16

Casting Net Assessment

Andrew W. Marshall and the Epistemic Community of the Cold War

John M. Schutte
Lieutenant Colonel, USAF

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14. ABSTRACT

Andrew Marshall devoted his considerable intellectual talents and the entirety of his long adult life to help protect and further America???s national interests. Yet he remains an enigma to all but his closest associates. To date, no one has published a book-length biographical account of America???s longest serving defense intellectual. Unless his story is captured, Marshall is at risk of becoming the Fox Conner of his generation: a man who profoundly influenced a generation of thinkers yet is largely forgotten by history. This paper is an attempt to negate that risk by answering the central and compelling question who is Andy Marshall? Marshall???s extensive professional career began at RAND in 1949, where he contributed to the creation of a community of civilian defense strategists attempting to divine changes to the very nature of warfare in the new atomic age. After a brief sojourn working for Henry Kissinger on the National Security Council in the early 1970s, he moved to the Department of Defense and has served as the sole director of the Office of Net Assessment (ONA) since October 1973. In government service, Marshall has projected and sustained influence in defense policy circles while serving eight presidents and 12 defense secretaries.2 By the time he entered civil service, most of Marshall???s formative ideas about the practice of net assessment and his unique understanding of organizational behavior had emerged. Instinctively multidisciplinary, Marshall accrued a multitude of ostensibly different analytic lenses. These lenses, layered upon one another, provided him a kaleidoscopic view and masterful understanding of strategy. Thus, to understand Marshall???s unique perspective on the process of net assessment, one is best served by studying the evolution of his thought prior to the establishment of ONA. The story of this journey, of Marshall???s growth and maturation as a strategist, is the focus of this biography.

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Lieutenant Colonel, USAF

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Contents

	Foreword	*vii*
	About the Author	*ix*
	Acknowledgments	*xi*
	Abstract	*xiii*
1	**Introduction**	1
2	**The Wider View**	5
3	**Alchemy for RAND's Golden Years**	21
4	**From Organizational Behavior to Bureaucrat**	49
	Epilogue	81
	Abbreviations	85
	Bibliography	87

Foreword

Andrew Marshall is among the United States' elite defense intellectuals. He was a member of the first generation of civilians devoted to strategic and military studies following World War II. From his perch at the RAND Corporation, he authored and advised on numerous early Cold War studies delineating strategy in the nuclear age. By the 1960s, he was an enabling intellectual partner to some of the era's most prominent thinkers, among then Herman Kahn and Bernard Brodie. During that tumultuous decade, he advised the Central Intelligence Agency on a range of issues, many of which remain shrouded in secrecy. In the early 1970s he began working directly for the Department of Defense as the director of Net Assessment, the Pentagon's in-house think tank. In this capacity, Marshall has served seven presidents and 13 defense secretaries. In all these roles across nearly 65 years of service, Andy Marshall has contributed to America's defense establishment like few others, in uniform or out. Certainly no one has matched his longevity at the task, and precious few have had a greater impact on the intellectual foundations of American strategy since World War II.

In this masterful account, Lt Col John Schutte traces Marshall's life and times until the point Marshall assumed his job with Net Assessment. Born of modest circumstances near Detroit, Marshall's cerebral talents found succor in the vibrant Michigan public schools of the 1920s and '30s. Factory work during World War II fired his quest for further education, taking him to graduate studies at the University of Chicago and then to RAND, the first "think tank," in 1949. Schutte finds sinews between Marshall as a young man and his later persona as a mature analyst of foreign policy, especially in Marshall's knack as an incubator and facilitator of group inquiry at RAND and the CIA. Despite Marshall's long shadow over America's defense establishment, there is no serious extant inquiry into his life. Schutte's treatment of Marshall aims to rectify that situation as it relates to the first half of Marshall's life. It succeeds most admirably.

Colonel Schutte's *Casting Net Assessment: Andrew W. Marshall and the Epistemic Community of the Cold War* received the USAF Historical Foundation's award for best School of Advanced Air and Space Studies history thesis of 2012. It stands as a model of broadly based, rigorous, and imaginative analysis to all who believe that strategic thinking can be profitably informed by cogent historical investigation.

THOMAS ALEXANDER HUGHES
Professor of Airpower History
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About the Author

Lt Col John M. Schutte graduated from the University of Virginia with a degree in history in 1999. He gained his commission through the Reserve Officer Training Corps and completed navigator training at Randolph AFB, Texas. He flew C-130s at Ramstein AB, Germany, prior to his selection for the Air Force Intern Program. As an intern, Colonel Schutte served rotations as a junior military assistant to the deputy secretary of defense and in the Headquarters Air Force Concepts and Strategy Division. He went on to serve as a country director for the undersecretary of the Air Force for international affairs. Before attending the School of Advanced Air and Space Studies, he served as an instructor navigator and the director of staff for the 374th Airlift Wing at Yokota AB, Japan. Colonel Schutte is a senior navigator with over 1,600 flying hours and combat time in Operations Joint Forge, Iraqi Freedom, and Enduring Freedom. Following graduation from the School of Advanced Air and Space Studies, Colonel Schutte served in the chief of staff of the Air Force's Strategic Studies Group, Headquarters Air Force, the Pentagon. He went on to command an expeditionary operations support squadron in Southwest Asia from June 2013 through June 2014. Colonel Schutte matriculated at Princeton in August 2014 to pursue a PhD in public and international affairs at the Woodrow Wilson School.

Acknowledgments

It takes a village to birth a School of Advanced Air and Space Studies (SAASS) thesis, and many deserve special acknowledgment. Thanks go first to the SAASS faculty for striving to impart the most important skill set to which we can aspire as military officers—the ability to think strategically. Theirs is a noble and sometimes fruitless cause. In my case, some deserve particular recognition for their mentorship and patience. Thank you to Dr. Stephen Chiabotti, Dr. James Forsyth, and Dr. James Kiras for encouraging me to pursue a lifelong goal and then not judging my subsequent vacillation. My appreciation also goes to Dr. Thomas Hughes for his mentorship, writing expertise, and friendship during this year. I benefited greatly from his talents as a teacher.

Beyond the insular gates of the "best hometown in the Air Force," several others gave generously of their time and energy. Foremost among them is Col J. R. Reid, USAF, retired. His mentorship has continued since first spotting the Blue Tail patch on my shoulder when I was a young lieutenant calling on the daughter of his German neighbor (my future wife) over a decade ago. I am a better officer and man because of it. Without his support and friendship, this paper would not have been possible.

Dr. Ben Lambeth worked indefatigably to provide research leads, official introductions, and encouragement along the way. Time and again, when thanked, he demurred by claiming "it's part of my job." Not once did he mention he had ended full-time employment after a fruitful 37-year career and moved on to an active retirement as a senior adjunct fellow at RAND and nonresident senior fellow with the Center for Strategic and Budgetary Assessments. His continuing dedication to strengthening the intellectual base of our officer corps, and our Air Force, is admirable.

Mr. Barry Watts and Dr. Mie Augier are both fonts of knowledge and research material on Mr. Marshall. I greatly appreciate their support and assistance.

Mr. Andrew Marshall facilitated this research (and my intellectual growth) by sitting for two interviews and granting access to resources previously reserved only for those within his small circle of trusted associates. Marshall's character was on display throughout. As he has for countless others, he allowed me to reach my own conclusions totally without concern for his own legacy or image.

To my parents, who have provided immeasurable support—especially my mother, who served as editor of this effort—I owe many thanks.

Finally, words are inadequate to express the debt of gratitude I owe my wife. This paper and the path we are forging together—immeasurably enriched by our sons—would not be possible without her love, fortitude, and tireless support. If my wife's support makes any modicum of success possible,

she and the two wonderful boys we have created make it all worthwhile. I look forward to the adventure that awaits us.

As E. H. Carr once wrote, "Facts speak only when the historian calls on them: it is he who decides to which facts to give the floor, and in what order or context."[1] By necessity, history is a distortion of the past. Good historians seek to do so responsibly. Historical biography levies an even more stringent demand. In attempting to portray both the historical context and the deeper contours of Andrew Marshall's life, I do so with humility and a fervent desire to be responsibly accurate. Nevertheless, errors of fact, description, and interpretation are probable. I accept sole responsibility for any mistakes herein.

Notes

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography.)

1. Carr, *What Is History?*, 19.

Abstract

Andrew Marshall devoted his considerable intellectual talents and the entirety of his long adult life to help protect and further America's national interests. Yet he remains an enigma to all but his closest associates. To date, no one has published a book-length biographical account of America's longest serving defense intellectual. Unless his story is captured, Marshall is at risk of becoming the Fox Conner of his generation: a man who profoundly influenced a generation of thinkers yet is largely forgotten by history. This paper is an attempt to negate that risk by answering the central and compelling question, who is Andy Marshall?

Marshall's extensive professional career began at RAND in 1949, where he contributed to the creation of a community of civilian defense strategists attempting to divine changes to the very nature of warfare in the new atomic age. After a brief sojourn working for Henry Kissinger on the National Security Council in the early 1970s, he moved to the Department of Defense and has served as the sole director of the Office of Net Assessment (ONA) since October 1973. In government service, Marshall has projected and sustained influence in defense policy circles while serving eight presidents and 12 defense secretaries.[2]

By the time he entered civil service, most of Marshall's formative ideas about the practice of net assessment and his unique understanding of organizational behavior had emerged. Instinctively multidisciplinary, Marshall accrued a multitude of ostensibly different analytic lenses. These lenses, layered upon one another, provided him a kaleidoscopic view and masterful understanding of strategy. Thus, to understand Marshall's unique perspective on the process of net assessment, one is best served by studying the evolution of his thought prior to the establishment of ONA. The story of this journey, of Marshall's growth and maturation as a strategist, is the focus of this biography.

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Chapter 1

Introduction

Fame came late for Andy Marshall—unsought and received bemusedly. According to Jay Winick, "the first time many in or out of the Pentagon ever saw his face was in a small sketch that ran alongside a 1994 *Wall Street Journal* article about wars of the future," after Marshall emerged as a central figure in the bureaucratic and ideational phenomenon of the revolution in military affairs (RMA).[1]

"Andrew Marshall is the Gray Cardinal, the 'Eminence Grise' of the new American Military revolution," wrote former KGB officer Sergey Mostestov in the Russian journal of military strategy *Nezavisimaya Gazetta* in 1995.[2] More recently, Gen Chen Zhou, the main author of the People's Liberation Army's four most recent defense white papers, conceded, "We studied RMA exhaustively. Our great hero was Andy Marshall in the Pentagon. We translated every word he wrote."[3]

Survival, both political and biological, has endowed this nonagenarian the seldom-acknowledged title of America's longest serving defense intellectual. His extensive professional career began in 1949 at the RAND (Research and Development) Corporation, where he contributed to the creation of a community of civilian defense strategists attempting to divine changes to the very nature of warfare in the new atomic age. After a brief sojourn working for Henry Kissinger on the National Security Council (NSC) in the early 1970s, he moved to the Department of Defense (DOD) and has served as the sole director of the Office of Net Assessment (ONA) since October 1973. In government service, Marshall has projected and sustained influence in defense policy circles while serving eight presidents and 13 defense secretaries.[4] His longevity is partially attributable to his unique understanding of organizational and human behavior. Marshall possesses ample contextual intelligence.[5]

Despite all of this, we know remarkably little about Andy Marshall. He is an intensely private and modest man who eschews publicity, is comfortable with relative anonymity, and remains an enigma to all but his closest associates. Consequently, few outside of a small circle of defense intellectuals and national security elites have even heard of him. " 'If you don't know who Andy Marshall is,' the saying goes, 'you don't need to know him.' And even those who need to know are more likely to know *of* him than actually *to* know him. 'Andy is,' sighs one of his oldest friends, 'the most influential person you've never heard of'" (emphasis in original).[6]

To date, no one has published a book-length biographical account of America's longest-serving defense intellectual. Instead, impressions of him are formed disproportionately by caricatures appearing episodically within the media. Perhaps the most common caricature used to describe Marshall is that of Yoda. As Alex Abella writes, Marshall "has been given the nickname of the diminutive sage for his soft voice and cryptic advice."[7] In contrast to this crude depiction, Marshall's reputation is quietly protected by a small but intensely loyal circle of former colleagues who consider themselves members of St. Andrew's Prep—a metaphor for those who have graduated from Marshall's unique school of thought. Neither of these extremes offers the full picture of a man who, in the final analysis, has been one of the driving forces behind modern American strategic thought.[8] While Marshall profoundly influenced the strategic community for over six decades, he is at risk of being forgotten by history unless his story is captured. This biographical sketch is an attempt to negate this risk by exploring the central and compelling question, who is Andy Marshall?

Marshall comes to us wholly formed, still surprisingly productive in the winter of his life. By the time he became director of the ONA, after a full and remarkably successful career at RAND, his strategic perspective was shaped indelibly by nearly a quarter of a century spent thinking intensely about the problems of national security. By the time he entered civil service, most of Marshall's formative ideas about the practice of net assessment and his unique understanding of organizational behavior had emerged. Instinctively multidisciplinary, Marshall had accrued a multitude of ostensibly different analytic lenses. These lenses, layered upon one another, provided him a kaleidoscopic and masterful view of strategy. Thus, to understand Marshall's unique perspective on the process of net assessment, one is best served by studying the evolution of his thought. The time allotted to thesis work during a School of Advanced Air and Space Studies year limits this biographical sketch to examining the life and times of Marshall prior to the ONA's establishment. It traces the trajectory of Marshall's intellectual and personal growth before becoming both a bureaucrat and defense intellectual.[9]

This biographical effort utilizes primary source material wherever feasible. As such, my research benefited greatly from the incredible volume of previously classified documents made available for public consumption on various government websites under the Freedom of Information Act. Many of the reports and analyses from RAND, however, would remain classified were it not for the concerted efforts of Barry Watts and Andrew May. Both May and Watts are longtime associates of Marshall.[10] Over the past decade, the two have intrepidly attempted to compile and help declassify much of the work

central to documenting the evolution of Marshall's thought. The fruit of their prodigious efforts extends far beyond declassification of documents.

May wrote what unquestionably remains the preeminent history of strategic thought at RAND during its golden years, from 1945 until 1962. Over the past decade, both men dutifully sifted through the detritus of nearly 40 years' worth of sustained intellectual effort to produce a multipart, thematically oriented intellectual history of the ONA. Watts and May, however, deliberately disassociate Marshall's intellectual growth from his personal life. By design they do not fully place Marshall within the larger context in which he lived. Similarly, Mie Augier studied Marshall's life and work for the past decade but has not yet written a full biographical depiction of Marshall. This paper builds on, and benefits greatly from, their scholarly efforts.

Surprisingly little is written of Marshall in book form. Dima Adamsky's book *The Culture of Military Innovation* provides perhaps the most detailed analysis of Marshall in his examination of the interplay between American strategic culture and the role of the ONA. Marshall appears as a supporting character in several popular books on RAND—specifically the works by Fred Kaplan, Alex Abella, and Sharon Ghamari-Tabrizi.[11] All three authors write for a popular audience and deliberately adopt a conspiratorial tone. Their analysis suffers accordingly.

Finally, I relied on interviews where appropriate. In the aftermath of the Cold War, several acolytes urged Marshall to capture his story in an autobiography. In the fall of 1993, Marshall acquiesced and hired Kurt Guthe to act as a researcher and coauthor. Guthe spent nearly two years on this ultimately abortive project, conducting 10 extended interviews with Marshall that were subsequently split into 12 transcripts. In total, the Guthe transcripts provide over 400 pages of oral history interviews. Though the autobiography never reached fruition, my research benefited enormously from Guthe's efforts. Nevertheless, oral history is subjective testimony, not objective evidence. While these interviews and those I conducted with half a dozen of Marshall's associates were enormously helpful, primary source documents served as the ultimate arbitrator of truth whenever and wherever possible.

This paper is organized chronologically and divided into three distinct periods. Chapter 2 explores Marshall's early years, from his childhood in Detroit to his experiences as a graduate student at the University of Chicago. Chapter 3 describes Marshall's first decade at RAND, where he contributed to many of the seminal studies that shaped intellectual thought within RAND's strategic community. Finally, chapter 4 explores Marshall's creation of an epistemic community to help form a new organizational behavior paradigm, the evolution

of his understanding of the net assessment methodology to provide a new way of thinking strategically, and his transition into government service.[12]

The story of this journey—of Marshall's growth and maturation as a strategist—is the focus of this biography. Before St. Andrew's Prep and an expansive network of acolytes, before the titles the Gray Cardinal and the éminence grise of the new American military revolution, before the diligent study of his writings by the Chinese, before age took its toll and exacted enough similarities to make the irreverent moniker Yoda stick, and before the legend and caricature of Andy Marshall—there stood Marshall, the man. This is his story.

Notes

(All notes appear in shortened form. For full details, see the appropriate entry in the bibliography.)

1. Winik, "Secret Weapon," 47.
2. Ibid., 48.
3. "Dragon's New Teeth: China's Military Rise," 30.
4. Donald Rumsfeld served twice as secretary of defense and is counted twice in this tally.
5. Joseph Nye defines *contextual intelligence* as "the ability to understand an evolving environment and capitalize on its trends." See Nye, *Future of Power*, xvii.
6. Unattributed source in Winik, "Secret Weapon," 47.
7. Abella, *Soldiers of Reason*, 275. See also Store, "Yoda in the Pentagon."
8. Adamsky, *Culture of Military Innovation*, 2.
9. Stephen Rosen, who worked with Marshall in the early 1990s, states, "From Andrew W. Marshall, I learned that it was possible to be a bureaucrat and an intellectual, in the finest sense of the word, and that it was important to understand bureaucratic politics." Rosen, *Winning the Next War*, 19–20.
10. While an active duty Air Force officer, Watts served as a military assistant in the ONA from 1978 to 1981 and 1985 to 1986. As an ONA alumnus, he maintains close ties with Marshall in his current role as a senior fellow at the Center for Strategic and Budgetary Assessments. May first gained familiarity with Marshall while completing his dissertation. See May, "RAND Corporation and the Dynamics of American Strategic Thought." He subsequently worked as a contractor at Science Applications International Corporation (SAIC) and began contract work with the ONA in 1999. By 2001 he was detailed to ONA full time to help with a strategy review requested by Secretary Rumsfeld. Delighted with the intellectual freedom and stimulation of the office, May never really returned to SAIC. He officially joined the office as a government employee in December 2005. See "Net Assessment and Defense Strategy," in Augier and Watts, *Essays on Diagnostic Net Assessment*, 313. May and Watts currently teach the course Net Assessment and Strategic Thinking at Georgetown University.
11. See Kaplan, *Wizards of Armageddon*; Abella, *Soldiers of Reason*; and Ghamari-Tabrizi, *Worlds of Herman Kahn*.
12. Haas defines an *epistemic community* as a "network of professionals with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain or issue-area." See Haas, "Introduction: Epistemic Communities and International Policy Coordinate," 3.

Chapter 2

The Wider View

Marshall bounded up the short flight of steps onto the final terrace of the Detroit Public Library's Woodward Avenue entrance. The building's grandeur always energized him. Built with Andrew Carnegie's philanthropic largesse, the three-story structure's ornate Italian Renaissance style conjured memories of a better time. Then, Detroit stood as one of the jewels of the new era; the automotive-infused renaissance of affluence, culture, and sophistication led many to call Motor City the Paris of the Midwest.[1] Renowned architect Cass Gilbert designed the library to serve as both symbol and incubator of Detroit's vibrant cultural life.[2] Marshall felt an enduring affinity for the building, officially dedicated in the summer months just before he entered the world in September 1921.

So much had changed in the 15 intervening years. Both library and child had experienced the frenetic energy and pressures of the boom city's rapid population growth during the roaring twenties, making Detroit the nation's fourth largest city by the turn of the decade.[3] Both endured privation during the desperate Hoover years. Ratty, hollow-cheeked Detroiters still impatiently queued up for their next free meal. Marshall opened the main door to enter the central hall, splendidly lined with Doric columns and framed by two massive staircases. Carved into the white Vermont marble above the impressive doorway were three simple words: "Knowledge Is Power."

Marshall's father—a stonemason by trade and autodidact by temperament—could have carved these words himself. John Pollock Mitchell Marshall was born the youngest of five children in Liverpool, England, in 1886.[4] At a young age, his life changed indelibly when his father died in an accident while serving as the chief engineer of a ship steaming from Liverpool to Buenos Aires. John's mother returned to her native Scotland to continue the difficult endeavor of raising her children alone. By age 14, John worked as a cobbler's apprentice cutting shoe heels.[5] Though his formal education suffered from the hardships of life without a patriarch, he compensated with what developed into a lifelong devotion to reading and self-education.

Ultimately, all of the Marshall children immigrated to either Canada or the United States. After visiting South Africa, Australia, India, and Canada in search of a new home best suited for fresh starts, John settled in Detroit in 1913.[6] The city pulsated with opportunity and economic vitality. Fueled by automotive industry profits, Detroit's future looked boundless. By the end of

the following year, Ford Motor Company had produced 1.4 million of the homely but reliable Model T cars and reigned over a score of automotive giants who were, literally and figuratively, transforming America's landscape—particularly its cityscapes.[7] Formerly, streetcars had "promoted growth only along the immediate vicinity of their tracks, leaving large stretches of land vacant."[8] The increased mobility automobiles provided simultaneously fostered the development of these vacant urban tracts and the expansion of suburbia.

In Detroit, the beginnings of this flush automotive age coincided with construction of some of the city's grandest private structures and a beautification movement emphasizing expansive green spaces flanked by impressive public buildings. Products of this architectural movement eventually came to include the Detroit Institute of Arts, the Detroit Public Library, and the further implementation of landscape architect Frederick Law Olmstead's 30-year-old designs for Belle Isle.[9] It appeared John Marshall's skills as a stonemason were going to be in high demand.

Detroit's aura of promise also attracted a vivacious 21-year-old named Katherine Last. Born in 1894, somewhat in the middle of a large family of 13 siblings, she was raised in Halstead in Essex, England. Farmers, weavers, and cloth makers of English and Belgian descent populated the small town.[10] Kitty, as she was affectionately called, worked as a domestic servant in country houses before emigrating in the autumn of 1915.[11] After landing at New York, she made her way to Detroit where an elder sister and aunt already lived. There she found employment as a servant with the Dodge family until meeting and falling in love with a quiet, deep-thinking man from Scotland eight years her senior. John and Katherine were married in 1920.[12]

The first of their two sons, Andrew Walter Marshall, was born in September of the following year and raised in a middle-class home on Detroit's east side. Named for his seafaring grandfather, Andrew grew to be quiet, studious, and precocious. Their second son, named Fredrick John but called simply John for his father, was born just two years later. Unfortunately, the era of promise and abundance that had drawn John and Katherine to Detroit ended calamitously shortly after young Andrew's eighth birthday.

The Great Depression hit Detroit hardest among all of the nation's big cities. The city's symbiotic relationship with the automotive industry had disastrous ramifications when demand for new cars vanished. By the summer of 1931, journalist Edmund Wilson reported over two-thirds of the city's workers were unemployed or working part-time. "The enormous organism of Detroit," wrote Wilson, "one of the vital organs of the country, is now seen, for all its Middle-Western vigor, to have become partially atrophied. It is clogged with

dead tissue now and its life is bleeding away, and no one can do anything to stop it."[13] Everyone suffered, but the construction industry witnessed some of the most staggering declines—from $183 million in business in 1926 to only $4 million in 1933.[14] With the demand for stonemasonry nearly nonexistent, Marshall's father found himself out of work for long periods of time.[15] Like so many others, the Marshalls endured terrible hardship.

Despite these material constraints, Marshall grew up in an intellectually rich home. Charles Warner's 31-volume *Library of the World's Best Literature* found its place among myriad other books lining the Marshalls' shelves. His father's bookish pursuit of knowledge taught an enduring lesson: if there was something you wanted to know, you could read about it and find out.[16] Marshall spent a lot of time at the Detroit Public Library, where books offered knowledge and thus power in its most durable form. His eclectic reading ranged from an early childhood interest in war, particularly naval war, to books on mathematics, philosophy, history, and literature. Through his father's example but almost entirely on his own initiative, Marshall read broadly and deeply.[17]

By age 15 Marshall had experienced extraordinary times, both personally and vicariously through his self-directed learning. At the end of his ninth-grade year at Barbour Intermediate School, Marshall's hard work paid off when the principal asked to see him and five classmates. This small cohort tested highest in a class of over 500 students. With student attrition rates as high as 65 percent in grades six through 10, the intermediate-school curriculum provided vocational skills to those "who must leave school early."[18] For those who clearly demonstrated an ability to excel, Detroit's high school system offered a rich opportunity to prepare for college. In fact, during the twenties, Detroit's public schools had been transformed along progressive lines to become among the best in the nation. City leaders revamped curricula and initiated an ambitious building and hiring campaign to meet growing demands from a student population more than doubled in size.[19] Despite the school system's unparalleled financial crisis during the Depression, astute fiscal management and teachers' committed efforts preserved this reputation for excellence.[20] Barbour's principal wanted to ensure Marshall and his high-achieving classmates maximized the opportunities awaiting them.

