THE INFLUENCE OF ORGANIZATIONAL CULTURE ON THE ACQUISITION OF THE M16 RIFLE

A thesis presented to the Faculty of the US Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE
Military History

by

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Fort Leavenworth, Kansas
2006

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
15-12-2006	Master's Thesis	Feb 200 - Dec 2006

4. TITLE AND SUBTITLE

The Influence of Organizational Culture on the Acquisition of the M16 Rifle

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Kern, Danford A., MAJ, AV

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army Command and General Staff College
ATTN: ATZL-SWD-GD
1 Reynolds Ave.
Ft. Leavenworth, KS 66027-1352

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT The US Army has a history of constant evolution and transformation. At times the transformation was ordered and efficient, and at other times it has been an example of chaos. The effective modern leader charged with transformation of an organization must be an active manager of a learning organization, who is capable of interpreting the lessons of the past. The M16 acquisition program that occurred from 1958 to 1968 serves as a valuable case study of Army transformation during a time of war. It demonstrates the interrelationship of economic, military, and political organizational cultures in a dynamic system. Moreover, the M16 acquisition program highlights the influence of tradition on transformation efforts. By analyzing the organizational cultures and their influence on each other, this research proposes that there are both positive and negative effects caused by the interrelationship of cultures. It demonstrates that the various political and economic aspects of organizations as well as their traditions greatly influence the course that transformation will take.

15. SUBJECT TERMS
M16, AR-15, Culture, Rifle, Acquisition, Vietnam, McNamara, Armalite, Colt, Ordinance

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**		124	**19b. TELEPHONE NUMBER** *(include area code)*
Unclassified	Unclassified	Unclassified	UU		

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

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

ABSTRACT

THE INFLUENCE OF ORGANIZATIONAL CULTURE ON THE ACQUISITION OF THE M16 RIFLE, by MAJ Danford Allan Kern, 124 pages.

The US Army has a history of constant evolution and transformation. At times the transformation was ordered and efficient and at other times it has been an example of chaos. The effective modern leader charged with transformation of an organization must be an active manager of a learning organization, who is capable of interpreting the lessons of the past. The M16 acquisition program that occurred from 1958 to 1968 serves as a valuable case study of Army transformation during a time of war. It demonstrates the interrelationship of economic, military, and political organizational cultures in a dynamic system. Moreover, the M16 acquisition program highlights the influence of tradition on transformation efforts. By analyzing the organizational cultures and their influence on each other this research proposes that there are both positive and negative effects caused by the interrelationship of cultures. It demonstrates that the various political and economic aspects of organizations as well as their traditions greatly influence the course that transformation will take. This research points to the importance of understanding organizational cultures within the system when leading that system through change.

ACKNOWLEDGMENTS

Thanks to the entire History Department of the US Army Command and General Staff College (CGSC) for their untiring support, guidance and advice throughout the research and completion of this thesis. Special thanks to my committee chairperson, Dr. Deborah Kidwell, whose skills as a historian and educator have been a model for me. Additional thanks to all of the personnel supporting the Graduate Degree Programs of the CGSC whose help made this paper possible.

Finally, special thanks to my wife and son who supported me throughout the entire process by giving me time to work and by providing the quality time with them when I needed a break from writing.

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ACRONYMS

ARPA	Advanced Research Projects Agency
BAR	Browning Automatic Rifle
CDC	Combat Developments Command
CDCEC	Combat Development Command Experimentation Center
CONARC	Continental Army Command
DOD	Department of Defense
FPAO	Force Planning and Analysis Office
FY	Fiscal Year
HVSC	High Velocity Small Caliber
IMR	Improved Military Rifle (smokeless powder type)
NATO	North Atlantic Treaty Organization
NRA	National Rifle Association
ORO	Operations Research Office
OSD	Office of Secretary of Defense
SAWS	Small Arms Weapons Systems
SPIW	Special Purpose Individual Weapon

CHAPTER 1

INTRODUCTION

> In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex.
>
> President Dwight D. Eisenhower, Farewell Address, 17 January 1961

From the end of the Korean War through the 1960s, the US Army experienced transformational change. The transformation involved such aspects as funding, organization, and organizational philosophy. The Army came face to face with challenges to its established culture and responded to those challenges in various ways. The final result of the conflict in many respects was an enduring change in culture. The acquisition program of the M16 rifle during this era serves as an outstanding case study for transformational change occurring during the period. It illustrates how dissolution of organizations, changes in policy, creation of new organizations, and most importantly changes in leadership can dramatically influence organizational culture and the programs they produce. Close analysis of the interplay between various cultures involved in the M16 acquisition program provides insight into the importance of understanding cultural conflict during periods of change. Before delving into the history of the M16 Rifle program there must be a framework established for analyzing the historical organizational cultures involved.

Framework of Analysis

Contemporary analysis of leadership and management during periods of change provides a framework within which to analyze cultural conflict and its dynamic results.

Change is, and always has been, a part of life. Due to the human dimension, change often comes with the downside of conflict. How leaders and their subordinates face change and the resulting conflicts plays a significant role in the success or failure of their organizations. Leaders of large organizations must deal with a very complex environment involving numerous subsystems.

The US military is one such complex system. A complex system is defined as a system consisting of subsystems which interact and influence each other. The military's management consists of a structure of systems which interact to provide a service to the nation. The complex system concept is just the first step in understanding the interplay of organizational culture. The next step is to understand the cultural differences that occur and this requires a solid definition of culture. When analyzing conflict between cultures, several definitions become paramount. Culture consists of the behavioral norms and shared values of a certain group of people. These shared values consist of common member concerns, goals, and objectives that influence group behavior. Behavioral norms, then, are common behavioral patterns found within a group. Both behavioral norms and shared group values often persist over time even though the members may change. John P. Kotter, a leadership and management expert, observed that, "Culture is important because it can powerfully influence human behavior, because it can be difficult to change, and because its near invisibility makes it hard to address directly."[1] Kotter's statement illustrates the difficulty in forcasting the influence of culture on a system.

It is often the role of the historian to look at the influence and interplay of various cultures because of their near invisibility. Sound analysis of culture, however, goes

beyond this basic definition. It requires an understanding of cultural subcomponents. Two significant components of culture are the agent and strategic focus.

An agent interacts with its environment, to include other agents, while strategy guides selections. For the purposes of this research, the agents are people influencing the M16 acquisition process through their decisions and actions. In addition, strategy, defined as, "the way an agent responds to its surroundings and pursues its goals."[2] is key. A group of agents comprise a population, which often uses objective measures of success to determine how well their strategies are applied. Complex systems like the US military often shift courses by changing their agents or strategies.

The interplay of numerous agents and their strategies can result in the adaptation of several cultures and eventually produce positive results. Because the M16 acquisition program encompasses many different populations with specific subcultures, the result is a co-evolutionary process. The co-evolutionary process causes cultural shifts which either result in improved performance, or failure. Because the M16 rifle has been the longest serving rifle in American military history, the result of the co-evolutionary process was favorable, although the process of this evolution was replete with conflict between systems and cultures whose goals and values were not always compatible.

Why Cultures Form

Members of large organizations often develop behavior patterns and belief systems that are unique to their organization. These patterns of behavior and ways of thinking are fostered by leadership and systems within the organization to facilitate cohesive, efficient and effective completion of the organization's missions and tasks. This dynamic occurs in any large group of people tasked with accomplishing common

goals. If an organization lacks a perceived need for change, it maintains static procedures and systems which over time become aspects of that organization's culture. When the systems become entrenched there is a psychological aversion to change by the members of the organization absent a coherent, logical reason for change. Reinforcement of these entrenched group behavioral patterns includes incentive programs, information systems, and interpersonal relations. When organizations with varied cultural identities work together to accomplish an objective the potential exists for conflict. Just such a conflict occurred in the 1960s over the acquisition of a controversial weapons system, the M16.

Methodology of Analysis

There are four significant issues that set the ground work for the analysis of how the conflict of organizational culture influenced the acquisition of the M16 rifle and the organizations themselves. The first issue is to identify the patterns of behavior and the reasons for those patterns among the economic, traditionalist and political influences associated with the M16 program. This is important as it establishes a baseline that defines each subculture prior to the changes that occured during the M16 acquisition process. The second issue is to study the interaction between the organizations. Study of the interaction identifies points of conflict and their results. With defined points of friction and their outcomes it becomes possible to address the third issue, the long term influence upon the program. Analysis of the developmental milestones in the acquisition process and identification of the organizations that influenced the outcomes of each milestone identifies the dominant culture and its influence upon the outcome. The fourth issue relates to the long term influence of conflict upon the cultures involved. The M16

acquisition process demonstrated how the interaction and clash of cultures resulted in evolutionary progress that would have never happened had the conflict not occurred.

Background

The M16 rifle program spawned in an era of significant military change. As a result of changing security strategy and active foreign policy, the Department of Defense (DOD) and the military services reacted to significant changes in scope of mission, doctrine, and funding. Post-World War II military strategy centered on understanding how to cope with the most recent military revolution, the advent and use of nuclear weapons.[3]

In 1961, retiring President Dwight D. Eisenhower spoke prophetically when he warned the nation to beware the growth and control of the military industrial complex.[4] Analysis of the environment that existed when President Eisenhower made this statement reveals much about the selection of the M16. Eventual selection of the rifle influenced the way American soldiers fought for the next half century. The organizations involved in the acquisition process had significant differences in their subcultures. The Ordinance Department, Infantry Branch, arms manufacturers, defense civilian leadership and Congress all had different views of the same problem. Within the Department of Defense, the purpose and requirements of an individual's rifle varied among the services. Several subcultures had significant positive and negative influence on the design and development of the M16. This research documents the influence of cultural beliefs and how critical analysis and analytical processes were introduced to the process. Where science and statistical evidence should have had precedence, emotion often influenced

more. The history of the M16 is one of failure, frustration, and eventually unexpected triumph.

Though President Dwight D. Eisenhower felt that alliances and nuclear arms would lead to a more peaceful world and a decrease in the need for large armies, the reality of the era was different. The Army of the 1950s and early 1960s was faced with an uncertain future and significant change. In 1953, the Korean conflict ended in a stalemate after significant investment of national treasure. North Korea remained communist and South Korea dependent on other nations for her defense.[5] In 1954, the Geneva accords divided Vietnam at the 17th parallel and allowed for a communist North Vietnam.[6] The Suez crisis and Soviet intervention in Hungary demonstrated in 1956 that the world was uncertain and had many actors vying for position on the international stage who would act regardless of the threat of nuclear war[7]. The Berlin crisis of 1958 and the downing of pilot Francis Gary Powers and his U2 spy plane over Soviet territory in 1960 continued the chill of the cold war and made the world seem much more dangerous.[8] The US Army found itself in a race with the Soviets to have better trained and equipped soldiers and realized that those soldiers were not obsolete in the nuclear world. During that race came the need to modernize and the M16 was seen as a radical step towards modernizing the American soldier. At the most fundamental level, the rifle a soldier carried into battle demonstrated the capabilities and capacity of his nation to mobilize for and fight the wars of his country.

