercise of selectivity would ultimately permit us to concentrate on the best long-range missile and the best short-range missile."[276] Specific to the land-based IRBM debate, this comment suggested that the

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[274] Armacost, *The Politics of Weapons Innovation*, 273.

[275] S. Everett Gleason, "Memorandum of Discussion at the 280th Meeting of the National Security Council, Washington, March 22, 1956: Duplications of Anticipated Trends in the U.S. Military Program," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 268–74, https://history.state.gov/historicaldocuments/frus1955-57v19/d67.

[276] Ibid., 273.

DoD should eventually settle on either the Air Force's Thor or the Army's Jupiter. Based on the initial directive, the sole requirement was a single land-based IRBM, and Eisenhower's comment only reinforced the Army's "race" to operationalize the Jupiter. As Armacost explains, it was "widely assumed that either the Thor or the Jupiter project would be eventually cancelled, and the Air Force missile had been designated IRBM No 1."[277] JCS Chairman Admiral Radford acknowledged the president's intent and subsequently informed Eisenhower that the problem of redundant systems extended beyond the IRBM race and included numerous missile types.[278]

One week after Radford's comments, in a budget meeting with DoD officials, President Eisenhower again raised his concerns regarding IRBMs.[279] The DoD's notes highlight the president's aversion to an Army IRBM project specifically: "the President questioned why the Army should have a 1500-mile ballistic missile program, since the Army does not have the equipment to see where they are hitting."[280] Beyond expressing doubt regarding the Army's IRBM, the president alluded that the Air Force "ought to be

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[277] Armacost, *The Politics of Weapons Innovation*, 91.

[278] Gleason, "Memorandum of Discussion at the 280th Meeting of the National Security Council," 273.

[279] "Notes on a Meeting with the President, President's Office, White House, Washington, March 29, 1956: Memorandum Prepared by Defense, in Response to Request from the President, Concerning 1957–58 Defense Budget Picture," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 276–79, https://history.state.gov/historicaldocuments/frus1955-57v19/d69.

[280] Ibid., 278.

the boss" of these new long-range guided missiles.[281] As a result, without explicitly directing the DoD, Eisenhower expressed his opinion regarding IRBM service function clarification, underscoring his disinclination to the ongoing effort duplication. Importantly, the services did not have a representative at the meeting, so Eisenhower made these comments to Deputy Director of Defense Robertson and Admiral Radford.

The following day, Eisenhower had the opportunity to continue the conversation with the JCS. He commented to the service chiefs that he "tends to look on the 1500- and 5000-mile missiles as being in the same class operationally."[282] He stated that "it would be most harmful to have public quarreling over the responsibility for employment of such missiles."[283] With this comment, Eisenhower identified a potential secondary consequence of the accepted effort duplication that Secretary Wilson may not have accounted for. With the Army's IRBM pursuit a divisive point between the services, Eisenhower followed up his JCS meeting with a one-on-one sit down with Army Chief of Staff General Taylor.

When President Eisenhower met with General Taylor in April 1956, it was an informal conversation regarding developing Army programs such as guided missiles and

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[281] "Notes on a Meeting with the President," 279.

[282] Andrew Goodpaster, "Memorandum of a Conference with the President, White House, Washington, March 30, 1956," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 280, https://history.state.gov/historicaldocuments/frus1955-57v19/d70.

[283] Ibid., 280–81.

aviation.[284] For missiles specifically, General Taylor provided the president updates on the three Army missile types—short-, medium-, and long-range—and described how the Army would employ these systems on its envisioned future battlefield.[285] However, President Eisenhower quickly turned the conversation to the Jupiter missile and questioned Taylor directly on whether or not there was an Army utility to firing a missile 1,500 miles.[286]

General Taylor was candid with the president, noting that the Jupiter was "being developed by the Army to take advantage of Redstone experience," but he confessed that "the Army had no clear proposals for using it at this time."[287] While General Taylor attempted to describe the potential for a theater-support missile operating in North Africa or Central Europe, the president seemed doubtful about such an endeavor's coordination and accuracy.[288] Taylor, in response, asked that "no decision be taken now freezing the Army out."[289] He argued: "it should be up to the Army to incorporate what they can best use in the performance of their operations . . . there is good reason to feel that close

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[284] Andrew Goodpaster, "Memorandum for the Record of a Meeting between the President and the Chief of Staff, United States Army (Taylor), White House, Washington, April 2, 1956," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 283, https://history.state.gov/historicaldocuments/frus1955-57v19/d71.

[285] Ibid., 284.

[286] Ibid.

[287] Ibid.

[288] Ibid.

[289] Ibid.

support air operations are fading out of the picture. Missiles will take over this function."[290] In offering his guidance to General Taylor, the president implied that he did not support the Army's Jupiter pursuit, as he generally opposed "a service assuming or duplicating a function simply because of lack of confidence that another would perform it."[291] Further, in support of Army operations, Eisenhower made it clear to General Taylor that if the Air Force was not fulfilling its primary support functions to the service such as interdiction and support to combat operations, it was the Army's responsibility to address the issue with Secretary Wilson or directly with him.[292] Shortly thereafter, as he began to see the secondary impacts of IRBM effort duplication, the president's dissatisfaction with these projects would extend beyond missile development.

JCS Expectations: Avoiding Effort Duplication

Over the course of his time in office, President Eisenhower was regularly frustrated with the JCS, particularly as it pertained to budgetary issues. Amid the IRBM competition, Eisenhower confided to his long-time friend Everett Hazlett:

> When each Service puts down its minimum requirements for its own military budget for the following year, and I add up the total, I find that they mount at a fantastic rate. There is seemingly no end to all of this. Yet merely 'getting tough' on my part is not an answer. I simply must find men who have the breadth of understanding and devotion to their country rather than to a single Service that will bring about better solutions than I get now.[293]

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[290] Goodpaster, "Memorandum for the Record of a Meeting between the President and the Chief of Staff, United States Army (Taylor)," 284.

[291] Ibid.

[292] Ibid., 284–85.

[293] Eisenhower, *Mandate for Change*, 455.

In March 1956, the president discussed these issues with the JCS, explaining that he expected "each Chief to subordinate his position as a champion of a particular Service to his position as one of the overall national military advisors."[294] This demonstrates an expectation that the JCS—and, by extension, its subordinate committees—was and is required to overcome individual service prerogatives. In fact, the president suggested that he wanted the services to "seek to be the first to suggest places where the program can be cut—particularly on a basis of one Service giving up a function if another Service would perform it."[295] In essence, Eisenhower envisioned a selfless JCS, and was hopeful that the organization could embrace a collaborative mindset.

The following week, 5 April 1956, President Eisenhower followed up on his JCS expectations. The president noted that the individuals assembled represented the DoD and should express the "corporate opinion," adding that "single service opinions and points of view are not of value."[296] In May, this conversation culminated. President Eisenhower noted that he was "inclined to think that the Chiefs of Staff system we now have has failed . . . Apparently the system is wrong."[297]

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[294] Goodpaster, "Memorandum of a Conference with the President, March 30, 1956," 281.

[295] Ibid.

[296] Andrew Goodpaster, "Memorandum of a Conference with the President, White House, Washington, April 5, 1956," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 286, https://history.state.gov/historicaldocuments/frus1955-57v19/d72.