Cass Technical High School embodied the best of Detroit's public school system. Opened in 1922 at the cost of $3.93 million ($53 million in 2012) with room for 3,600 students and 50 classrooms, the *Detroit News* reported Cass Tech was "by far the largest, most modern and most fully equipped of any high school" in Michigan. Educators praised the building as being as beautiful as it was successful. With its brick and limestone exterior, marble-lined

vestibules, and bas-reliefs with industrial motifs flanking the entrances, the seven-story building shared the main public library's grandeur reminiscent of a bygone era by the time Marshall matriculated in 1936.[21]

Cass Tech offered everything from vocational to college preparatory courses, with an emphasis on science and technology.[22] With admission contingent upon individual achievement, the student body's high intellectual caliber permitted a rigorous curriculum. Charles Lindbergh's mother taught organic chemistry there. Though Marshall never took her class, two other instructors left lasting impressions. Mr. Larson, head of the foundry located on the school's top floor, served as both Marshall's instructor and homeroom teacher. As such, he developed into a friend and mentor. Similarly, Mr. Fountain ran the machine shop and, through Marshall's friendship with his son, became a trusted teacher. Tellingly, in a school known for its excellence in science, Marshall resonated most with those concerned with the practical application of knowledge. Although knowledge in its esoteric form served an important purpose and Marshall demonstrated an ability to master it, he was drawn inextricably to the utility of its practical, empirical applications.

Fine teachers did not denude Marshall of initiative in his education. During his senior year, he worked part-time in a small factory owned by the father of a friend. With newfound disposable income, Marshall purchased books and began amassing his own library.[23] He read heavily in mathematics and science, where he demonstrated natural strengths, and broadly in other fields. Writings from philosophers Alfred Whitehead and George Santayana and the ethicist F. H. Bradley soon lined his shelves. Two particular books made a lasting impression on Marshall. Ford Madox Ford's *The March of Literature*, which traced the progression of the literary genre from Confucius's day onward, led Marshall to read the corpus of Russia's literary titans—particularly Dostoyevsky and Tolstoy. Similarly, Arnold Toynbee's sweeping multivolume *A Study of History* provided capsule histories of disparate cultures and societies. These and myriad other works developed Marshall's understanding of the sweep of history and man's innate proclivities, helping him adumbrate a nascent worldview.[24] Combined with his self-directed intellectual exploration, Marshall thrived in Cass Tech's demanding but congenial intellectual atmosphere. By the end of his senior year, he tested second in a class of 400 students.[25]

Unfortunately, the growing threat of war overshadowed this achievement. Marshall's high school years coincided with Mussolini's invasion of Ethiopia; the Spanish Civil War; Japan's invasion of the Chinese mainland; and Hitler's annexation of the Rhineland, Austria, and the Sudetenland.[26] By the spring of Marshall's senior year, the world seemed to be descending into chaos; parents

and teachers could do little to protect their children from the gruesome butcher's bill soon to reach maturity.

As historian John Lukacs describes, "In 1914 most people expected a grand and short European war. In 1939 no one expected a short war, perhaps with the solitary exception of Adolf Hitler. Without demur, and without the enthusiasm surging out of relief, people did what they had to do." [27] At Cass Tech—and across America—long-standing isolationist sentiments gave way to a martial spirit. Nearly half of the members of the disproportionately male student body enrolled in Junior Reserve Officer Training Corps (JROTC), wearing their uniforms to class and participating in organized drills and after-school training.[28] Marshall did not participate in JROTC, but gym classes for males were realigned to prepare him and others for boot camp.[29] In metallurgy class one day, Marshall's instructor held up a cold piece of steel and warned, "Unfortunately I think you are all going to have a lot to do with this in the future because it's what helmets are made of."[30] At the graduation ceremony in June 1939, these anxieties erupted into an emotionally charged public spectacle. Rather than joyfully celebrating an important milestone, parents, teachers, and students became overwrought by the ominous storm gathering on the near horizon.

Within three months, 60 German divisions rolled across Poland's border to ignite the conflagration of the Second World War.[31] Detroit factories slowly geared up as America's leaders intensified their material support of future Allies to hedge against Germany's stunning early military successes. The automotive industry's mastery of mass production techniques, extensive network of large and small suppliers, and huge skilled workforce made Detroit the center of gravity for what became known as the "arsenal of democracy."[32] While Europe and Asia were engulfed by the horrors of war, increased production on the home front definitively ended the Depression's lingering economic malaise.

Within this milieu, Marshall declined a scholarship offer to an engineering school in upper Michigan and worked for a year after high school. He believed the likelihood of America's continued neutrality diminished on the wreckage-strewn beaches of Dunkirk in late May 1940. After its heroic cross-channel retreat under fire, "Great Britain stood alone against the Nazi war machine that had swept all before it."[33] America's involvement seemed increasingly likely to Marshall.[34] In the interlude, he attended the University of Detroit to study engineering during the 1940–41 school year. In a routine physical, doctors diagnosed Marshall with a heart murmur, rendering him medically unfit for military service.[35] Bored with the engineering curriculum

and unable to enlist, he quit the university after a year to work in the large Murray Body Company factory.

Formerly a coach builder for Ford and smaller automotive companies, Murray had barely survived the Depression. However, it thrived fulfilling newfound military contracts to build airplane wings and subcomponents for the Boeing B-17 Flying Fortress for the Army Air Corps and the DB-7 Havoc for the Royal Air Force.[36] Like others, Marshall worked 10 hours per weekday, eight hours on Saturday, and six hours on Sunday at Murray. One Sunday afternoon in December, as was his custom after finishing his shift, Marshall sat in front of his parents' radio to listen to the New York Philharmonic. Shortly after 2:00 p.m. a special news bulletin interrupted the broadcast.[37] Japanese forces had attacked American bases in Oahu and Manila, and "hostilities seemed to actually be opening over the whole South Pacific."[38] The interregnum in America's involvement in wars abroad had finally ended; its commitment to victory would be total.

Marshall's war was fought from the factory floor. The Murray plant quickly expanded to 13,500 workers, most of them women. Huge presses operated around the clock as America's industrial base became fully mobilized.[39] Like many Americans unable to join the military, Marshall served by contributing to America's wartime economy. In all, over 200,000 Detroiters served in uniform during the Second World War.[40] Marshall's younger brother served in the Air Transport Command (ATC) and flew the venerable C-47 in the China-Burma-India theater.[41] In three-and-a-half treacherous years of ATC operations flying the Hump over the Himalayas, over 600 aircraft were lost and more than 1,000 crewmen killed.[42] John survived the war, but the loss of countless others stayed with Marshall. Memory of their sacrifices propelled him to the beaches of Normandy to pay respects to the fallen from his generation six times over the course of his long life.

Patriotically motivated, Marshall worked nearly every day during his four years at Murray. His youthful naivety was tempered by his exposure to the often messy realities of life. In one incident at the plant, a female worker was shot by her forlorn lover in an affair gone awry. On another occasion—when many erroneously assumed victory was inevitable in late 1944 during the heady days preceding the Battle of the Bulge—workers threw a debaucherous Christmas party that ended with a drunken female trying to jump from the top of the building. These and other occurrences offered important lessons of human behavior beyond what Marshall had learned from books or in the classroom.[43]

Nevertheless, Marshall's autodidactic pursuits and formal education continued while he worked at Murray. He enrolled in night school at Wayne State

University in the fall of 1943 and took general coursework with the intent of transferring credits whenever the war ended. Wayne State had come of age during the Great Depression—when economic pressure forced six individual colleges to merge for greater fiscal efficiencies—and offered a suitable venue for continuing studies.

Marshall soon befriended a chemist who was working on his dissertation. One day in mid-1944, the young scholar confided his belief that the United States was secretively working on an atomic bomb since many of its topflight physicists had mysteriously disappeared.[44] Based on his largely self-taught knowledge of physics, Marshall grasped the theoretical possibility of atomic weapons but did not contemplate their horrific efficacy.[45] Nor could he possibly foresee the way these weapons would fundamentally alter both the character of warfare and his life's trajectory—drawing him from the factory floor to the hallowed halls of a new strategic community within only half a decade.

In late 1944, with Allied victory increasingly assured, Marshall took an entry exam to the University of Chicago proctored by a Wayne State professor.[46] As in the past, he tested remarkably well. Marshall soon received an offer of acceptance directly into the university's graduate school of economics, allowing him to forgo the requirements for an undergraduate degree. Whenever the war finally ended, Marshall would be prepared. By the following August, with victory in Europe won and Japan's official surrender just days away, Marshall left his native Detroit for the University of Chicago to cast himself into the world of ideas.

Opened in 1892 with a gift from oil tycoon and philanthropist John D. Rockefeller, the University of Chicago aspired from the outset to be a "center of graduate study where research and the discovery of new knowledge, rather than mere teaching and transmission of established truths, was to be the central aspiration of professors and students alike." Its motto *Crescat Scientia, Vita Excolatur* concisely expressed the creed of the university's first president, William Harper: "Let knowledge increase, life be enriched." Harper's brilliance and tenacity, coupled with Rockefeller's continuing generosity, made the university a bellwether of higher education throughout the United States.[47]

Following Harper's death, the university muddled through a succession of three unremarkable presidents. Each proved incapable of arresting the steady decay of the school's preeminence in American education. Finally, in 1929, the board of trustees and faculty committee made a deliberate gamble in selecting their fifth president. In choosing a brash young scholar named Robert Maynard Hutchins, they consciously and nostalgically attempted to recreate the magic of Harper's once-youthful vigor.[48] Hutchins, dean of the Yale Law School and just turned 30, did not disappoint. Ultimately, Hutchins's acerbic

wit, often construed as arrogance, and insatiable ambition conspired to mark his tenure at Chicago with controversy and limit the durability of his reform efforts.[49] But his imprint on the spirit of the school would prove indelible.

Hutchins held a strongly intellectual view of higher education. As a Progressive, he believed "knowledge, efficiency, and scientific planning, arrayed against ignorance, error, and waste" could catalyze social reform.[50] Over the course of his long tenure, he attempted to implement sweeping reforms to "mute the importance of disciplines while at the same time glorifying fundamental knowledge." His efforts were based on "two fundamental axioms. First, higher education should be grounded in fundamental scholarly knowledge, not in the accumulation of facts or vocational preparation."[51] With the assistance of Mortimer Adler, a fellow secular perennialist, Hutchins implemented a liberal studies program to help undergraduates develop meaningful conceptual thinking and judgment through exposure to the great books of the Western canon. His self-purported aim was mastery of the medieval trivium of grammar, logic, and rhetoric.[52]

Hutchins's second axiom proved equally radical: "discipline based education created barriers to the exciting educational opportunities found in interdisciplinary work." To mitigate these artificial barriers to greater understanding, Hutchins encouraged cross-disciplinary engagement through the formation of interdisciplinary committees and the exploration of interdisciplinary graduate research.[53]

Marshall's matriculation in the autumn of 1945 coincided with a time of great tumult on campus. The military's rapid demobilization in the aftermath of the war created a sudden influx of veterans at the university—from 2,687 in Marshall's first year to 4,392 in his last. In all, the total number of registered students nearly doubled from the low point in 1943–44 to a record high just three years later. Shortages in classroom space and housing quickly became acute. Groupings of ramshackle wooden buildings sprouted up on vacant land and former playing fields to support veterans, their wives, and a swarm of infants from the postwar baby boom.[54] With the university focused on caring for veterans, single students were left to find their own living accommodations. For the duration of his studies, Marshall boarded in one of several theological seminaries associated with the university—first with the Unitarians and then, when they ran out of room for him, with the Congregationalists. He dined at a home-turned-cafeteria designed by architect Frank Lloyd Wright near campus.[55]

When Marshall and this deluge of veterans arrived, Hutchins was entering the final quarter of his 22-year run as university president and, later, chancellor. Growing impatient and increasingly stymied by an intractable network of

teachers, Hutchins had recently implemented reform focused on the abolishment of passive learning. Lecturing was nearly banished in favor of discussion—endless discussion—as the vehicle for active learning. Students achieved a "superior level of verbal agility" and acquired an "aptitude for taking on big questions and unfamiliar data."[56] Empowered by this newfound egalitarianism, students demonstrated their preparedness to put everything continuously into question and their comfort with the intellectual ambiguity and political incorrectness this process required.[57]

Marshall thrived in this intellectual efflorescence. The spirit of Hutchins's multidisciplinary approach resonated strongly with Marshall's wide-ranging reading interests and instinctively multidisciplinary outlook. While enrolled as a graduate student in the Department of Economics, Marshall surveyed courses in philosophy, mathematics, and statistics.[58] Additionally, the university's intellectual environment offered an important lesson in the value of contrarianism—the relentless questioning of accepted truths occasionally led to revolutionary changes in understanding.[59]

The field of economics itself was in the midst of its own revolutionary changes. The profession's failure to anticipate or mitigate the nation's worst depression—coupled with the limited effectiveness of New Deal recovery efforts—stimulated professional introspection, intellectual controversy, and institutional experimentation during the war.[60] While Keynesian macroeconomic theory helped to mobilize resources in a wartime economy, its applicability in peacetime remained suspect. Professors and students alike grappled with economists' wartime experiences harnessing the neoclassical approach to economics "to problems of planning, allocation, and choice."[61]

The economics discipline was being redefined. "No longer the study 'of nature and causes of wealth of nations' (as Adam Smith had claimed), or a 'critical analysis of capitalist production' (as Karl Marx had suggested)," economics was transmogrifying into "the formal study of 'the adaptation of scarce means to given ends.' "[62] The emergent Cold War context imbued this transformation with gravitas.[63] Marshall soon became involved with the Cowles Commission, an organization leading many of these changes.

Frustrated by the limited predictive power of economic analysis, businessman Alfred Cowles III had founded the Cowles Commission for Economic Research in 1932.[64] He also supported a newly formed Econometric Society, devoted to the further advancement of economic theory in its relation to statistics and mathematics.[65] Seven years later, the commission moved from Colorado to Chicago, due in part to Cowles's managing interest of the *Chicago Tribune* and in part to Hutchins's active attempts to plant the commission in the rich intellectual soil of Hyde Park.[66] By the time Marshall joined it, the

commission reflected the "way in which the Hutchins' spirit was transformed into a dedication to fundamental research on deep questions of economic analysis. The commission championed the use of mathematics, statistics, and economic theory, both to develop new ideas for economics and to solve complex problems of planning and management."[67]

The commission thrived under Jacob Marschak's directorship, which began in 1943. A Kiev-born Russian exile, Marschak was "inquisitive, unpretentious, perceptive, and persistent yet cordial." He cultivated "a spirit of free and imaginative yet dogged inquiry."[68] Marschak assembled a group of extraordinary young economists. Among them were no less than eight future Nobel laureates.[69] Staff meetings at the Cowles Commission were models of constructive intellectual violence, where Marschak encouraged complete equality: a graduate student could contradict a senior scholar with impunity and encouragement.[70] Discussions frequently devolved into a cacophony of disparate European accents as the scholars tried to speak at once.[71] This creative tension produced remarkable results—the commission soon became "the Mecca of quantitative economics."[72]

Within the larger Economics Department, Marshall took Milton Friedman's first class at the university. He also took several courses with the doyen of the department, Frank Knight, and was not disappointed. Knight dissected some of the flawed assumptions of economics theory. "Every farmer knows that one boy is worth one boy, and two boys are worth about a half a boy, and three boys are worth almost nothing," decried Knight, "but the economist would say three boys are worth three boys, missing the fact that the family is the most important unit not the individual." In demonstrating the limitations of models and economics theory, Knight encouraged his students to think critically.[73] Marshall found Knight, Marschak, and Tjalling Koopmans—Marschak's successor as director of the commission in 1948—remarkably approachable and down-to-earth.[74] They facilitated his academic research and intellectual growth.

Marshall grew increasingly interested in statistics. In his last year at the university, he took a course in the Chicago Business School taught by Allen Wallis titled Readings.[75] Wallis had trained as a quantitative economist but became heavily involved with the Statistical Research Group (SRG) at Columbia University during the war. In many intellectual respects, the SRG resembled the Cowles Commission currently at the university—overflowing with brilliant minds and committed to an interdisciplinary approach. Wallis proved adept at managing its research efforts.[76] Now at Chicago, he fostered Marshall's intellectual growth by directing his reading and having him draft response letters to inquiries he received asking for statistical advice.[77]

Marshall's 1949 master's thesis, "A Test of Klein's Model III for Changes in Structure," tested Klein's 15-equation model with its estimated parameters to determine if it fit data for 1945–46 as well as it did for the data from which its parameters had been estimated. In short, Marshall sought to determine the "empirical consistency of the model with the reality it purports to explain or describe."[78] He concluded that only seven of the 12 applicable equations (the other three being definitions) could be considered valid in the postwar period. Years later an academic history of the Cowles Commission judged that Marshall was, in this instance, among the "first to act on the precept that econometric models, like any other theories, must be tested by their performance in making predictions."[79]

Marshall's experiences at the Cowles Commission were intellectually invigorating, but he grew disillusioned with the limited predictive utility of econometric models. He eventually concluded that it was "not clear these models were saying anything about the economy, really. Instead, they were predictions of the next number that would appear in the Commerce Department's summary of the thing. That was as far as you could go."[80] Marshall proved disinclined to accept without question the prevailing wisdom of academic economics.[81] Fortunately, others shared his multidisciplinary bent and skepticism.

One individual's impact on Marshall, though tangential, proved fortuitous in later years. Five years Marshall's senior, Herbert Simon had enrolled at the University of Chicago in 1933 and pursued cross-disciplinary research in economics, political science, logic, and mathematical biophysics. He graduated with a degree in political science (after refusing to fulfill an accounting requisite for a degree in economics). His dissertation, published during Marshall's first year at Chicago in book form as *Administrative Behavior*, explored decision making and limited rationality.[82] Simon began working as a research consultant with the Cowles Commission in the spring of 1947, periodically presenting his research to the commission.[83] The seeds Simon planted would blossom in later years for Marshall.

The intellectual fervor permeating Hyde Park was partially attributable to exogenous forces. Marshall's university years coincided with wrenching change in the international order. Escalating tensions in the new atomic age undoubtedly amplified the gravity of students' efforts. Postwar euphoria quickly dissipated as hopes for an enduring peace were replaced by an emergent bipolar order pitting the United States against the Soviet Union, along with their respective allies. To some, atomic weapons seemed to fundamentally alter the character of war and the conditions of peace—necessitating the formulation of a new strategic calculus. As Bernard Brodie wrote in the summer

of Marshall's second year, "our military authorities will have to bestir themselves to a wholly unprecedented degree in revising military concepts inherited from the past. That will not be easy. They must be prepared to dismiss, as possibly irrelevant, experience gained the hard way in the recent war."[84]

In the winter of 1948, Marshall neared completion of his master's degree. Because the university did not offer a doctorate in statistics, Marshall planned to work for a few years before finding a suitable PhD program elsewhere. Serendipity intervened. Sociologist Herbert Goldhamer, a professor at the University of Chicago having recently joined RAND, planned to run a study to examine the significant increase from the First World War to the Second in the percentage of individuals deemed unfit for military service due to mental illness. He intended to parse out any trends with potential impact on America's ability to mobilize its populace if tension with the Soviets should erupt in another total war. Goldhamer needed someone with a background in statistics. Marshall's friend Prof. Allen Wallis made the necessary referral.[85] Knowing little about the newly formed think tank, Marshall accepted Goldhamer's offer to come work for RAND. Providence, and a salary 50 percent higher than his only other job offer, drew Marshall into the nucleus of an emerging strategic community grappling with the changed character of warfare.[86]

In January 1949, when Marshall left for RAND's Social Science Division in Washington, DC, neither he nor those who knew him could anticipate the way experiences during his formative years would alchemize a unique strategic perspective. Among other things, Marshall was a second-generation American imbued with a robust sense of civic duty, strong work ethic, and Midwestern sensibility; an autodidact with a predilection for multidisciplinary, empirically based study; and a natural mathematician. He demonstrated an ability and desire to thrive in an egalitarian intellectual environment, a rudimentary understanding of and exposure to the limits of human rationality, an early interest in and respect for history and military matters, and a gravitational pull toward models yet with an understanding of their limitations.

These personal traits and early formative experiences reverberated through Marshall's long life. So too did the scope and tenor of the remarkable times in which he lived. "Growing up in the thirties and forties," Marshall later reflected, "provided a view of the potential actions and behavior of human beings that seems to be a lot wider than what people want to assume these days." Neither peace nor stasis predominated—man's destructive proclivities and the discontinuous nature of change were both important lessons for Marshall.[87] They would serve him well in the challenging times ahead.

Notes

1. Mirel, "Politics of Educational Retrenchment," 324. See also Vachon, *Images of America*, 35.
2. "Main Detroit Public Library," Michigan State Housing Development Authority.
3. Jeffrey Mirel estimates Detroit's population grew "from 993,678 in 1920 to 1,568,663 in 1930." See Mirel, "Politics of Educational Retrenchment," 323–24.
4. The census lists Arthur, James, Christina, Andrew, and John as children of Susan Marshall. See "1891 Census Returns of England and Wales."
5. "1901 Scotland Census."
6. The census recorded the year of John Marshall's immigration as 1913. See "1930 United States Census."
7. Davis, *Detroit's Wartime Industry*, 9.
8. Bottles, *Los Angeles and the Automobile*, 13.
9. Vachon, *Images of America*, 23.
10. Marshall, Guthe transcripts, 1-7. Guthe conducted 10 interviews with Marshall between September 1993 and October 1995 that he transcribed into a 12-part series to chronicle the intellectual history of net assessment. Hereafter, notes refer to the specific Guthe transcript (numbered one through 12) with the associated page number. For example, the above citation means that the information can be found on page seven of the first transcript.
11. The passenger manifest shows Kitty Last departed Liverpool and arrived in New York on 9 September 1915. "New York Passenger Lists, 1820–1957."
12. Marshall, author interview, 21 February 2012.
13. Wilson, "Despot of Dearborn," 24–25.
14. Mirel, "Politics of Educational Retrenchment," 326.
15. Marshall, author interview, 21 February 2012.
16. Guthe transcripts, 1-7. Guthe's research reveals that Marshall inherited the multivolume set and still kept it on his personal bookshelves in 1991.
17. Ibid., 2-3.
18. Spain, Moehlman, and Harrington, "Intermediate School in Detroit," 9–12.
19. Mirel writes that 122,690 young people were served by 3,750 public school teachers, supervisors, and administrators in 1920. In 1930 these numbers were 250,994 and 7,525, respectively. Mirel, "Politics of Educational Retrenchment," 324.
20. Ibid., 325–49.
21. Austin, "Cass Tech High School (Old)."
22. Angus and Mirel, "Equality, Curriculum, and the Decline of the Academic Ideal," 180. The authors report that between 1928 and 1940 the proportion of classes devoted to English, art, and the sciences remained stable while that of mathematics and foreign language classes declined; also, social studies and vocational classes rose from about one-third of all classes to just under one-half (ibid.).
23. Marshall, author interview, 21 February 2012.
24. Guthe transcripts, 1-3.
25. Ibid.
26. Maddox, *United States and World War II*, 47–57.
27. Lukacs, *Last European War*, 53.
28. Marshall, author interview, 21 February 2012.
29. Ibid.; and Vachon, *Forgotten Detroit*, 71.
30. Guthe transcripts, 1-9.