The late 1950s and decade of the 60s were also a period of significant change to American society and the military that was sworn to protect it. The era is defined by many historians as a period characterized by social and military conflict. As society

transformed its ideals so did the US Armed Forces. The American people began to take a critical look at their military and question the reasons behind their actions. Beyond the social accountability for actions there became greater political and financial accountability. As with any transformation, there were those who strived for and thrived in change, and there were those averse to it. The conflict that resulted demonstrated the cultural differences and institutional behavior influencing the decision processes of our armed forces. The conflict between civilian leadership of the armed forces and the military culture was problematic but served as a machine of change. Through the conflict of the varying participants involved in the M16 acquisition process there evolved what became the accepted standard for military small arms throughout the world.

Near the end of World War II, the US Army began looking for one rifle to replace the many small arms in their inventory. Their request was for the development of a rifle that weighed not more than 7 lbs. and fired the then experimental 7.62 (.308 Winchester) cartridge. The rifle was to replace the M1 rifle, Browning Automatic Rifle (BAR) and existing sniper weapons. The Army later added the requirement for the rifle to replace the .30 carbine and several submachine guns in service at the time. Requirements of the design included the capability of bayonet warfare, the launching of anti-tank grenades and ability to fire both semi-automatic and automatic. The request to a layman was considered ambitious; to an expert it was impossible.[9] The resulting M14 rifle was an attempted compromise.

At the same time work was being conducted in the development of the M14, the Army Ordinance Department conducted an investigation in the 1950s that layed the foundation for future changes. The investigation looked into the feasibility of High

Velocity Small Caliber (HVSC) cartridges. It led to additional testing by the US Army Infantry Board in 1956 that evaluated a high velocity .22 caliber cartridge.[10] The Infantry Board concluded the Army should continue research and development on the concept. They reported that a high priority should be placed on the development of the cartridge as well as a lightweight rifle to fire it. Though the concept originated within Army structure, a civilian company eventually developed a suitable rifle to fire an HVSC cartridge. The Army remained focused on the M14.

The concurrent development of the M14 made evident a growing trend of reliance on manufacturers and civilian contracts than with the Army's own ordinance personnel at Springfield Army Depot. That trend became more pronounced over time; however, there was a prevalent attitude among the administrators that the principle purpose of Springfield Depot was production and manufacturing rather than research and development.[11] The quest for a replacement to the M1 was problematic; the move from the M14 to the M16 was even worse and required visionary problem solvers. One of those was Mr. Eugene Stoner

Stoner, a small arms designer working for ArmaLite, helped design and develop the M16 rifle. Stoner was a forward thinker who saw the application of new technologies and innovative ideas as the answer to many of the problems inherent in the development of the M14. Though not the originator of all of the innovations that became the M16, he was the talent that refined them and made them work.[12] In many respects Mr. Stoner represented what the Ordinance Department should have been. His prototype, the AR-15, was also a rifle designed around the .223 caliber cartridge which was classified as an HVSC round.

While the early stages of the M14 had little input from the administrators of Springfield Army Depot, it eventually evolved into a rational rifle program that they defended in the face of overwhelming evidence against it. The M14 came to represent the tried and true ways of the past. It represented the thinking of a subculture that had grown from the days of America's struggle for independence and placed a high value on marksmanship. Infantry leaders identified with the concept of the marksman. The accurate hunting rifles of the colonial militias had fired the shots heard around the world. It was a subculture that saw accurate, long range marksmen as a sign of discipline and martial prowess even though historical fact had demonstrated otherwise.[13]

Both the M14 and M16 were to be interim weapons pending the development of the Special Purpose Individual Weapon (SPIW). SPIW was a program that sought to develop a weapon that fired multiple projectiles at the same time, thereby enhancing the likelihood of striking the target and potentially increasing lethality[14]. This concept was counter to the established tradition of marksmanship and produced concepts that would became the genesis of the M16 program as well as the conflict surrounding that program.

Cultural Conflict

The key organizational cultures that influenced the acquisition of the M16 rifle included the US Army, US Air Force, weapons manufacturers ArmaLite and Colt, the US Congress, and Secretary of Defense Robert McNamara. Subcultures also existed within the US Army which held differing views and stakes in the M16 program. The major Army subcultures included the Ordinance Department, Infantry Branch, and Department of the Army senior leadership. One of the more significant subcultures that existed after the issuing of the rifle to troops in Vietnam was the culture of the combat soldier, a voice

the politicians and acquisition officers eventually responded to. The greatest number of conflicts resulted from cultural differences between the Army Ordinance Department and the other previously mentioned organizational cultures. The Ordinance Department, like the Infantry Board, held fast to a marksmanship tradition that had long been a myth of American military culture. Additionally, they were bound by an internal culture of thrift forged from economic constraints they had faced throughout their existence. The culture of thrift limited their abilities during transformational change. Finally, their desire to be the focal point of small arms research and development resulted in opposition to outside innovation.

Marksman Tradition

The US Army has long identified with the concept of marksmanship. From its birth in the American war for independence through the Korean War, the US Army strived to produce a soldier capable of exceptional marksmanship and resourced with a capable rifle. The attitude of the military was not a significant departure from civilian society that identified with and romanticized the frontier spirit in such personalities as Annie Oakley, Daniel Boone, David Bowie, and Wild Bill Hickock. The early settlers that pioneered American western expansion relied on their rifles to feed and protect their families. When cavalry soldiers patrolled the open prairie, they were trained with the understanding that well-placed, long range shots provided them the advantage that allowed them to dominate the battles they found themselves in. This thinking resulted in the development of such nineteenth- and twentieth-century rifles as the Krag-Jorgensen, the M1903 Springfield, the M1 Garand, and the M14 rifles.

With the development of the Krag-Jorgensen, the Army experienced significant debate over the decision to move from a large, 45 caliber rifle to a 30 caliber rifle. The marksmanship tradition was central to the debate over weapon caliber. Army leadership believed that a larger caliber had greater lethality at long ranges and was less affected by wind. Only after significant demonstration of effectiveness did the Army accept the .30 caliber bullet. This .30 caliber round proved to be the standard rifle bullet diameter for the next three quarters of a century. The standardization of the .30 caliber 7.62 NATO round in 1958 silenced many of the proponents for a smaller caliber rifle round that began voicing their opinions in the 1950s. Military leaders that formed their cultural beliefs and patterns of behavior on the battlefields and in the machine shops of World War II had little reason to feel that there was need for significant departure from the tried and true.

Veterans of World War II praised the main battle rifle that infantrymen carried. The M1 Garand rifle was the first semi-automatic rifle in the world to be issued as the basic rifle of a nation's army. Though praise for the M1 was significant, veterans voiced two drawbacks regarding the weapon. The M1 was heavy, and its 8 round clip and semi-auto only capability lacked firepower when compared to light machine guns and sub-machine guns. Requirements for the next generation rifle to replace the M1 addressed these two deficiencies. The goal was eventually to produce a lightweight rifle, capable of holding more rounds and possessing the ability to fire fully automatic. Additionally, there was a desire for the next rifle to attain these goals without degradation in the weapon's capabilities or lethality.

One of the problems with development of small arms was that the historical trend painted the process as slow and methodical. Any change that marked significant departure from the norm was viewed with skepticism. Significant departures from the norm rarely happened at a rapid pace and seldom did numerous technological advances become combined into one rifle development program. Often the development of small arms in American military history followed a gradual process where small improvements were made to existing rifles or designs. Manufacturers used steel and wood as the primary building blocks of military rifles produced by ordinance depots from 1794 to 1963. The M16 program represented a significant departure from these established elements of continuity.

Catalyst of Change

It is interesting to note that prior to 1962 there was a significant level of support for the HVSC concept and development of a rifle that would fire an HVSC round. After President John F. Kennedy selected Robert S. McNamara as Secretary of Defense in 1961 there was a coinciding shift in acceptance of the HVSC concept by leaders from both the Infantry Board and the Ordinance Department. Ordinance Department leadership did not receive well McNamara's hands-on leadership style and the business practices he brought to the defense acquisition process. Many viewed him as a threat to the institutional identity that had long developed in the Armory subculture. In fact, McNamara was a vocal opponent of the Armory's system of business and it became one of his transformations to rely heavily on industry contract and competition, rather than the previous armory system. With a defense leader critical of the established procedures and programs that resulted from years of effort and development, it is not hard to imagine

how emotional, organizational conflict influenced important decisions. Military organizations were, by their very nature, tradition bound. They clung to established policies and procedures with the fallacy that one need not change a process that has historically worked. Additionally, such large organizations required the coordination of vast resources of men and material, and preferred to rely on maintenance of tradition to motivate and coordinate. It was paramount to counter culture to challenge tradition in the military. When members of an organization became consumed by their culture they were often blinded to changes that could improve effectiveness and efficiency, merely because their paradigm did not allow them to view change from the correct mindset. Secretary McNamara forced the system to see its inherent inefficiencies and organizations did not appreciate what they saw. As a result, some of the organizations pushed back in the hopes that they would outlast the political appointee and continue with the status quo. After McNamara halted M14 production, the Army conducted an additional test program designed to identify the immediate requirements for the infantry, particularly as the Army became more deeply involved in Vietnam. Called the Small Arms Weapons Systems (SAWS) project, it eventually strongly recommended the AR-15, which upon standardization became the M16.

The era of the M16 acquisition program was characterized by two significant changes. The late 1950s and early 1960s saw a shift in thinking about how riflemen fought in combat. Additionally, there was a significant change in how weapons development and acquisition was organized and resourced. With that change, there was a change in leadership and priorities. The motivation for this change was multifaceted, but the key factor that caused it was the leadership of Secretary of Defense Robert

McNamara. He brought to the position a keen interest in changing tradition-bound systems to make the DOD acquisition and logistical processes more effective and efficient. Central to his thinking was an analytical approach to problem solving. One of the personality traits that made him successful but also earned him enemies was a desire to know the intricate details of problems that he was faced with. Additionally, his hands-on active participation in the problem solving process caused many to consider him to be a micromanager. New views towards defense leadership enabled McNamara's unique management approach.