[297] Andrew Goodpaster, "Memorandum of a Conference with the President, White House, Washington, May 18, 1956, 9 a.m.," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States

In general, this failure of cooperative efforts raises fundamental questions regarding the JCS's ability to manage emerging technology. The 1950s missile issues underscore the challenges that individual chiefs face in subordinating their service priorities to support the larger military mission. Although the modern emphasis on joint operations did not exist in the 1950s, President Eisenhower expressed his concerns regarding effort duplication and set clear expectations for the JCS. However, based on the missile competition in the 1950s, it is fair to assume that inter-service competition and unnecessary duplication regarding emerging technology is likely to occur when ambiguous responsibilities concern its use and development. In order to mitigate unwanted competition, a central authority must establish clear service responsibility—even if inclusive—and not rely on an expected altruistic approach from the services.

Resolving the Jupiter Missile Controversy

The Air Force Fights for Missile Restrictions

In August 1956, frustrated with the Army's encroachment on its assigned missions, Secretary of the Air Force Donald Quarles attempted to halt the Army's Jupiter missile project by having the Secretary of Defense Wilson clarify missile responsibilities. Secretary Quarles formally expressed the Air Force's concern over the Army's pursuit of an IRBM, urging Wilson to restrict the Army's ability to develop surface-to-surface missiles to systems with a range of 200 miles or less.[298] According to Condit, Quarles

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Government Printing Office, 1990), 305, https://history.state.gov/historicaldocuments/frus1955-57v19/d78.

[298] Condit, *The Joint Chiefs of Staff and National Policy 1955-1956*, 65.

justified his proposed range restriction by arguing that it allowed the Army to place their systems a "suitable distance behind front lines and still strike targets 100 miles beyond those lines."[299] Of note, Quarles' objective in airing grievances to Wilson was not to justify the Air Force's project. Instead, as was consistent with the Air Force's missile complaints throughout the 1950s, Quarles attempted to discredit the Army's capability need and gain full control of the new weapon. This point reinforces the differing views of the services. By directly associating missiles with service functions, the Air Force could view Army missile projects as an attempt to obtain resources and missions unjustly. In contrast, the Army viewed missiles as a battlefield tool and did not demonstrate any concern regarding other services' functions around their development.

Proactively, Secretary Wilson asked the JCS to review Quarles' proposal before making any decisions. Similar to the Air Force's earlier range restriction proposals, the other services initially opposed the 200-mile restriction as an arbitrary and unnecessary limitation that could have potentially long-term impacts on future warfare capabilities.[300] According to Condit, General Taylor—supported by Chief of Naval Operations Admiral Arleigh Burke—contended that "ground combat operations of the future would require weapons systems of considerably greater range than those now available, which, because of superior accuracy and dependability, should be guided missiles under Army control rather than Air Force fighter-bombers."[301] Unsurprisingly, Air Force Chief General

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[299] Condit, *The Joint Chiefs of Staff and National Policy 1955-1956*, 65.

[300] Ibid.

[301] Ibid.

Twining supported Secretary Quarles' recommendation. Echoing the Regulus missile controversy from 1953, the Air Force was once again outvoted in missile disputes.

General Twining reframed the range-restriction argument, instead shifting the debate to clarity and efficiency. According to Condit, Twining argued that "the assignment of responsibility made by the Secretary of Defense in November 1954 was in general terms and subject to varying interpretations, a specific range limit was needed to prevent costly duplication of effort."[302] This only further illuminates the continuing issues that equivocal language creates regarding missile development. Additionally, it demonstrates that the military members of the time were aware of the effort duplication the policies allowed and the respective cost to the DoD. Importantly, building on the arguments of his predecessors, Twining contended that the Army could not exploit an explosion beyond 100 miles—anything beyond that distance should be categorized as interdiction mission, an Air Force responsibility.[303]

Next, the JCS convened to discuss Quarles' recommendation and prepare a formal report for Secretary Wilson. While the respective services' positions had already been outlined, Admiral Radford offered his opinion on the matter. Although Radford technically sided with the Air Force, he was more flexible on the specific mile restrictions, suggesting the Army's limit extend to 250 miles.[304] After the meeting, which lacked consensus, the JCS decided to submit four separate statements to Secretary

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[302] Condit, *The Joint Chiefs of Staff and National Policy 1955-1956*, 65–66.

[303] Ibid., 66.

[304] Ibid.

Wilson, with only General Taylor arguing against range restrictions.[305] The report, submitted on 25 October 1956, provided Secretary Wilson an opportunity to resolve the issue and clarify missile responsibilities.

Clear and Concise Missile Responsibilities

In November 1956, frustrated with the service chiefs' inability to reach a consensus on numerous contentious issues, Secretary of Defense Wilson took definitive and precise action. In his memorandum, the "Clarification of Roles and Missions to Improve the Effectiveness of Operation of the Department of Defense," Wilson took a strong stance on five significant inter-service competition issues: Army use of aircraft, adequacy of airlift, air defense, Air Force support to the Army, and IRBMs.[306] The memorandum carried a drastically different tone than earlier adjustments of service functions, as Wilson delineated that despite a lack of consensus amongst the JCS members, the clarification of responsibilities was necessary to establish explicit and directed changes to better the department.[307] He began the memorandum by justifying his actions: "there are times when conditions require that changes should be made in administrative responsibilities and at such times decisions are mandatory. That is the

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[305] Condit, *The Joint Chiefs of Staff and National Policy 1955-1956*, 66.

[306] U.S. Secretary of Defense, "November 1956 Memorandum: Clarification of Roles and Missions to Improve the Effectiveness of Operation of the Department of Defense," in *The United States Air Force: Basic Documents on Roles and Missions* (Washington, DC: Office of Air Force History, United States Air Force, 1987), 293–301, https://media.defense.gov/2010/May/25/2001330272/-1/-1/0/AFD-100525-080.pdf.

[307] Ibid.

situation now."[308] Wilson's intent was not to recraft service functions, but he observed, as did many others, a growing misinterpretation of intended responsibilities across numerous missions. Wilson noted that the "development of new weapons and of new strategic concepts, together with the nine years operating experience by the Department of Defense have pointed up the need for some clarification and clearer interpretation of the roles and missions of the armed services."[309]

In the new policy, Secretary Wilson explicitly addressed missile development. He alleviated any confusion surrounding IRBMs, declaring that "operational employment of the land-based Intermediate Range Ballistic Missile system will be the sole responsibility of the U.S. Air Force."[310] Beyond simply assigning the Air Force the new missile, the choice to include the term "sole responsibility" alleviated any ambiguity. In addition to removing IRBMs from the Army, the secretary imposed specific range restrictions, declaring that "the U.S. Army will not plan at this time for the operational employment . . . of any other missiles with ranges beyond 200 miles."[311] This restriction mirrored the Air Force recommendation, and similarly to Secretary Quarles, Secretary Wilson justified the 200-mile restriction. Of note, this justification defined the Army zone of operations "as extending not more than 100 miles beyond the front lines."[312] This specific term is a

[308] U.S. Secretary of Defense, "November 1956 Memorandum," 293.

[309] Ibid., 294.

[310] Ibid., 300.

[311] Ibid.

[312] Ibid., 299.

callback to the 1954 missile-responsibility memorandum, in which the Army's zone of operations was undefined and continually misinterpreted.

In addition to clarifying these issues to the respective services, Secretary Wilson deemed it necessary to publish his memorandum to Congress and release it to the press.[313] The decision to promulgate his memorandum was based on numerous factors, including the services' growing public campaigns, but ultimately, by using his office authorities, Wilson finally and unequivocally clarified the Army's missile development responsibilities. Armacost argues that Wilson's decision to clarify the main inter-service competition issues was based on a "desire not to leave a series of unresolved disputes to his successor."[314] Conspicuously, less than a year after publishing this controversial memorandum, Secretary Wilson retired from office.[315] Although the Army was quick to reopen the conversation to gain a theater-support missile—a requirement that Wilson disregarded—the 1956 missile policy demonstrates the secretary of defense's essential role in emerging technology management.