31. Maddox, *United States and World War II*, 58.
32. Davis, *Detroit's Wartime Industry*, 8.
33. Maddox, *United States and World War II*, 71.
34. Marshall, author interview, 21 February 2012.
35. Guthe transcripts, 1-4.
36. "Murray Corp."
37. Marshall, author interview, 21 February 2012.
38. "Pearl Harbor Attack Announcement."
39. "Murray Corp."
40. Vachon, *Forgotten Detroit*, 70.
41. Marshall, author interview, 21 February 2012.
42. Spencer, *Flying the Hump*, 13.
43. Guthe transcripts, 1-13.
44. This scholar was more correct than he could have known, albeit somewhat behind the highly secretive developments. On 2 December 1942, the first man-initiated, self-sustaining nuclear chain reaction was achieved in Chicago as part of the Manhattan project. However, it would take until mid-1945 for the atomic bomb to be tested. See Freedman, *Evolution of Nuclear Strategy*, 14–15.
45. Guthe transcripts, 1-8; and Marshall, author interview, 21 February 2012.
46. Marshall, author interview, 21 February 2012.
47. McNeill, *Hutchins' University*, 3, 17.
48. Ibid., 17.
49. Ibid., 19–20; and Augier and March, *Roots, Rituals, and Rhetoric of Change*, 60.
50. Kuklick, *Blind Oracles*, 18.
51. Augier and March, *Rhetoric of Change*, 60–61, 66.
52. McNeill, *Hutchins' University*, 112.
53. Augier and March, *Rhetoric of Change*, 61.
54. McNeill, *Hutchins' University*, 139.
55. Marshall, author interview, 21 February 2012.
56. McNeill, *Hutchins' University*, 141.
57. Van Overtveldt, *Chicago School*, 30.
58. Marshall, author interview, 10 November 2011.
59. Van Overtveldt, *Chicago School*, 32.
60. Bernstein, *Perilous Progress*, 75.
61. Ibid., 70.
62. Ibid., 95.
63. Ibid., 79–82.
64. Van Overtveldt, *Chicago School*, 36.
65. Cowles, "Meeting of the Econometric Society."
66. Augier and March, *Rhetoric of Change*, 68; and Van Overtveldt, *Chicago School*, 36.
67. Augier and March, *Rhetoric of Change*, 68.
68. Hildreth, *Cowles Commission in Chicago*, 3, 5.
69. Van Overtveldt, *Chicago School*, 39.
70. Hildreth, *Cowles Commission in Chicago*, 7.
71. Ibid., 6.
72. Van Overtveldt, *Chicago School*, 37.
73. Guthe transcripts, 12-20.

74. Ibid., 1-13.
75. Marshall, Goldberg and Matloff interview, 1 June 1992, 1–2.
76. Augier and March, *Rhetoric of Change*, 166–68.
77. Marshall, Goldberg and Matloff interview, 1 June 1992, 2.
78. Marshall, "Test of Klein's Model III," 3.
79. Cowles Foundation, *Economic Theory and Measurement*.
80. Guthe transcripts, 12-24.
81. Watts, "Net Assessment Sourcebook," 315.
82. Augier, review of *Administrative Behavior*, F386–87.
83. Cowles Foundation, *Economic Theory and Measurement*, app., "Biographies of Staff, Fellows, and Guests, 1932–1952."
84. Brodie, *Absolute Weapon*, 81.
85. Marshall, Goldberg and Matloff interview, 1 June 1992, 2.
86. Guthe transcripts, 11-4.
87. Ibid., 1-13.

Chapter 3

Alchemy for RAND's Golden Years

RAND's antecedents sprang from the Second World War, when rapid technological advancements within the context of total war necessitated an unprecedented level of collaboration between the military and industrial-scientific community.[1] By the latter part of the war, scientists evolved beyond an advisory role and often sat alongside generals and colonels in Washington headquarters to participate directly in war planning.[2] This ascendency of scientific advisers stemmed from two things: the unprecedented destructiveness of new technologies created by hard scientists and the efficacy of new methodologies created by soft scientists. Both harnessed science to the exigencies of the state.[3]

As victory neared, the Army Air Forces' (AAF) chief, Gen Henry "Hap" Arnold, had grown concerned with sustaining a productive postwar relationship with the scientific community to maintain technological and air superiority. Above all, he needed an organization to help generate the intellectual capital necessary for understanding the changing character of warfare in a nascent atomic age. "Any Air Force," wrote Arnold, "which does not keep its doctrines ahead of its equipment, and its visions far into the future, can only delude the nation into a false sense of security."[4] He and his wartime advisor, scientist and engineer Edward Bowles, collaborated with Donald Douglas and his affiliate, flight test engineer Frank Collbohm, to determine how best to establish a private corporation dedicated not to product development but to intellectual development for the military. In October 1945, still under the loose congressional oversight of wartime conditions, Arnold provided $10 million in seed money from the AAF's considerable budget surplus.[5] RAND began operations as a Douglas Aircraft subsidiary in a wing of its parent company's Santa Monica offices shortly thereafter.

From the outset, RAND sought and attained the freedom to decide how best to advance the art of air war with minimal oversight.[6] During the recent war, the British had developed operations research (OR) techniques to help assess and increase the effectiveness of new weapons. The American military enthusiastically adopted this methodology, particularly strategic bombing advocates in the Army Air Corps. Operations research provided policy makers an economist's approach to battle. It helped rationalize the planning and allocation of limited resources to resolve complex operational problems.[7] While primarily a quantitatively oriented analytical tool, OR embraced any discipline

providing insight into battlefield problems.[8] Drawing from OR's analytic methodologies, RAND developed its own unique approach to the timeless quest for a science of strategy. "A fundamental part of RAND's philosophy," notes its second annual report, is "that scientific methodology can reduce the areas where intuitive judgments alone have heretofore been possible."[9]

Ed Paxson, an acerbic but ingenious analyst hired into the Mathematics Division, organized RAND's first major analysis of an air campaign against the Soviet Union in 1947. Drawing on his colleagues' work in targeting, morale, aircraft design, and future weapons systems, he invented the term "systems analysis" to describe the new "RAND way."[10] Systems analysis differed from OR in one critical respect: "An operational researcher answered the question: what is the best that can be done, given the following equipment having the following characteristics? The systems analyst, as Paxson conceived the notion, would answer a more creative question: here is the mission that some weapon system must accomplish—what kind of equipment, having what sorts of characteristics, would be best for the job?"[11] In short, systems analysts widened their apertures from the narrow view of applying existing military forces in an operation to the broader problem of determining force structure and correlating strategies.

The methodological limitations to systems analysis quickly became apparent. Paxson's multiyear study sought to encompass a vast number of variables and combinations, eventually including no fewer than 400,000 bomber-weapon combinations, yet it ultimately arrived at spurious conclusions.[12] Quantifying the human dimensions of warfare and intangible elements of military power proved difficult. John Williams, the "obese, genial, and charmingly eccentric" head of RAND's Mathematics Division, and other analysts hoped to strengthen systems analysis by fusing hard and soft scientists into a truly interdisciplinary team.[13] They convinced Collbohm to host a weeklong conference in September 1947 to recruit some of the nation's leading social scientists. Attendees included luminaries such as political scientist Bernard Brodie, economist Charles Hitch, and sociologists Hans Speier and Herbert Goldhamer, Marshall's future benefactor.[14]

This push for inclusion of the softer sciences coincided with RAND's move toward independence. Concerned that the Air Force awarded contracts to other companies to avoid the appearance of preferential treatment, managers at Douglas Aircraft increasingly viewed RAND as a commercial liability.[15] Relationships continued to sour until May 1948, when, based on the legal counsel of wealthy San Francisco lawyer and MIT Radiation Lab business manager Rowan Gaither, RAND incorporated as an independent nonprofit corporation. Collbohm became its first president, with approximately 200 staff

members.[16] He served in this capacity for nearly 20 years, contributing immeasurably to the growth, intellectual tenor, and quality of the organization. Project RAND thus became the RAND Corporation, though its mission to remain involved in almost all aspects of the newly independent US Air Force remained unchanged.

After Collbohm allayed their fears about coming to work for a newly independent nonprofit think tank, the social scientists officially joined RAND over the summer of 1948. Speier headed the Social Science Department based in Washington, DC, and Hitch directed the Economics Department in Santa Monica.[17] Ultimately, this geographic separation created formidable unforeseen barriers to the integration of the social scientists into RAND. Their inability to participate in many of the major studies exacerbated methodological differences, contributed to their failure to coalesce within the larger organization, and sowed seeds of distrust with long-term ramifications.[18]

Marshall's career at RAND began several months later, in January 1949. Working for Goldhamer from the Washington offices by happenstance, he spent most of his first year geographically and intellectually isolated from RAND's mainstream culture. In the autumn of 1949, Marshall gained exposure to it during a month-long trip to Santa Monica to help further the processing of data for a mental health study. Goldhamer, formerly the junior chess champion of Canada, introduced Marshall to Kriegspiel and the small but elite group of RAND employees enthusiastically seeking its mastery.[19] The Prussian war game amounted to three-dimensional blind chess—where players could see their own pieces but not those of their adversaries—and encapsulated the challenges of devising strategies under conditions of uncertainty.[20] Williams led this lively group of Kriegspiel devotees.[21] Marshall and Goldhamer spent three or four nights every week at Williams's residence in the Pacific Palisades.[22]

The Soviet Union had broken America's atomic monopoly in August. While years away, Russia's accumulation of an atomic stockpile seemed inevitable.[23] During games of Kriegspiel at Williams's home and in the lunchroom cafeteria at RAND headquarters, conversation turned invariably to the strategic implications of this looming parity. Employees energetically debated the merits of preventive war and the best way to wage an "efficient, one-way strategic air campaign against the Soviet Union" during what many conceptualized as a narrowing window of opportunity.[24] Marshall found the conversation and intellectual environment stimulating. It seemed a breeding ground for fertile minds and soul-searching discussions.[25] Unlike RAND's Washington offices, the atmosphere in its Santa Monica headquarters embodied the vision of

freewheeling, multidisciplinary exploration set forth by the organization's founders.

After Marshall returned to Washington, Russ Nichols, an economist assigned as a liaison to the Social Science Department's Washington offices, helped keep Marshall apprised of developments in Santa Monica. Marshall impressed both Nichols and Hitch. By late May of the following year, Marshall returned to Santa Monica at Hitch's invitation to participate in a major summer study on Soviet economic targeting.[26] He agreed to split his time in Santa Monica between the Social Science and Economics Departments. Unbeknownst to him at the time, Marshall would not move back to Washington, DC, for another two decades. However, the friendship he had formed there with Goldhamer—and the appreciation he had gained for the social scientists' nonquantitative methodologies during his year in RAND's wilderness—paid lasting dividends.

Marshall was quickly assimilated into the vibrant intellectual community at Santa Monica headquarters. Collbohm attracted and retained the very best talent by bidding high for the people RAND wanted, establishing relatively lavish work conditions, and providing the freedom and resources necessary for intellectual creativity. Marshall's generous compensation package—50 percent higher than his next highest offer when leaving the University of Chicago—was not atypical. Employees traveled first class. To encourage people to utilize their generous leave plans and help prevent staff burnout, management paid double for vacation days. Most importantly, it provided analysts intellectual freedom. Employees largely set their own research agendas and, through RAND's Summer Studies Program, brought in some of the best minds from across the country to help solve seemingly intractable problems—continuing a tradition born of the recent war.[27]

While Collbohm enriched the soil of intellectual innovation at RAND, two idiosyncratic department heads helped ensure the conditions proved fruitful. Apart from their own intellectual contributions, Hitch and Williams also helped to shape the scope and tone of RAND's intellectual environment. They cultivated full-ranging discussions, practiced intellectual fairness, and deliberately developed younger people and new methods of analysis.[28] Although a small minority of the total staff—never numbering more than 25 out of the several hundred scientists who worked there—these civilian military strategists forged a new profession.[29] Like Marshall, most were only in their late twenties. Chosen for their intellectual acumen, they envisioned themselves at the leading edge of centrally important problems.[30] Frequently they were.

RAND's Santa Monica offices were abuzz with the zeitgeist of the early nuclear age when Marshall arrived for the summer of 1950. Convinced that

the Russians held both the capacity and will to develop thermonuclear weapons, President Truman had publicly committed at the end of January to building the "superbomb."[31] NSC-68, completed in April, had articulated a grand strategy for the Cold War based on a significant hardening of America's military posture. Stated policy became to protect and project freedom and "to attempt to change the world situation by means short of war in such a way as to frustrate the Kremlin design and hasten the decay of the Soviet system."[32] The outbreak of the Korean conflict—shortly after Marshall's arrival—tested this policy in the first limited war of the nuclear age. Paradoxically, atomic weapons exacerbated tensions but militated against conflict escalation.

Rising tensions drove both sides of the nuclear dyad to begin stockpiling.[33] For the time being, atomic weapons remained *a* decisive weapon—but not *the* decisive weapon—in what many presumed would be a general war of long duration against the "Russian Bear."[34] Most strategic thinkers in the late 1940s and early 1950s believed atomic airpower could produce victory only when used in conjunction with land and sea forces. Strategic bombing concepts—incubated in the interwar period and tested during the Second World War—still provided an adequate framework for thinking about how best to fight an atomic war.[35]

Marshall's early work at RAND paralleled other economists' efforts. He focused on determining appropriate measures of effectiveness, commonly called "the criterion problem," and on targeting issues.[36] Systems analysis attempted to recast military problems as economic problems, necessitating focus on the most efficient allocation of available resources—choosing doctrines, equipment, techniques, and so on.[37] Selecting the appropriate criterion frequently became the central problem in the design of an economic analysis intended to improve military decisions. Economists in RAND's early years—Marshall included—helped to scrutinize desired ends and distinguish preferred combinations of consequences from less desirable ones.[38] Yet ultimately, when choosing a course of action, resource constraints mattered. RAND engineers, however, who previously had dominated all of the studies, tended to view budgets as arbitrarily or bureaucratically imposed obstacles. Marshall and other economists worked to persuade them that budgets actually reflect constrained resources and affect macroeconomic behavior.[39]

In addition to the criterion problem, Hitch asked Marshall to analyze Soviet economic targeting. The enemy's war-making potential remained essentially an economic problem and thus an issue best suited for economists.[40] Hitch, a Rhodes scholar turned Oxford don, held considerable experience with targeting analysis. He had employed reverse-analysis OR during the war, using damage reports from the Battle of Britain to ascertain the efficacy of British

bombing raids over Germany.[41] Marshall employed the still-embryonic methodology of systems analysis to determine the potential impact of a finite, but increasing, number of atomic weapons on the Soviet economy. He concluded that, based on variances in bombing accuracy, 200 atomic weapons of still-limited yield were insufficient to destroy the Soviet's massive and dispersed economy.[42]

Marshall's work in this and other targeting studies led him gradually to suspect "there were problems [in] most aspects of higher-level strategic choice that fundamentally eluded quantification, starting with the choice of appropriate criteria for judging the relative merits of competing alternatives."[43] His views opposed the dominant intellectual paradigm of RAND's vanguard, who shared an unwavering belief in the efficacy of submitting warfare's vagaries to the logic and quantification of the scientific methodology. Marshall's unlikely friendship with a fellow empiricist helped to solidify a contrarian view.

Shortly after his arrival, Marshall befriended the gregarious physicist Herman Kahn. The two were drawn together by similar intellectual temperaments, if wholly different demeanors. Kahn was voluminous and voluble. At six feet in height and 300 pounds, he was nearly as wide as he was tall. Kahn stood out for his girth and loquaciousness.[44] By contrast, Marshall was of average build, laconic, and deliberatively low key. The peak of their friendship coincided with Kahn's metamorphosis from whiz-kid physicist to polemical showman. For the remainder of their bachelorhood, the two spent their available evenings and weekends together engaged in endless discussion.

Both came from modest means.[45] During the war, while Marshall toiled on the factory floor, Kahn served as a telephone linesman and ensured communication lines paralleling the treacherous Burma Road remained operational. After falling gravely ill, Kahn returned stateside where he enrolled at the University of California, Los Angeles (UCLA), and, later, graduate school at Cal Tech to study physics. Nearly the same age, both entered RAND directly from graduate school and frequently expressed wonderment at their newfound discretionary income.[46] Years later, a friend jokingly described their frequenting of California's best restaurants as a "multi-year quest for gastronomic ecstasy."[47] But they shared a bond far deeper than their stomachs might allow.

Both were inveterate autodidacts and eclectic readers. Marshall thought Kahn "a polymath, omnivorously curious about everything."[48] Kindred spirits, their freewheeling conversations spanned nuclear strategy, economics, anthropology, and sociology. Perhaps most importantly, both were devout empiricists. After endless hours of discussion, they created a bifurcated taxonomy of worldviews—people were either model- or reality-oriented. Model-oriented

individuals tended to get attached to solutions too quickly. They risked becoming caught in the beauty and intricacy of models for their own sake, turning inwardly on them and away from reality.[49]

For many systems analysis enthusiasts, if a subject could not be "measured, ranged, and classified, it was of little consequence. Numbers were all—the human factor was a mere adjunct to the empirical."[50] For Marshall and Kahn, while theories and models served an important analytical purpose, reality remained their primary referent. They believed that only empiricism and flexibility of mind offer insight into human behavior. Yet both understood, improved upon, and masterfully employed the dominant analytic methodologies within RAND's strategic community. Though skeptical, the two still contributed to the heady quest to inflict scientific rigor on warfare and strategy.

Kahn's early work at RAND focused on attempting to simplify Monte Carlo calculations, a technique of statistically systematizing random variables to model phenomena with significant uncertainty in inputs. Kahn "applied Monte Carlo techniques to calculations on the workings inside a hypothetical hydrogen bomb, especially the diffusion of heat and the collision of neutrons."[51] During their tireless conversations in the halls of RAND and over exquisite meals, Marshall and Kahn discussed ways to enhance systems analysis using Monte Carlo techniques. They were among the first to apply the robust mathematics of physics to modeling human competition—particularly one's opponent in war.

In 1951 Marshall and Kahn began a project on using the Monte Carlo method to help analyze four alternate reconnaissance plans in a strategic air campaign. The report, released in the spring of the following year, was RAND's first major systems analysis based on this statistical method. At a Washington conference for the Operations Research Society of America in November 1952, the two delivered an address on another paper they coauthored. "In cases where the underlying structure of the problem is complicated and contains probabilistic elements," the two posit, "Monte Carlo computations may be of help in making such decisions if analytic methods fail or are not known." In an era of still-costly and limited computer processing, they sought to reduce the sample size required to obtain a fixed level of accuracy. Yet, while Monte Carlo techniques offered pliability in building mathematical models to approximate reality, Marshall and Kahn conclude by warning that the technique "in its most primitive form, is in danger of being oversold." Ever the empiricists, they caution against the "Monte Carlo will do anything view."[52] Thus, even when creating new and better methodologies for making predictions, they remained wary. Their work on these techniques, however, continued over the next several years.

In parallel to these collaborative efforts, Kahn was helping make the macabre dream of producing the hydrogen bomb a reality. Due to his work on targeting issues, Marshall held a Q clearance—a prerequisite for access "behind the glass curtain" quarantining the Physics Department from the rest of RAND.[53] In late 1951, Kahn confidentially told Marshall scientists were nearing a technical solution to the invention of the superbomb.

Around the same time of Kahn's admission to Marshall, several analysts began meeting to evaluate the new weapon's strategic implications. The small group included Hitch, James Lipp, Ernest Plessert, and Bernard Brodie. Lipp headed the Missile Division and Plessert led RAND's Physics Department. Brodie had just joined the Social Science Division in August; he enjoyed notoriety for his earlier contributions to what many considered the seminal analysis of the strategic implications of the atomic weapon—*The Absolute Weapon*—and for his consultancy to Air Force chief of staff Hoyt Vandenberg. Lipp, horrified by the results of the initial analysis, dropped out of the group.[54] The remaining trio briefed their findings in preliminary form in March 1952. RAND released the final report, entitled *Implications of Large-Yield Nuclear Weapons* and classified Top Secret, in July of the same year.[55] The team's apocalyptic conclusions generated great interest among policy makers anxiously following the hydrogen bomb's development, including President Truman.[56]

The H-Bomb promised to change everything. The Soviets' all-but-inevitable attainment of thermonuclear weapons promised them disproportionate gains—redressing America's advantages in atomic stockpile, delivery capability, basing, and experience in long-range strategic bombing.[57] Additionally, the horrific destructiveness of thermonuclear weapons vitiated earlier notions of strategic bombardment based on precision bombing of industrial capacity and rendered earlier notions of atomic warfare obsolete. "Because of the power of such weapons," wrote the study's authors, "area rather than point targets will be destroyed, and cities and their populations will be devastated."[58] The authors chillingly estimated the death of up to 35 million people in the event of war.[59] "The political objectives of wars cannot be consonant with national suicide," warned the trio, "and large-scale reciprocal use of atomic or thermonuclear weapons against civilian cities would not fall short of national suicide for both sides."[60]

From Marshall's perspective, if one examined the debate in an unemotional and cold-blooded way, the logic of choosing preemption was overwhelming. If one truly believed Soviet intentions to be malevolent and the threat existential, then arguments against America capitalizing on its fleeting thermonuclear advantage through a war of preemption had to rest upon more than a lack of precedent.[61] Fortunately, as Brodie later concluded in his seminal work

Strategy in the Missile Age, the pressure for preventive war diminished as "the Soviets developed a nuclear capability, and especially as Americans became acclimated to living with those nuclear weapons that had provoked the idea in the first place."[62] The only remaining alternative—deterrence—gradually became the cornerstone of America's nuclear policy. In the event deterrence failed, argued Brodie in 1952 to a captive Air War College audience, US objectives might be secured by breaking and burning "Soviet armies on the ground wherever they might commit aggression" rather than by bombing enemy cities.[63] This tension between countervalue and counterforce strategies would continue to reverberate throughout the formation and transmutation of America's Cold War nuclear strategy over the next decade.

For RAND's strategic community, the "thermonuclear revolution" marked a decisive break with the past and created a situation where there were no experts—Nobel Prize winners were no better than graduate students in thinking about relevant issues.[64] Analysts grappled with issues with existential implications. The gravity of their work was punctuated by a self-consciously avant-garde sensibility. People worked at all hours: "Cool jazz could be heard outside somebody's office late at night. Beards sprouted here and there, and pipe tobacco was everywhere."[65] The thermonuclear revolution propelled RAND into the forefront of the golden age of international security studies.[66]

As with the Cowles Commission at Chicago, Marshall thrived in an egalitarian environment where analysts were valued for what they could contribute. By 1952, while writing the occasional short paper for the Social Science Department and collaborating with Kahn on Monte Carlo techniques, Marshall moved fully into the Economics Department to assume a management-level position. His work soon took him into the conceptual lynchpin of effective deterrence—strategic warning.

Belief in the inevitability of a massive surprise attack as the opening shot in any war permeated the strategic calculus of the Cold War. As Lawrence Freeman later described, "It was particularly strong in the US, because of the experience of Pearl Harbor, but was widely accepted in Europe. It was not based simply on a calculation of tactical need, to beat a strong defense, but on a presumption that this was the way of aggressors."[67] This desire to avoid another Pearl Harbor, woven into the psyche of Marshall's generation, became starker in the nuclear age when the expected benefits from achieving surprise increased exponentially and the penalties for losing the initiative in an all-out war grew correspondingly.[68] Survival of strategic forces remained the linchpin of mutual deterrence. Strategic warning, base hardening, and civil defense became the cornerstones of deterrence strategy.

The Soviets' continued accumulation of an atomic stockpile greatly concerned American military officers, particularly in Europe where the threat of the Soviets' large standing army and their strategic air forces were far more proximate. In the spring of 1952, while visiting US Air Forces in Europe (USAFE), Hitch met with the head of Air Force intelligence in Europe, Gen Millard Lewis. Lewis presented Hitch with a series of topics requiring RAND's attention, including the examination of strategic warning issues. Upon his return, Hitch assigned Marshall and a young engineer named James Digby to run the study.

The two spent a significant portion of the summer in Washington where they worked with representatives on the Air Staff to frame the study. Beginning in August, Marshall and Digby lived in Wiesbaden for nearly four months to analyze "the contribution of intelligence warning of attack to the performance of military forces in war." They traveled to military bases at Heidelberg and Frankfurt. Unable to convince the Air Force to grant them access to communications intelligence (COMINT), Marshall and Digby analyzed the Air Force's general approach to strategic warning, including reaction plans and alert levels. Yet their lack of access to current COMINT activities truncated their analysis. Their final report, classified Top Secret and released in July 1953, "recommended attention to short-term indications of dynamic preparedness of a Soviet attack" because of the increasing decisiveness of "the early moves of a war as a result of plentiful atomic bombs, long-range air forces for their delivery, and highly mobile ground forces."[69]

The report's conclusions were not particularly novel, yet Marshall's thinking on the approach to indicator intelligence proved otherwise. The existing indicator intelligence system focused on proper protection of friendly forces. Unusual activity such as cancelled leaves, changes in train activity, or signal intercepts normally resulted in heightened alert postures. Marshall conceived of a new approach to indicator intelligence. He pointed out to Digby that "Western responses should be designed not only for self-protection, but to affect the behavior of the enemy." Even at this early stage, Marshall conceived of the adversary as responsive and looked at intelligence in a two-sided way.[70] The study marked the beginning of Marshall's long-term involvement with strategic intelligence, rooted in his belief in responsive adversaries.