In 1960 Senator Jackson's Subcommittee on National Policy Machinery found that the legal depth and breadth of the office of the Secretary of Defense had not been fully realized. The findings included a statement which proposed, "More vigorous employment of the broad authority already invested in the Secretary of Defense," were possible. As Eisenhower and his cabinet departed and Kennedy's administration moved in, the die was cast for a leader who would certainly expand the role of the Secretary of Defense beyond any that had been before him. Robert S. McNamara's seven year reign as the Secretary of Defense brought with it sweeping changes in management. McNamara's strengths were both in his management skills and cognitive ability. His resume included a position as an assistant professor at Harvard Business School, as well as a management specialist for the Army during World War II. Kennedy saw McNamara as the perfect fit to transform the DOD into an organization that was responsive to the low level wars the president anticipated during the Cold War. McNamara assumed the position in January of 1961 at a time when many Americans questioned the nation's capability to defend itself and its interests overseas. McNamara's personality and perspective initiated conflict with

the status quo. His approach was characterized by a focus on management and less on politics. He tended to view all problems from a management efficiency perspective and didn't acknowledge need for consensus building so important in politics. McNamara's principle concern was with management, and his style of secretary of defense was essentially that of a functionalist. [15] Conciliation might have been necessary for consensus, but would not necessarily make significant change happen, which is what McNamara wanted to do. The organizations involved had their individual priorities and at times varied behavior within their organizations. Politically, consensus was difficult to find among all of the varied organizations.

Though several noted small arms historians pointed to specific patterns of behavior or belief systems as the key influences on small arms development, rarely did a single reason explain cultural acceptance and adoption of a new concept or firearm.[16] Often political, economic pressures and leadership influenced the evolution of weapons through their development and acceptance. The culture McNamara brought with him changed all paradigms almost overnight.

Economic and political influences themselves were often cultural in nature and represented paradigms that organizations had to develop within. [17] As an organization matured, its operational paradigm significantly influenced its decisions and actions. Those interactions resulted in patterns that became behavioral norms within a culture. Resistance to further change in an organization could result in developmental stagnation that would negatively influence organizational success.[18] The connection to a system worked well until the variables within a system changed and the established patterns of behavior no longer provided reasonable assurance of success.

An analysis of the history of American small arms development identifies paradigms that the US Army acquisition process developed in as well as cultures of economics and politics that historically influenced the acquisition process. The Army's small arms acquisition history and the founding of Army Ordinance sheds light on these processes and the development of individual cultures.

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[1]John P. Kotter, *Leading Change* (Boston, MA: Harvard Business School Press, 1996), 18.

[2]Robert M. Axelrod and Michael D. Cohen. *Harnessing Complexity: Organizational Implications of a Scientific Frontier* (New York: Free Press, 1999), 4.

[3]MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution, 1300-2050 (* Cambridge, UK; New York: Cambridge University Press, 2001), 13.

[4]John W. Chambers and Fred Anderson, *The Oxford Companion to American Military History* (New York: Oxford University Press, 1999), 438-439.

[5]Robert A. Doughty, *American Military History and the Evolution of Warfare in the Western World* (Lexington, MA.: D. C. Heath and Co., 1996), 630-631.

[6]Chambers and Anderson, 758.

[7] Ibid., 150-151.

[8] Ibid., 746

[9] Edward Clinton Ezell, *The Great Rifle Controversy: Search For the Ultimate Infantry Weapon From World War II Through Vietnam and Beyond* (Harrisburg, PA: Stackpole Books, 1984), 69-70.

[10] Thomas L. McNaugher, *The M16 Controversies: Military Organizations and Weapons Acquisition* (New York: Praeger, 1984), 58-59.

[11] Ezell, xiv.

[12] Duncan Long, *The Complete AR-15/M16 Sourcebook: What Every Shooter Needs to Know* (Boulder, Colo.: Paladin Press, 2001), 14.

[13] William R. Dean, "I Don't Like Rifles," *Infantry* 56, no. 2 (1966), 4

[14] Long, 15-16.

[15] James M. Roherty, *Decisions of Robert S. McNamara* (Coral Gables, Fla.: University of Miami Press, 1970), 20-21.

[16] Thomas L. McNaugher and Edward C. Ezell both address cultural influences to small arms development, but approach the history with very specific and defined reasons for certain advances or failures. A more holistic examination was used in this research that took the combined works of these historians and searched for additional influences that had direct effect on the complex system. Building on the outstanding work of McNaugher and Ezell, this research addresses primarily concepts of economic, political, leadership and traditionalist influence on the organizational cultures related to the M16 rifle program.

[17] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1996), 109-150. Paradigm Shift is first used by Thomas Kuhn in The Structure of Scientific Revolutions to describe a change in basic beliefs regarding a ruling scientific theory. It is currently applied to many other areas beyond science. In Kuhn's view, a paradigm goes beyond just the theory, but encompasses the entire world-view that it exists within. For example, it is commonly thought that theories regarding global terrorism experienced a paradigm shift when airplanes were flown into New York's Twin Towers on 11 September 2001.

[18] Kotter, 3-4.

CHAPTER 2

HISTORICAL ARMS DEVELOPMENT PRIOR TO THE VIETNAM WAR

The history of US small-arms development helps to explain Army small-arms acquisition culture as it related to the M16 rifle. Economic, political and leadership influences formed the organizational behavior patterns and set the stage for understanding the mindset prevalent during the M16 acquisition process. The start of US government small arms development and acquisition occurred in conjunction with the founding of the Army Ordinance Department and it is here that the paper's research begins.

The Beginnings of Government Production

The founder of the US Ordinance Corps, Brigadier General Henry Knox, was an artilleryman by profession and training and a veteran of many of the major battles of the American Revolution from Bunker Hill to the British surrender at Yorktown. He knew first-hand the struggles the Continental Army endured to supply its army with equipment, weapons and ammunition, and understood the importance of the latter two elements in defeating the enemy.[1]

Inexperience plagued the new nation. Equipping the colonial militia had been the responsibility of the British crown. Revolution against the British monarchy placed the necessity of equipping the Continental Army in the hands of the newly formed Continental Congress. The Army obtained arms primarily through the seizure of British stores, however, this method provided only a small fraction of what was needed. Authorities purchased a significant number of muskets from the French, who were eager

to see the British embroiled in conflict in North America.[2] The reliance on foreign ordinance concerned political and military leaders; they sought an internal means of providing for the Army. This was one of the first examples of the civilian political culture influencing small arms acquisition. To achieve these ends the Continental Congress used both the purchase of weapons from private contractors as well as government run factories. Though private contractors often provided adequate quality of materials, they lacked the capacity to produce the quantity needed, and thus could not be relied upon to meet the demand.[3] The congressional guidance directing military and commercial production foreshadowed a pattern of persistent behavior that became evident again in 1967. From the years 1967 to 1969 congressional involvement, motivated partially by fiscal oversight, influenced M16 production. In establishing a military design and production apparatus, Congress introduced an additional system into small arms development in America - the depot system.

Knox and his officers received orders in 1776 from General George Washington to establish an ordinance depot. Springfield Massachusetts afforded a strategically suitable location as it provided an adequate supply of water power, accessible natural resources, skilled arms craftsmen, and was well situated for strategic defense by the Continental Army. What made it even more attractive was that it was also the home to the Continental Army Cannon Foundry which was already producing cannon for the Army.[4]

By February 1777, construction began on the armory and within a month, the arsenal was turning out musket cartridges; by April production rose to 7,500 cartridges per week.[5] The arsenal in Springfield Massachusetts proved to be a key factor in the

logistical support of the Continental Army. One hundred and eighty years later, Springfield Armory remained as a critical American institution involved in small arms development and would itself epitomize some of the Ordinance Department's organizational culture. It's existence through the years, however, followed cyclical patterns of importance that changed with the ever changing landscape of economics and politics.

Developing Influence of Politics and Economics

In 1782, after British General Cornwallis' surrender at Yorktown in October 1781, Congress closed the Springfield Arsenal and locked the doors which held cannon, ten thousand muskets, and powder.[6] This decision demonstrated how the culture of the civilian political leadership influenced the military acquisition system. It also illustrated the significance that economics had on both the civilian and military cultural behavior patterns.

Although the early republic post war government saw little need or desire to maintain a standing army and its associated logistical systems there were those who believed it was essential for the defense of the new nation. In 1783 Alexander Hamilton, in his "Report on a Military Peace Establishment," called for the creation and maintenance of cannon foundries and manufacturers of arms and powder. Eight years later in 1791 his, "Report on the Subject of Manufacturers," continued to urge other political leaders of the necessity of maintaining a capability to provide for the national defense and to argue that such a capability could not be instituted only when the need arose.[7] Hamilton's continued emphasis on national defense capability provided an early example of how leadership at a key time and place had significant influence on the

transformation of cultures. His words and ideas took on new meaning when the US once again felt threatened.

The nature of British colonial institutions influenced the political and economic policies of the early American Republic. There were few who eagerly sought a strong American central government and military capable of enforcing its will on the states. Additionally, standing armies and armories cost resources and money that the fledgling government did not have. This resulted in a culture of thrift within both the military and political cultures. It was not until the French revolution in 1793 and resulting pressure from both France and Britain in 1794 that the government accepted the necessity for maintaining a capability of arming its militias and regular army and took steps to fund that capability.[8]

In 1794 Congress authorized purchase of 7,000 foreign muskets and established the Springfield and Harper's Ferry Armories. By 1795 the armories began producing muskets; however, the low combined production of both armories necessitated the contracting of private industry to once again produce arms for the state militias.[9] This means of providing for the nation's defense set the pattern of small arms development and production for over 150 years to come.

The armories established their role in the small arms development and acquisition process as one of design and standardization while still maintaining a capability for limited production. Federal armories produced the specifications and patterns for the small arms and assisted the contractor in producing the weapons that met those specifications.[10] Although many criticized the federal armory system as tradition bound and lacking innovation, this criticism does not stand up to the test of time.[11] A more

appropriate observation of the armory's research and development efforts revealed a lack of timeliness constrained by economics.

Powder Development

Since rifles are ineffective without cartridges, the development of powder and bullet is an essential element of study when analyzing the development of military small arms. Development in one aspect of small arms technology would often lead to additional changes. Improvements in powder resulted in changes in weapon design, which in turn spurred additional research and development of newer cartridges.