Conclusion

It is no understatement that inter-service competition dominated the latter half of Eisenhower's first term, especially since the ambiguous language prevalent in the established service functions, and subsequent missile-responsibility memorandums,

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[313] U.S. Secretary of Defense, "November 1956 Memorandum," 301.

[314] Armacost, *The Politics of Weapons Innovation*, 119.

[315] Historical Office of the Office of the Secretary of Defense, "Biography: Charles E. Wilson," accessed November 10, 2020, https://history.defense.gov/Multimedia/Biographies/Article-View/Article/571268/charles-e-wilson/.

allowed the Army to compete for a weapon system without a justifiable service need. As Armacost explains, "it was difficult to persuade the Air Force, the Secretary of Defense, and the President that such a rocket could appropriately be designated 'tactical.'"[316] Although President Eisenhower authorized the dual-track IRBM approach, he did so begrudgingly and continued to question the effort duplication and the impact it had on his fiscally conservative policies. Additionally, Eisenhower expressed his frustrations with the JCS and the members' inability to subordinate their individual interests. Likewise, after years of indecision, Wilson finally attempted to resolve the most contentious DoD issues with clear and concise language. His 1956 service function memorandum drastically altered the Army's missile development authorities, forcing the Army to readdress its role on the future battlefield. As Brian Linn explains, the new policy not only "destroyed the service's space rocket program but also undercut its ability to wage the long-range, mobile, deep-penetration operations called for in its atomic war doctrine."[317] Overall, the lessons from the Army's Jupiter missile pursuit, and the services' inability to delineate developmental responsibility for missiles, illuminate the challenges of efficiently managing emerging technology.

[316] Armacost, *The Politics of Weapons Innovation*, 83.

[317] Linn, *Elvis's Army*, 86.

CHAPTER 5

THE AFTERMATH

Although Secretary of Defense Charles Wilson established a clear DoD policy in 1956 regarding missile development, the Army continued to fight for theater-support missiles, which was an operational need established in 1950 as a tactical requirement that envisioned ranges up to 750 miles. Additionally, although Wilson's actions ended the IRBM race, the short-lived effort duplication had consequences that the president and the DoD had to face. To better understand the aftermath of the DoD's management of missiles, this chapter analyzes the Army's 1957 efforts to create an exception to the missile-development policy, and then examines the varying impacts of effort duplication on the DoD.

The Army Fights Back: Pursuing Theater-Support Missiles

In the summer of 1957, Secretary Wilson publicly reinforced his stance restricting the Army's missile programs. The service subsequently enlisted the president's help to gain approval to extend the Redstone missile's range.[318] Eisenhower captured his opinion on the matter in his diary on 5 August 1957:

> The Army . . . requested authority to introduce a solid propellant which it is alleged would give the missile an effective range of 400 to 500 miles (not 800 as alleged in the question directed to Mr. Wilson). The Army also states that its plan would be to use this weapon to get greater flexibility, but dependent completely upon the Air Force for reconnaissance necessary to report targets and results of findings . . . Actually the whole proposition seems sensible to me, particularly in

[318] Dwight Eisenhower, "Diary Entry by the President, August 5, 1957," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 573, https://history.state.gov/historicaldocuments/frus1955-57v19/d135.

> that development costs would be limited to modification for the change in fuel. I suggested that the Chief of Staff seek an appointment at once with the Secretary of Defense, telling the Secretary that he was doing so at my instruction.[319]

Eisenhower expressed these thoughts to General Taylor, and over the next couple of weeks, he hosted numerous meetings to discuss the Army's desire to exceed its 200-mile restriction.

On 12 August 1957, President Eisenhower held a conference with senior defense officials to discuss the Army's desire to acquire a theater-support missile. Going into the meeting, Gates Brown contends that "President Eisenhower was sympathetic to Army leader's arguments concerning the need for longer range missiles."[320] During this meeting, Secretary of the Army Brucker and Army General Lyman Lemnitzer argued that the Army had a "definite need for a missile of the 500-mile range, not so much to reach out into the enemy territory as to provide security for the missile itself by placing it well to the rear to fire in support of front line troops."[321] Although Eisenhower conceded that decisions regarding planning and evaluation of weapons systems fell within DoD responsibilities, he urged requirements be based on operational needs, explaining that "no service should feel that it is restricted within a rigid range ceiling."[322] He went on to

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[319] Eisenhower, "Diary Entry by the President, August 5, 1957," 573.

[320] Brown, *Eisenhower's Nuclear Calculus in Europe*, 68.

[321] John Eisenhower, "Summary of a Conference on the Army Missile Program, Washington, August 12, 1957, 10:30 a.m.," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 585, https://history.state.gov/historicaldocuments/frus1955-57v19/d139.

[322] Ibid., 585–86.

acknowledge the Air Force's lack of emphasis on tactical air support and the potential missiles in supplementing Air Force support.[323] While the issue was not fully resolved at the time, the meeting made clear that the president supported the Army's new missile endeavor.

The conversation between President Eisenhower and Secretary Wilson regarding Army theater-support missiles continued over the next few months, but the matter was not resolved until Wilson left office. On 14 October 1957, in one of the first meetings Eisenhower had with newly appointed Secretary of Defense Neil McElroy, the leaders agreed to let the Army move forward with their new missile.[324] Given that Wilson's restrictions did not account for the Army's assessed and articulated battlefield requirements, the Army continually questioned the policy. This matter, in particular, demonstrates Eisenhower's leadership style, including his willingness to allow the defense secretary to make decisions and the president's hesitancy to overrule him. Additionally, while not a vague policy like its predecessors, the challenges to the 1956 missile policy underscore the difficulty of managing emerging, and continually maturing technology. Nevertheless, while IRBM effort duplication was short-lived, it was not without consequences.

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[323] Eisenhower, "Summary of a Conference on the Army Missile Program," 585–86; Brown, *Eisenhower's Nuclear Calculus in Europe*, 68–69.

[324] Andrew Goodpaster, "Memorandum of a Conference with the President, White House, Washington, October 14, 1957," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 606, https://history.state.gov/historicaldocuments/frus1955-57v19/d147.

The Cost of Duplication

Missile development in the 1950s is an easily identifiable example of effort duplication, a situation epitomized by the 1956 multi-service pursuit of IRBMs. While the DoD's minimal restriction approach intensified inter-service competition, it also led to the rapid development of emerging technology. Gates Brown, for example, argues that "the competition between the Army and the Air Force made the U.S. IRBM program better."[325] It appears obvious then, that effort duplication, while inherently inefficient, has benefits. Michael Armacost agrees, saying that "if a technical problem urgently demands a solution, duplicative efforts may be warranted in order to accelerate this learning process."[326] He adds that "where military problems urgently demand solution, the support of parallel development programs may constitute a defensible method of overcoming technical difficulties."[327] Nonetheless, while duplicative efforts may have expedited missile innovations, the direct and timely implications of the intense competition between the Army and the Air Force created serious issues for the DoD. For analysis purposes, these issues fit into three categories: economic, opportunity cost, and unintended consequences.

Economic

First and foremost, missile effort duplication was not in line with President Eisenhower's fiscally conservative approach to the military, as multiple services

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[325] Brown, *Eisenhower's Nuclear Calculus in Europe*, 61.

[326] Armacost, *The Politics of Weapons Innovation*, 16.