While Marshall and Digby analyzed strategic warning systems in Europe, the United States dramatically entered the thermonuclear era with the "Mike" test on the first of November. Seven hundred times more powerful than the atomic bomb dropped on Hiroshima, the 10.4 megaton explosion created a fireball 3.25 miles wide and a mushroom cloud with a maximum diameter of nearly 100 miles. These effects surprised even experienced atomic observers.[71]

Though he played a miniscule role, Marshall contributed to the success of this herculean effort. Shortly before his departure for Europe, he had spent several long nights helping his good friend Kahn run calculations at UCLA's new state-of-the-art computer lab. The massive computer was sensitive to warm daytime temperatures and unreliable. So Marshall worked when the temperature was coolest, typically around 3 o'clock in the morning, and tested the computer's reliability with a set of calculations to which he already knew the answer before running actual calculations.[72]

Upon returning from Europe at the end of 1952, Marshall continued to work on strategic warning issues, targeting, and Monte Carlo techniques. However, his fertile and active mind found venues other than contemplating Armageddon to express itself. Las Vegas beckoned. Earlier in May, when Arnold Kramish and Marshall had travelled to the Nevada test site to observe a Nagasaki-type 12-kilaton tower test, Marshall had also visited Sin City for his first time. In the casinos, he observed others losing money to rapacious blackjack dealers.[73] Back at RAND, Marshall, Kahn, and three others examined a dealer's assumptions based on a casino's typical house rules. Their modeling and calculations suggested a player could enjoy a marginal advantage against the house by counting cards and employing a complex rule set they devised based on statistical probabilities. In the spring of 1953, after Kahn's wedding at a rabbi's house in Las Vegas, Marshall and the newlyweds spent several days testing the efficacy of this rule set on the green-felted tables of various casinos. To their delight, they determined the margin that, while miniscule, allowed them to play as long as they liked without running out of money.[74]

Life after the thermonuclear revolution continued, even for those who understood its potentially horrific implications and believed the risk of war likely. Kahn's decision to marry reflected this reality—though menaced by the threat of total war, he committed to a still imaginable future together. Marshall soon followed.

Mary Speer worked as Hitch's secretary. Born in the Midwest, the sprightly brunette moved to Santa Monica after graduating from the University of Minnesota. One day in January 1953, it had occurred to Marshall to ask if she was related to a girl he knew from graduate school named Marjorie Speer. By chance, Mary and Marjorie were sisters. Moreover, Marjorie and her husband had recently relocated to Los Angeles with their newborn. Marshall and Mary arranged to visit the new family.[75] Thus began a relationship lasting more than five decades. They wedded in September of the same year and departed shortly thereafter for Chicago.

In Chicago, Marshall planned to complete the requisite coursework for a new doctoral program in statistics at his alma mater within a year, under the

tutelage of his old friend Allen Wallis, and then return to RAND to finish his dissertation.[76] Shortly before the newlyweds' arrival, Wallis received an offer to serve on the Ford Foundation's staff for a full year to help lead an overview of grants and projects.[77] It was an offer he could not refuse. Wallis persuaded Marshall to teach his introductory graduate-level statistics courses rather than pursue his doctorate.[78] While Wallis's efforts bore fruit—he secured a large grant from the foundation for the University of Chicago and subsequently became dean of the Chicago Business School within two years of his return—they stymied Marshall's plans.[79] After the academic year ended, increasingly dissuaded of the importance of a doctorate for those outside of academia, Marshall returned to RAND.

Upon his return to Santa Monica in April 1954, Marshall immediately rejoined the strategic dialogue. The landscape had changed dramatically during his Midwestern hiatus. Dwight D. Eisenhower had entered the presidency in January 1953 "with a more thorough knowledge of nuclear weapons than any president before or since."[80] He soon demonstrated his willingness to use the threat of nuclear weapons to achieve a political objective, secretly passing word to the Chinese that he would employ nuclear weapons against North Korea to end the stalemated war unless the North Koreans immediately signed a truce.[81] His truculence brought an end to the war. The Soviets punctuated the subsequent armistice by successfully testing their first H-bomb, Joe-4, shortly before Marshall's wedding and departure. In December, partially in response to Joe-4, Eisenhower approved a three-year defense program reflecting three priorities: emphasizing a massive retaliatory striking power, which continued the Air Force's central role in national defense; fielding tactical nuclear forces to enhance defense of Western Europe; and creating an effective system of continental defense to protect America's striking force, mobilization base, and populace.[82]

At RAND a group of prominent strategists debated the implications of this policy. This informal group had begun meeting regularly in the fall of 1952 to consider the priorities and sequencing of nuclear attacks and the nature of the Soviets and of the alliances. Calling themselves the 1960 Committee, members included Brodie, Hitch, Victor Hunt, Kramish, Alex Mood, and Williams. Marshall and Digby had initially joined in 1952, soon after their sojourn in Germany. By the time Marshall returned from Chicago in 1954, the group was renamed the Strategic Objectives Committee (SOC) with Digby serving as its rapporteur.[83] The SOC struggled to divine the strategic implications of continuing weapons advances, pushing RAND's strategic community to embrace the frame-breaking implications of the thermonuclear revolution by identifying research issues requiring further attention.[84]

Two game-theoretic threads, tightly woven into RAND's culture by this time, bound their efforts. Merrill Flood first promulgated the notion of translating man's innate capacity to devise good strategies through repetitious games into formulating sound nuclear strategy through war games. By 1954 the statistician Alex Mood developed a complex war game, Strategic Air War (SAW), simulating large-scale nuclear exchanges. Some SOC members relied upon this war game and a quantitatively rigorous methodology known as game theory to inform their analysis.

Kriegspiel's popularity as a pastime at RAND had arisen from the real-world need to devise strategies amidst the uncertainty of an opaque Soviet opponent. Yet it failed to sate RAND strategists' hunger for quantitative methodologies offering the illusion of certainty. Game theory did. Created by John von Neumann, a brilliant Hungarian émigré, game theory offered a "mathematically precise method of determining rational strategies in the face of uncertainties."[85] Von Neumann had published a scholarly paper on game theory in 1928 to the acclaim of European academia, but the notion exploded in 1944 when he and a Princeton economist coauthored a massive volume in English—*Theory of Games and Economic Behavior*.[86] Their work applied a theory of games to economic and sociological problems of "parallel or opposite interest, perfect or imperfect information, and free rational decision or chance influences."[87]

The game theory ethos presumed rationality for both players and prescribed minimax strategies in the face of risk and uncertainty.[88] With Williams's enthusiastic backing, RAND strategists used von Neumann's methodology to explore nuclear strategies—it became their dominant intellectual framework. Indeed, the original inclusion of economists and social scientists in RAND stemmed partially from the need for a multidisciplinary understanding of the theoretic utility functions of various stakeholders in the game.[89] By the time SOC members utilized Mood's SAW model, game theory undergirded a strategic calculus predicated on the United States and Soviet Union settling into a long-term rivalry. US-Soviet relations came to be perceived increasingly in interactive terms based on action/reaction and relative cost/benefit. The "game-like aspects of military policy became increasingly salient, and this way of thinking was clearly linked both to the presence of game theory as part of the intellectual culture at RAND, and to the great interest people at RAND took in many forms of gaming."[90]

SAW suffered from familiar analytical limitations—it too failed to incorporate adequately the irrational into a science of war. Initially, the mathematicians who devised the game measured the outcome of its results by the overly simplistic criteria of where the front line lay in Europe at the end of a simulated

war. Caught in the beauty of their model, SAW's originators created a wonderfully complex game based on simplistic and faulty assumptions. Based on this frontline criterion, role players were trading half of the US gross national product (GNP) for only a few miles of movement on the front line. Marshall worked with fellow economist Jack Hirshleifer to develop a more complex measure of worth for the outcome. They integrated myriad factors and heavily weighted GNP in an attempt to replicate the complexity of warfare.[91] SOC strategists utilized this revised version of SAW to explore many of their suppositions.

In addition to these efforts, Marshall employed reverse analysis in an attempt to determine the Soviets' potential understanding of the US nuclear program. Like Hitch's earlier work on bomb damage assessments during World War II, analysts during the Cold War commonly employed reverse analysis in an attempt to understand an opaque Soviet adversary. This methodology was subject to mirror imaging, but it was the best one could hope for at the time. Marshall utilized open-source information—inadvertent public disclosures and seemingly tangential congressional testimony—to piece together a remarkably accurate picture of the size of the US nuclear stockpile despite his security clearance level. Kramish, whose work in the Physics Department gave him the need to know the actual classified stockpile numbers, tacitly validated Marshall's work.[92]

The product of SOC's collective efforts, "The Next Ten Years" was essentially a *tour d'horizon*.[93] Its authors—Marshall, Hitch, and Brodie—attempted to throw light on the strategic and political implications of projected weapons developments over the next decade. These developments included the growth of stockpiles of fusion and fission weapons, improvements in bomb technologies, and enhanced weapons effects and delivery mechanisms. The fielding of intercontinental ballistic missiles (ICBM) reinforced the primacy of the offensive in nuclear strategy and threatened to obviate base-hardening or civil-defense measures. Many of the study's conclusions echoed those of the earlier report on the implications of large-yield weapons, yet the SOC subcommittee took a longer view and promulgated a trio of strategic ramifications for both the United States and the USSR.[94]

First, for the United States, technological change promised to erode America's nuclear advantage. Second, the immediacy and totality of the thermonuclear threat largely negated any advantage from America's latent industrial capacity. Future wars promised to be determined long before America's industrial might could be mobilized. Lastly, the Soviets seemed to be rapidly closing America's technological lead. Conversely, for the USSR, thermonuclear weapons negated any advantage of the Soviets' large standing army. The authors believed

the Soviets held and would retain an all-but-absolute intelligence advantage over the United States, barring spectacular new ideas and devices for intelligence gathering and reconnaissance. Furthermore, the Soviets' political organization made it easier for them to capitalize on their asymmetric advantage in intelligence by launching a surprise attack.[95] In retrospect, while the authors' knowledge of the American situation allowed them to envision changes, their lack of knowledge of the Soviets' position led them to foresee stasis and continuing Soviet advantage.

Brodie, Hitch, and Marshall adumbrated elements of possible US strategies. The report reflected a dominant theme of SOC discussions—the deterrent value of a capability to "execute carefully controlled and limited attacks" against enemy forces.[96] President Eisenhower had expressed his own preference for concentrating on military targets in June 1954. "If we batter Soviet cities to pieces by bombing," he asked his Joint Chiefs, "what solution do we have to take control of the situation and handle it so as to achieve the objectives for which we went to war?"[97] However, the authors of "The Next Ten Years" took a dim view of counterforce strategy, citing formidable difficulties and objections and questioning its technical feasibility based on inadequate targeting intelligence. Success would require "something approaching 100 per cent destruction of the Soviet long-range air force with something approaching 100 percent confidence. This in turn seems to require (at a minimum) an extremely difficult combination of near perfect intelligence on the location of SUSAC [Soviet Union Strategic Air Command] and a degree of surprise which will prevent it becoming airborne before our bombs fall."[98]

One man disagreed. Before coming to RAND in August 1954, economist Joseph Loftus had served for four years as the civilian director of the Target Programs Office in the Air Force Intelligence Agency. In this capacity, he had worked tirelessly to find ways to blunt the Soviets' growing atomic capabilities by carefully collecting and analyzing data on military targets, particularly strategic air bases. Moody, with a black sense of humor and a grim seriousness, Loftus worried incessantly but retained a strong faith in the power of analysis. He believed you could solve any problem if you worked long and hard at it.[99] This belief stemmed partially from his personal experiences. A former Notre Dame football player, Loftus spent 18 months during the war in patrol torpedo (PT) boats circling the desolate island of Shemya, enduring the harshest of environmental conditions.[100] These experiences imparted an important lesson for Loftus—hard work and perseverance mattered.

During his time as a civilian targeteering analyst for the Air Force, Loftus waged a bruising and ultimately unsuccessful bureaucratic battle against Strategic Air Command's (SAC) preference for countervalue strategies, or city killing.

Loftus and his team were the first to sift systematically through the deluge of available intelligence in the context of atomic weapons targeting, developing a robust understanding of the Soviet nuclear program. Project Wringer provided the bulk of Air Force intelligence on the USSR between 1949 and 1953, employing "1,300 military and civilian personnel in Germany, Austria, and Japan to interrogate thousands of repatriated prisoners of war from the Soviet Union and correlate the reports for use in target and other planning."[101] The results of these efforts—aerial photographs taken by German pilots during World War II, interrogations of German scientists conscripted to work on Soviet military projects, reports from spies and émigrés—combined with rich COMINT sources to create a robust intelligence picture. Loftus believed in the viability of counterforce strategy; however, SAC proved more interested in mass destruction.[102] Exhausted and frustrated, Loftus quit the Air Force in July 1954 and was working temporarily from RAND's Washington offices when Brodie, Hitch, and Marshall disseminated "The Next Ten Years" for internal discussion and debate.

Loftus penned "Ten Minutes on the Next Ten Years" in response, questioning his colleagues' pessimism on targeting intelligence and expressing his concern over the inaccuracy of RAND analysts' understanding of the Soviet Union. "Perhaps for internal bureaucratic or political reasons, the Soviets had structured their forces in such a way as to make their strategic forces more vulnerable than they otherwise might be," suggested Loftus. Their "tendency to over-centralize control might have some bearing on the vulnerability of their strategic forces."[103] Based on his previous limited exposure to target intelligence and COMINT, the possibility of the existence of classified data validating Loftus's position intrigued Marshall. What began as a dialogue between the two developed into a friendship and collaborative efforts lasting for the next decade. Loftus shared his knowledge of the Soviets' nuclear program, explaining his belief in the importance of organizational dynamics and critical material shortages such as stainless steel and cement.[104]

The beginning of his friendship with Loftus marked an inflection point in Marshall's RAND career. Skeptical of the dominant tools and methodologies at RAND, Marshall was nonetheless devoted to improving them. His work with Loftus led him to grapple fully with the difficulty of forecasting and measuring military power and understanding what the Russians were really doing.[105] In May 1955, Marshall synopsized his thoughts on uncertainty in systems analysis during a lecture to Air Force officers, stating, "There are no rules of choice that are both simple and complete and agreed upon by reasonable men, but reasonable choice is possible nonetheless even in the case of uncertainty."[106] Together, Marshall and Loftus devised new analytical tools to facilitate

reasonable strategic choices. Increasingly, these tools did not involve systems analysis.

Marshall soon gravitated back to the problem of strategic warning. In early 1955, Marshall, Loftus, and mathematician Robert Belzer began work on a project to help the Air Force further its efforts to improve its expanding global network of strategic warning centers. These centers attempted to provide timely analysis to allow for the collection, interpretation, and effective notification of changes to the likelihood of enemy attack. They relied heavily upon information from the National Security Agency (NSA).

The Second World War had catalyzed a revolution in signals intelligence (SIGINT).[107] Nevertheless, lack of cooperation and unity of effort within the US intelligence community plagued SIGINT efforts in the early years of the Cold War. Interservice rivalry stalled the creation of America's first unified SIGINT agency, the Armed Forces Security Agency (AFSA), until 1949, and then left it bereft of any meaningful power or influence. The AFSA was an abject failure as an institution and was disbanded in less than four years. In its place, the NSA emerged as a new and truly unified SIGINT organization, centralizing control of disparate intelligence communities.[108] Under the NSA's direction, COMINT expanded dramatically during the 1950s and provided a rich—if tightly held—intelligence resource.

Marshall's work on strategic warning warranted a COMINT clearance, granting him access to highly classified information and furthering his understanding of the actual behavior of an opaque adversary. He made frequent trips to the nearest special security office at March AFB, just 80 miles east of Santa Monica, to review intelligence and Kelly AFB in San Antonio, where the Air Force conducted most of its COMINT analysis.[109] Only a handful of RAND analysts held similar clearances, which provided insight into the Soviet strategic air force's deployment and capabilities. Dissonance grew between Marshall's empirical bent and those at RAND misguidedly examining the wrong information. In particular, the community from which he originally emerged seemed to be floundering.

By the mid-1950s, most RAND analysts in Santa Monica held the contributions of political scientists in low regard. Still unassimilated—they remained geographically separated in Washington, DC, until 1956—the political scientists tended to be overly cautious and content to work on their own kinds of problems, in their own ways.[110] An August 1954 report by three social scientists illustrated just how far afield their efforts sometimes went. Their report, *The Soviet Strategic Base Problem*, attempted to predict Soviet basing through rational analysis, unfettered by historical or organizational realities. They considered only two key factors to select desirable Soviet base locations:

(1) critical distances—or how far the base would be from the target, favorable entry points, enemy airpower, and the source of logistic supply—and (2) meteorological and terrain features. Ultimately, they concluded that the "best combination of base features appears in an area in Western Siberia served by the Trans-Siberian Railroad" deep inside Russia.[111]

Loftus and Marshall attempted to disabuse these analysts of their misguided beliefs, asking them why March AFB was located where it is. US Air Force base locations had been determined in the 1920s, when border defense and the relatively limited range of aircraft were primary factors. Clearly, they suggested, organizational histories and political pressures provided reasonable explanations. Despite Soviet basing possibly being equally path dependent, most analysts remained unmoved.[112]

A great majority of the social scientists focused somewhat myopically on Soviet military doctrine, refusing to temper this with any analysis of what the Soviets were doing in reality. The Soviets' 1945–50 Five-Year Plan significantly reoriented their strategic posture, yet their doctrine remained stagnant. Consequently, a large discrepancy existed between overt Soviet doctrine, which discounted the importance of nuclear weapons in favor of massive conventional land forces and tactically oriented air forces, and actual Soviet behavior. Although Soviet doctrine downplayed the importance of nuclear weapons, nearly 50 percent of concrete poured in the Soviet Union during the late 1940s went into its nuclear and missile programs despite an acute shortage of building materials. Similarly, while their air doctrine prioritized close air support (CAS), the Soviets failed to build any CAS-type aircraft after war's end. Instead they devoted their resources to TU-4 strategic bombers and MiG-15 fighter-interceptors, a robust air defense effort, and nuclear and missile technologies.

In short, RAND's political scientists seemed focused on what the Soviets were writing rather than what they were doing.[113] Loftus and Marshall's rare access to COMINT helped them understand this disconnect, though they could not share this information to shatter their colleagues' illusions. In addition to the political scientists' errant behavioral analysis, specialists on the Soviet economy were often failing to produce useful analyses. In an effort to improve projections of the Soviets' military programs, Loftus and Marshall frequently asked leading questions about the military burden on the long-term prospects of the Soviet economy, but to little avail. Many Keynesian economists who came of age during the Great Depression were inured to the Soviet technocracy, seeming content to work within their narrow intellectual comfort zones rather than address harder questions. Observing this approach reinforced an enduring lesson for Marshall: mediocre answers to good

questions were more important and useful than splendid answers to poor questions.[114]

Lack of intelligence data crippled many RAND studies at the time. Although RAND had been established to facilitate forward-looking analytical capabilities, the Air Force had failed to establish the institutional arrangements for adequate and appropriate intelligence support.[115] Marshall believed the inadequacy of intelligence input to RAND studies stemmed from two things. First, the intelligence community had yet to develop the capacity to create good five-to-10-year projections. Second, the Air Force viewed RAND employees as futurists and thus did not believe they needed access to intelligence on current targets.[116] Without timely intelligence data, RAND analysts were forced to make their own projections, often based on mirror imaging and presuming rationality uninhibited by organizational impediments.[117] Their analysis suffered accordingly.

By early 1956, attempting to correct this problem, Marshall and Loftus instituted Project Sovoy. Loftus created the name from a transliteration of the Cyrillic for Soviet military (Советскиевоиска) into the English alphabet (SovetskiyeVoyska).[118] The two offered to serve as an interface with the intelligence community and to start making projections for the rest of RAND using their access to classified information. Subsequently, they gained access to additional resources through Loftus's connections with analytic-level members of the intelligence community.[119] The two soon began consulting for the Central Intelligence Agency (CIA) as part of Project Sovoy, gaining Talent-Keyhole (TK) security clearances and serving as a conduit for documents that otherwise would not have reached RAND.[120] This TK clearance granted them access to tightly held imagery beginning to flow from aerial reconnaissance missions.

In March 1956, a group of RB-47 reconnaissance bombers began collecting imagery intelligence on target locations within the USSR. According to James Bamford's book *Body of Secrets*, "In all, 156 eavesdropping and photo missions were flown over Russian airspace during the almost two months of Project Homerun."[121] Shortly thereafter, on Independence Day, President Eisenhower authorized the CIA to begin U-2 operations.[122] Four years later, in May 1960, the Soviets' successful shootdown of Francis Powers's U-2 unveiled the CIA's highly secretive reconnaissance effort. Soon after, Alain Enthoven, by then a former RAND analyst working at the Pentagon's R&D directorate for a year, stopped Marshall in a parking lot to say, "Now I understand what you and Loftus were talking about."[123] In the interim, Marshall had been unable to disclose the information he held.

In retrospect, Marshall called Project Sovoy the "first really big, intellectually interesting thing" he did at RAND.[124] In the summer of 1956, he and Loftus travelled to Alaska and Japan to visit strategic warning sites and local COMINT intercept and analysis sites. In September Marshall returned to Europe for a long visit—traveling across western Europe through the winter to various COMINT locations. He developed pneumonia in Paris and was forced to delay his return until February 1957.[125] Throughout the project, Marshall and Loftus worked to improve the understanding and forecasting of Soviet behavior by examining organizational and long-term macroeconomic constraints.

Like many during the Eisenhower era, Marshall and Loftus viewed the Cold War as an extended competition. Their training as economists led them to examine the importance of macroeconomic constraints in a novel way. In conjunction with the CIA, the two expanded the level of intelligence analysis beyond a static view of individual components of the Soviets' economy for targeting purposes to an overall costing of their entire military effort. At the time, according to Noel Firth and James Noren, "RAND was the only research entity besides [the] CIA to devote a substantial effort to investigating Soviet defense costs."[126] Marshall and Loftus worked with the CIA to discipline and integrate efforts to look at the Soviet military program in its entirety and to formulate cost-imposing strategies.[127]

To help inform their analysis of the Soviet military, Marshall examined the US military's own inaccuracy in programmatic cost estimation. He worked with economist W. H. Meckling to explore the extent and nature of uncertainty in weapon system development and the reasons for endemic cost overruns. They examined Air Force innovation and concluded that estimates of the outcome of development projects "have been quite inaccurate. Cost increases on the order of 20 to 30 percent and extensions of development time by 1/3 to 1/2 are not the exception, but the rule" due to technological uncertainty and advances.[128] Generally, estimates improved as development of the system progressed; however, early estimations of important parameters were quite inaccurate because of overoptimism.[129]

While struggling to integrate resource constraints into Soviet force-structure projections, Marshall and Loftus began to account formally for the contributions of organizational behavior. Although it took several years for Marshall to play a direct role in the emergence of a new bureaucratic politics paradigm within the strategic community, by the late 1950s he gained insight into what may now seem to be obvious. Rather than taking the dominant view of the Soviets as rational, unitary actors, Marshall came to understand Soviet behavior through the refractory lens of large, complex organizations.[130] This understanding served him well during his next intellectual challenge.

By late 1956, Eisenhower "adopted a strategy to evade nuclear war by making it so dangerous that his advisors would find it impossible to push him toward war and away from compromise."[131] With the development of ICBM and thermonuclear technologies, the growing Soviet missile threat presented a twofold challenge: tactical warning of a surprise attack shrank to minutes—vastly exacerbating the vulnerability of bomber forces in the missile age—and the problem of locating and destroying the Soviet nuclear ballistic missile capability grew greatly.[132] Given these destabilizing developments, Eisenhower concluded that war between the two nuclear powers would escalate uncontrollably to absolute extremes. Consequently, he deemed distinctions between peripheral and general wars arbitrary and dangerous and rearranged official American basic security policy so that a war with the Soviets would escalate automatically into a general thermonuclear war.[133] Massive retaliation strategy, first articulated by Secretary of State John Dulles in January 1954, began to transmogrify and threatened to further diminish conventional force structure, doctrine, and strategic thinking.

In the summer of 1957, Marshall was selected to go to Washington to serve on the staff of the upcoming Gaither Committee. The National Security Council had commissioned a study of America's civil defenses.[134] Rowan Gaither—who had served as the chairman of RAND's board of trustees since advising Collbohm on the company's incorporation—led the committee.[135] As a result, RAND analysts played an influential role, providing briefings and studies for committee members' consideration.[136]

Marshall served with a small group with systems-analysis skills on the evaluation quantitative assessments panel, providing expertise and consulting for members of the active, socioeconomic, and passive panels.[137] In November 1957, shortly after the Soviets launched Sputnik to challenge the West's technological and military advantage, the committee offered its anxiety-laden assessment to Eisenhower. The report was quickly leaked to the press and politicized; it concluded that the United States risked losing its nuclear superiority over the Soviet Union, thus finding itself vulnerable to a surprise Soviet attack. Recommendations included "increasing nuclear forces to maintain US superiority or, at a minimum, the ability to retaliate; expanding US early warning radar capabilities; dispersing SAC forces; constructing antimissile defenses; building fallout shelters; reorganizing the Defense Department; and augmenting limited war capabilities."[138]

Marshall was disappointed by the committee's unimaginative strategy of how to employ nuclear weapons should deterrence fail. In accordance with the conventional wisdom of the day, it assumed forces would be used to strike Soviet cities and totally discounted the counterforce strategy Marshall knew

to be feasible.[139] He returned to Santa Monica in December 1957 convinced that the "questions of not just limiting but *ending* and *winning* a nuclear war had received very little attention" (emphasis in original). Marshall began to work with longtime friend Herbert Goldhamer to develop "a single force posture and doctrine that would be both a strong deterrent and, if deterrence failed, would provide a viable strategy for controlling, surviving, and even winning a nuclear war."[140] Kremlinologist Nathan Leites occasionally sat in on their discussions. After nearly a year of work, their final report was completed in late 1958 and released the following April.