American interest in gunpowder manufacture existed since the first colonists arrived on the continent. Gunpowder, and the weapons that used it, was a critical tool for early settlers that provided them food and protection. Saltpeter, an essential ingredient to black powder manufacture was not known to exist on the continent. Consequently, settlers relied upon nitraries, or "saltpeter sheds" where animal and vegetable waste was used to create saltpeter. In 1675 the first powder mill was established at Milton, Mass.[12]

Throughout the revolutionary war the supply of saltpeter was of serious concern. Local governments provided instruction and encouragement in the production of this essential ingredient to black powder. In addition to providing a valuable resource to the community, those who undertook the endeavor also found that they would be handsomely rewarded for their efforts. Compensation for production of black powder and its components was often clearly seen as an issue of supply and demand, with demand often exceeding supply in America's infancy. During the war years, every colony but Delaware encouraged the manufacture of gunpowder. Even with this emphasis on powder

production, colonists produced only one third of the powder required in America, while the remainder continued to be imported with the aid of French shipping.[13]

Around 1800 the manufacture of gunpowder received national attention. An 1810 census reported that there were over 200 mills in 16 states producing gunpowder.[14] One noteworthy producer of quality gunpowder was E. Irene DuPont de Nemours whose Wilmington, DE mill produced a powder noted for its clean burning properties. DuPont's company exists today and is noted as having produced powder fired from the M16 rifle.

An outstanding example of the American method of military funding when faced with no known threats occurred in the Ordinance stocks of powder in the two decades following the war of 1812. The small Army retained large stocks of powder held in ordinance depots for long term storage during the period following the war of 1812. Prior to 1836, the acceptable age of gunpowder for storage was approximately 3 years. Technical improvements allowed powder to be stored for up to 50 years while still retaining its full serviceability. The problem with the Army, however was that it made no powder purchases from 1822 to 1835. Congress ordered an inventory of stocks in 1834 due to concern over deterioration and inadequate supplies on hand. As a result of the inventory, government officials determined that stocks were dangerously low and immediately made orders to replenish stocks to acceptable levels. Additionally, they established testing procedures to ensure the serviceability and quality of powder and appointed public inspectors with the responsibility to maintain quality. [15] This government oversight became institutionalized and influenced rifle production as well.

Marksman's Rifle is Born

Little development of small arms technology occurred during the first half of the nineteenth century. The most notable improvements to the infantryman's rifle during that era were made to rifling and more reliable percussion ignition systems. The rifle soldiers carried into the Mexican War in 1845 was essentially the same rifle carried by George Washington's Continental Army in the American War of Independence.[16] Rifling however, eventually altered the tactics and methods armies employed in the fight.

Rifling was not practical to military application prior to 1854 because the grooves in the barrel of the weapon made loading the rifle time consuming and necessitated frequent cleaning after several shots to remove the fouling that filled the barrel's grooves. Manufacturers solved these problems with the invention of an expanding cartridge that sealed the expanding gasses during firing, removed the necessity for a lubricated patch, and provided for adequate engagement of the bullet to the lands and grooves of the rifled bore. A Frenchman named Captain Claude Etienne Minie improved an existing concept that utilized a conical bullet with an expanding base that engaged the grooves of a rifled barrel. This bullet, referred to as the Minie ball, made possible the production of military rifles with increased range and accuracy of fire without degrading the rate of fire.[17] The first American military small arm intended for general issue to the Infantry to have a rifled barrel went into production in 1855.[18] The development and acceptance of a rifled musket for general use encouraged the institutional concept of the marksman and instituted a tradition that continued to grow within the US Army throughout the next century. This tradition not only influenced tactics, doctrine, and training of the American rifleman, but also future rifle development.

The American Civil War placed a huge demand on the Ordinance Department. In the early stages of the war, Confederate forces seized the Harpers Ferry Depot. This loss, compounded with the vast mobilization of resources necessary to supply an expanded and fully engaged million man Union army, severely strained the system. The US Model 1861 and 1863 rifled-muskets were the main arms provided to the troops.[19] They represented no great leap in technology but were relatively easy to produce within the skills of the available labor and cartridges were produced in sufficient quantity to keep the riflemen's cartridge boxes full. The Ordinance Department placed little effort on new rifle development. Ordinance leaders viewed research and development as an unnecessary diversion of resources in a very resource constrained environment.[20] Thus, the Ordinance Department developed a persistent culture of economic thrift in regard to breech-loading rifles during the Civil War era. This culture, though prevalent throughout Ordinance Department history, appeared again in twentieth- century programs. The Civil War example demonstrated how decisions regarding needs and capabilities could dramatically influence capabilities of forces in war. Perceived economic and industrial constraints contributed to the reluctance of the Ordinance Department to field breach-loading rifles that were available well before the Civil War.

Although the war caused the Ordinance Department to face rapid mobilization of limited resources, it also occasioned the expression of opinions that favored adoption of breach loading rifles. Admiral John A. Dahlgren, Chief of Naval Ordinance in 1861, along with several of his subordinates pushed hard for the adoption of breach loading rifles that Europeans had successfully designed and routinely produced since the 1830s.[21] General James W. Ripley, the Army Chief of Ordinance, believed the war would be of

short duration and did not envision the need to make significant changes. Additionally, there was concern among ordinance leadership that breach-loading rifles would increase ammunition consumption and place a strain on ammunition re-supply systems that would exceed capability to support. Ripley also argued that the cost of the breechloader made it impracticable in light of the numbers of arms needed for the rapidly growing army. The influence of economics convinced the president to support the muzzle-loader, even though he was an ardent supporter of breach loading rifles.[22]

At the end of the Civil War, the War Department's budget dropped from $31 million to $0.7 million in 1866. The decrease in budget was also representative of the decrease in force size during the same timeframe. With a restricted budget and tens of thousands of rifled muskets, the Ordinance Department set about converting muzzle-loaders to breach-loaders. Economic constraints and political policies that embraced minimal military support during periods of peace, depressed weapons development, which consisted of only modest improvements to existing designs for the next four decades.[23]

Ordinance Department Armories and Weapons Design

Significant improvement in small arms technology for the US military occurred at the end of the 19th and beginning of the 20th centuries. Though still behind its European contemporaries, the US Army embraced new technology made possible by smokeless powder, industrial capabilities, metallurgy, and research into small arms ballistics. Of all of the improvements made at the turn of the century, smokeless powder was the most significant. It provided a cleaner burning propellant that delived the same performance as

black powder cartridges, but in less space.[24] The change in powder technology and competition with European advances resulted in steps to modernize American rifles.

In 1892 after significant debate and pressure from Congress to modernize, the US Army selected the Krag-Jorgensen rifle. This rifle replaced the breach loading 1873 rifle which still satisfied the Infantry Branch.[25] The Krag-Jorgensen was designed with a magazine cutoff which allowed it to be fired as a single shot rifle, being loaded one round at a time. It was a rotating bolt, breach loading rifle that fired a metallic cartridge. This design represented a significant improvement in US military technology, yet still was less capable than other rifles being fielded by European armies. The magazine cut-off was seen as an appropriate modification to the rifle that represented the marksmanship tradition that military leaders saw as uniquely American. This thought process proved harmful in the Spanish-American war where American soldiers were outmatched by an enemy who carried a rifle capable of more rapid fire, greater accuracy and longer range.[26]

As a result of the Spanish American War, the Army went back to the drawing-boards and developed the 1903 Springfield. The 1903 Springfield increased the capabilities of all aspects that had been deficient in the Krag-Jorgensen. Originally, the rifle fired a 220 grain round nose bullet much like the one used in the Krag. Ballistic research conducted during this timeframe identified that pointed bullets had better aerodynamic characteristics and thus would travel faster and farther. These pointed bullets, called spitzer rounds, were eventually used in the M1903 Springfield. The 150 grain spitzer bullet performed significantly better than its predecessor.[27] The Ordinance Department began work towards a semi-automatic rifle in 1902, though the search was not one that received a great deal of emphasis. There was no strategic or tactical catalyst

for such a significant change in philosophy and most generally agreed that the newly fielded bolt action magazine fed M1903 rifle could fire “ten times as fast as it should be in battle if efficiency and execution are properly attended to”[28] With that mentality prevalent in both the users and the suppliers, there was little reason to further increase the rate of fire or ease with which a soldier could expend ammunition.

There was evidence that suggests that the Army sought to avoid congressional intervention by avoiding radical innovation. Where innovation occurred it was only after complete support was garnered within the organization. As a large institution, institutional change was often very methodical. This has been misconstrued as an inherent organizational conservatism. Though belief patterns averse to change may explain some conservative patterns of innovation within small arms development, other significant factors influenced innovation. Economically, change incurs some degree of cost, inefficiency, and risk. Organizations with limited resources, inefficiency and increased economic expenditures tend to avoid these risks. However, political influence by civilian leadership is impossible to avoid. Major manufacturing and industry interests are intrinsically linked to political constituencies. Federal government contracts awarded to large business within a particular state are likely to receive attention from the states political leadership. Cost, transportation and manufacture capabilities influenced logistical doctrine. This doctrine focused on a conservation of those resources of war essential to win engagements. Rapid fire weapons were seen as a potential inefficiency caused by the use of two many rounds by a rifleman to achieve his objective of disabling an enemy soldier. This inefficiency was a nightmare to a logistician faced with a finite resource they could not easily replace.

The existing bolt action rifles strongly influenced the development and research into early self-loading rifles. Not only did the situation warrant a shift in the paradigm that had existed for over 125 years, but there was also the matter of commonality of parts and minimum changes required to tooling and manufacturing. These concepts were greatly affected by the economics of change.[29] A good example of this concept included the attempt to convert existing M1903 rifles to self-loaders. These attempts failed even though their minimal cost made their concept acceptable to all involved.

Soldiers first used the M1903 rifle in combat during WWI. This experience encouraged some debate regarding the suitability of rifles in large conventional conflict.[30] Experience indicated that high volumes of fire used to cover a large area, inhibit the maneuver of the enemy, or to cover the maneuver of friendly forces had more than just a physical influence on the battlefield. Those involved with small arms acquisition found it difficult to understand or quantify the psychological influence of the bullet in battle and were therefore averse to embracing the concept of individual full automatic weapons.

Official doctrine following WWI demonstrated that the Army continued to embrace the concept of long range accurate rifle fire. The basic infantry text of 1935 stated, “The value of knowing how to shoot was proved in the World War.” One positive outcome from early attempts at auto loading rifle development was to establish desired specifications for future designs. Though the Armories had always set the standards of production by building the dies, establishing the patterns, etc. they had never really been the origin of new invention. Known for taking others ideas and incorporating them in US service rifles, they seemed unable to produce a new rifle from within their own

institution. Experimentation with semi-auto rifles in the early days of the twentieth century demonstrated such incapability.