[327] Ibid., 260.

spending money on comparable projects strained a limited defense budget. In fact, in 1955 and 1956, missile spending accounted for 20% of the defense budget—twice the amount Secretary Wilson asserted was sustainable.[328] Amidst the IRBM race, Wilson explained to the president that it was "proving to be very difficult to keep the current expenditure rate in the Defense Department for FY 1956 down to the levels which had been estimated earlier," and that the services "were spending a very great deal on research and development, for which there was a continuing demand for funds."[329] To make matters worse, Wilson informed President Eisenhower that he believed for 1956, "the total expenditures of the Defense Department as a whole would actually prove to be higher than the earlier forecast," and "the prospect for the years 1958, 1959 and 1960 was one of increasing Defense Department expenditures."[330]

As is evidenced, effort duplication led to missile expenditures growing exponentially, and the DoD predicted it would continue to do so at an unmanageable rate (see Table 3).[331] In July 1957, Donald Quarles, who had recently been elevated to the deputy secretary of defense, noted that for missile development, it was clear "that the

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[328] S. Everett Gleason, "Memorandum of Discussion at the 329th Meeting of the National Security Council, Washington, July 3, 1957: U.S. Ballistic and Non-Ballistic Missiles Program," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office1990, 1990), 536–37, https://history.state.gov/historicaldocuments/frus1955-57v19/d126.

[329] Gleason, "Memorandum of Discussion at the 280th Meeting of the National Security Council," 269.

[330] Ibid., 269–70.

[331] Gleason, "Memorandum of Discussion at the 329th Meeting of the National Security Council," 536.

resources of the United States would be insufficient to support all these programs."[332] Wilson reinforced this assertion, arguing that the United States could not afford to spend more than 10% of the budget on missiles, noting that "we must pull down the costs of our missile programs in the future."[333] Expressing similar frustrations, Eisenhower contended that numerous missiles "resemble one another quite markedly in their capabilities," and that the DoD needed to eliminate programs.[334] This economic strain eventually reached a tipping point wherein Eisenhower explained that the country was headed to a "garrison state," warning that if expenditures were "allowed to run too high, the result would be to ruin the America we know."[335] Ultimately, despite the side effect of rapid technological advancement, effort duplication was economically unsustainable; these expenditures are not only measured in dollars spent, but also in missed opportunities across the services. Across the board, modernization choices simply must account for the next-best use of resources.

[332] Gleason, "Memorandum of Discussion at the 329th Meeting of the National Security Council," 536.

[333] Ibid., 537.

[334] Ibid.

[335] Goodpaster, "Memorandum of a Conference with the President, April 5, 1956," 288–89.

Table 3. 1957 Missile Expenditures and Five-Year Forecast (billions)		
	1956-1957	1958-1963
Missile Spending	Actual: $11.8	Projected: $36.1

Source: Created by author from S. Everett Gleason, "Memorandum of Discussion at the 329th Meeting of the National Security Council, Washington, July 3, 1957: U.S. Ballistic and Non-Ballistic Missiles Program," in Foreign Relations of the United States, 1955-1957, National Security Policy 19 (Washington, D.C.: United States Government Printing Office1990, 1990), 536, https://history.state.gov/historicaldocuments/frus1955-57v19/d126.

Opportunity Cost

In essence, extra expenditures on missile development within the constrained budget meant an opportunity cost to other capabilities, which impacted all three services. For example, in March 1956, amidst the IRBM competition, Chief of Naval Operations Admiral Arleigh Burke's concerns about dwindling sonar research were brought to the executive level.[336] The following month, Secretary Wilson pressured the Air Force to drop its required number of aircraft wings.[337] In tandem, for the Army, missile development—particularly for a weapon it would not employ—exhausted its research and development funds, limiting the modernization of more conventional capabilities. Walter Kretchik illuminates this Army funding disparity and associated opportunity cost:

> Tactical nuclear weapons research and development consumed service funds at an alarming rate and other equipment suffered for it. In 1957 alone, nearly half of the service's research and development budget went toward missiles and nuclear

[336] "Notes on a Meeting with the President," 277.

[337] Goodpaster, "Memorandum of a Conference with the President, April 5, 1956," 289.

> weapons compared with 4.5 percent for new vehicles, 4.3 percent for artillery, and 4 percent for aircraft.[338]

Additionally, this extra financial strain influenced manning policy; for example, while discussing planned military programs in July 1957, President Eisenhower acknowledged inevitable personnel reductions in the Army and Marine Corps, noting that "in order to develop missiles we must make reductions somewhere."[339] On top of directly measurable impacts, this effort duplication also had unintended consequences that were often difficult to quantify.

Unintended Consequences: Inter-Service Relationships

In addition to the financial issues of effort duplication, public competition for IRBMs eroded the Army and the Air Force's already tenuous relationship. This relationship strain is significant given its strategic implications because the services are inherently joint in their operations, with the Army reliant on the Air Force for movement and close-air support. To wit, when President Eisenhower sat down with the JCS in March 1956, JCS Chairman Admiral Radford started the conversation by noting "that unless brought under control, a situation may develop in which the Services are involved in increasing public disagreement among themselves."[340] Radford was concerned with

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[338] Kretchik, *U.S. Army Doctrine*, 175.

[339] Marion Boggs, "Memorandum of Discussion at the 332d Meeting of the National Security Council, Washington, July 25, 1957: U.S. Military Programs for FY 1958 and FY 1959," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 560, https://history.state.gov/historicaldocuments/frus1955-57v19/d133.

[340] Goodpaster, "Memorandum of a Conference with the President, March 30, 1956," 280.

the Army's "increasingly aggressive public relations policy," and he feared that the other services would soon follow suit.[341] Eisenhower also expressed his concern regarding these unintended consequences of effort redundancy, directing the services to end what he termed "competitive publicity," explaining that "it was highly harmful to the Nation."[342]

Although Wilson clarified missile development and operational responsibility, and the Army was no longer authorized to operate it, the Jupiter missile project continued. Watson states that the restrictions "dealt a shattering blow to morale at Redstone Arsenal. Army missile experts were now devoting their efforts to a weapon that, if it succeeded, must be surrendered to another service."[343] Essentially, the Army continued to dedicate a large portion of its budget to a project it no longer owned, which in an inability to fully utilize its own facilities or manpower to pursue other missile projects within the new restrictions.

Given the perception that the Army was the clear loser of the public IRBM race, this was a potentially devastating issue for esprit de corps. While discussing the inter-service IRBM resolution in August 1957, President Eisenhower pointed this out to Secretary Wilson, noting that "the difficulty now is that of morale. From the way it is being handled in the press, it will appear that the Army and the Air Force are in a cat and

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[341] Goodpaster, "Memorandum of a Conference with the President, March 30, 1956," 280.

[342] Ibid.

[343] Watson, *Into the Missile Age*, 165.

dog fight over possession of the missile, with the Air Force emerging winner."[344] Wilson agreed with the president, adding that "there is a large service morale problem which involves the entire future ballistic missile mission."[345] In this regard, while the DoD made progress on two distinct IRBM projects in the short-term, the long-term cost included a fractured relationship between these two interdependent services.

Although the missile race generally subsided after 1957, the Army and the Air Force's relationship remained strained into Eisenhower's second term, particularly regarding the Air Force's responsibility to provide the Army close-air support. In fact, in 1959, this tension led Army Chief of Staff General Lyman Lemnitzer to initiate a study to create a contingency plan for assuming the responsibility of tactical air support missions, eventually leading the Army to challenge numerous service-function restrictions established by Secretary Wilson.[346] In the report, the Army claimed that the Air Force had neglected its support mission in numerous ways, pushing the Army towards independence.[347] John Schlight analyzes the rift between the two services, explaining that the Army desired "modification of the currently assigned roles and mission to allow

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[344] John Eisenhower, "Memorandum of a Conference with the President, White House, Washington, August 16, 1957," in *Foreign Relations of the United States, 1955-1957, National Security Policy*, vol. 19 (Washington, DC: United States Government Printing Office, 1990), 588, https://history.state.gov/historicaldocuments/frus1955-57v19/d140.