If "The Next Ten Years" was a tour d'horizon, *The Deterrence and Strategy of Total War* was a tour de force.[141] Marshall and Goldhamer employed game theory to examine a Soviet-initiated preventative war in which the United States aimed not to maximize deterrence or the utility of a possible war but rather to get the best possible value for both elements combined.[142] The "rational actor" assumption undergirding both game and deterrence theory "directed attention away from the organizational, psychological, and domestic political factors that also shaped state behavior."[143] Game theory prescribed conservative minimax strategies in the face of uncertainty. Marshall and Goldhamer aspired to do better. Rather than assuming rationality, they focused on facts and behavior. Knowledge of past behavior and these refractive forces allowed one to predict the probability distribution of behaviors much more accurately than game-theoretic notions suggested.[144]

Marshall and Goldhamer devised an ingenious model to quantify and test strategies for the three goals of deterrence, survival, and victory.[145] While acknowledging that estimates based on research and analyses were unavailable, they used hypothetical numbers to speak the highly quantitative language of RAND's strategic community. Ultimately, they concluded that the conflict between requirements for deterrence and those for conducting war was less severe than assumed. The report posited that the likelihood of the Soviets choosing total war depended more on their estimation of the proportion of SAC that survived their initial attack than on their estimates of what target system SAC would use in its retaliatory strike.[146]

Marshall and Goldhamer rejected the pure population-attack strategy tacitly endorsed by the Gaither Report, labeling it the least effective option. Instead, they proposed a mixed targeting strategy that would provide, in most cases, the greatest utility to the United States. They suggested that the mixed target strategy use high-yield weapons with groundbursts to produce extensive fallout and the "bonus" of heavy civilian casualties. Given the handicap of no first strike, the study suggested development of part of SAC as a hardcore force able to survive the first 24 to 48 hours of nuclear war.[147] Counterforce, as they

presented it, "emerged as a strategy for both war and peace; it provided for both deterrence and war, and in the event of war offered hope of survival and perhaps, victory."[148]

The implications of total war seemed unimaginable to many—America's stockpile had grown from approximately 1,000 weapons in 1953 to nearly 18,000 by the end of the decade.[149] Marshall and Goldhamer looked beyond the abyss to determine how best to wage and terminate a nuclear war should deterrence fail. "There are few things so bad," wrote the two, "that not thinking about them won't make them worse." They noted that "the capacity for sacrifice that a nation brings to moments of great crisis deserves a respect that should preclude the easy utilization of it" and emphasized strategists' obligation to demonstrate plausible grounds for believing whatever strategy they put forward.[150]

The Deterrence and Strategy of Total War reflects the evolution of Marshall's intellect in his first decade at RAND. Not yet 40, Marshall boldly proposed an imaginative strategy and, despite his skepticism with game theory's limitations, deftly employed game-theoretic methodologies to render his work palatable to RAND's strategic community. Many "strategists at RAND had initially resisted the idea of counterforce because the strategy seemed to connote a first-strike force structure," as advocated by early proponents. Marshall and Goldhamer drew from the psychological studies of the social scientists to "demonstrate that counterforce could be an effective retaliatory strategy"—thus gaining the support of a significant proportion of analysts.[151]

Marshall wrote prolifically during his first decade at RAND.[152] Seldom publically at the forefront of issues but seemingly omnipresent for many of the seminal studies, he contributed immeasurably to RAND's golden years. If the social scientists and the systems analysts represented two opposing poles in the views of warfare at RAND, Marshall seemed able find a pragmatic synthesis of the two. Ever the empiricist, he struggled mightily to factor uncertainty into a scientific understanding of war. Though he soon recognized the futility of this effort, he never gave up attempting to improve the level of thinking within the strategic community. He knew that "science" was relative and that good strategy involved something more akin to turning base metals into gold. Strategy required alchemy. Understanding how to effect lasting change within lumbering bureaucracies required something wholly different.

Notes

1. May, "RAND Corporation," 21.
2. Kaplan, *Wizards of Armageddon*, 54.

3. For a take on how social scientists were also enlisted in the World War II effort, setting the stage for postwar involvement in military affairs, see Sam Sarkesian, "The Sorcerer's Apprentice: Social Science and the American Military," in Chiabotti, *Tooling for War*.
4. Arnold as quoted in Wolk, "Planning and Organizing the Air Force," 174.
5. May, "RAND Corporation," 23–24.
6. Ibid., 24.
7. Kuklick, *Blind Oracles*, 20; and Wakelam, *Science of Bombing*, 25.
8. Collins, *Cold War Laboratory*, 116.
9. *RAND Second Annual Report*, 3, as quoted in May, "RAND Corporation," 32.
10. Digby, "Strategy for the Nuclear Era," in RAND, *Project Air Force 50th*, 23.
11. Kaplan, *Wizards of Armageddon*, 86–87.
12. Watts, "Net Assessment Sourcebook," 329. The sourcebook is an unpublished compilation of Marshall's writings with analysis.
13. Abella, *Soldiers of Reason*, 21.
14. May, "RAND Corporation," 113.
15. Checkland, *Systems Thinking*, 154.
16. "History and Mission," RAND Corporation.
17. May, "RAND Corporation," 119.
18. Ibid., 121.
19. Guthe transcripts, 4-8.
20. Abella, *Soldiers of Reason*, 35.
21. Ibid., 21.
22. This study was published as Herbert Goldhamer and Andrew Marshall, *The Frequency of Mental Disease: Long-Term Trends and Present Status*, Report no. R-157 (Santa Monica, CA: RAND Corp., July 1949). A description of Marshall's experience with Kriegspiel can be found in the Guthe transcripts, 4-8.
23. Freedman, *Evolution of Nuclear Strategy*, 60.
24. May, "RAND Corporation," 179.
25. Jaymie Durnan in "Festschrift on Andrew Marshall's 90th Birthday," unpublished booklet, 2011. This festschrift compiled submissions from Marshall's friends on some of their memories of Marshall.
26. Watts, "Andrew W. Marshall's Project and Work Chronology," 2. Working copy provided by Watts to the author.
27. Guthe transcripts, 3-11–3-12.
28. Marshall, "Strategy as a Profession," 304–5.
29. May, "RAND Corporation," 7.
30. Marshall, "Strategy as a Profession," 304.
31. Craig, *Destroying the Village*, 23–32.
32. National Security Council, "NSC-68: United States Objectives and Programs for National Security (April 14, 1950)."
33. In the fall of 1949, President Truman approved the JCS request to substantially increase nuclear production. In October 1950, following the outbreak of the Korean War, he approved a second increase. See Rosenberg, "Origins of Overkill," 22.
34. Ross, *American War Plans*, 154.
35. Trachtenberg, *History and Strategy*, 4.
36. Guthe transcripts, 4-7, 4-54.
37. Hitch and McKean, *Economics of Defense in the Nuclear Age*, v–vi.
38. Ibid., 158–59.
39. Guthe transcripts, 10-1–10-2.

40. Trachtenberg, *Strategy and History*, 12.

41. Abella, *Soldiers of Reason*, 28.

42. Watts, "Andrew W. Marshall's Project and Work Chronology," 2. This determination was in line with the results of the May 1949 Harmon Report, stating that precise employment of the entire US stockpile of 133 atomic weapons would fail to "bring about capitulation, destroy the roots of Communism, or critically weaken the power of the Soviet leadership to dominate the people." See Rosenberg, "Origins of Overkill," 16.

43. Watts, "Net Assessment Sourcebook," 329.

44. Abella, *Soldiers of Reason*, 95.

45. Kahn's parents divorced when he was 10. Afterwards, he moved with his mother and two brothers to Los Angeles, where the family endured hardship. Twice his mother was forced to apply for public assistance (ibid., 96–97).

46. Marshall, author interview, 21 February 2012.

47. Pillsbury, "Festschrift on Andrew Marshall's 90th Birthday."

48. Ghamari-Tabrizi, *Worlds of Herman Kahn*, 66.

49. Guthe transcripts, 3-13.

50. Abella, *Soldiers of Reason*, 59.

51. Kaplan, *Wizards of Armageddon*, 221.

52. Kahn and Marshall, "Methods of Reducing Sample Size," 263, 278.

53. Ghamari-Tabrizi, *Worlds of Herman Kahn*, 53.

54. May, "RAND Corporation," 181.

55. RAND, *Implications of Large-Yield Nuclear Weapons*, iii.

56. Larry Henderson, RAND's vice president in Washington who had sat in on several briefings and knew the material very well, delivered the briefing to President Truman in March 1952. See Kaplan, *Wizards of Armageddon*, 82.

57. RAND, *Implications of Large-Yield Nuclear Weapons*, 11.

58. Ibid., vii.

59. Kaplan, *Wizards of Armageddon*, 78.

60. RAND, *Implications of Large-Yield Nuclear Weapons*, 18.

61. Guthe transcripts, 3-23.

62. Brodie, *Strategy in the Missile Age*, 228. By the time he published this work, preventative war seemed a dead issue. Nevertheless, he devoted 14 pages (227–41) to exploring systematically the logic and arguments for preventative war.

63. Brodie, "Changing Capabilities and War Objectives" (lecture, Air War College, Maxwell AFB, AL, 17 April 1952), in Trachtenberg, *Development of American Strategic Thought*, 7.

64. Trachtenberg coins the term "thermonuclear revolution" to describe this discontinuous change. See Trachtenberg, *History and Strategy*, 6. Many strategists at the time used the word "revolutionary" to describe the strategic implications of thermonuclear weapons. For a description of RAND's egalitarian atmosphere, see Marshall, "Strategy as a Profession," 304.

65. Ghamari-Tabrizi, *Worlds of Herman Kahn*, 56.

66. Walt, "Mershon Series: The Renaissance of Security Studies," 214.

67. Freedman, *Evolution of Nuclear Strategy*, 32.

68. Wohlstetter, *Pearl Harbor*, 399. Wohlstetter credits Marshall in the preface of her book for being the "initial stimulus for the book" and providing "constant encouragement and advice through five years of research" (ibid., xi).

69. This report remains classified. For a brief description of the report, see Davies and Harris, *RAND's Role*, 49.

70. Digby, *Strategic Thought at RAND*, 14.

71. "Operation Ivy," Nuclear Weapon Archive.

72. Marshall, discussion with Andrew May, 19 March 2010.
73. Watts, "Andrew W. Marshall's Project and Work Chronology," 4.
74. Marshall, author interview, 21 February 2012.
75. Ibid.
76. Ibid., 10 November 2011.
77. Augier and March, *Roots, Rituals, and Rhetoric of Change*, 167.
78. Guthe transcripts, 4-2–4-3.
79. Augier and March, *Roots, Rituals, and Rhetoric*, 166, 168.
80. Rosenberg, "Origins of Overkill," 27.
81. Rose, *How Wars End*, 178.
82. Rosenberg, "Origins of Overkill," 27–32.
83. Digby, *Strategic Thought at RAND*, 13–14.
84. Guthe transcripts, 3-17, 4-13.
85. Kaplan, *Wizards of Armageddon*, 65.
86. Ibid., 66.
87. Von Neumann and Morgenstern, *Theory of Games and Economic Behavior*, v.
88. Guthe transcripts, 3-6.
89. Kaplan, *Wizards of Armageddon*, 67.
90. Trachtenberg, *Strategy and History*, 14.
91. Guthe transcripts, 3-22–3-23.
92. Ibid., 4-14; and Watts, "Andrew W. Marshall's Project and Work Chronology," 5.
93. Trachtenberg, *Strategy and History*, 28.
94. Brodie, Hitch, and Marshall, "Next Ten Years," 3–8.
95. Ibid., 9–4.
96. Digby, *Strategic Thought at RAND*, 14.
97. Rosenberg, "Origins of Overkill," 35.
98. Brodie, Hitch, and Marshall, "Next Ten Years," 28.
99. Kaplan, *Wizards of Armageddon*, 209–12.
100. Guthe transcripts, 3-44.
101. Rosenberg, "Origins of Overkill," 42.
102. Kaplan, *Wizards of Armageddon*, 211–12.
103. Loftus as quoted in Trachtenberg, *History and Strategy*, 29.
104. Watts, "Andrew W. Marshall's Project and Work Chronology," 6.
105. Guthe transcripts, 3-44.
106. Marshall, "Treatment of Uncertainty."
107. Johnson, *American Cryptology during the Cold War*, bk. 1, 1.
108. Ibid., 23–35.
109. Guthe transcripts, 5-3; and Watts, "Andrew W. Marshall's Project and Work Chronology," 6. The USAF established its headquarters and a stateside COMINT processing center at Kelly AFB in 1951. See Johnson, *American Cryptology*, bk. 1, 30.
110. Guthe transcripts, 4-10.
111. DeHaven, *Soviet Strategic Base Problem*.
112. Guthe transcripts, 3-5–3-6.
113. Ibid., 3-8, 3-25, 4-10–4-12. See also May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, pt. 1, 90–97.
114. Guthe transcripts, 10-19.
115. Rosen, *Winning the Next War*, 217.
116. Marshall, Digby and Goldhammer interview, 2 August 1985, as quoted in Rosen, *Winning the Next War*, 217.

117. Marshall, Goldberg and Matloff interview, 1 June 1992, 6.
118. Guthe transcripts, 4-12; and Watts, "Andrew W. Marshall's Project and Work Chronology," 6.
119. Guthe transcripts, 3-25–3-26.
120. Watts, "Andrew W. Marshall's Project and Work Chronology," 6.
121. Bamford, *Body of Secrets*, 35.
122. Ibid., 43.
123. Guthe transcripts, 3-32, 4-8.
124. Ibid., 11-5.
125. Watts, "Andrew W. Marshall's Project and Work Chronology," 7.
126. Firth and Noren, *Soviet Defense Spending*, 35.
127. Guthe transcripts, 3-3–3-4. Reports from Project Sovoy remain classified. For more information on the inclusion of a building-block approach to making Soviet military cost estimates for inclusion in early national intelligence estimates, see Firth and Noren, *Soviet Defense Spending*, 28–32.
128. Marshall and Meckling, *Predictability of the Costs*, 474–75.
129. Ibid., 461.
130. Guthe transcripts, 3-4, 11-5–11-6.
131. Craig, *Destroying the Village*, 69.
132. Rosenberg, "Origins of Overkill," 44–46.
133. Craig, *Destroying the Village*, 67.
134. Ibid., 73.
135. Snead, *Gaither Committee*, 51.
136. Ibid., 111.
137. Marshall, Goldberg and Matloff interview, 1 June 1992, 8. For an organizational chart of the Gaither Committee, see President's Science Advisory Committee, *Deterrence and Survival in the Nuclear Age* [the "Gaither Report" of 1957], 30.
138. Snead, *Gaither Committee*, 186.
139. Kaplan, *Wizards of Armageddon*, 213.
140. May, "RAND Corporation," 389.
141. Kaplan, *Wizards of Armageddon*, 214.
142. Goldhamer and Marshall, with Leites, *Deterrence and Strategy of Total War*, iii–iv.
143. Walt, "Mershon Series: The Renaissance of Security Studies," 215.
144. Guthe transcripts, 3-6 and 11-13.
145. May, "RAND Corporation," 400.
146. Goldhamer and Marshall, with Leites, *Deterrence and Strategy of Total War*, 188.
147. Ibid., iii–x.
148. May, "RAND Corporation," 402.
149. Rosenberg, "Origins of Overkill," 23.
150. Goldhamer and Marshall, with Leites, *Deterrence and Strategy of Total War*, 191, 193.
151. May, "RAND Corporation," 477.
152. Augier, who spent the past decade combing RAND's archives, concludes that the list of reports and papers Loftus and Marshall collaboratively wrote is not yet complete. See Augier and March, *Roots, Rituals, and Rhetoric*, 88.

Chapter 4

From Organizational Behavior to Bureaucrat

Marshall settled in for the long flight between Los Angeles and Washington, a trip made with increasing frequency as his relationships with leaders within the defense and intelligence communities grew. On this occasion in 1960, he and Loftus were en route to meet with Robert Komer, the CIA's chief of the Office of National Estimates (ONE), to discuss plans for Project Lamp. The two hoped to facilitate greater cross-pollination of the cost estimation and force structure forecasting methodologies being developed under the auspices of Project Sovoy. Komer sought particular advice on how best to estimate and predict the number of Soviet ICBMs—a hot-button issue due to John Kennedy's mendacious politicization of a "missile gap" during the 1960 presidential campaign.[1] Uncertainty surrounded the Soviet missile program. Air Force intelligence estimates, leaked deliberately to help bolster the Air Force's bureaucratic position, were ominously high. Yet recent CIA estimates had "failed to establish Soviet ICBM production rates or to provide positive identification of any operational ICBM unit or launching facility other than the test range."[2] Marshall believed the gap was a myth and had met with Kennedy campaign aide Deirdre Henderson to express his concerns.[3]

For many at RAND, Kennedy was nearly an "ideal candidate—energetic, urbane, active, and genuinely interested in bolstering national security."[4] His political ascendancy capitalized on a growing sense of frustration among not only defense intellectuals but also the public at large. Recent events had eroded public confidence in a nuclear policy that overtly disallowed limited military responses to provocation—Sputnik, Fidel Castro's successful coup in Cuba, Nikita Khrushchev's saber rattling in Berlin, and the downing of the CIA's U-2 spy plane all stoked Cold War insecurities. Within this milieu, a trio of writings from RAND strategists enhanced the strategic community's public notoriety—Brodie's *Strategy in the Missile Age*, Kahn's *On Thermonuclear War*, and Albert Wohlstetter's "The Delicate Balance of Terror."

These forays into the public sphere catalyzed public debate over nuclear strategy and placed RAND's small strategic community at the forefront of the public's imagination.[5] Reflecting this trend, in May 1959, Marshall appears anonymously in a full-page photograph at the end of a *Life* magazine article on RAND, "Valuable Batch of Brains." The image became iconic for RAND in its golden years. Marshall, clad in a suit, reclines casually with Henry Rowen and two others on the floor, clearly engrossed in conversation with Wohlstetter,

who sits above everyone in a chair in his conspicuously avant-garde den. The caption reads, "Discuss[ing] study involving economic recovery of U.S. after an all-out war."[6] The inferred message was clear. Here sits a group singularly capable of forging a way out of the strategic morass.

The ambitions and fortunes of Kennedy and RAND's small community of defense intellectuals thus became intertwined. Beginning in late 1959, a small team of analysts—all friends of Marshall—had quietly begun aiding the Kennedy campaign by offering ideas and even drafting speeches.[7] Marshall travelled in Europe during the final months of the election campaign, enjoying one of his lengthy episodic vacations with his wife, Mary. As lifelong Francophiles, the two enjoyed these sabbaticals to their fullest—sating themselves on France's cultural attractions, fine wines, and exquisite cuisine. Marshall mixed business with pleasure on this trip by delivering a paper at the first major international operations research conference, meeting in Aix-en-Provence, before touring the French countryside for the next six weeks.[8] Nevertheless, he closely followed the election results.

Kennedy's election altered the fortunes of RAND. A deluge of analysts moved into political appointments to spread the ethos and methodologies of the RAND way, most notably Hitch, Alain Enthoven, and Harry Rowen.[9] One man in particular facilitated this exodus from West Coast to East—President Kennedy's choice for secretary of defense, Robert McNamara. McNamara had studied economics at Berkeley, earned his MBA from Harvard Business School (HBS), and served with distinction in the Army Air Corps's statistical control group during the war, where he employed operational research methodologies to maximize the gruesome efficiency of bombing raids. After the war, he had joined an ailing Ford Motor Company and helped turn things around by radically changing management practices and systematically rationalizing cost and production schedules. One month prior to his appointment as defense secretary, he had become president of Ford at the age of 44. Though he had followed a different career path than those at RAND, he shared the same quantitatively oriented, analytical ethos.[10]

After his nomination, McNamara moved with alacrity to assemble a team of civilian appointees before Inauguration Day in January 1961. The group was a mixture of experienced officials and defense intellectuals from Ivy League schools and leading think tanks, particularly RAND. Collectively branded the Whiz Kids, "they infused great energy and broad intelligence into the department. Their presence, however, caused considerable dismay among many of the military, especially older hands . . . [who did not appreciate] the brash self-confidence of youthful civilians moving into areas generally untouched by the secretary."[11] McNamara had never met Hitch but admired a

book he had written not 10 months earlier with Roland McKean, *The Economics of Defense in the Nuclear Age*. Hitch and McKean advocated program-based budgeting with multiyear projections to help rationalize the Defense Department's finances and promote the efficient allocation of resources.[12] McNamara agreed. He appointed Hitch his comptroller and pushed him hard to effect change quickly.

Hitch set to work immediately, establishing a fourth deputy assistant secretary position and expanding his 200-person staff by 31 positions. He hired 30-year-old Alain Enthoven, a former RAND colleague, to run the new weapons systems analysis directorate and made plans to begin contracting with RAND immediately because of its expertise in systems analysis. In March 1961, Hitch briefed McNamara on his proposal to convert the budget arrangements for all of the services' strategic nuclear forces to a program budget, phasing them in over 12 months. McNamara enthusiastically endorsed Hitch's proposal but asked for one change. "Do it for the entire defense program," he exclaimed at the end of Hitch's presentation, "and in less than a year."[13]

Past defense secretaries had lacked the tools necessary to manage the DOD's financial portfolio in a truly unified manner. Instead they resorted to the budget-ceiling approach. Under this system, defense secretaries had apportioned a presidentially determined budget among the three military departments. According to Hitch, "Each military department would in turn prepare its own budget submission, allocating its ceiling among its own functions, units, and activities, and present additional requests, which could not be accommodated within the budget." In turn, the defense secretary reviewed the services' budget submissions together in an attempt to achieve balance. The consequences of this approach were predictable: service parochialism, interservice rivalry, a short-term focus on the next fiscal year, inadequate information for the secretary to make an informed decision, and complete separation between budgeting and military planning.[14]

In contrast, what came to be known as the Planning, Programming, and Budgeting System (PPBS) sought to unify services' defense programs by programmatically binning mission sets, spanning the gap between strategic planning and budgeting, and inflicting longer-term budgetary rigor through a Five-Year Force Structure and Financial Program.[15] These five-year projections, expressed in forces and dollars, served as a basic official plan subject to modification when necessary.[16] Hitch's plan sought to provide defense leaders a system that consolidated and quantified all of the relevant information they needed to make sound decisions.[17]

The PPBS became the core element of the McNamara revolution, a powerful tool used to centralize control of a sprawling bureaucracy characterized by

internecine service rivalry and weak civilian oversight. Introduced in the spring of 1961 and first applied fully to prepare the 1963 fiscal year budget, it provided not only a different way of looking at budgets but also of conceiving the function of the military establishment.[18] The PPBS employed systems analysis to help the secretary of defense make decisions on a cost-effective basis using quantified data. Soon systems analysis, long an indelible part of the RAND ethos, "became the buzzword, the way that decisions were rationalized, the currency of overt transactions, the *lingua franca*" of the national security community.[19]

For the intelligence community, the quantitative approaches to defense analysis under PPBS increased demand for cost estimates of the Soviet military threat by several times. With costs of US programs as a critical variable in the new Pentagon analysis, Soviet defense costs inevitably assumed heightened importance. While some of the new demand came directly from Hitch and Enthoven, most "developed indirectly as a result of the changes in the National Intelligence Estimate (NIE) process instituted to meet new defense strategists' and planners' needs."[20]

Marshall and Loftus helped launch Project Lamp in anticipation of the demands of this new planning and programming process. Leaders at the CIA knew the intelligence community had neither unified its research and production of military intelligence nor made the organizational and managerial changes required to create an integrated, consumer-oriented program. As a 1964 CIA analysis would later assert, Project Lamp was "one of the earliest frontal attacks on the problem of getting improved military estimates for the new defense planners." The product of Loftus and Marshall's efforts "contained views and suggestions very similar to those issued later as requirements by the new defense planners."[21]

Project Lamp concluded in April 1961, shortly after Hitch's brief to McNamara and the rapid implementation of PPBS. Marshall, Loftus, and George Pugh debriefed their findings to the CIA deputy director of intelligence (DCI), Robert Amory.[22] Though cognizant of the limitations of systems analysis, the trio astutely employed the coin of the new realm. The objective of the study, they wrote, was to examine the "potential application of systems analysis techniques to the producing of national intelligence estimates on the Soviet military posture" by projecting alternate force structures five to seven years in the future.[23] Despite resistance to alternate force-structure projections by the CIA's new director of ONE, this recommendation was implemented in subsequent estimates.[24] The trio proposed ideas for executing their recommendations but "recognized that they had not been asked, and indeed were in no position, to weigh the merits of alternative organizational plans and the bureau-

cratic problems associated with them." Ultimately, despite their best efforts, beyond inclusion of alternate projections, "little or no action seems to have been taken on the Project Lamp report."[25]

Marshall stayed on at RAND but found ample opportunities to work with former colleagues in Washington. Shortly after the conclusion of Project Lamp, he joined a subgroup of the McCloy Arms Control and Disarmament Committee.[26] The committee was named after a wizened elder statesman of the eastern elite, John McCloy, who served as the president's advisor on disarmament. McCloy had formed the subgroup to analyze the risk of accidental nuclear war. With Thomas Schelling as panel chair, Marshall and six others examined "brink-of-war situations in which general war seems imminent, the urge to preempt is heightened, extraordinary events and military movements have to be interpreted, and alarms are more likely to be acted on."[27]

The Schelling Panel's final report to McCloy, issued as a Top Secret memorandum in May 1961, argues that "better warning, better command and control, more secure forces that can survive if necessary the first moments of the attack, and a better basis for belief that the enemy is in fact deterred" are the principle means of reducing danger through arms control. The group's 15 substantive recommendations include bilateral access to the Midas early warning system and the urgent installation of a "purple phone" to facilitate communication and mitigate misunderstanding in crises. While acknowledging that the suggestion for such a hotline had been made in the past, the panel provides technical and diplomatic recommendations for implementing it. "Accidents and false alarms can happen," warns the panel, "sudden actions can be misinterpreted, [and] mischief can be done. The important thing is to keep them from leading to . . . war by mistake . . . [,] initiated in haste on ambiguous evidence."[28]

Twice within the next 16 months this advice was sorely tested. Within weeks of the panel report, Soviet Premier Khrushchev's renewed threat to limit access to West Berlin presented the Kennedy administration with an early foreign-policy test. Kennedy and McNamara mobilized American reserve forces. Though they quickly realized they did not want to employ nuclear weapons, their options with existing conventional forces and plans proved woefully insufficient.[29] Thus, the Berlin crisis precipitated the refinement of flexible-response strategy, necessitating the expansion of the defense budget by 25 percent to create a credible conventional force and the reinvigoration of a civil defense program.