American involvement in WWI provided some insight into how far behind America was in the field of military small arms. American enemies and allies demonstrated on the fields of France that they had been researching the use of new technologies and tactics regarding their riflemen. The most notable evolution to occur at this time was the rapid proliferation of the machine gun, and more specifically, the light machine gun.

In the last moments of WWI Inventor and gun designer John C. Garand began work on a light machinegun to meet the needs of the American military. His design was tested and given poor review by the US Army evaluation officers who recommended that no army funds be spent on the weapon. Garand refused to abandon the weapon, however, and continued his work on the piece even after the war ended. His hard work and perseverance paid off when an Ordinance Department officer familiar with his works work had Garand transferred to the Springfield Armory from the national bureau of Standards where he worked as a master gauge and gun experimenter. This transfer proved to be both a blessing and a source of frustration. It eventually took seventeen years to produce a rifle that satisfied the Army, even though Garand based the product off of a design that he had taken a mere eighteen months to develop prior to his association with the Army.

In addition to experimentation and development of self loading rifles, government officials initiated research into the idea that a smaller bullet could produce higher velocities, with greater accuracy, and provide sufficient power to be acceptable for use on

the battlefield. Testing in 1931 on a .276 caliber bullet that was fired from both a rifle designed by John Garand and one designed by the bullet's inventor, John Pederson, encouraged the board to approve its use in combat. Moreover, the board noted that the bullet was better suited for self loading rifles than the 30-06 cartridge currently in service. Many felt that the 30-06 was too powerful to be fired from a light auto-loading rifle and that the .276 with its smaller powder charge would be a better fit for such a rifle.[31]

The acceptance of a new rifle and cartridge demonstrated that there were some aspects of the Army's culture that were willing to change. The board's findings represented a rapid departure from the standard rifle that was already in existence. The only cultural aspect that was not challenged by the acceptance results was the culture of marksmanship. The action challenged other cultural beliefs, however, and these challenges resulted in the rejection of the change in caliber by the Army senior leadership. The marksmanship tradition was not the only influence to arms development. Economic influences resulted in the entrenchment of a culture of thrift.

Culture of Thrift

The main cultural hurdle that could not be vaulted was the culture of efficiency and fiscal responsibility. Though efficiency and fiscal responsibility are considered positive attributes of any government organization, they were not balanced by a need for continual evolution or improvements in military effectiveness. When such an evolution occurred, the Ordinance Department often approached the problem with a mentality of doing more with less. Rarely did they ask for more resources to meet new challenges. The fiscal constraints placed on them came from congressional budgeting, allocation of resources within the senior military leadership, and within the Ordinance Department

management. The American peacetime military of 1931 was acting just as peacetime Armies had done in America since its inception. It was conserving and preserving what limited assets it was given with an understanding that money was not available for military spending. Military officers at the senior levels reminded themselves that they had to be good stewards of the taxpayer's money and not waste what little they were given. 1931 was just one year of many years of recession and depression that existed prior to the start of World War II.

Because of this culture of thrift, Army chief of staff Douglas McArthur decided in 1932 to decline acceptance of the .276 caliber rifle due to logistical constraints that would result from having separate rifle and machine-gun cartridges as well as the fact that there were existing large quantities of .30 caliber ammunition available and development of a new cartridge would make much of those stocks obsolete. He did, however, recognize the importance of evolving rifle technology and ordered further work on John Garand's .30 caliber auto-loading rifle.

By 1936 John Garand's rifle had evolved into the .30 caliber M1 rifle. This rifle would become the first semi-automatic rifle in the world to be issued as a general purpose rifle to a nation's army. Soldiers armed with the M1 in World War II had greater accuracy and firepower than their counterparts on the battlefields of the Pacific, Europe, and North Africa. General George S. Patton's observation that the M1 Garand was, "the greatest battle implement ever devised,"[32] illustrated the popularity of the rifle. The affectionate regard for the M1 rifle that evolved out of its service in World War II resulted in another cultural pattern, one where many perceived the M1 as the perfect rifle despite statistical evidence that demonstrated potential improvements could be made.

Post war research into the effectiveness of the M1 and its .30 caliber bullet found that there were many misperceptions by soldiers about the rifle. Its lethality was not any better than the .276 caliber bullet that the Japanese copied from Pederson in the 1930s and used on American soldiers throughout the pacific campaign.[33] The culture of thrift present in congressional budgeting and Ordinance Department management assisted those leaders and cultures promoting the marksman tradition by promoting slow, methodical change to the already established tradition of marksmanship.

The roots of the Cold War started in 1945 with the conclusion of World War II and the establishment of spheres of influence dominated by either the Soviet Union or the United States and its allies. Intensification of the Cold War continued as communism spread and expanded the Soviet Union sphere of influence. In 1947 George F. Kennan wrote "The main element of any United States policy toward the Soviet Union must be that of a long-term, patient but firm vigilant containment of expansive tendencies."[34] This idea became the foundation of a policy of containment which required new military capabilities and approaches. In August 1947, a war plan was developed named "Broiler" which began to integrate atomic weapons into the nation's security strategy. By 1948 the emphasis continued to favor air power and its ability to deliver the American nuclear arsenal to enemy targets. The belief was that America would be forced to respond to a surprise attack with its nuclear weapons which would buy time to marshal conventional resources required to complete the campaign. This belief led to a significant portion of the resources being focused on air power and nuclear weapons to the detriment of conventional forces. The 1950 budget saw increased nuclear forces and further reduced conventional forces.[35] The war in Korea however, led President Truman to realize that

there were situations in which the threat of nuclear weapons held no influence. With the war in Korea there began a gradual shift in thinking that would place greater influence on conventional forces and free up resources to the Army. This shift would be short lived as political change would once again influence cultural behavior. A change in presidency from Truman to Dwight D. Eisenhower in 1953 would reverse the trend towards balanced conventional and nuclear forces started by Truman in 1950. This change would again demonstrate the influence and importance of the civilian political culture and the culture of thrift.

Eisenhower ran on a platform in 1952 of ending the war in Korea and cutting the federal budget. Upon assuming the role of Commander in Chief Eisenhower was responsible for a budget that military costs consumed 70 percent of. His view was that American foreign and military policy was not realizing the complete benefits of the nuclear age. Therefore, Eisenhower sought to use diplomacy and nuclear deterrence to solve security issues and cuts in conventional forces to solve economic ones, namely the budget. His national security policy termed the, "New Look" placed emphasis on strategic nuclear arsenals and diminished the importance of traditional forces. In his opinion, "the United States will consider nuclear weapons to be as available for use as other munitions." This new strategy would be termed, "Massive Retaliation," in 1954 when Secretary of State John Foster Dulles used the term to define America's response to Soviet aggression.[36]

Marksman Tradition Continues

As the Army had done following WWI when looking for a semi-automatic rifle to replace the bolt action it did again following World War II when it sought a full

automatic replacement to the M1. In 1946 the War Department Equipment Board (Stillwell board) established that the next generation rifle should weigh less than 7 pounds, be capable of both semi-automatic and automatic fire and have the same ballistic performance as the current M1 rifle and fire a .30 caliber round. The requirements do not seem overly demanding except when placing the .30 caliber requirement into context. The .30 caliber round that the board was expecting the new rifle to be designed around was the experimental T-65 round which used new powder technology to produce 30-06 performance from a smaller cartridge. Recoil from this experimental round was not significantly less than its 30-06 parent. As in the tests conducted in 1931 with the .276 cartridge, it was believed that the recoil of such a cartridge would make automatic fire impracticable. During the same period one of our most significant allies, the British, were conducting experiments with new automatic rifles in .276 caliber. They were not wedded to any requirement to maintain a specific caliber and had acknowledged that their experience in World War II had proven that normal engagement ranges were not the same as they had felt were experienced in WWI. Maneuver warfare, the proliferation of artillery and armor and changes in tactics and doctrine in the worlds armies caused the British Ideal Caliber Panel to determine that three hundred yards was the maximum range that should be expected from an infantry soldier's rifle.[37]

Due to cooperation resulting from the newly formed NATO alliance, there was opportunity for the British developments to be compared with American efforts at new rifle design. In 1950, the Infantry board compared US developments towards meeting the requirements set forth by the Stillwell board with the work the British had completed on their .276 caliber EM2 rifle. During these comparisons and the resulting dialogue with

the British experts the Infantry board admitted that there were flaws in the requirements placed on them and acknowledged their preference for the .280 cartridge.[38] Again we see members in the military community who are willing to accept that change was necessary, however we will also see, similar to 1931, the pressures of politics and economics influence the desire and speed of change.

The commanding general of Army Field Forces which was essentially the chief of infantry felt that the .280 cartridge did not have enough muzzle energy and disapproved the findings. So in 1950, after recognizing that a lightweight rifle was impractical for firing high powered cartridges due to the recoil produced, the Infantry board lowered the importance of the weight requirement for the next generation automatic rifle. This decision demonstrated an attachment to the high powered cartridge and the long range performance that it delivered. Further evidence of this attachment is demonstrated in 1952 when the Army published a definition of stopping power which called for a round that could produce fatal wounds at 2,000 yards and pierce armor at 1,200 yards. Those requirements were the same that were set forth for machine-guns of the era.[39]

The result of this research, testing and controversy was organizational affinity to the T-65 round which would result in the .308 Winchester round. The acceptance of the T-65 would lead to the development of the M14 rifle which would become the standard rifle to fire the .380 Winchester in 1957. To demonstrate the influence of this decision, the .308 Winchester cartridge would be forced upon our NATO allies as the rifle standard caliber and become the 7.62 NATO round.[40]

In 1952 the Army began revolutionary research into new small arms technology. Titled “Project SALVO”, the desire of military researches was to develop a weapons

system that would both improve the likelihood if hitting a target as well as the lethality of the impact.[41] The two most significant findings of SALVO were that a lightweight projectile was adequate for normal combat ranges; and three to five round bursts provided optimal efficiency for automatic fire in small arms.[42] From this research developed interest and further research into small caliber, high velocity cartridges.