[345] Ibid.

[346] Schlight, *Help from Above,* 198.

[347] Ibid.

the Army to develop 'organic systems' it deemed necessary for land operations."[348] While missile-development responsibilities were not the only contentious issues between the services, the public and aggressive contests over IRBM jurisdictional assignment undoubtedly exacerbated the relationship's negative aspects.

Conclusion

The Army's continual pursuit of theater-support missiles in direct conflict with the 1956 missile-development policy brought to the forefront the challenges and fluidity of managing emerging technology. In sum, the continual maturation of missile technology—warhead miniaturization and solid fuel developments—enabled the Army's policy reevaluation request. This demonstrates that even a straightforward policy that leaves little room for interpretation needs to be continually reassessed as technology and the battlefield implications develop.

Additionally, while Wilson put an end to missile effort redundancy, the impacts of the competition had already become apparent. Overall, effort duplication may have increased the speed at which the services developed IRBMs in 1956, but the consequences were keenly felt over the next few years. Therefore, it can be asserted that the inherent challenge of emerging technology management is balancing the rewards of capitalizing on the unforeseen advantages of developing and immature capabilities with the risk of economic waste, the opportunity cost of foregoing more conventional modernizations, and the strain on inter-service relationships.

[348] Schlight, *Help from Above,* 198.

CHAPTER 6

CONCLUSION

From 1947 to 1956, President Truman, President Eisenhower, Congress, and the DoD established and adapted service functions to create a military unity of effort and maximize the dwindling defense budget. The previous chapters' analysis demonstrates the ways in which missile development—the emerging technology of the time—challenged the DoD's ability to mitigate inter-service competition and unnecessary duplication of effort. While the Army's pursuit of the Jupiter missile was the focus of the research, this thesis's overarching purpose was to understand how service functions can be adapted to effectively manage emerging technology.

Jupiter Missile Implications and Emerging Technology

While numerous factors contributed to the Army's Jupiter missile pursuit, this project was scoped explicitly to assess the impact of service functions—both enduring land-combat responsibilities and specific missile-development restrictions. Additionally, while indirect and abstract motivations undoubtedly drove the Army's decisions, this analysis focused exclusively on Jupiter's battlefield application. The subsequent analysis demonstrates that the Army took advantage of the imprecise wording in the 1954 missile agreement, and then applied its land-combat function broadly to justify developing an IRBM. While the Army ably articulated the potential that long-range missiles had in a future conflict, the service failed to convey any justification for jurisdictional missile responsibility that extended beyond a few hundred miles, which was well short of the Jupiter missile range. It is important to note that without said operational need, the

Army's Jupiter missile pursuit serves as an example of a service betting on the unforeseen advantages of immature technology and capitalizing on a development opportunity to compete for finite and shrinking resources. In this analysis of the Jupiter situation, three clear challenges emerge for the DoD: the inherent challenge of managing emerging technology, the varying authority to delineate development responsibility, and the problem with ambiguity.

Service Functions and Emerging Technology

Above all, established service functions did not account for missile development, which forced continual adaptations and corollary agreements across the board. While important, this is unsurprising. The initial codification of service functions and subsequent adjustments at the Key West and Newport Conferences provided the framework for the services to man, train, and equip. Yet inherent to the process is the DoD's limited ability to account for immature technology or predict the impact that emerging capabilities could have on the battlefield. While not the only 1950s emerging technology, missiles illuminated the DoD's challenges in mitigating duplicative efforts. Consequently, the DoD needed to update service functions through conferences, JCS proposals, and directive policy.

Not insignificantly, at the time, jurisdictional assignment for missiles was not obvious. While not a profound point, it is fundamental to understanding how service functions are developed to manage emerging technology; for example, more than one service could have legitimate and distinct operational requirements for new technology. Specifically, both the Navy and the Air Force required aircraft to accomplish their primary missions, but the extent to which they needed the technology was quite different.

Similarly, missiles were a viable tool for all of the services in different and unique ways. Hence, by its very nature, emerging technology does not fit easily into established service functions, requiring the DoD to assess new capabilities regularly to maximize unforeseen potential, while avoiding expensive effort duplication when possible.

Delineating Responsibility and the JCS

Throughout the missile competition, service representatives were generally parochial. In turn, the JCS members and similar service-based committee members failed to subordinate their individual service interests to delineate missile-development responsibilities efficiently. However, it is not revelatory that service representatives were hesitant to agree to developmental limitations regarding emerging technology. Any restriction imposed on a service regarding missile research and development—even if temporary—could preclude the service from the unforeseen potential the immature technology offered. Even if the JCS had the best intentions, the organization, by its nature, could only reach agreements through consensus or adjudication by the secretary of defense, who, in Wilson's case, was explicitly hesitant to make controversial decisions. In turn, the consensus-based approach limited the effectiveness of the two JCS missile agreements, as they consistently included non-specific language, provoking contentious overlap.

This approach to delineating responsibility raises fundamental questions regarding the efficacy of the services' ability to resolve contentious issues internally. While the JCS representatives are the respective subject matter experts for assessing operational service requirements, it is unrealistic to expect them to subordinate their own interests. In the competition for limited resources, the services are inherently bureaucratic organizations.

While none of the service chiefs openly undermined DoD policy with their missile pursuits, their respective service interests took priority. Even when the services agreed on the importance of eliminating effort duplication, consensus-based agreements—a by-product of an organization of equals—still fostered ambiguity that the services quickly exploited. For example, while the chiefs proclaimed in their 1950 missile agreement that "undesirable duplication in research and development should be avoided," just three years later, all three services were developing comparable systems—Redstone, Matador, and Regulus.[349] As follows, while the JCS can provide the necessary context needed to delineate responsibility by assessing operational requirements, the effective application must come from a centralized authority.

Essentially, the distinction between the 1950, 1954, and 1956 missile-restriction policies spotlight the JCS's limited ability to resolve internal service issues. Contextually, the fact that the JCS created the 1950 and 1954 missile-development agreements contributed to the continued use of ambiguous language. In contrast, Secretary Wilson's 1956 missile restrictions efficiently delineated development responsibilities—even if the Army leadership was disappointed with the outcome.

Ambiguous Wording

In the 1950 and 1954 missile-development agreements, ambiguous language enabled the services to interpret their restrictions broadly, resulting in duplicative efforts and capabilities. For example, in 1950, when the JCS assigned the Army missiles "which

[349] U.S. Secretary of Defense, "March 1950 Memorandum," 210; Converse, *Rearming for the Cold War 1945-1960*, 394.

supplement or extend the capabilities" of artillery, they did not define to what extent the Army could extend artillery ranges.[350] Subsequently, the Army assessed its operational needs and capitalized on the undefined term, establishing artillery "requirements" up to 750 miles.[351] This significant capability leap was a range increase over 30 times that of the cannons that the missiles were intended to replace. Not inconsequentially, the Army's operational assessment then created tension amongst the services, as the Army and Air Force had drastically different interpretations of the 1950 missile agreement's imprecise wording. The 1953 Regulus missile controversy illustrates these varying service interpretations, which directly led to a reevaluation of service functions.