One year later, during 13 breathless days in October 1962, the world came to the brink of a cataclysmic war. Kennedy contacted John McCone first for advice when the CIA discovered that the Soviet Union was sneaking nuclear-

tipped missiles into Cuba at the start of what became the Cuban missile crisis. McCone, who had replaced Allen Dulles as DCI after the CIA's disastrous role at the Bay of Pigs, recommended firm action "including, if necessary, an air-strike and invasion to remove the missiles."[30] Fortunately, Kennedy "gave himself five days to deliberate, review the evidence, listen to counterarguments and change his mind more than once. As he noted afterward, if he had been forced to make a decision in the first 48 hours, he would have chosen an air strike on the missile sites rather than the naval blockade he eventually selected. That air strike could have led to nuclear war."[31] During the crisis, messages between Kennedy and Khrushchev were delayed for up to 12 hours as they were received and decoded—an eternity in the game of nuclear brinkmanship. By June 1963, a hotline connected the White House to the Kremlin—though the phone was red, not purple.

In the immediate aftermath of the Cuban missile crisis, former RAND colleague Henry Rowen, by now deputy assistant secretary of defense for international security affairs, asked Marshall to help with a postmortem.[32] The day after the crisis abated, the NSC had tasked Rowen to examine lessons from Cuba and consider methods the Soviets might employ to regain their position in the nuclear arms race after the crisis publically revealed America's nuclear superiority.[33]

Marshall and Thomas Wolfe, then an Air Force officer working at RAND, reviewed a deluge of classified material from the crisis. They completed their efforts within only two short weeks yet provided an astute political-military analysis of the crisis. The authors of "Some Lessons from Cuba" caution against generalizing what had been learned from Cuba to future crises. They describe how the Soviets' provocative actions had renewed the credibility of fears of Russian expansionism and note that, while US nuclear superiority had been a restraint on "the Russians against a nuclear attack," it failed to deter them "from military and nuclear incursion into Cuba." Marshall and Wolfe catalog how the policy process had been attenuated by a combination of imperfect information heightened by the need for secrecy in planning, the complete interdependence of military and political factors, and inadequate contingency planning.[34]

In retrospect, historian Ernest May concludes that the Cuban missile crisis unintentionally forced Soviet and US strategic policies out of phase for the remainder of the decade. Soviet leaders began a large-scale buildup of "strategic forces, facilitated by removal of deployment constraints on intercontinental delivery systems after the Cuban experience. By contrast, the main trend of US strategic policy during the same period was to contain the impressive momentum" of American strategic programs.[35] Marshall would later describe

America's move toward arms control in the aftermath of the crisis as anti-strategic. It allowed the Soviets to impose costs on the United States by increasing the accuracy of their weapons and hardening their strategic forces, while the United States deliberately abstained from imposing similar costs on its adversary.[36] At the time, however, understanding the implications of these divergent policies and the intentions of an opaque adversary proved especially challenging.

Marshall's work in Washington complemented his continuing efforts with Loftus to improve five- to seven-year forecasts of Soviet force structure through Project Sovoy. The two took a decidedly different approach to understanding Soviet behavior than the systems analysis methodology so in vogue. By the late 1950s and early 1960s, academic insights on decision making and organizational behavior were starting to gain traction. According to Mie Augier and Barry Watts, "Marshall managed to identify the early pioneering ideas and scholars behind them, and built upon their ideas in order to provide a better understanding of Soviet military behavior."[37] In the spring of 1957, as his eyes opened to seeing the Soviets as a system of bureaucracies, Marshall had revisited *Administrative Behavior*, written by his old colleague from the Cowles Commission, Herbert Simon.[38] Simon had since moved to the Carnegie Institute of Technology, where he worked with James March, Richard Cyert, and other academics in the Center for Advanced Study in the Behavioral Sciences.

Marshall had read the latest from Simon and March, *Organizations*, shortly after it was published in 1958. *Organizations* surveyed existing theories of organization and sought to "describe the delicate conversion of conflict in corporations, the mobilization of resources, and the coordination of effort that facilitate the joint survival of an organization and its members." Simon and March challenged the neoclassical economic theories of optimization and maximization in organizational decision making. In their view, rationality—pursued after careful analytic evaluation of probable consequences for the preferences of the actor—did not ensure intelligence. Decisions and organizational behavior were refracted by limited, or bounded, rationality—the "incomplete knowledge of economic actors, their uncertainties about the future, and the limits on their ability to discover optimal actions."[39] Rationality was bound by these cognitive limitations in situations of uncertainty. Rather than optimize, individuals and organizations tended to "satisfice"—that is, to focus on targets and distinguish more sharply on success and failure than among gradations in either.[40]

In early 1963, March coauthored *A Behavioral Theory of the Firm* with Cyert, then the president of Carnegie Tech. The two had collaborated for over a

decade to integrate the theory of the firm and organization theory.[41] Marshall would later describe the product of this long period of gestation as the book most influential to his understanding of organizational behavior.[42] Cyert and March sought to better understand economic decision making by supplementing the study of market forces with an examination of the internal operation of the firm. They studied the effects of the operational structure and conventional practices on the development of goals, formation of expectations, and execution of choices. They describe how, rather than being monoliths, firms and their behavior are the weighted outcome of conflicting interests between individuals and groups.[43] Cyert and March examine actual decision processes, thus reasoning from empirical evidence rather than creating a theory of behavior and testing its fit to reality. This methodology resonated strongly with Marshall's pragmatic bottom-up perspective.

In July 1963, Marshall and Loftus published a report stressing the importance of bureaucratic and budgetary constraints for Soviet force structure. The behavioral scientists' impact on their analysis was evident. After examining the evolution of the Soviet military from 1946 through 1961, Marshall and Loftus conclude that "the Soviet posture evolved as the result of decisions taken within a bureaucratic structure" rather than "as the output of a small set of individuals working in a highly constrained manner."[44] Thus, while the McNamara-Hitch-Enthoven team vigorously pursued control of the American defense bureaucracy through budgeting and systems analysis methodologies, Marshall and Loftus were seeking greater understanding of the history, structure, and processes of Soviet bureaucracies through less quantitative social science perspectives. This had important implications. Rather than seeing the strategic arms competition as an "action-reaction mechanism, where each power was reacting rationally to moves made by its opponent," Marshall and Loftus believed that "the interaction process was not nearly as smooth or as governed by rational strategic calculation."[45] Marshall soon had the opportunity to observe firsthand some of the refractory forces of an unfamiliar and ineffectual bureaucracy, the North Atlantic Treaty Organization (NATO).

Earlier in 1963, NATO secretary general Dirk Stikker had proposed an initiative to improve NATO's planning procedures and facilitate the emergence of a stronger conventional force structure. John Duffield describes how "under the existing process, alliance force requirements were devised by the major NATO military commanders with little consideration for member countries' available resources and strategic views. As a result, the force levels they recommended were never approved as formal national commitments and, thus, were not binding." Stikker's "NATO Force Planning Exercise" sought to close the gap between the alliance's force requirements and the

forces partner nations were willing to provide by relating strategy, force requirements, and countries' resources in a rational, systematic way.[46]

McNamara had agreed to Stikker's proposal and suggested they conduct preliminary analysis to inform their next review of all NATO military programs, scheduled for 1965. At Rowen's suggestion, RAND assembled a small cadre of five analysts to facilitate several multinational studies. Burt Klein, Hitch's replacement as the head of the Economics Department, led the team and asked Marshall to accompany him. Klein was described by one contemporary as "a man earthy enough to be effective with the military and so intent on his message that he would burn his fingers while lighting his pipe."[47] With their wives in tow, Klein, Marshall, and three other analysts departed for Paris in August 1963. It was their home for the next 19 months.[48]

Life in "La Ville-Lumière" suited Marshall and Mary. Never burdened by the demands of parenthood, they shared countless hours enjoying the city's cultural attractions and late meals in Parisian bistros. Mary was a lover of fine art, Marshall of the perfect meal. Mary had joined the UCLA Art Council shortly after their return from Chicago and remained an avid fundraiser to help purchase art for the benefit of students.[49] She took great pleasure in touring Paris's many art museums. Marshall delighted in navigating its labyrinth of narrow streets and alleyways in search of Michelin-rated restaurants with the most succulent roast quail or exquisitely braised chateaubriand.

Marshall's job at NATO headquarters, however, was far less idyllic. Along with a French colonel, he co-led a study to ascertain the adequacy of NATO's stockpiles of war-readiness materials. Their team was comprised of languorous international civil servants. Other RAND analysts worked on NATO's first studies of crisis handling. Their efforts slowly and painfully facilitated the establishment of the Nuclear Planning Group, where the most classified and subtle aspects of a controlled nuclear-response strategy could be discussed.[50] Marshall grew dispirited by the lacuna of intellectual output and laggardly pace at NATO.[51] France proved unwilling to entertain any meaningful flexibility in its nuclear strategy except in the context of general war, and by the time of Kennedy's assassination in November, the Force Planning Exercise had ground to a halt.[52] By the following summer, Marshall was relieved when Rowen asked him to head a delegation to Norway. Unconvinced of NATO's ability to defend them, the Norwegians had formally requested to open discussions with the United States on establishing a bilateral defense agreement.[53]

Nathan Leites, the psychology-trained analyst who famously wrote *The Operational Code of the Politburo* in the early 1950s, had offered Marshall his personal opinion on the European operational code years earlier. Leites believed that Europeans' belief structure was based on viewing the world as

one made of giants, pygmies, and midgets. Seeing themselves as pygmies, they felt compelled to deal with the midgets of the world but were psychologically unable to act as giants—content instead to remain dependent on their larger brethren for protection. While it was terribly undiplomatic, Marshall found Leites's depiction all too accurate. His experiences at NATO and in Norway led him to conclude that Europeans were not very serious about defending Western Europe.

Soon thereafter, Marshall translated Leites's dependency schema into a politically palatable explanation of why NATO's military strength remained greatly diminished, despite Europe's economic recovery by the early 1950s. He examined the constraints, inefficiencies, and conflicting nationalistic objectives attenuating the ability of Western European allies to defend themselves. Western European allies collectively spent $20 billion per year, which represented approximately four-fifths of Soviet military expenditures, but domestic political groups and bureaucratic proclivities significantly diminished the effectiveness of forces provided to NATO. "Too often," wrote Marshall, "the bureaucratic, economic, and social factors that so strongly influence individual countries' behavior are lumped loosely under the rubric 'political' without differentiation or analysis."[54] Marshall postulated that nationalistic objectives, diseconomies of scale, underinvestment in new equipment, and overinvestment in manpower due to demographic pressures all undermined NATO's force posture and contributed to its fecklessness.

In March 1965, Marshall returned to his home in Los Angeles and a strategic community at RAND diminished significantly from its golden years. The think tank was in the midst of a "prolonged and painful era of divisiveness and reorientation during which it distanced itself from the Air Force" and "aligned with the Office of the Secretary of Defense."[55] The Air Force considered the Whiz Kids' cost savings analysis treasonous. The president of RAND, Collbohm, agreed. Tensions between RAND management's loyalty to their longtime benefactor and many strategists' alignment with OSD pitted the two groups against one another. Having grown frustrated and feeling stymied, Kahn had already departed in 1962 after securing donations to form the Hudson Institute.[56] After a lengthy feud with Brodie, Wohlstetter had ignominiously been cashiered from RAND in 1963.[57] Loftus had retired on a medical disability the following year.[58] Marshall kept in contact with all three, but their absence exacerbated the void left by those who had joined the Kennedy administration.

RAND's intellectual decline concerned Marshall. Upon his return he discussed this at length with James Schlesinger, a Harvard-trained economist eight years his junior. Schlesinger had spent the summer of 1962 at RAND,

working under Marshall's supervision. The two became friends, and Schlesinger had joined the Economics Department shortly before the Marshalls' departure for France the following August.[59] While the NATO delegation was away, Schlesinger and Richard Nelson coauthored a memorandum to the acting head of the Economics Department to express their concerns about both RAND's decline and the limitations of systems analysis and to endorse the importance of Marshall and Loftus's organizational behavior work in anticipating future Soviet force developments.[60] Over the next few years, Marshall's friendship with Schlesinger deepened as they collaboratively sought ways to infuse intellectual vitality back into RAND.[61] Further exploration of organizational behavior was their first best hope.

Shortly after his return to RAND, Marshall proposed to organize a program of study on organizational behavior. RAND management approved his request and authorized him to recruit three or four people to help. Marshall knew precisely where to start. In the spring of 1965 he flew to Pittsburgh, home of Carnegie Tech, to meet with Jim March. Marshall enthusiastically described his hope of transferring the academic insights of March and others to better understand the Soviets. The two began a close friendship spanning the next four and a half decades. March suggested the names of several promising students to Marshall, including a young man named Pat Crecine.[62] Crecine, who had recently completed his doctorate at Carnegie Tech and was teaching at the University of Michigan, impressed Marshall sufficiently to gain an invitation to spend 1966 at RAND.[63]

Marshall also travelled to Cambridge to meet with faculty members at HBS, particularly Joseph Bower and C. Roland Christensen. Bower had completed his doctorate under Christensen's supervision two years earlier. Christensen had been a member of the HBS staff for nearly two decades and was one of the founders of the field of business strategy.[64] Both supported Marshall's interest in translating their work in corporate strategy into a Cold War strategic calculus.

At Rowen's suggestion, Marshall also met with Harvard's Richard Neustadt.[65] Neustadt—a political historian with "an infectious fascination with issues of politics, power, and governance"—had spent decades studying and serving in political institutions.[66] He had worked as a junior aide to Harry Truman and served as a consultant to both Kennedy and Johnson after the success of his seminal analysis of presidential decision making, *Presidential Power*. By the time of Marshall's visit, Neustadt was interested in exploring "why so many results diverged so far from policy intention," particularly Vietnam and the Great Society. Marshall's discussions with Neustadt catalyzed the formation of the "May Group," named for its chairman, Harvard historian Ernest May.[67]

The May Group soon began meeting every second Saturday to discuss the impact of bureaucracy on government's choices and actions.[68] Marshall's other obligations prohibited him from attending more than a handful of these meetings, but he kept apprised of the group's intellectual dialogue by reading the reports of each session artfully produced by its rapporteur, Graham Allison. Allison had completed his master of philosophy degree at Oxford in 1964 and currently studied under Neustadt for his doctorate. After each session, the bright 26-year-old produced an "evolving paper" to summarize the content of the discussion and provide fodder for the next meeting. Allison served as a conduit, feeding details from meetings to Marshall and injecting Marshall's ideas on organizational behavior into the group.[69] The two frequently saw one another in Washington, where Marshall worked on several new consulting projects.

John Bross, one of the princes of the realm within the CIA and clandestine services, had requested to meet with Marshall shortly after Marshall's return from France. Marshall's reputation from his earlier work on improving estimates and forecasts preceded him. During the war, Bross had been among the first to volunteer for the Office of Strategic Services (OSS) and served as the OSS chief of mission to the United Kingdom, Norway, and Denmark. After practicing law for six years following the war, Bross had rejoined the CIA and served with distinction thereafter, first in the clandestine services' Cold War battlegrounds in Europe and then in management roles of increasing responsibility in Washington.[70] By the time he called on Marshall, Bross was serving as deputy to the DCI for National Intelligence Programs Evaluation (NIPE).

Director McCone had created the NIPE staff in 1963 to provide an instrument "through which he could exercise community-wide management-related leadership in coordinating and guiding the US foreign intelligence effort." Bross felt his charge to be threefold. First, he was to help the DCI deal with the rising costs of intelligence by understanding those costs more precisely and getting control over them. Second, he was to help the DCI understand adequately what all the programs in the community actually did and assess their effectiveness. Third, he was to help set priorities as guidance and then relate programs to objectives. In effect, the NIPE staff was a mechanism for the DCI to assert leadership and integrate the community to gain efficiencies, eliminate duplication, and rationalize intelligence resources.[71] This was a difficult task, even for a man of tremendous skill such as Bross.

At their first meeting in the summer of 1965, Bross asked Marshall to become a consultant for the NIPE. Because of the staff's small size, the two interacted frequently, and Bross came to hold Marshall in high esteem. Through the trust engendered by this friendship, Marshall gained exposure to top-level

management issues within the intelligence community. Director Richard Helms, who replaced McCloy in 1966 and served in this capacity for the next seven years, later described Bross as one of his closest advisors.[72] By observing Bross's interactions with the DCI, Marshall gained a firsthand perspective on how to serve in an advisory role to the head of a federal department. Marshall's consultancy to Bross continued until he joined the government nearly seven years later.[73]

That same year, Marshall and Schlesinger also began consultancy work for Rowen, who had been appointed assistant director of the Bureau of the Budget (BOB) after President Johnson ordered the adoption of the DOD budgeting methods throughout the federal government.[74] Johnson hoped to rationalize the federal budget and create cost savings that would both enable aggressive tax cuts and help fund the ambitious programs he envisioned for his Great Society initiative.

Marshall thus ventured outside of defense policy analysis for the first time since his inaugural study on health care with Goldhamer 16 years earlier. In November 1965, he presented a briefing on cost-benefit analysis in health care to an audience of people from "numerous US Government Departments and Agencies attempting to introduce program budgeting and cost effectiveness measures."[75] Marshall's foray into applications other than military strategy proved short-lived, but his consultancy to the BOB continued over the next few years. The bureau oversaw the preparation and administration of the federal budget. Marshall's consultancy provided him a fuller understanding of the budgeting process for the defense and intelligence communities and of the messy realities of bureaucratic behavior.

Back in Santa Monica, RAND's organizational behavior program quickly gained momentum. Marshall, Schlesinger, and several others worked to replace the rational process model with something that more accurately reflected the context and constraints within which Soviet military posture incrementally evolved. In 1966 Crecine and others arrived to begin their studies under Marshall's tutelage. Marshall balanced contributions to these efforts with frequent trips to Washington for his consulting work throughout the year. The different facets of these experiences shared a certain synergy.

In September 1966, Marshall presented a paper to a political scientists' convention on the problems of estimating military power, where he offered his belief that the "conceptual problems in constructing an adequate or useful measure of military power have not yet been faced. Defining an adequate or useful measure looks hard, and making estimates in real situations looks even harder." In an oblique critique of systems analysis, Marshall criticized attempts to measure power by tabulating forces as an evasion of the problem of

estimating military power "since it says nothing about the actual capabilities of the forces of one country to deal with another." The key problem if one is to do a better job of predicting the behavior of governments and military bureaucracies, argued Marshall, was to develop useful models of the decision-making process in such organizations.[76]

By the following spring, he and Sydney Winter submitted a research proposal to the Air Force. Winter had recently completed his doctorate in economics at Yale. Together they proposed a multiyear study of the major factors determining the outcome of the defense budgeting process and implications of those factors for the evolution of the Air Force's force posture. Unlike economists' and system analysts' view of organizational decision making as a single unit with comprehensive rationality, Marshall and Winter planned to use the recent work of Cyert, March, and Simon as their methodological point of departure. They hoped to examine the process by which alternatives were generated and considered and to explore why the list of options presented to policy makers was much shorter than a straightforward application of the rationality model would suggest. "Better understanding," they wrote, "should lead to suggestions for improvement, and to better techniques for predicting the evolution of force posture here and abroad."[77]

Although the Air Force never approved their research proposal, RAND's organizational behavior work continued undeterred. At Marshall's invitation, Allison participated in his first of several summer-study programs at RAND in 1967. Their friendship deepened. Marshall, now 46, assumed a mentorship role for Allison, Winter, and others—facilitating their intellectual growth through the bonds of friendship.[78] That summer Mary and Marshall hosted a reception for Allison and his new bride after their wedding in Santa Monica. The new husband worked diligently to expand the latest of his evolving papers into his dissertation, formally accepted by Harvard's Department of Government in January 1968. Allison returned to Santa Monica that summer to write and publish an abstract of his dissertation as a RAND paper.[79]

Through these efforts, Allison synthesized the disparate ideas from the May Group into three distinct models. These lenses—first described as the "rational policy," "organizational process," and "bureaucratic politics" models—were subsequently relabeled as "rational actor," "organizational behavior," and "governmental politics" in Allison's seminal analysis of the Cuban missile crisis, *Essence of Decision*.[80] Allison thus became the first and arguably most famous scholar to publicly articulate an organizational behavior lens to better understand national policy makers' decision making. Years later, he called Marshall the primary intellectual force behind this model.[81]

Allison's efforts at RAND were not solely academic. Ivan Selin, the deputy assistant secretary for strategic programs, had approached Marshall in the summer of 1967 to ask what could be done to forecast Soviet reactions to changes in US force posture. Marshall had developed a set of specific propositions related to predicting Soviet force posture:

1. Force posture for a nation is especially influenced by the organizational interests and behavior of subparts of the military establishment.
2. Internal Soviet security controls over the flow of information and the general privacy of the decision-making process lead to an even more bureaucratically influenced force posture than is usual in Western countries.
3. Parts of the Soviet military bureaucracy strive to keep their budgetary shares and are fairly successful in doing so.
4. The mechanics of the operation of the budgetary process have a substantial impact on the formation of force posture.[82]

Predicting an opaque adversary's reaction to one's own behavior was a significantly more complicated problem. Marshall assembled a team that included March, Christensen, and Bower. Allison was chosen to help translate their work into a RAND paper. After securing the appropriate security clearances, the group convened regularly over a series of two-day meetings in Washington during the first half of 1968.[83] Marshall's direct contact with Allison in Washington allowed him to remain informed of the May Group's ongoing dialogue.[84]

Amazingly, Marshall found time to continue accreting lenses from various academic disciplines in his quest to better understand the evolution of Soviet forces. His early reading of Toynbee and other historians, furthered by his eternally eclectic reading habits, reflected a long-term interest in models of behavior other than the rational model. Marshall read French sociologist Michel Crozier's work *The Bureaucratic Phenomenon* with great interest and was struck by its central insight—bureaucratic institutions must be understood in terms of the cultural context in which they operate. Because organizations are deeply rooted in culture, "a sociology of organizations and a sociology of organizational systems are equally necessary to a general theory of action."[85] Among other things, this meant that Soviet command-and-control systems were indelibly Russian, with relationships between superiors and subordinates profoundly different than in the United States.[86] During another long vacation in France with Mary in 1967, Marshall traveled to the United Kingdom to explore the possibility of a comparative study of defense decision making based partially on Crozier's insights.[87]