The ArmaLite division of Fairchild Aircraft Corporation was approached by the US Army in 1957 to produce a light, HVSC rifle capable of penetrating a standard US steel combat helmet at 500 meters.[43] Eugene Stoner, an engineer/designer for ArmaLite, working closely with L. James Sullivan and Robert Freemont modified an earlier design that had been chambered for the 7.62 NATO cartridge and presented it to the US Army as the AR-15.[44]

So it is clear to see that there were some patterns of behavior that were at times challenged but remained due to the influence of politics and economics. Though 1957 saw the high powered, large caliber rifle win out over its competition with the acceptance of the M14, history showed that there was room within the organization for new and inventive thought. The experimentation and acceptance by some within the Army of a smaller caliber rifle capable of high volumes of fire showed that there were those who embraced a change in small arms philosophy and the doctrinal changes that such a paradigm shift would entail. The proponents of the British .280 would continue their support of a smaller caliber rifle even if the support had to be underground for a period of time.

When the AR-15 appeared in 1957 amidst acceptance of the M14, it provided the opportunity for small caliber proponents to again voice their preference for change.

Because the AR-15 offered superior performance over many of its competitors and it utilized revolutionary enhancements to rifle design it was a perfect cornerstone to the revisited argument for small caliber rifles capable of high rates of fire. What will come to light in the next chapter is that the aspects of economics and politics that had pushed for conservative and traditional development of small arms in the past would, during the decade of the 1960s, serve to enable the change that the small caliber advocates were calling for. In fact, it is politics that forces change in the Army's acquisition programs.

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[1] Erna Risch, "Evolution of the Ordinance Department," *Supplying Washington's Army*, http://www.army.mil/cmh/books/RevWar/risch/chpt-11.htm

[2] James E. Hicks, *U. S. Firearms, 1776-1956* (Beverly Hills, Calif.: Fadco Pub. Co, 1957), 9.

[3] Edward Clinton Ezell, *The Great Rifle Controversy: Search For the Ultimate Infantry Weapon From World War II Through Vietnam and Beyond* (Harrisburg, PA: Stackpole Books, 1984), 3.

[4] William H. Hallahan, *Misfire: The History of How America's Small Arms Have Failed our Military* (New York: Scribner's, 1994), 16-17.

[5] Ibid., 17.

[6] Ibid, 18.

[7] Ezell, 4.

[8] Hallahan, 24.

[9] Ezell, 4-5.

[10] William M. Hix. *Rethinking Governance of the Army's Arsenals and Ammunition Plants* (Santa Monica, CA: Rand, 2003), 15.

[11] Martin Pegler. *Firearms in the American West, 1700-1900* (Marlborough, UK: Crowood 2002), 84. It is noted by Pegler that the Ordinance department's pattern of behavior towards innovation was not nearly as bad as their British counterparts during the same period. He notes one of the early problems with the American system is that of standardization.

[12] Berkeley R. Lewis. *Small Arms and Ammunition in the United States Service* (Washington: Smithsonian Institution, 1956), 24.

[13] Ibid.

[14] Ibid., 27.

[15] Ibid., 29-31.

[16] Hix, 15-16.

[17] Pegler, 90-91.

[18] Ibid., 97-98.

[19] Ibid., 99-100.

[20] Ezell, 9.

[21] Hallahan, 128-129.

[22] Ibid., 130-135.

[23] Ezell, 9.

[24] Ibid., 10.

[25] Thomas L. McNaugher, *The M16 Controversies: Military Organizations and Weapons Acquisition* (New York: Praeger, 1984), 21.

[26] Ibid., 22.

[27] Ibid.

[28] Ibid.

[29] Ezell, 13.

[30] McNaugher, 28.

[31] Ibid., 29.

[32] Ibid., 32.

[33] Ibid., 33.

[34] Robert A. Doughty, *American Military History and the Evolution of Warfare in the Western World* (Lexington, Mass.: D.C. Heath and Co., 1996), 580.

[35] Ibid., 581.

[36] Ibid., 584.

[37] Ibid., 35-39.

[38] Ibid., 37.

[39] Ibid., 37-38.

[40] Patrick Sweeney, *The Gun Digest Book of the AR-15* (Iola, WI: KP Books, A Division of F+W Publicaitons, 2005), 10.

[41] Ezell, 168-169.

[42] Duncan Long, *The Complete AR-15/M16 Sourcebook: What Every Shooter Needs to Know* (Boulder, Colo.: Paladin Press, 2001), 15.

[43] McNaugher, 59; Ezell, 174. Ezell defines the performance standards.

[44] Long, 5.

CHAPTER 3

1957 to 1964: THE SEEDS OF CHANGE

The period from 1957 to 1964 was significant to the M16 acquisition program. The US Army and the DOD experienced some of the most rapid peacetime change in its history during those eight years. Although the shadow of the Korean war shaped peacetime military, the escalating Cold War with the Soviet Union in general, and the growing Vietnamese conflict in particular drove military planning. The interplay of various organizational cultures, changes in political leadership, and economic constraints that characterized the era resulted in significant modification to the resource allocation process. The dynamic environment resulted in organizational change effecting small arms development and thus, the development of the M16 rifle. The election of President John F. Kennedy, his appointment of Robert S. McNamara as secretary of defense and their change in defense strategy proved to be a catalyst for organizational change that transformed organizational behavior based on tradition into behavior influenced by operational research and scientific management principles..

Operational research began in earnest during World War II, as researchers applied scientific methods to the challenges of weapons development. These new approaches also informed decision making processes through the introduction of organizational and systems management. This infusion of scientific practices with intuitive experiential processes gained momentum throughout the 1950s and 60s. The momentum created conflict between operations research organizations created during World War II and further empowered by Robert McNamara with Army Ordinance acquisition cultures emphasizing long standing traditions.[1]

As science pointed to changes in traditional military rifle use, a civilian company led the innovation. The military, historically bound to traditional ways of thinking, was slow to consider many of the proposed modifications. American business culture, however, recognized and rewarded forward thinkers who could find new markets and develop novel products for those markets. That enabled the ArmaLite Corporation to develop a radically new rifle to meet the needs established through new scientific approaches.

Faced with economic and political pressures, what should have been a coordinated effort within the military to approach new problems with innovative answers was instead uncoordinated and disjointed. Input from various political leaders reflected rapidly changing expectations and conflicted guidance. Economic priorities often guided decision-making and resulted in cumbersome and ineffective processes. The Army Ordinance Department, Army senior leadership, and Infantry Board developed a cautious approach that favored a culture of thrift. When faced with options from outside their organizational culture, Ordinance Department leadership became automatically opposed to the outside influence. Such was the case with the AR-15 presented by ArmaLite.

Organizational culture within the arms manufacturers Colt and ArmaLite varied just as did that of military institutions. Colt Firearms viewed the AR-15 as a potential key to their future economic success and began to aggressively market the rifle while the original developer, ArmaLite, did not. When the US military required redesign of the weapon, ArmaLite dropped their efforts to develope the rifle, and eventually sold their production rights to Colt. Colt directed their marketing efforts toward cultures with

greater control of economic and political aspects of the environment. This led to reexamination of a concept thought to be dead in the eyes of the Army.

Colt's focus on marketing eventually led the new leadership of the DOD to question why the Army senior leadership and Ordinance Department did not embrace the concepts presented in the AR-15. DOD placed ever increasing political and economic pressure on traditional Army acquisition procedures which led to the reevaluation of the AR-15. Secretary of Defense McNamara challenged the military's traditional view of the role of the American rifleman and his rifle. McNamara's application of scientific methods to the selection presented quantifiable effects that a traditionalist organization could not logically counter. In the end, McNamara's decision to force a change on the rifle acquisition system opened the door for further change as the American military involvement in Vietnam intensified.

Politics and Change

Research into the high velocity, small caliber cartridge began in 1950 and after more that 250 tests resulted in the M16-A1[2]. No time was more significant to the concept's final acceptance as the period from 1962 to 1963. During that time leadership changes at the DOD and throughout the upper level Army leadership, to include Ordinance Department leadership, resulted in a shift in organizational thought which influenced small arms development.

Voters elected President John F. Kennedy in 1960 on a platform of social and governmental reform[3]. His foreign policy involved active military engagement around the world to prevent communist expansion. Kennedy believed the nation should posture itself for defense differently from his predecessor, Dwight D. Eisenhower. This shift in

strategy had a significant influence on the political and economic conditions surrounding the M16 program and set conditions for the conflict that occurred during operational testing.

A change in leadership within the defense community accompanied the new strategy. Robert S. McNamara, Kennedy's choice to run the DOD, was a hands-on leader with a strong organizational management background from the civilian sector. During this period McNamara initiated numerous changes in the Armed Forces[4]. Moreover, McNamara became the single most important agent in the weapons selection process that resulted in the adoption of the M16 as the sole rifle in the US Armed Forces. If not for McNamara's influence, the Army's cultural affinity to large caliber, long range rifles may have prevented adoption of the weapon. The Army's perspective towards the rifle changed along with changes in America's defense policy.

The change in American defense policy coincided with McNamara's appointment in 1961. Referred to by author Gregory Palmer as the rationalist approach which, "gives the concept of security a function in international relations analogous to that of utility in economics."[5] The McNamara approach to security was a significant shift from the previous approach established by President Eisenhower.

Eisenhower saw the vast growth in military technology during the interwar years and the years immediately following World War II as posing new problems for American military policy, which prior to WWI had been one of isolationism. In a span of a mere 50 years America fought two world wars, a regional war in Korea, and was on the verge of another regional war. The United States assumed world leader status at the end of World War II. Eisenhower's perspective viewed security as an issue of global spheres of

influence between the US and the Soviet Union that could be resolved through maximum use of technology. This US reliance on technology incurred a significant cost paid by Americans to develop systems that allowed war to be an instrument of national policy. This approach was at the heart of two opposing doctrines of total and limited war.[6] Essentially, Eisenhower saw nuclear weapons and the concept of total war as the answer to America's security concerns. It was appealing because it gave a nation many of the economic benefits of isolation without the normal constraints of isolationist policies. America's influence in the world was no longer reinforced with a large army and the drain on resources that that army would entail. Eisenhower's foreign policy placed a great deal of emphasis on treaties and agreements to prevent nations from becoming neutral or slipping to the side of communism. He maintained that these binding treaties would prevent the use of his nation's military might. The limited war theory that developed alongside the total war theory proposed that the nation had to be prepared to act alone and use military force free of alliances if it was in the best interests of the nation. The limited war theory saw military force not as a result of failed diplomacy, but as a peer to diplomacy. In this peer status, diplomacy could at times be seen as less desirable to military force.