The 1954 missile agreement, similar to its predecessor, was also littered with less than specific phrasing. The JCS restricted the Army—with Army Chief of Staff General Matthew Ridgway in agreement—to surface-to-surface missile development explicitly "for use against tactical targets within the zone of Army combat operations."[352] However, by not defining "tactical targets" or establishing what the "zone of Army combat operations" entailed, the Army was again free to define the terms for itself. By continually redefining its vision of the future battlefield and liberally applying its "zone" within it, the Army was able to stretch the intent of the 1954 agreement and interpret its restrictions to meet its own needs. Simply put, ambiguous wording directly enabled the Army's Jupiter missile pursuit, an accepted effort duplication. Strikingly, service function

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[350] U.S. Secretary of Defense, "March 1950 Memorandum," 210.

[351] Bullard, "History of the Redstone Missile System," 22.

[352] Watson, *The Joint Chiefs of Staff and National Policy 1953-1954*, 185.

overlap and emerging technology management are enduring problems that have and continue to impact military formations differently across time periods.

Service Functions: A Modern Problem

Lessons learned from the initial development of service functions are not isolated to the 1950s, and are applicable to current military dilemmas. For example, the INF Treaty's 2019 demise created a military innovation opportunity, albeit a contentious one.[353] In addition to the end of missile development restrictions, the 2018 National Defense Strategy codified the U.S. strategic shift to Great Power Competition, driving the services to prepare for a near-peer threat.[354] To support this shift, the Army began modernizing for large-scale combat operations, and Secretary of the Army Ryan McCarthy declared "Long-Range Precision Fires" as the service's top developmental priority.[355] This combination of treaty termination, strategic realignment, and the Army's modernization priorities sets the stage for a new missile-development era, reminiscent of the 1950s. Predictably, just as competition influenced the original development of IRBMs, modern missile development will have inter-service implications.

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[353] Michael Pompeo, "U.S. Withdrawal from the INF Treaty on August 2, 2019," U.S. Department of State, August 2, 2019, https://www.state.gov/u-s-withdrawal-from-the-inf-treaty-on-august-2-2019/.

[354] U.S. Secretary of Defense, *Summary of the 2018 National Defense Strategy of The United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Department of Defense, 2018), https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf.

[355] Chief of Staff of the Army and Secretary of the Army, "Modernization Priorities for the United States Army" (Official Memorandum, Washington, DC: Department of the Army, 2017), https://admin.govexec.com/media/untitled.pdf.

As the Army begins its post-INF Treaty missile development, it may be challenging the accepted inter-service norms identified in this case study. In fact, a July 2020 opinion piece by retired Air Force Lieutenant General David Deptula has revived the 70-year-old debate regarding service responsibilities. Deptula calls the Army's decision to invest in INF-range missiles "ridiculous," and contends that "it is encroachment on roles and missions" of the Air Force.[356] The retired general has been an advocate for service function clarification for years, even testifying on the topic in 2015 to the U.S. Senate Armed Services Committee while serving as the Dean of the Mitchell Institute for Aerospace Studies. In his testimony, Deptula called attention to the strategic implications of poorly defined service functions and inter-service competition, particularly when assessing capability needs.[357]

Within a week of Breaking Defense's publication of Deptula's comments on Army missile-development plans, Army Brigadier General John Rafferty, current Director of the Long Range Precision Fires Cross-Functional Team, U.S. Army Futures Command, responded. Rafferty argues that the Army's missile development program is in fact complementary, stating that "there's always going to be competition for resources,

[356] Theresa Hitchens, "Long-Range All-Domain Prompts Roles & Missions Debate," *Breaking Defense* (blog), July 9, 2020, https://breakingdefense.com/2020/07/long-range-all-domain-prompts-roles-missions-debate/.

[357] David Deptula, "Revisiting the Roles and Missions of the Armed Forces," Statement before the Senate Armed Services Committee on Roles and Missions of the Armed Services (Washington, DC: Senate Armed Services Committee, November 5, 2015), https://www.armed-services.senate.gov/imo/media/doc/Deptula_11-05-15.pdf.

but I don't think this one is about roles and missions."[358] Instead, Rafferty contends that "the race is against a pacing threat."[359] Both flag-grade officers allude to the 1950s established services roles, which raises questions about its relevancy today. As the innovation surround INF-noncompliant missiles begins, it is clear that inter-service competition will play a significant factor in the development of this resurgent capability.

In February 2021, the concerns regarding service function clarity resurfaced at the JCS level, with Air Force Chief of Staff General Charles Brown challenging the DoD to reassess roles and missions for "All Domain Operations," the new joint-warfighting concept.[360] Brown explains that while service functions do not require an overhaul, "there needs to be better delineation of responsibility for joint long-range fires, joint command and control and logistics protection missions."[361] On 31 March, this conversation escalated when Air Force General Timothy Ray, Air Force Global Strike Command leader, called the Army's missile development plans "stupid."[362] General Ray

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[358] Sydney Freedberg, "Army Says Long Range Missiles Will Help Air Force, Not Compete," *Breaking Defense* (blog), July 16, 2020, https://breakingdefense.com/2020/07/army-says-long-range-missiles-will-help-air-force-not-compete/.

[359] Ibid.

[360] Theresa Hitchens, "Roles & Missions Scrub Needed for All Domain Ops: CSAF Brown," *Breaking Defense* (blog), February 18, 2021, https://breakingdefense.com/2021/02/roles-missions-scrub-needed-for-all-domain-ops-csaf-brown/.

[361] Ibid.

[362] Valerie Insinna, "Air Force General Says of Army's Long Range Precision Fires Goal: 'It's Stupid'," *Military Times*, April 2, 2021, https://www.defensenews.com/air/2021/04/02/air-force-general-says-of-armys-long-range-precision-fires-goal-its-stupid/.

went on to note: “I just think it’s a stupid idea to go and invest that kind of money that recreates something that the service has mastered and that we’re doing already right now. Why in the world would you try that? I try to make sure that my language isn’t a little more colorful than it is, but give me a break.”[363]

While the renewed interest in missile development tops the list of potentially contentious issues, implications for the services go far beyond missiles. Importantly, and in line with findings of this thesis, General Brown concedes that “only Defense Secretary Lloyd Austin can really make the call to undertake any review of specific mission sets, and institute changes.”[364] For this reason, as the services look to future operations and the incorporation of emerging technology beyond just long-range missiles, such as cyber, space, and artificial intelligence, a reassessment of service functions is in order.

Further Research

This thesis raises questions about the adaptability of service functions and the challenges associated with emerging technology. Many of these questions merit further research, especially those with a bearing on modern service function issues. Some examples include:

1. What are the Army’s operational long-range fire requirements in support of the envisioned joint warfighting effort of All Domain Operations?

[363] Insinna, “Air Force General Says of Army’s Long Range Precision Fires Goal: ‘It’s Stupid’.”

[364] Hitchens, “Roles & Missions Scrub Needed for All Domain Ops.”

2. Given the secretary of defense's inherent turnover rate, how does the near-absolute authority over service functions impact the United States' ability to conduct long-term (ten-fifteen year) modernization efforts?
3. What are the potential consequences of duplicate effort regarding current emerging technology such as cyber warfare, and do they outweigh the potential benefits of developing this immature capability?
4. What is the feasibility and strategic implications of stationing post-INF Treaty IRBMs in Europe or Asia?