Marshall also explored other aspects of human behavior and human nature. In 1968 he and Schlesinger happened upon Robert Ardrey's *The Territorial Imperative*, which included an "anthropological examination of human behavior in threatening situations."[88] Marshall and Schlesinger were intrigued by the work of Ardrey, Lionel Tiger, and other ethologists who were rapidly reframing human behavior—especially its nonrational aspects—in primatological terms. These anthropological frameworks' deeper appreciation for man's primordial motives informed Marshall and Schlesinger's understanding of the political-psychological use of force in peacetime.[89] It also helped them make sense of things happening closer to home, within RAND. Maybe, they concluded after long discussion, RAND was not a rational animal.[90]

In January 1967, Collbohm's successful 20-year tenure as president of RAND came to an inglorious end. RAND's board of trustees selected Rowen, who had recently left government service and planned to teach at MIT, as their next president. Rowen acted decisively to end the festering debate over whether to expand the think tank's mandate. By the spring of 1967, Rowen had restructured the internal divisions to make the organization better able to diversify and established the Social Urban Institute to position RAND as the nexus of social policy research.[91]

Marshall and Schlesinger met frequently with Rowen to offer advice on how best to revitalize RAND's strategic community. Rather than approve their proposal to establish a management department, Rowen elected to create a chair to help organize and rationalize RAND's research program in strategic studies. He appointed Schlesinger the first director of strategic studies in the spring of 1968. Neither a division nor a department, the post was a single position "designed to promote cross-disciplinary strategic analysis."[92] Schlesinger took several steps to implement the vision he and Marshall had created over the past several years, but his tenure ended abruptly when he joined president-elect Nixon's transition team after the November election and was subsequently appointed a deputy director in the BOB in January 1969. At Rowen's request, Marshall stepped into the breach and became director of strategic studies.[93]

As director, Marshall sought to create a coherent intellectual strategy that orchestrated RAND analysts' studies on strategic forces. Central to this strategy was reorienting the underlying premise of most strategic perspectives. By the late 1960s, most analysts focused on the role of strategic forces in large-scale nuclear wars, yet nearly 20 years had elapsed since the first and only employment of nuclear weapons. The view of a protracted competition with the Soviets had existed in RAND's early years. Indeed, the Strategic Objectives Committee and the paper Marshall had coauthored with Hitch and Brodie, "The Next Ten

Years," reflected a long view of the Cold War shared by Eisenhower and others. This view, however, had vanished inexplicably from RAND by the second half of the 1950s.[94] More than a decade later, Marshall made a concerted effort to bring it back by producing a framework for long-term competition (LTC) to stimulate discussion on what the strategy ought to be. He believed "once you had the strategy, various programs would be implementation moves within the strategy."[95]

Drawing partially on Christensen's notion of a large organization having to develop a strategy for competing, Marshall penned *Long-Term Competition with the Soviets*.[96] He proposed that the United States was in an extended, continuing, and inevitable strategic arms competition with the Soviet Union. Therefore, American policy makers should assess the nature of the competition, clarify national goals, and seek to become a strong competitor. Current arms-control programs focused on stability in the arms race. Marshall proposed a separate question: how well is the United States doing in its competition with the Soviets? He warned that the United States might be pricing itself out of the competition by inefficiency, particularly in the production and political employment of strategic arms. Rather than stability, improving one's position should be the greater goal.[97]

By the late 1960s, there were clear indications that the Soviets were catching up in a range of key military areas through their efficient use of resources. Based on CIA analysis, the Soviets had apparently increased their defense budget but not their defense burden (i.e., the portion of their total expenditures devoted to defense spending). If the trend continued, they would surely pull away from the United States over time. The United States simply could not afford its existing inefficiencies, spending great sums to hedge against very unlikely contingencies while doing comparatively little to make life harder on the Soviets. Instead, Marshall asserted that the nation must use its resources more efficiently to create positions of strength while imposing costs on the Soviets. He believed the LTC framework provided a better methodology for assessing military strength, better insight into why and how the Soviets had been catching up, and a tentative projection of what the future might hold.[98] This long-term perspective, Marshall argued, could provide a context to devise strategies for future advantage.

Marshall's LTC framework differed substantively from the view of extended competition in RAND's early years. It considered such things as the social-cultural aspects of competitors, organizational arrangements and how they derived from historical experiences, and long-term economic and population-growth rates.[99] It also differed in form and substance from systems analysis. By now, Marshall had grown weary from the hubristic overextension of systems

analysis. In a paper prepared for a Senate committee in April 1968, Schlesinger had, with tongue in cheek, offered two-and-a-half cheers for systems analysis.[100] Marshall would have given it one less cheer. He felt that it tended to push people in the direction of asking the wrong question—specifying a job, such as destroying targets, solely in terms of the most cost-effective means. The LTC framework compelled one to look at things as a "very lengthy move-countermove competition with the Soviets in the military area, and the strategic area within that; from that perspective, buying another airplane is just another move within this continuing competition." People coming from a systems analysis background "tended to be inoculated against thinking that way."[101]

Marshall's new framework required a wholly different methodology for thinking about the problem. While acknowledging the difficulty of predicting the necessary changes in analytical methods and inputs to analysis for an LTC strategy, Marshall offered areas for further research: (1) force-posture gaming; (2) further exploration of various techniques for decision making under uncertainty, particularly Bayesian methods for improved risk balancing; (3) changes in intelligence estimates to better account for the way complex decision-making processes involving many organizations with conflicting goals determine Soviet, and US, force posture; and (4) improved methods for making net assessments to monitor how the United States is doing relative to the Soviets in strategic arms competition.[102]

Marshall's reference to net assessments was informed by his ongoing work for Fred Wikner, who led the Net Technical Assessment staff in the Office of the Secretary of Defense (OSD). The concept of net assessment possessed a decades-long history, beginning in January 1953, when President Truman created a special subcommittee of the NSC to "evaluate the net capabilities of the Soviet Union to inflict direct injury to the US. For the next 11 years, the Net Evaluation Subcommittee (NESC) was reconstituted annually to assess the balance between Soviet and American nuclear capabilities."[103] The subcommittee had a limited focus—looking only as far as two years into the future. Headed by the chairman of the Joint Chiefs of Staff, the NESC's assessments had focused solely on the US-USSR strategic nuclear balance and hypothesized what a nuclear exchange between the two nations might actually look like.[104] Reports from the NESC "had considerable impact on the view of top-level decision-makers on the nature of the strategic balance between the US and USSR."[105]

McNamara, however, believed the NESC's efforts were redundant and had successfully eliminated the subcommittee in 1964. Ironically, the NESC was dissolved "at a time when it was arguably most needed. Once the Limited Test

Ban Treaty entered into force in October 1963, the ability of the US to monitor Soviet nuclear developments through air sampling was greatly impaired." Consequently, the United States began to depend more heavily on "technical extrapolations for weapons intelligence."[106] Soon a net technical assessment function led by Wikner was reconstituted under the Defense Department's director of defense research and engineering.

Wikner focused on comparisons of US and Soviet weapons systems and each side's supporting science and technology.[107] Several years prior to Marshall's work on a framework for long-term competition, Wikner had approached RAND in search of analytic support and enlisted the help of Marshall and other analysts.[108] For Marshall, the LTC framework and the notion of net assessment informed one another.[109] He "was distressed by the nation's current defense strategy, and the R&D strategy in particular."[110] Because of the economic and strategic malaise engendered by Vietnam, the Soviets seemed to have achieved strategic parity. Marshall believed that if the United States considered itself in a continuing and essentially never-ending arms competition with the Soviets and relative resource streams remained finite, then US R&D strategies needed to be more selective—steering the competition into areas of US comparative advantage.[111] Policy makers would have to make hard decisions about where they wanted the United States to remain ahead and where it could afford to trail behind.[112]

These tough decisions would have to be predicated on the ability to make worthwhile forecasts of where the United States and the Soviets might be in five to 10 years. This required a "much better picture of Soviet military and R&D organizations, their past growth pattern, likely future trends, the budgeting practices, the design practices and the general decision-making practices within these parts of the Soviet bureaucracy." Marshall believed the intelligence community had devoted a scandalous deficiency of resources "to trying to understand Soviet decision-making processes and Soviet organizational behavior."[113] In contrast, RAND's ongoing work on organizational behavior, set within the framework of long-term competition, could inform these strategies. Unfortunately, like Schlesinger before him, Marshall was pulled away by Washington's gravitational force before he had a chance to implement fully these plans for strategic studies at RAND.

In September 1969, Marshall received an important phone call. The gravelly Frankish accent at the other end of the line added solemnity to the request being made. Henry Kissinger, national security advisor to President Nixon, was asking Marshall to come meet with him in Washington. Just days away from another long trip to Europe with Mary, Marshall adjusted his itinerary to meet with Kissinger. Once in Washington, Marshall listened intently as

Kissinger described his proposal. Nixon was extremely dissatisfied with recent intelligence reports. Kissinger had closely read some of the early NIEs and found them abominable—riddled with flawed logic, poor writing, and shallow analysis. He wanted Marshall to conduct a two-month study to analyze the flow of intelligence into the White House.[114] Based on his long-standing relationship with the intelligence community and other policy makers in Washington, Marshall was a natural fit for the job. He agreed to help by working half-time as a consultant on the NSC but only after sating his Francophile spirit with his wife. It was the last vacation he took to Europe for nearly 30 years.

Marshall returned to Santa Monica in early November and began transferring his short-term commitments to others to handle during his temporary absence. Col Al Haig, Kissinger's military assistant, called repeatedly to ask Marshall to expedite his arrival. Finally, in the first week of December 1969, Marshall returned to Washington.[115] Days before Marshall's arrival, the selective service held its first draft lottery in 27 years at its Washington, DC, headquarters. Finding a way to extricate America from the conflict in Vietnam consumed the administration's attention and intellectual energy. It also destroyed Nixon's and Kissinger's faith in the intelligence community. Kissinger later remembered that "the analytical side of the CIA, never the group of wild-eyed Cold Warriors that media and Congressional investigators suggested, generally reflected the most liberal school of thought in the government. They had long since given up on Vietnam; they tended to believe that nothing would work."[116] Yet Marshall was unperturbed. Believing Vietnam was a strategic mistake, he had remained focused on the Soviet threat.[117]

After a long discussion with Kissinger, Marshall agreed to perform two studies to examine the flow and quality of intelligence into the White House.[118] The first study would determine where the intelligence came from, how people decided what they were going to send, and what could be done to improve the process. The second study would focus on the overall quality of the Soviets' missile.[119] Marshall set to work immediately.

By the time Marshall arrived on the scene, it was very clear that President Nixon had stopped reading the CIA's premier intelligence product, the President's Daily Brief (PDB). Marshall started his analysis by talking to staffers in the Situation Room, where information coming into the White House flowed, and then interviewing members of the intelligence community. He analyzed PDBs from the first six months of the administration and determined that Nixon, who invariably made marginal notes on everything he read, had stopped reading them fairly quickly. Instead, Nixon began reading an alternative product generated by the Situation Room.[120] DCI Helms knew this but

felt powerless to change things. Kissinger was masterfully freezing him out in his attempt to centralize control of the federal bureaucracy.[121]

Nixon, deeply distrustful of the government bureaucracy, enhanced the power of the national security advisor and placed him in charge of a more centralized policy-making structure.[122] Kissinger obliged. Under Nixon, and with Kissinger's leadership, the NSC's role in policy making greatly expanded. Its personnel strength quadrupled in size and grew substantively.[123] Kissinger gained the power to issue national security study memorandums directing the work done by state, defense, and other departments and when they did it.[124] Ironically, while Marshall had spent the past decade studying the behavior and maladaptations of bureaucracies, he was now consulting for a man who ruthlessly circumvented the federal bureaucracy—perhaps the preeminent practitioner of bureaucratic politics.

In March 1970, Marshall delivered his report to Kissinger. As widely suspected, the success of the Situation Room product had driven the CIA PDB out of the president's focus and attention. Even more disconcerting, Marshall's analysis revealed that nearly two-thirds of the items in the PDB were not making it into the Situation Room product. Thus, the president reviewed only one-third of the intelligence deemed worthy of his attention by the intelligence community. The report raised a number of significant issues, including others' frustration with the dearth of feedback from Kissinger and Nixon, and offered several potential solutions. The most radical of these included using existing computer technology to develop a flexible online reading program, available on a TV screen at all times, with controls allowing readers to pick subjects. The system, wrote Marshall, could automatically provide feedback on what Kissinger and/or the president read and how much attention they paid to particular areas.[125] His proposal reflected both Nixon's penchant for isolation and the increasing importance of computers and technology in intelligence work. It also showed Marshall's proclivity for practical solutions.

Marshall completed the second study in May 1970. Per Kissinger's request, Marshall conducted a follow-on study of the SS-9 and its antecedents to help coach CIA analysts and produce an exemplar of strong analytical work. The SS-9 was the Soviet's first multiple independently targeted reentry vehicle (MIRV) missile, and it was at the center of an intense political struggle between the CIA and the DOD. Air Force intelligence analysts believed it to be highly accurate and possess enormous lift capacity. Analysts at the CIA disagreed. Great debate existed over whether the Soviets sought a first-strike capability. The Defense Department believed they did; CIA analysts and DCI Helms did not. In mid-1969, while seeking congressional support for a multibillion-dollar antiballistic missile program, the administration had

endorsed the Air Force's hyperbolic estimates for the purpose of political expediency.[126]

Marshall's task was to lead a team of analysts at the CIA in a study of both the bureaucratic and historical antecedents of the SS-9. Clearly his work was fraught with implications for the NIE being prepared for 1971. Marshall completed his study in the fall of 1971. The NIE, issued shortly thereafter, concluded that the "SS-9 is the only missile now in the Soviet arsenal which could have the necessary combination of yield and accuracy to threaten US land-based ICBMs and other critical hard targets."[127] On the issue of Soviet pursuit of a first-strike capability, the report remained safely ambiguous.

Marshall's efforts as a consultant on the NSC quickly grew beyond his initial commitment. In the summer of 1970, Kissinger had asked Wayne Smith, director of program analysis staff on the NSC, to chair a special defense panel to develop programmatic options Kissinger could use to pressure the Soviets in the event that they began to drag their feet in the Strategic Arms Limitation Talks (SALT).[128] Smith, a Princeton-educated economist who had spent the past two years at RAND, included Marshall and Schlesinger in the small group he formed discreetly.[129] In an effort to provide a broad conceptual background for the group, the two friends performed what Marshall later considered his first "national" net assessment of US and Soviet force posture.[130]

With Schlesinger preoccupied with other duties, Marshall wrote most of the assessment and drew two main conclusions: "First, important data were lacking: intelligence gaps were lacking in a number of crucial areas, including Soviet logistics and the readiness of Soviet military units. Second, appropriate analytic methods for assessing the capabilities of the opposing force to deal with one another in specific contingencies did not exist."[131] Marshall recommended that someone begin organizing a major national study, to run from 12 to 18 months, to produce a net assessment of the US and Soviet force postures as of the end of 1972.[132]

Marshall soon became involved in another project with far-reaching implications. In December 1970, Nixon had asked Kissinger and George Shultz, head of the Office of Management and Budget (OMB), to conduct a study to help him better understand how to reform the intelligence community and reduce its budget.[133] Schlesinger, still serving as deputy director of the OMB, had been appointed to lead a study of the effect "technical collection" systems were having on the intelligence community.[134] He worked closely with members of the NSC staff on the project, including his old friend Marshall. Kissinger had asked Smith to lead the NSC's contribution to the study. Unable to find the additional time for this effort, Smith asked Marshall to handle the issue.[135]

Marshall often served as an intermediary between the NSC and CIA, walking a tightrope between two communities driven by mistrust and political intrigue. In February 1971, he met with Bross's recent replacement as head of the NIPE staff, Bronson Tweedy, to discuss ways to improve strained relations. Marshall informed Tweedy of the progress of Schlesinger's investigation to ensure the CIA was not broadsided by its results. Tweedy believed lack of feedback from Kissinger and Nixon remained the crux of the issue. He proposed having someone close to, and trusted by, Kissinger formally assume the role of conveying his thoughts, needs, and the detailed requirements of studies to someone on Helms's staff. Marshall, who made the same recommendation to Kissinger the previous May, promised to convey the suggestion through Smith.[136] Several days later, in a letter to Kissinger, Smith relayed the details of the meeting and concluded with a question: Is the notion of having someone close to you devoted almost full time to liaison with CIA a feasible, desirable option?[137]

The following month, Schlesinger released "A Review of the Intelligence Community," commonly called the Schlesinger Report. The report's conclusions were damning. It described a community adapting haphazardly to technological change, producing intelligence reports of scope and overall quality incommensurate with the dramatic increase in the cost of intelligence and collection activities.[138] Schlesinger clearly indicted Helms for his inability to centralize control of the intelligence community. He offered a range of potential solutions, all premised on the importance of creating a leadership position within the intelligence community able to centralize control by planning and rationalizing resource allocations. Based partially on this report, Schlesinger's star continued to rise within the Nixon administration. In August 1971, the president appointed Schlesinger chairman of the Atomic Energy Commission (AEC) to help implement regulatory reforms and restore public confidence in the safety of nuclear power plants.[139]

The Schlesinger Report was completed officially in September. Marshall drafted implementation memoranda and the directive for Nixon's intelligence reform.[140] He submitted his work to Smith and Haig for their review. In the process of vetting the directive, someone added a singular paragraph with profound implications for Marshall.

In the spring of 1970, when Marshall was completing his first report on the flow of intelligence into the White House, a member of the Blue Ribbon Defense Panel on defense reform had asked Marshall to include a recommendation for a net assessment activity at the NSC in his report. While Marshall agreed with the premise of the argument, he had not believed the recommendation was congruent with his study. Subsequently, the panel's final report

included a recommendation for the creation of a net assessment group (NAG) to report directly to the secretary of defense.[141] Initially, Defense Secretary Melvin Laird had chosen not to do anything with this recommendation. Nixon's November 1971 intelligence reform directive included a paragraph, added to Marshall's original draft without his knowledge, calling for the creation of a NAG within the NSC. The directive stipulated that "the group will be headed by a senior staff member and will be responsible for reviewing and evaluating all intelligence products and for producing net assessments of US capabilities via-à-vis those of foreign governments constituting a threat to US security."[142]

Smith and Haig immediately began lobbying Marshall to become director of the newly formed NAG. By January 1972, Marshall acquiesced and took the position, though because of bureaucratic delays he did not become a full-time government employee until April 1972.[143] After 23 years at RAND, including 28 months working half-time on the NSC, Marshall began a new career as a civil servant. He reported directly to Kissinger and gained an office in the stately Old Executive Office Building. Marshall began piecing together a small staff by quickly hiring a secretary and his first military assistant, George "Chip" Pickett. Pickett—a young Army captain, intelligence officer, and Vietnam veteran—was taking Bower's business policy course during his final semester of study in Harvard Business School's MBA program. Bower, having participated in the May Group, used draft chapters of Allison's *Essence of Decision* as case studies for his students. While others in the class questioned the applicability of Allison's models as a framework for analysis in the corporate world, Pickett was captivated. Through Christensen, Bower arranged an interview for Pickett.[144]

Marshall hired his second staff officer, Navy lieutenant commander Robin Pirie, based on the recommendation of a former RAND colleague. Pirie ran afoul of Adm Hyman Rickover while working in the systems analysis directorate and was available for hire. Marshall planned to have Pickett help monitor the reorganization of the intelligence community and Pirie handle assessment activities. Pragmatically, neither counted against the NAG's limited budget.[145] More importantly, Marshall sensed the importance of hiring military officers with a variety of operational experiences to help counterbalance the high levels of intellectual abstraction the office would occasionally encounter.[146] For the time being, Pickett remained far busier than Pirie.

In a staff meeting among defense leaders one week after Nixon's reorganization directive, Laird expressed his surprise at the addition of a net assessment function on the NSC. He believed Helms should become chairman of the NAG, but it had been placed in the NSC.[147] For Laird, this unwelcome change reflected Kissinger's insatiable drive to consolidate power within the

NSC. Laird told his staff he was now "convinced that both net assessment and long-range planning should be done within his immediate offices rather than under the auspices of the NSC's NAG." Within weeks, he established the position of director of net assessment within the OSD but deliberately left it vacant. The ensuing bureaucratic stalemate stymied progress on net assessments for most of 1972. "Given Laird's resistance together with his political connections to Congress as a former nine-term member of the House of Representatives, Kissinger decided not to press ahead" with assessments from the NSC until after Laird left his post as defense secretary in March 1973. In the interim, Marshall had plenty of time to envision both the nature and scope of an office of net assessments and create a viable strategy for its implementation.[148]

In an April 1972 memorandum, Marshall summarized his views on national net assessments. The phrase "net assessment," wrote Marshall, "has two connotations: a comparison between the United States and some rival nation in terms of some aspects of our national security activity, and the most comprehensive form of analysis in the hierarchy of analysis." While net assessment as a distinctive form of analysis was not yet clearly defined, Marshall believed its objective should be to provide senior policy makers "diagnosis of problems and opportunities, rather than recommended actions." For Marshall, the focus on diagnosis rather than solutions was especially significant.[149]

Net assessments, Marshall suggested, should provide "an objective and comprehensive comparative analysis of US programs, policies, and military forces with those of potential adversaries or competitors," which would serve as the basis for diagnosis. At a macro level, net assessment would seek to answer the following questions: Do we have a problem? If so, how big is it? Is it getting worse or better? What are the underlying causes? Answering these deceptively difficult questions would require the creation of a new form of analysis concerned with "national security in its broadest sense, embracing political, economic, and technological problems as well as purely military ones." This would take time. Marshall acknowledged that "the initial assessments are bound to be crude, tentative, and controversial. Producing net assessments suitable for the President and the NSC will not be an easy task. The methodologies for doing net assessments are not well developed. Data problems abound. The single most productive resource that can be brought to bear in making such net assessments is sustained hard intellectual effort."[150]

For now, as the parlor game of bureaucratic politics ran its course, Marshall expended much of his intellectual effort on monitoring implementation of Nixon's intelligence reforms. Kissinger chaired the National Intelligence Council Intelligence Committee (NICIC), established as part of the November reform directive, but was preoccupied with larger foreign policy issues.

Marshall frequently attended meetings of the NICIC in Kissinger's absence. In June 1972, he sent Kissinger a detailed synopsis of progress to date. The memo demonstrated Marshall's mastery of both the issues requiring Kissinger's attention and the bureaucratic politics in play. Marshall believed that Helms's cautious and limited approach deliberately retarded the president's reforms. He summarized the pertinent issues, offered several short-term and midterm strategies, and then provided recommendations with predrafted implementation memoranda. Based on Marshall's conversations with Haig, he knew Helms would be eligible for retirement at the end of March 1973 and that a major showdown would be unwise and likely unproductive. Marshall counseled Kissinger to continue applying pressure on Helms while making known his views on the appropriate characteristics of the next DCI and stockpiling ideas for that person to take once appointed.[151] They would not have that long to plan.

By the end of December 1972, Helms's refusal to interfere with the Federal Bureau of Investigation's growing inquiry into the Watergate burglaries led to his premature retirement. Schlesinger took his place. Marshall sent his old friend a handwritten letter explaining the problems Schlesinger faced. He offered his belief that Schlesinger was assuming directorship of an institution diminished significantly from its heydays in the 1950s, when CIA employees were imbued with a sense of purpose, worked long hours, and sought help from outside. Analysts now worked routine eight-to-five jobs and seemed uninterested in anyone else's information or knowledge. Marshall began spending Saturdays at CIA headquarters to help Schlesinger wherever he could. Schlesinger aggressively made changes in the organization and operations of the agency, hoping to use the strength of his will and intellect to right the bureaucracy in a manner similar to his performance at the AEC.[152] During Schlesinger's time as DCI, nearly 1,000 employees "were fired, retired, or caused to resign."[153] His tenure, however, ended unexpectedly due to exogenous developments.

Nixon reshuffled his administration as the Watergate scandal deepened and began to attrit political appointees. Elliot Richardson moved from secretary of defense to replace the sitting attorney general, felled by allegations of unethical behavior. On 17 May 1973, Nixon announced his intention to replace Richardson with Schlesinger. By July 1973, Schlesinger, age 44, assumed his new duties as secretary of defense. Soon thereafter, he began regularly calling Marshall to persuade him to help create a net assessment office in the Defense Department. Marshall resisted. He did not know if he wanted to stay in Washington—Mary and the life he had left in Santa Monica beckoned.[154] Nevertheless by mid-August, compelled by loyalty to his friend and a desire

to be of service, Marshall penned a letter to explore what he might usefully do for Schlesinger—specifically to set down ideas on what Schlesinger's long-term goals should be during his tenure.