US policy attempted to apply the two theories in Europe; the resulting national military strategy emphasized alliances and the threat of massive retaliation to enforce the peace. In Asia however, alliances were less successful as they were in Europe and some believed they encumbered the American ability to counter aggression. As a result, Americans anticipated a limited war in Asia, one which required a strong military force to execute.[7] As the military adapted from fighting a total war to preparing for a more

limited conflict the nation's security strategy encouraged military institutions to change their view of small arms requirements. The limited war theory borne out in The Kennedy-McNamara "flexible deterrent" policy reinvigorated military spending to modernize conventional forces and equipment. With new focus on modernizing conventional forces, weapons programs received new emphasis and oversight. Where economics had limited improvements to gradual, methodical change in the past, a new influx of money during the Kennedy administration provided the opportunity to make significant changes in a short period of time. The civilian culture of thrift began to shift to a culture of spending.[8] With the changes in political and economic landscape came an emphasis on the effectiveness and efficiency of scientific methods applied to management.

At the close of World War II, science and scientists found they had a greater role to play in the defense of their country. The development of the atomic bomb was the most significant example, however, science took on additional significance in other areas. Quantitative analysis and the scientific method drove operational research and development. Researchers used slide-rules and simulations to make their recommendations, rather than the hindsight of previous combat. One group of scientists with an influence on the future of the military was the Operational Research Office (ORO)

The US government instituted the ORO in 1949 as the continuation of a wartime fusion of civilian scientists and operations research experts. They used their work in war planning and development of future weapons systems.[9] Science provided the weapons that ended the war in the Pacific and operations research continued to play a significant role as the Soviet Union and United States began a 50 year arms race. The Korean War

provided a significant amount of data for ORO analysts. Over 150 analysts went to Korea during the war to gather data and conduct research[10]. As with any organization, the ORO developed beliefs and patterns of behavior. The ORO centered on the strengths and value of science and the reliability of scientific analysis.

Reinvigoration of the HVSC concept spawned from ORO research into combat wounds in an attempt to provide better ballistic protection for soldiers. The ORO discovered that battlefield wounds were just as likely to come from random fragments as from consciously aimed rifle fire[11]. Additionally, they found that the kind of operation a soldier conducted influenced the type of fire. In the defense, aimed fire played a more significant role. In the offense however, massed un-aimed fire resulted in more enemy casualties than did aimed fire[12].

Additional research that resulted from ORO's investigation into battlefield wounds identified changes in rifle technology necessary to increase effectiveness on the battlefield. ORO concluded that the normal combat environment allowed only fleeting targets to an infantryman and engagements usually occurred within 300 meters.[13] Their research included not only observations of actual combat, but also controlled scientific experiments that attempted to replicate combat while retaining controls and standards to the testing. Their controlled testing used moving targets, attempted to replicate the sights and sounds of the battlefield, and induced fatigue in the soldiers conducting the firing. In this manner, they could be sure that the environment remained consistent during testing.

Norman A. Hitchman, the head of the Infantry division at ORO, made numerous recommendations resulting from their research. One such recommendation was the concept of weapons that fired multiple, dispersed rounds in order to increase hit

probability. This had the potential of increasing ammunition consumption depending on the method of accomplishing the dispersion. Hitchman also stated that the standards for rifle accuracy could be relaxed without significant influence on hit effectiveness. In essence, Hitchman's findings suggested that, "the Army's insistence on a long range, full power infantry cartridge was based on false assumptions."[14] Those assumptions were that the environment of combat necessitated long range accurate rifles.

ORO eventually recommended the development of a rifle that could fire large numbers of projectiles in a short period of time. They proposed to accomplish this by adopting a rifle that fired multiple projectiles at a high rate of fire. Additionally the ideal rifle required light recoil that soldiers could easily control while fired at a high cyclic rate.[15] One way to have controllable automatic fire was through the use of HVSC cartridges. The Army's Ballistics Research Laboratories research into HVSC rounds done in the 1920s and 30s continued to show promise. They discovered that a projectile's lethality directly correlated to the cube of its velocity at impact. The importance of this finding was that increases in velocity had a significantly greater influence on lethality than did increases in bullet mass.[16] With this in mind, great gains in lethality were possible by merely increasing a bullet's velocity. Since it was easier to move lighter bullets at higher velocities, a reduction in bullet mass provided the increase in velocity that actually increased a bullet's lethality. The ballistics research findings proposed that HVSC cartridges could produce greater lethality than the .30 caliber 7.62mm NATO round while at the same time reducing the combat load of the soldier and his logistical requirements.[17]

Arguments Against HVSC

A 1963 study evaluating Army rifle development demonstrated the Army's position on rifle caliber by stating that the .30 caliber round was the optimal choice for two reasons. The first reason was that the bullet was of sufficient size and mass to enable the implementation of special purpose rounds such as incendiary, armor piercing and tracer rounds. The second reason cited by the study was that it was the most powerful that could be "tolerated in a shoulder weapon and still adequately meet the extended range performance required in the automatic weapon,"[18] thereby demonstrating the cultural affinity to long range fire. The report stated that success in WWI resulted in general acceptance of the .30 caliber 30-06 cartridge fired from the M1903 rifle. This same cartridge became the round used in the M1 Garand which was originally designed for a smaller cartridge but was redesigned to accept the 30-06. This redesign resulted from Gen. Douglas McArthur's decision to continue work on a semi-automatic rifle capable of accepting the 30-06 cartridge. The report cited the earlier research by the Ballistics Research Laboratory, in Aberdeen Maryland. That research recommended investigation into the feasibility of a smaller caliber cartridge as early as 1928. Those recommendations led to the Pederson and Garand designs which predated Garand's heavier caliber M1. The cartridges proven performance, large existing stocks in a budget constrained environment, and the desire of ammunition compatibility of the individual rifles and machine-guns of the era influenced the desire to retain the 30-06.[19] Adoption of the 7.62 NATO round in 1954 leveraged new improvements in gunpowder technology. The technology allowed smaller cartridges to perform with the same ballistic characteristics as the 30-06. The same technology enhanced the HVSC argument as well. The HVSC

proponents, however, needed to gain converts from those who viewed the rifle and its role in traditional terms. New developments in the firearms industry provided the rifle from which would spring renewed interest in the HVSC concept.

ArmaLite Takes on Challenge

The innovation in rifle design that became the M16 had its origins in aviation industry by a company named ArmaLite. In October 1954, Fairchild Engine and Airplane Corporation established the ArmaLite Division. ArmaLite's purpose was to take cutting-edge aviation industry technology, namely in non-ferrous metals and polymers, and introduce it into the firearms industry. Their goal was to lower both weight and production cost. ArmaLite engineer Eugene Stoner developed the AR-15 to meet a 1957 Continental Army Command (CONARC) requirement for the next generation infantry rifle. The prototype rifle did well enough for the US Army Infantry Board to order ten rifles for testing and evaluation.[20] The testing conducted in 1958 began nearly a decade of controversy and a change in how the US Army viewed rifle use on the battlefield. The culture of science within the ORO, complemented by the culture of innovation within the ArmaLite, influenced the Army Infantry Board to consider a change to their long standing traditions of marksmanship. The results of that consideration resulted in some of the first conflicts of cultures.

The Infantry Board first conducted tests in 1958 to determine suitability of the rifle as a replacement to the M14. The Ordinance Corps at Aberdeen Proving Grounds conducted the second test to determine if the rifle met the standards set forth for service. The third test applied the weapons in a tactical environment to determine their influence on squad effectiveness. Testing of the new .223 caliber AR-15 in 1958 also leveraged the

new gunpowder technology and ballistic research that demonstrated the lethality of HVSC rounds. The Infantry Board received the concept well, but there were reservations regarding the .223 caliber round for military use. Selection of a rifle which used a different cartridge from the NATO standard had numerous implications. The US had strongly advocated the selection of the 7.62 round over the objections of other NATO countries who had preferred other cartridges for standardization. In essence, because the US had so forcefully supported the use of the round a change to the standard cartridge just 4 years after acceptance of the 7.62 NATO would have had significant political implications among NATO military and civilian leadership.

The Powell Board, convened in 1958, took on the task of reconciling the divergent opinions within the Army regarding the HVSC concept. The findings of the board could be seen as an attempt to appease both sides with the following statement,

> The board . . . liked the small caliber, high velocity concept, but recommended that no further consideration be given to the caliber .233 round. It further recommended that the M14 be retained for the automatic rifle role and that development of the AR-15 type of weapon, chambered for a .258 caliber round, be expedited to replace the M-14 in the rifle role.[21]

Even with this statement, the board held fast to the M-14 and its 7.62 caliber round and maintained tradition by using political and economic constraints to validate their position in the face of scientific evidence that contradicted their position. The board's findings were a compromise which left no group satisfied, yet empowered Ordinance Department leadership to continue with their current programs with a recommendation to develop an AR-15 type rifle chambered in .258 to replace the M14. The Powel Board had determined that a .258 caliber round would be the ideal HVSC round.[22]

Also in 1958, the Army Combat Development Experimentation Center in Fort Ord California executed testing that compared units armed with HVSC rifles against the 7.62 M14. The final report stated that the lightweight high velocity rifles when compared to the M14 provided "overall combat potential superior to that of the M-14,"[23] thereby enabling the HVSC advocates.

Prior to the completion of the tests at Fort Ord and upon recommendation of the Powell Board, the Army Chief of Staff decided to continue production of the M-14. The 7.62 remained the standard until any new concept could provide a significant advantage over the 7.62 cartridge. As a result of this decision, the HVSC concept was shelved by Army Ordinance leadership and efforts were directed towards an entirely new concept being developed known as the special purpose individual weapon (SPIW). SPIW provided a potential revolutionary change to military small arms that showed promise on the drawing board but never progressed from testing to implementation due to technological limitations and expense.

Enter Politics and Economics

When all testing and recommendations prior to 1961 by ORO and the Army Ballistics Laboratory demonstrated that the HVSC round was a concept worthy of implementation, Army senior leadership continued to reject the idea. This rejection was evidence of a cultural influence on the decision making of the Army leadership. The cultural influence continued, as it had in the past, to be based on the perceptions of the economic and political ramifications of change. The Army Infantry Board demonstrated a desire to consider change to their culture of marksmanship through testing of the HVSC

concept, but their actions alone could not institute a change that would influence all of the cultures involved in small arms acquisition.