Enduring Findings and Recommendations

While this research is historical, five distinct findings provide potentially enduring application for emerging-technology management. First, emerging technology by its very nature is unaccounted for in established functions, requiring continuous policy updates. To manage this uncertainty, the services are responsible for assessing and articulating their respective operational needs, in particular as technology matures in tandem with its battlefield implications. To support these updates, conferences that mirror the Key West and Newport gatherings should not be viewed as novel concepts, nor should they be reactionary. If the secretary of defense is only conducting service function reviews to mediate conflict or adjudicate contentious issues, then these sessions will be combative versus cooperative and it is unlikely that the department will utilize its resources efficiently. Instead, it is recommended that in-depth service function reviews are conducted regularly and are either event- or time-driven. For example, the DoD can conduct these conferences annually, every other summer, during a JCS changeover, when

a new National Security Strategy is published, or after a change of administration or defense secretary.

Second, this thesis illuminates the assertion that the JCS is an inefficient decision-making organization regarding issues limit the services; in terms of the respective chiefs, the pull to service interests is inexorable. It is beyond expectation that a service chief would ever vote against service interests. From this perspective, in order to be effective, delineating developmental responsibility for emerging technology must come from a central authority. The management of these emerging technologies is not the services' responsibility; it is instead that of the Office of the Secretary of Defense. Contrary to the challenges that Secretaries Forrestal, Johnson, and Wilson faced, the current DoD has a substantial staff, capable of conducting detailed assessments to facilitate its responsibility to adjust policy regarding emerging technology. Consequently, it is recommended that the Office of the Secretary of Defense assign an assistant secretary the responsibility to track, manage, and assess the development and impact of emerging technology on the battlefield and continually draft updates to service functions for review and eventual discussion at JCS conferences mirroring the Key West conference.

Third, as previously established, ambiguous language in DoD policy and directives has created and continues to create misunderstanding. Across services, leaders are likely to interpret the intent of said unclear language differently, based solely on their professional experience. In this regard, undefined terms allow service representatives to interpret the DoD's intent broadly, and often in self-interested ways. Even if the JCS agrees on intent, if the verbiage is not clear, then the policy will only maintain relevancy under the same service chiefs—a position with inherently high turnover. That being so, it

is recommended that the DoD use clear language and define terms that do not already have joint definitions. This was a technique Secretary Forrestal used in the Key West Agreement, in part by providing a glossary of terms within the policy. For mature technology such as missiles, delineation by range is the least unambiguous approach. For more immature technology like cyber, this verbiage should either be openly inclusive—accepting and promoting effort duplication—or clearly restrictive. Confusion brings controversy; it is the DoD's responsibility to provide clarity.

Fourth, effort duplication is a double-edged sword—a balance of risk to reward. While there are immediate technological benefits to having numerous organizations working on the same problem, these situations also include economic trade-offs and the potential for unintended consequences. Given this predicament, the DoD must analyze potential secondary and tertiary impacts of both effort redundancy and probability of competing nations realizing the potential of various technology ahead of the United States. Further, in order to best weigh the conscious decision of allowing effort duplication, the DoD should use research organizations such as RAND to assess the battlefield implications of emerging technology including cyber and artificial intelligence.

Finally, it can be asserted that upgrading current systems is less contentious and generally more efficient than developing new ones. Army Chief of Staff General Matthew Ridgway used this logic in 1955 when he opposed the Army's IRBM pursuit, pushing instead to increase the range of its Redstone missile to avoid a confrontation with the Air Force. Similarly, one of the main reasons President Eisenhower supported the Army's 1957 theater-support missile policy exception was because the integration of

solid fuel would enhance an already developed missile system and would have minimal financial impacts. In this regard, it is recommended that before the Army creates any new post-INF missile platforms, the service maximizes its current missile delivery platforms—Multiple Launch Rocket System and the High Mobility Army Rocket System—to meet its long-range fire requirements.

Overall, this study of the Army's Jupiter missile pursuit analyzed and detailed the DoD's challenges delineating missile-development. While Great Power Competition is by no means a second Cold War, the U.S. military is again competing with growing and resurgent powers, making this thesis' findings clearly applicable to current problems. Furthermore, mirroring this research's findings, Deptula warned the Senate Armed Forces Committee that "a dollar spent on duplicative capability comes at the expense of essential capacity or capability elsewhere."[365] Similar to this thesis, he concluded that "outdated service roles and missions parameters yield costly, inefficient acquisition programs," noting that "security circumstances and fiscal pressures will no longer tolerate such conditions."[366] In this regard, to thrive in this complex new environment, just as in the 1950s, the United States cannot afford inefficient modernization practices. Even so, it must also capitalize on the yet unforeseen capabilities of immature technology. This balance is the enduring challenge of emerging technology management, which must be proactively approached, led by a central authority, and free of ambiguous language.

[365] Deptula, "Revisiting the Roles and Missions of the Armed Forces," 1.

[366] Ibid.

APPENDIX A

PRE-JUPITER ARMY MISSILES

Before pursuing the Jupiter IRBM, the Army began developing missiles for its three support-based requirements. These are delineated by range and are henceforth categorized as short, medium, and long. Central to this thesis is the Army's first attempt at a long-range—theater support—missile known as the Redstone. This appendix describes the Army's first three missile projects to provide the necessary context for understanding the service's technical capabilities and limitations regarding 1950s missile development.

Since the Army's short-range missile type mirrored artillery capabilities of the time, it was uncontroversial in terms of inter-service missile competition. The Army designed these missiles to support corps operations, intending them to have a range from 5 to 35 miles.[367] The service eventually produced numerous missiles in this category to provide a nuclear capability to the lowest-level commander.[368] In May 1950, the Army Chief of Ordnance Major General Elbert Ford ordered the Redstone Arsenal development team to conduct "a preliminary design study of a special purpose, large caliber field artillery rocket."[369] In June 1951, the Redstone Arsenal team conducted numerous test-fire demonstrations; by the end of the summer, Secretary of the Army Frank Pace

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[367] Bullard, "History of the Redstone Missile System," 22.

[368] McKenney, *The Organizational History of Field Artillery 1775-2003*, 209–41.

[369] U.S. Army Aviation and Missile Life Cycle Management Command, "Honest John," Redstone Arsenal Historical Information, accessed February 6, 2021, https://history.redstone.army.mil/miss-honestjohn.html.

approved full-scale production of the Army's first short-range missile—the Honest John.[370]

The Army rapidly designed the Honest John and successfully equipped units with the new system in 1954.[371] As Janice McKenney explains, "the earliest Honest Johns were hastily improvised weapons to augment existing artillery when ammunition problems in Korea were still acute and when the threat from the Soviet Union seemed particularly great."[372] With a maximum range of only 16 miles—upgraded to 25 miles in 1961—the Honest John provided an example of the Army supplementing or replacing current artillery systems.[373] Thus, the Honest John met the intent of the 1950 missile responsibility memorandum.

[370] U.S. Army Aviation and Missile Life Cycle Management Command, "Honest John."

[371] Ibid.

[372] McKenney, *The Organizational History of Field Artillery 1775-2003*, 212.

[373] Ibid., 241.