"We are at the end of an era," wrote Marshall. He described how the Soviets had achieved parity in key areas and rendered moot the early Cold War strategy of leveraging America's superior resources and comfortable technological lead to contain them. In recent years, he said, sapped of its strength by the grinding war in Vietnam, the United States had grown increasingly reluctant to commit the necessary resources to continue this old policy. America needed a new grand strategy, Marshall continued, to address questions concerning its goals and basic defense posture. "Apart from this matter of rethinking our basic strategy and strengthening our institutions and procedures for a continuing long-term competition with the Soviets, we need to play a much more sophisticated game" by emphasizing characteristics and aspects of our forces that impress the Soviets. He asked, "Can we do things in our exercises that provide psychological impact on the key decision makers?"[155]

Marshall's conclusion demonstrates the extraordinary evolution of his thought process since his years as a young, skeptical RAND analyst:

> In addition to all this, I think actions to change our basic framework of analysis should be undertaken. I take it that one of the functions of net assessment, which after all is not that distinctive in terms of methodologies, is precisely to move away from the standard systems analysis and other methods of analysis designed in the '50s. These were developed in a context, especially in the key areas in which they were applied (e.g., strategic forces), of a rich man countering the activities of a poor man. These forms of analysis also have tended to deal with largely fictional opponents. If you don't know something about an opponent, you assume that he doesn't have any problems in that area or, without taking the trouble to really ask how he would fight or what his doctrine and tactics are, you merely mirror image or optimize his use of weaponry, etc. Analysis has been excessively worst-case, even when it nominally is not so. One of the functions of net assessment is to try to compare our forces with the best, most accurate and comprehensive picture we can attain of Soviet or other potential opponent's forces.
>
> In general we need to look for opportunities as well as problems; search for areas of comparative advantage and try to move the competition into these areas; [and] look for ways to complicate the Soviets' problems. A major focus of net assessment should be on these issues, and be used as a way of reorienting defense analysis.[156]

Marshall soon had the opportunity to begin to reorient defense analysis by being emplaced within the belly of the world's largest bureaucracy. Schlesinger negotiated a solution amicable to both Kissinger and Marshall, transferring the small office Marshall had assembled and the responsibility for national net assessment to the DOD.[157] On 18 October 1973, without fanfare, Marshall began his long journey as director of the Office of Net Assessment.[158]

Notes

1. Watts, "Andrew W. Marshall's Project and Work Chronology," 9.
2. Goldberg, *History of the Office of the Secretary of Defense*, vol. 5, 300.
3. Wells, *Wild Man*, 153.
4. Kaplan, *Wizards of Armageddon*, 249–50.
5. May, "RAND Corporation," 448.
6. "Valuable Batch of Brains," 107.
7. Kaplan, *Wizards of Armageddon*, 249–50. Kaplan claims that Daniel Ellsberg, Albert Wohlstetter, Enthoven, Rowen, Hoffman, and Marshall aided the Kennedy campaign. I have found no evidence to substantiate this claim of Marshall's involvement.
8. Watts, "Andrew W. Marshall's Project and Work Chronology," 9. For a description of Marshall taking long vacations to France every few years, see Guthe transcripts, 4-8.
9. In addition to these three, Bill Kaufman (by now an MIT professor) became a close advisor and speechwriter, Dan Ellsberg became a very active assistant in Rowen's international security affairs (ISA) directorate, Bruno Augenstein became assistant director of defense research and intelligence, and Frank Trinkl became an assistant to Enthoven. Though he did not join the new administration, Wohlstetter exerted great influence through a RAND contract with ISA. Frequent advisors included Marshall, Leites, Digby, and Hoffman. See Digby, *Strategic Thought at RAND*, 26.
10. Kaplan, *Wizards of Armageddon*, 250–51.
11. Golderg, *McNamara Ascendancy*, 7.
12. See Hitch and McKean, *Economics of Defense in the Nuclear Age*.
13. Goldberg, *McNamara Ascendancy*, 75–77.
14. Hitch, *Decision Making for Defense*, 23–25.
15. Ibid., 27–37.
16. Goldberg, *McNamara Ascendancy*, 78.
17. Hitch, *Decision Making for Defense*, 39.
18. Goldberg, *McNamara Ascendancy*, 72.
19. Kaplan, *Wizards of Armageddon*, 257.
20. Firth and Noren, *Soviet Defense Spending*, 35–36.
21. Seidel, "Intelligence for Defense Planning," 22–23.
22. Watts, "Andrew W. Marshall's Project and Work Chronology," 9.
23. Andrew Marshall, Joseph Loftus, and George Pugh, *Project Lamp, Systems Analysis and the Military Estimates Process* (Santa Monica, CA: RAND Corp., 1961), 1, as quoted in Firth and Noren, *Soviet Defense Spending*, 36.
24. By the time Project Lamp was completed, Robert Komer had joined Kennedy's NSC. Sherman Kent assumed the directorship of ONE and was outspoken in his critique of alternative projections, stating, "while this would provide more variations to explore, we think the tendency would inevitably be to inject the worst case philosophy into all estimates" (ibid.).
25. Seidel, "Intelligence for Defense Planning," 23.
26. Guthe transcripts, 5-4. The actual name of the McCloy Committee was General Advisory Committee on Arms Control and Disarmament, chaired by elder statesman John McCloy. Marshall was a member of the Consultative Group on War by Accident, Miscalculation or Surprise Attack, hereafter referred to as the Schelling Panel.
27. Schelling Panel to McCloy, memorandum, 86.
28. Ibid., 6, 16.

29. Goldberg, *McNamara Ascendancy*, 147.
30. "Cuban Missile Crisis, 1962: Selected Glossary," JFK Lancer website.
31. Allison, "How It Went Down."
32. Guthe transcripts, 5-5.
33. Rostow to Bundy, memorandum.
34. ISA draft, "Some Lessons from Cuba," 15 November 1962, in Chang and Kornbluh, *Cuban Missile Crisis*, 308–18.
35. See also May, Steinbruner, and Wolfe, *History of the Strategic Arms Competition*, pt. 2, 799.
36. Guthe transcripts, 3-33.
37. Mie Augier, James March, and Andrew Marshall, "Net Assessment and the Pursuit of Novel Ideas," in Augier and Watts, *Essays on Diagnostic Net Assessments*, 227–28.
38. Guthe transcripts, 3-26.
39. March and Simon, *Organizations*, 4, 8–9.
40. Ibid., 4.
41. Cyert, retrospective comment on the book *Behavioral Theory of the Firm* by Cyert and March.
42. Guthe transcripts, 3-26.
43. Cyert and March, *Behavioral Theory of the Firm*, 1–4.
44. Marshall, *Improvement in Intelligence Estimates*, 1. Marshall and Loftus published two research memoranda on Project Sovoy, one in 1962 and another in 1963. Both remain classified.
45. Trachtenberg, *History and Strategy*, 30–31.
46. Duffield, *Power Rules*, 172–73.
47. Digby, *Strategic Thought at RAND*, 27.
48. Watts, "Andrew W. Marshall's Project and Work Chronology," 10.
49. Marshall, author interview, 21 February 2012.
50. Digby, *Strategic Thought at RAND*, 27.
51. Guthe transcripts, 3-28.
52. Duffield, *Power Rules*, 171.
53. Guthe transcripts, 5-6.
54. Marshall, *Determinants of NATO Force Posture*, 4.
55. May, "RAND Corporation," 8.
56. Ghamari-Tabrizi, *Worlds of Herman Kahn*, 307–8.
57. Abella, *Soldiers of Reason*, 196.
58. Guthe transcripts, 3-44.
59. Marshall, author interview, 10 November 2011; and Guthe transcripts, 3-29.
60. Watts, "Andrew W. Marshall's Project and Work Chronology," 10.
61. Marshall would later recall that he was "probably Schlesinger's closest friend at RAND. Actually, my wife and I spent a lot of time at their house with them." See Marshall, Goldberg and Matloff interview, 18.
62. Guthe transcripts, 3-28.
63. After his year at RAND, John "Pat" Crecine returned to the University of Michigan and established the first graduate program in public policy. He went on to serve as the ninth president of the Georgia Institute of Technology.
64. Harvard Business School, "C. Roland (Chris) Christensen."
65. Guthe transcripts, 3-28–3-29.
66. Allison, "Three Bright Threads."
67. Neustadt and May, *Thinking in Time*, xx. The group's formal title was the Institute of Politics Faculty Study Group on Bureaucracy, Policy, and Politics (ibid.). In leadership, locus, and

funding, the institute played an important role in what emerged in 1969 as the new John F. Kennedy School of Government's Public Policy Program. See Allison, "Three Bright Threads," 9.

68. In 1966 members of the group included Neustadt, May, Marshall, Morton Halperin, Fred Ikle, Kaufmann, Don Price, Rowen, and Allison. See Allison and Zelikow, *Essence of Decision*, xiii.

69. Allison, author interview.

70. Helms with Hood, *Look over My Shoulder*, 451–52.

71. Garthoff, *Directors of Central Intelligence*, 44–45.

72. Helms with Hood, *Look over My Shoulder*, 327.

73. Guthe transcripts, 5-6.

74. Abella, *Soldiers of Reason*, 201.

75. Marshall, *Cost/Benefit Analysis in Health*, 1.

76. Marshall, *Problems of Estimating Military Power*, 2, 9, 17.

77. Marshall and Winter, "Program of Studies in the Analysis of Organizational Behavior," 1–4.

78. Ermarth, author interview.

79. Allison, "Conceptual Models and the Cuban Missile Crisis."

80. Allison's work was originally published in 1971. He partnered with Philip Zelikow in 1999 to produce a revised version. Allison and Zelikow, *Essence of Decision*, 4–5.

81. Allison, author interview.

82. These propositions were part of an unpublished paper written by Marshall and quoted in Allison and Halperin, "Bureaucratic Politics," 71–72.

83. Marshall, *Improvement in Intelligence Estimates*, 89.

84. Allison, author interview.

85. Crozier, *Bureaucratic Phenomenon*, 8.

86. Guthe transcripts, 10-4–10-5.

87. Watts, "Andrew W. Marshall's Project and Work Chronology," 12.

88. May, "Early History of Intellectual Themes," 10.

89. Marshall, author interview, 11 November 2011.

90. Guthe transcripts, 3-29–3-30.

91. Abella, *Soldiers of Reason*, 202–4.

92. May, "RAND Corporation."

93. Marshall, author interview, 10 November 2011.

94. Guthe transcripts, 12-1–12-2.

95. Marshall, author interview, 10 November 2011; and Guthe transcripts, 3-31.

96. Guthe transcripts, 3-31.

97. Marshall, *Long-Term Competition with the Soviets*, iii–vii.

98. May, "Early History of Intellectual Themes," 14–15.

99. Guthe transcripts, 12-2.

100. Schlesinger, *Selected Papers on National Security*, 106.

101. Marshall, Goldberg and Matloff interview, 7–8.

102. Marshall, *Long-Term Competition with the Soviets*, ix–x.

103. Rosenburg, "Origins of Overkill," 31–32.

104. Skypek, "Evaluating Military Balances," 10. For a sample of an NESC report, see the now declassified Staff of the Net Evaluation Subcommittee of the National Security Council, "A Study of the Management and Termination of War with the Soviet Union," 15 November 1963, http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB31/05-01.htm.

105. Marshall, memorandum for record, 26 April 1972, 1.

106. Skypek, "Evaluating Military Balances," 11–12.
107. Watts, "Framing Good Net Assessments," 389.
108. Guthe transcripts, 3-30.
109. Writing in 1971, Marshall acknowledged that "net assessment is not a strictly defined term. It connotes a comparison of military capabilities, usually of whole forces or programs. As such it involves more complex comparisons than are usually made," including "political and economic factors that may influence the outcome of potential conflict." See Marshall, "Comparisons, R&D Strategy, and Policy Issues," 1.
110. May, "Early History of Intellectual Themes," 17.
111. Marshall, "Comparisons, R&D Strategy, and Policy Issues," 22–23.
112. May, "Early History of Intellectual Themes," 18.
113. Marshall, "Comparisons, R&D Strategy, and Policy Issues," 15–16.
114. Guthe transcripts, 5-9–5-10.
115. Ibid., 5-10.
116. Kissinger, *White House Years*, 1180–81.
117. Marshall, Goldberg and Matloff interview, 12.
118. Watts, "Framing Good Net Assessments," 5.
119. Guthe transcripts, 5-10–5-14.
120. Ibid., 5-12.
121. Helms with Hood, *Look over My Shoulder*, 382.
122. Isaacson, *Kissinger*, 152.
123. Helms with Hood, *Look over My Shoulder*, 382.
124. Isaacson, *Kissinger*, 155.
125. Marshall to Kissinger, memorandum, 18 March 1970.
126. Helms with Hood, *Look over My Shoulder*, 385.
127. Director of Central Intelligence, *Soviet Forces for Intercontinental Attack*, 16.
128. Watts, "Framing Good Assessments," 5.
129. "OCLC's Presidents: Dr. K. Wayne Smith," OCLC [Online Computer Library Center].
130. Guthe transcripts, 5-14.
131. Watts, "Framing Good Assessments," 6.
132. Marshall, "Net Assessment of US and Soviet Force Posture," in Watts, "Net Assessment Sourcebook," 30.
133. Guthe transcripts, 5-16. The Bureau of Budget was renamed the Office of Management and Budget in 1970.
134. Warner and McDonald, *US Intelligence Community Reform Studies*, 23.
135. Guthe transcripts, 5-16.
136. Marshall to Kissinger, memorandum, 1 May 1970.
137. Smith to Kissinger, memorandum.
138. Warner and McDonald, *US Intelligence Community Reform Studies*, 23.
139. Walker, *Three Mile Island*, 30.
140. Guthe transcripts, 5-16–5-17.
141. Blue Ribbon Defense Panel, Report to the President.
142. Nixon to secretary of state et al., memorandum.
143. "Narrative History of Creation of OSD/NA [Office of Net Assessments]," in May, "Early History of Intellectual Themes," app. A.
144. Guthe transcripts, 5-21–5-23. For a biographical sketch of Pickett, see "Senior Advisors: George 'Chip' Pickett."

145. Guthe transcripts, 5-23–5-24.
146. Marshall, author interview, 11 November 2012.
147. "Minutes of Secretary of Defense Laird's Staff Meeting."
148. The governing directive was Department of Defense Directive (DODD) 5105.39, Director of Net Assessment, 6 December 1971. For a description of this bureaucratic stalemate, see Watts, "Framing Good Net Assessments," 9.
149. Marshall, memorandum for record, 26 April 1972, 2.
150. Ibid., 3, 6.
151. Marshall to Kissinger, memorandum, 30 June 1972.
152. Guthe transcripts, 5-31–5-33.
153. Helms with Hood, Look over My Shoulder, 424–25.
154. Guthe transcripts, 5-30.
155. Marshall to Schlesinger, memorandum, 20 August 1973, 1–2, 4.
156. Ibid., 5.
157. Guthe transcripts, 5-30.
158. Marshall to Schlesinger, memorandum, 13 October 1973.

Epilogue

The magic of mornings at the Pentagon is real but fleeting. In the short space of an hour, nearly 23,000 workers converge—each charged with the promise of a new day. The sheer potential of their energy brings the world's largest low-rise office building to life. Juxtaposed against this sense of agency is the loneliness individuals feel while making their way to their workplace. Numbness from swimming in a sea of anonymity comingles with a sense of purpose and pride; the scale and grandeur of the limestone building and the enterprise it symbolizes affect everyone. During this liminal period, rank and bureaucratic stature are muted. For a brief moment the soulless monotony and relentless demands are mercifully still. It is easy to imagine that even the lowliest clerical worker feels energized by the heady ideal of furthering America's defense.

Within this sea of faceless employees, Andrew Marshall, now elderly, makes his way to a nondescript suite of offices. As he has on nearly every workday for the past 39 years, he keys in the entry code for room 3A932. Unlike those around him energized by quotidian concerns, this nonagenarian's still-vibrant mind focuses unremittingly on the future. Ironically, while unrecognizable to most, he may hold greater potential to influence defense leaders' understanding of the security environment than the aggregated contributions of the masses of workers shuffling past him. Marshall has demonstrated an uncanny ability to help change the way senior leaders in defense frame problems and anticipate the evolving strategic environment.

All biography begins at the end, yet Marshall is still writing his final chapter. Only time will permit a full and measured assessment of his life and influence. Yet Marshall's rich experiences prior to the establishment of the Office of Net Assessment (ONA) are instructive. A first-generation American, Marshall was profoundly affected by the formative experiences of his time—from the privation of the Great Depression to the immense sacrifice of the Second World War and, finally, to the challenge of living under the existential threat of nuclear annihilation during the Cold War. Marshall manifested an early and abiding empirical pragmatism, informed greatly by his reflexively multidisciplinary outlook.

Marshall's career at RAND began serendipitously in the wilderness of the social sciences division in Washington, DC. The friendships and perspectives gained from this experience allowed him to form a multidisciplinary understanding that evolved significantly over the next quarter century. Marshall combined an economist's sensibility of the way macroeconomic constraints

affect behavior and a statistician's sensitivity to privileging data over models. This empiricism led him eventually to envision behavior as an aggregate of resource-constrained decisions bounded by the forces of uncertainty, primordial irrationality, history, organizations, and politics. The evolution of this understanding took decades.

After joining the federal service, Marshall went nearly 30 years without taking a vacation. He felt his work too important—and too enjoyable—to continue his tradition of long sabbaticals in Europe. Nevertheless, Marshall never intended to stay more than a few years in his position as director of the ONA. He and Mary left their home in Los Angeles intact, with their furniture and paintings unmoved and their wine cellar stocked with bottles of California's finest wines. They left their private possessions in the care of a friend who acted as a house sitter, charged only with the responsibility of keeping the house in good order for the couple's inevitable return. Rather than purchasing a second set of furniture in Washington, they rented it. Only after Mary's death in 2004 did Marshall concede he would not return by selling the house and moving some of his favorite pictures to his small Washington apartment.[1] This impermanence, coupled with financial security born of a full career at RAND and a childless marriage, freed Marshall to act without concern for his own political survival.

Many of Marshall's closest friends over the years—Herman Kahn, Joseph Loftus, James Schlesinger—were strong-willed, opinionated, and even bombastic at times. Marshall, by contrast, was introverted and seldom focused on self-promotion. The common thread of these friendships is the contrarian view they took to accepted paradigms. Marshall was a partisan for critical thinking about the evidence through different perspectives without getting trapped in ideological debates.[2] Marshall's work inside the belly of the bureaucracy over the last four decades continues this pattern. He has often surrounded himself with boisterous personalities willing to challenge conventional views.

As Marshall had predicted, the practice of net assessment evolved during its first few iterations in the middle 1970s. Yet the ideas he adumbrated in April 1972 have proven remarkably durable. Today, the term *net assessment* is officially defined as "the comparative analysis of military, technological, political, economic, and other factors governing the relative military capability of nations" in order to "identify problems and opportunities that deserve the attention of senior defense officials."[3] As those who have attempted to practice this methodology attest, however, net assessment is impossible to reduce to any formulaic codification.[4] "Eclectic, holistic, and synthetic in nature," this

style of thinking is "remarkably divergent from the logical-analytic approach of mainstream American strategic culture."[5]

As Barry Watts describes, Marshall is reticent to help even members of his own staff understand what net assessment is. This unwillingness to foist his opinion on others reflects his own transformative experiences at RAND—the long journey from scientific certitude to acceptance of the vagaries of human competition. Pedagogically, Marshall believes that allowing others to work out *how* to do a net assessment is preferable to him trying to explain it to them. His mentorship is not pedantic but that of a shepherd guiding others' intellectual growth to help them arrive at their own conclusions through an intensive process.[6] Meeting Marshall's exacting standards for a balance can take years; he has long maintained that the process of completing a responsible net assessment is intellectually comparable to writing a doctoral dissertation.[7] But for those who persevere and graduate from Marshall's unique school of thinking, the strategic perspective they gain is well worth their sacrifice.

Marshall's longevity is partially attributable to this network of alumni—loyal graduates of St. Andrew's Prep. In recent years, several of these acolytes have attempted to spread the gospel of St. Andrew by teaching graduate-level courses on net assessment in Washington-area universities' strategic studies programs. Arguably, as evidenced by their formative experiences in the ONA, one cannot teach the highly idiosyncratic and contextual process of net assessment. It must be learned experientially. While their efforts have raised awareness of the process of net assessment within strategic studies programs, the question remains whether net assessment is an idiosyncratic reflection of Marshall or a practice capable of surviving the bureaucracy's virulent rejection of contrarian views.

Marshall became a builder of both epistemic communities and much of the intellectual architecture undergirding the Cold War.[8] Yet remarkably few know of him. Even fewer understand the scope of his contributions. Perhaps the gravest risk is that Marshall may pass into history little understood and grossly caricatured. This paper attempted to add texture and context to his life prior to the establishment of the ONA. Had it ended in October 1973, Marshall's career would have been successful by any measure. But it did not end then. In important ways for Marshall and for America, his career was just beginning. Marshall's office, with a small staff and relatively miniscule budget, went on to conceive and bureaucratically midwife strategic frameworks such as the Competitive Strategies Initiative, the revolution in military affairs, and, most recently, antiaccess/area denial.

In short, Marshall was an important architect of the intellectual frameworks undergirding America's strategy in the Cold War and beyond. This

story remains less well documented than the one just shared and clearly warrants a telling. Two specific constraints, however, complicate this worthy task. First, the sheer quantity of information that the ONA has handled over the past four decades is daunting. Early on, Marshall secured a budget to allow him to outsource intellectual expertise, which he did prodigiously. A recent Freedom of Information Act (FOIA) request surfaced a list of studies conducted between 1987 and 2008. The FOIA listing for 2008 alone is 101 titles.[9] Simply wading through this deluge of information would be difficult enough were it not for the second, and related, issue of classification. Unlike work from Marshall's early years at RAND, largely declassified through the intrepid efforts of Watts and Andrew May, Marshall's work in the ONA remains highly classified. For those who do not have access, the process and product of the net assessment are as opaque as the Soviet adversary this old Cold Warrior so long opposed. Despite these constraints, capturing the remainder of this masterful strategist's story is a worthy endeavor. History should not forget the contributions of a man who gave so much, for so long, to America's defense.

Notes

1. Marshall, author interview, 10 November 2011; and Watts, author interview.
2. Ermarth, author interview.
3. Department of Defense Directive 5111.11, *Director of Net Assessment*, 1.
4. Barry Watts, "Scientific Methods and Net Assessment," in Augier and Watts, *Essays on Diagnostic Net Assessment*, 301.
5. Adamsky, *Culture of Military Innovation*, 90.
6. In describing his early notion of net assessments, Marshall conceded that "net assessment in the sense we propose is not an easy task. The single most productive resource that can be brought to bear in making net assessments is sustained hard intellectual effort." See Marshall, memorandum for record, 16 August 1972, 2.
7. Watts, "Scientific Methods and Net Assessment," in Augier and Watts, *Essays on Diagnostic Net Assessment*, 301–11.
8. Ermarth, author interview.
9. Augier and Watts, *Essays on Diagnostic Net Assessment*, 7.

Abbreviations

AAF	Army Air Forces
AEC	Atomic Energy Commission
AFSA	Armed Forces Security Agency
ATC	Air Transport Command
BOB	Bureau of the Budget
CAS	close air support
CIA	Central Intelligence Agency
COMINT	communications intelligence
DCI	director of central intelligence
DOD	Department of Defense
FOIA	Freedom of Information Act
GNP	gross national product
HBS	Harvard Business School
ICBM	intercontinental ballistic missile
ISA	international security affairs
JROTC	Junior Reserve Officer Training Corps
LTC	long-term competition
MIRV	multiple independently targeted reentry vehicle
NAG	net assessment group
NATO	North Atlantic Treaty Organization
NESC	Net Evaluation Subcommittee
NICIC	National Intelligence Council Intelligence Committee
NIE	National Intelligence Estimate
NIPE	National Intelligence Programs Evaluation
NSA	National Security Agency
NSC	National Security Council
OMB	Office of Management and Budget
ONA	Office of Net Assessment
ONE	Office of National Estimates
OR	operations research

OSD	Office of the Secretary of Defense
OSS	Office of Strategic Services
PDB	President's Daily Brief
PPBS	Planning, Programming, and Budgeting System
PT	patrol torpedo
R&D	research and development
RAND	Research and Development (Corporation)
RMA	revolution in military affairs
SAC	Strategic Air Command
SAIC	Science Applications International Corporation
SALT	Strategic Arms Limitation Talks
SAW	Strategic Air War
SIGINT	signals intelligence
SOC	Strategic Objectives Committee
SRG	Statistical Research Group
TK	Talent-Keyhole
UCLA	University of California, Los Angeles
USAFE	US Air Forces in Europe

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