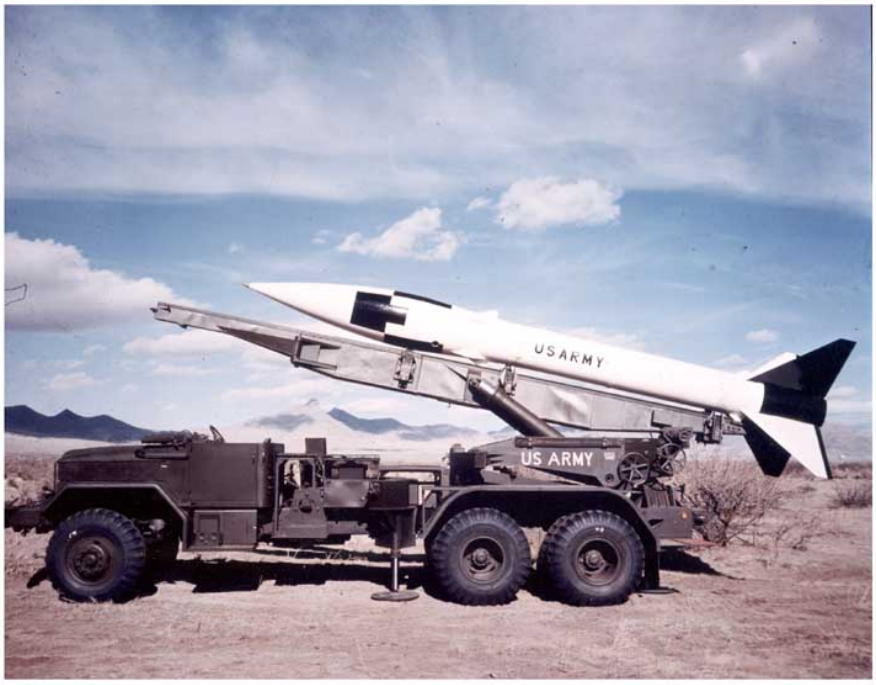

Figure 1. The Honest John Missile

Source: U.S. Army Aviation and Missile Life Cycle Management Command, "Honest John," Government, Redstone Arsenal Historical Information, accessed February 6, 2021, https://history.redstone.army.mil/miss-honestjohn.html.

In contrast to the Honest John, the Army's medium-range missile type dramatically extended the range of the service's organic strike capability. The first of these medium-range missiles—designated as the Corporal—was the product of the Army's first experiments with missile technology. From 1949 to 1951, the Redstone Arsenal team conducted extensive Corporal missile flight tests, demonstrating the Army's technical missile ability.[374] While the Redstone Arsenal team measured early test

[374] James Bragg, "Development of the Corporal: The Embryo of the Army Missile Program," (Declassified Government Report, Reports and Historical Branch Control Office, Army Ballistic Missile Agency: Redstone Arsenal, AL, August 1971), 118–26, https://apps.dtic.mil/dtic/tr/fulltext/u2/a586733.pdf.

errors in miles, by June 1953, after firing over 50 tests, the missiles achieved accuracy within 100 meters.[375] The missile was a significant technological accomplishment and spoke to the Army's technical prowess. The Army intended to create 16 Corporal battalions by the summer of 1954; however, the service did not field the medium-range missile until 1955.[376]

Once developed, the Corporal ballistic missile had a range from 25 to 75 miles.[377] While this range did not mirror conventional artillery capabilities, it did not necessarily encroach on the Air Force's presumed missions—conducted by either aircraft or Air Force missiles. Despite this fact, the new missile had numerous operational challenges that limited its utility. As McKenney explains:

> The liquid-fueled Corporal was susceptible to countermeasures, requiring many items of specialized ground equipment and a correspondingly large number of personnel; its mobility was poor and its fueling process slow; and the intervening time between target assignment and actual firing was excessive.[378]

Additionally, the 45-foot missile was easily identified on the battlefield, had a large firing signature, and the units could not defend themselves.[379] While the Army's first ballistic missile had tactical potential, it also identified new problems that the Army had to overcome to employ them successfully. For example, a significant range increase could

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[375] Bragg, "Development of the Corporal," 133.

[376] McKenney, *The Organizational History of Field Artillery 1775-2003*, 214.

[377] Ibid.

[378] Ibid.

[379] Ibid., 214–15.

solve many of these problems, reinforcing the notion of an Army long-range missile program.

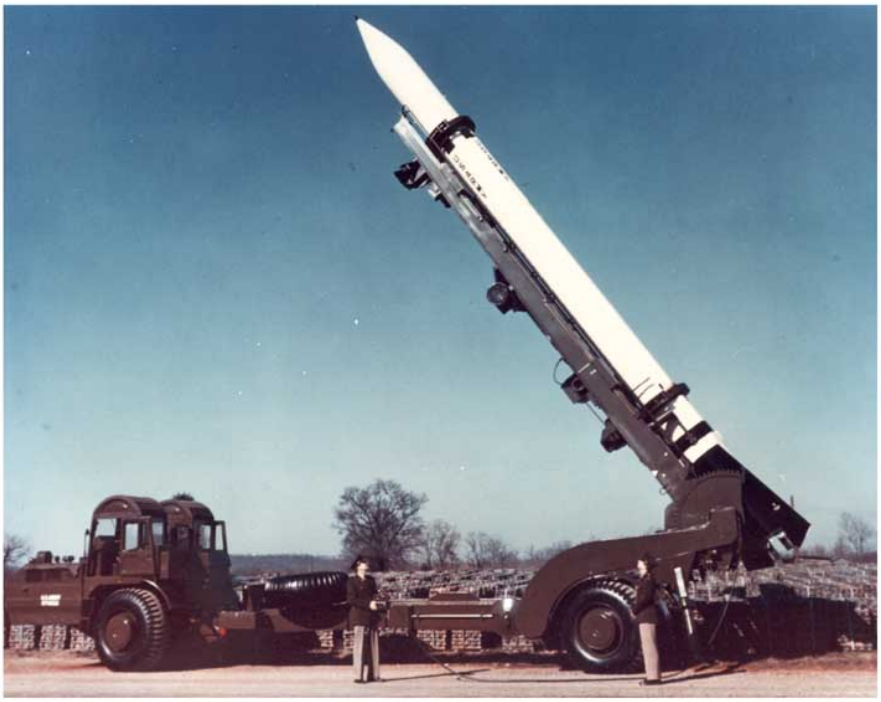

Figure 2. The Corporal Missile

Source: U.S. Army Aviation and Missile Life Cycle Management Command, "Corporal," Government, Redstone Arsenal Historical Information, accessed February 6, 2021, https://history.redstone.army.mil/miss-corporal.html.

The Army's first missile to potentially impinge on the Air Force mission of interdiction was the Redstone missile. The Army began developing the Redstone missile in the summer of 1951, with a goal range of 500 miles.[380] As Bullard explains, the Army designed the Redstone to "supplement and extend the range or firepower of the existing

[380] Bullard, "History of the Redstone Missile System," 49–50.

artillery and shorter-range missiles, to provide increased support for deployed ground combat forces, and to compensate for the expanding dimensions of the battle area."[381] The Army conducted its first Redstone test flight in August 1953, and although there was a control system malfunction, a successful follow-up test in January 1954 demonstrated the new missile's potential.[382] However, the Redstone missile did not reach the Army's intended goal range of 500 miles. Instead, it had a reduced maximum range of 175 miles. While the Army did not deploy the missile until 1958, successful testing in the early 1950s proved the concept and, just like the Corporal, demonstrated the service's technical capacity to create missiles.[383] In fact, this testing set the foundation for the entire Army missile program over the next two decades. As Bullard notes, the Army "used the Redstone to prove or disprove concepts and techniques that created a store of information they used in developing the Jupiter, Pershing, Honest John, Littlejohn, and Sergeant missile systems."[384] Accordingly, the Redstone missile set the Jupiter project's groundwork, both in scientific knowledge and eventually in parts repurposing.

[381] Bullard, "History of the Redstone Missile System," 95–96.

[382] Ibid., 162–64.

[383] McKenney, *The Organizational History of Field Artillery 1775-2003*, 241.

[384] Bullard, "History of the Redstone Missile System," 139.

Figure 3. The Redstone Missile

Source: U.S. Army Aviation and Missile Life Cycle Management Command, "Redstone," Government, Redstone Arsenal Historical Information, accessed February 8, 2021, https://history.redstone.army.mil/miss-redstone.html.

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