The ORO and ballistic data prompted the Army Infantry Board to readdress the specifications for the next generation of military rifle. The two previous times they addressed the possibility of a smaller caliber, lower recoil, less powerful round their recommendations were not approved. Both times, Army senior leadership used the arguments of efficiency and economic constraints to counter the recommendations. Historian Dr. Thomas L. McNaugher proposed that these were valid concerns, however, they supported a deeply-held cultural belief that long range accurate fire was the hallmark of a great military rifle.[24]

Though ORO reported that the maximum range soldiers needed to engage targets in combat was 300 yards, and the Infantry Board agreed with that assessment, CONARC requirements were for the rifle to fire a cartridge that would puncture both sides of a standard steel helmet at 500 meters. Stoner explained that the Infantry Board did not feel that CONARC would accept 300 yards. As a result, they added 100 yards, made their requirement 400 and submitted it to CONARC. CONARC, after reviewing the recommendation reportedly adjusted the requirement because they knew everyone at the upper levels of the Pentagon thought in terms of 1,000 meters. With this muddled reasoning in view CONARC leadership changed the testing requirement from 400 to 500 and from yards to meters. The final specification required a bullet that performed with favorable terminal ballistics at 500 meters.[25] This cultural influence resulted in changes to testing requirements that were entirely subjective and not based on the objective results of ORO's research. The cultures involved at this point demonstrated varied behavior

patterns regarding decision making and management. On one side the scientific approach was prevalent, and on the other, a more experiential and intuitive approach existed. The difference in approach contributed to future conflicts within the program. Those conflicts were eventually resolved through the input of a culture that had the power to induce cultural change through both economic and political pressure. Colt Firearms, saw the ability to influence just such a culture and approached the problem from a political and economic perspective instead of just a technical perspective.

Colt takes the Reigns

Development of the AR-15, a rifle of superb accuracy at shorter ranges, embraced the research by the ORO that stated that the majority of rifle engagements in combat occured at ranges of 300 meters or less. It should be noted that the American adversary and co-superpower of that era had, after research of its own, concluded that the rifleman need only be able to engage targets out to 300 meters. When, in 1947, the Soviet Union developed one of the most prolific military small arm in history, the AK-47, it was with this thinking in mind.

After the military published the Powell Report, a dispirited ArmaLite sought to divest itself of the AR15 program. They viewed the report as an end to the program and wanted to recoup what money they could. Colt Firearms relieved ArmaLite of their perceived burden. Colt considered the rifle patent as an opportunity; they approached the problem from a marketing perspective and their efforts ultimately succeeded. With the license, they hired the rifle's developer, Eugene Stoner, to work through the flaws that the 1958 tests identified. Colt went even further and employed Cooper-MacDonald Inc., of Baltimore, Md. to promote the rifle both within the US and overseas.[26] With growing

conflict in Indochina, Colt saw potential markets for the rifle. By 1960, Colt prepared the improved rifle for further testing. Though the Army had temporarily lost interest in the rifle, the Air Force was interested in a rifle to replace their ageing M-1 carbines.[27]

A New Round of Testing

At the request of the Air Force, the Ordinance Department conducted a second test in 1960 that resulted in favorable results for the AR-15. Additionally, because the .223 cartridge was developmental and initially designed specifically for the AR-15, the Air Force desired analysis of the cartridges capabilities. Air Force tests conducted on the .223 Remington cartridge at the Ogden Air Material Area resulted in the conclusion that the lethality of the cartridge was excellent at ranges out to 500 yards. The Air Force lacked the long standing culture of long range marksmanship of the Army, and thus viewed the primary role of the rifle from a different perspective. Although Congress and the DOD voiced some resistance, the government contracted Colt for 8,500 rifles. They also awarded and additional contract for the manufacture of 8,500,000 rounds of ammunition that met the specifications of the ammunition used in the Ogden test.[28] Because of the contract, the Air Force culture radically changed the landscape of the AR-15 development and M16 acquisition program by making the rifle a government purchased weapon system. The contract for the rifles opened the door to foreign sales purchased with American military aid dollars. As a result, interest by the Republic of Vietnam to purchase the rifles had ordered effects that revitalized interest in the AR-15 for US forces.

In September 1961, 10 rifles were sent to Vietnam for testing in a combat environment with the Military Assistance Advisory Group, Vietnam. The results of this

evaluation were very favorable for the AR-15 and the Army initiated requests for more rifles. American military advisors reported that the light recoil and weight combined with the ergonomic design made the rifle suitable for the smaller stature of the Vietnamese soldiers. The request for more weapons was made by soldiers in the field after having seen demonstrations by Colt in the Republic of Vietnam. From that point on, combat soldiers and the culture they represented dramatically influenced the course of the M16 program. Their requests went to Secretary of Defense McNamara for approval. The Secretary then directed the Advanced Research Projects Agency (ARPA) to evaluate the combat trials.[29]

In 1962, ARPA, whose charter it was to oversee the research and development of advanced weapons systems, took on the AR-15 as part of its project AGILE. AGILE's purpose was primarily the development of equipment for America's Southeast Asian allies who were becoming more significant as communist opponents sought to gain dominance in the region.[30] Reports from the AGILE field study showed that the Vietnamese regarded the weapon favorably and preferred it to their current issue of M1s and BAR automatic rifles. The new rifle equally impressed American advisors working with the Vietnamese. The final recommendation supported the use of the weapon as the standard rifle by the South Vietnamese Military. A supply of ammunition with IMR powder was also provided with the weapons. With that rifle and ammunition combination the Vietnamese reported no significant reports of rifle failure. The ARPA report concluded that, "no deficiencies in the weapon requiring correction prior to adoption were found during the test in Vietnam,"[31] giving support to the HVSC concept.

The favorable ARPA report and continuing pressure from the Air Force to procure rifles for security force use encuraged the DOD Comptroller to conduct a cost effectiveness comparison of the M-14 and the AR-15 rifles. The comparison was complete and the Comptroller published the results in 1962 which indicated that the AR-15 was superior to the M-14 in all respects. In addition to the technical aspects of combat effectiveness, the report addressed the fact that the AR-15 was less expensive to produce. The report criticized the M-14 by even stating that it was inferior to its parent, the M1, and the Russian AK-47.[32] The cost effectiveness comparison, however, may have been influenced by culture in the DOD comptrollers office as well.

A case study written at the US Army War College in 1969 on the M16 rifle paints the OSD cost-effectiveness study as biased in favor of the AR-15. The author of the case study, COL. Louis J. North, stated, "An objective and critical analysis of this report reveals it to be slanted and heavily biased in favor of the AR-15." COL. North, an infantry officer also maintained that the writer of the report lacked an appreciation of infantry weapons and supported his claims with numerous examples to highlight the point.[33] COL. North's case study concluded with recommendations that supported the HVSC concept as valid and indicated it had tactical applications. As a result of his balanced analysis, the study demonstrated an honest analysis of the M16 rifle program. COL North's analysis, however, was not the norm regarding the HVSC concept which had either strong supporters or critics.

Civilian Marksmen and Their View

The National Rifle Association (NRA), one of the most significant gun lobby groups in American history, closely followed the development of new rifle technology

through the 1950s and 1960s. They followed development of the HVSC concept and reported on it in their monthly membership magazine, *American Rifleman*. Their staff had conducted tests on the AR-15 rife while it was still in its infancy in 1959. Their initial impressions reported favorably on the light recoil, functioning and reliability. Their negative comments were critical of the high rate of fire in the automatic mode, which made the rifle difficult to control without practice. Moreover, the shouldering felt awkward relative to what they considered to be "a stock of usual form."[34]

The NRA reviewed the AR-15 rifle again in May 1962. Their analysis of the rifle and the concepts that it represented consisted of their own test data as well as the data from Army testing. NRA members Walter J. Howe and E.H. Harrison analyzed historical information on the development of small caliber military rifles but demonstrated their ties to tradition in their analysis of the Army and NRA tests. The NRA view of the 1958 tests was that they produced unfavorable results with regards to penetration, accuracy in simulated combat and arctic conditions. They pointed out that following the tests, "Winchester ceased work on cal .22 military rifles," and "The management of Fairchild Engine and Airplane Corp. decided to divest themselves of the AR-15 rifle,"[35] implying that industry found the concept lacking merit.

The 1962 testing conducted for *American Rifleman* concluded that the AR-15 was not an acceptable replacement for the M-14. They did however note that the rifle showed some value among Asian soldiers of a smaller stature due to the lighter weight and recoil.[36] The NRA also expressed their position in the AR-15 article through a long account of the reasons for standardization of the M14 rifle.[37] The reasons the NRA

writers submit for the unacceptability of the AR-15 rifle are very similar to the reasons used by ordinance officers throughout history to resist change.

The negative NRA view of the military small caliber bullet was evident in the statement "In every instance the AR-15 has functioned well and there is no doubt it is a fine little weapon. However, there were and still are serious doubts as to the performance of a small bore round as a military cartridge for general use."[38] The NRA also observed in a statement common to many Army officers, that the reasons that existed when the 7.62 NATO cartridge was selected continued to exist in 1961. Additionally, they stated that there appeared to be issues of interchangeability, lethality, and range associated with adopting a cartridge other than a full power cartridge.

Authors of the 1962 *American Rifleman* article presented the NRA testing and evaluation of the AR-15 wrote following the first round of military testing but prior to the second round of testing that occurred after developers made modifications to the rifle. The NRA has historically represented the long range marksman tradition. Members of the marksmanship culture embraced the M-14 for its capabilities at long range accuracy.

The culture of the NRA and the civilians it represented was similar to that of the Ordinance Department. The difference between the Ordinance Department and the NRA was that in subsequent years there was a large turnover in Ordinance Department and Army senior leadership which resulted in changes in organizational thinking. That change was brought on by Secretary of Defense, Robert S. McNamara.

McNamara, Catalyst of Change

McNamara, an educated man with a degree in economics from Berkeley and an MBA from Harvard, was both an experienced scholar and manager. He was a member of

the faculty of Harvard when the Army Air Forces commissioned him and used his talents to develop scientific and mathematical methods for managing the European bombing campaign of World War II. After the war, Ford Motor Company hired McNamara. While at Ford he helped to reversethe company's failing business.[39] This success as well as his reputation and liberal connections at Harvard caught the eye of President Kennedy who offered McNamara the position of Secretary of Defense.[40] The request by Kennedy was finally accepted only after he reportedly agreed to McNamara's request for full control and authority over the department as a condition of employment.[41] This proved to be an indicator of the way McNamara did business throughout his tenure.

When McNamara arrived to head the DOD, he brought with him a group of personnel whose main purpose was to improve the performance and efficiency of the DOD.[42] Their work, along with the secretary's desire to consider widespread change, encouraged the proponents of change within the small arms community who finally believed that conditions existed which were favorable to the presentation of their ideas. In fact, just six months after assuming his position, McNamara criticized the M14 rifle program stating, "I think it is a disgrace the way the project was handled,"[43] signaling the demise of the M14 and ascendance of the M16.

At the same time acquisition of the rifle was receiving new emphasis, Secretary McNamara was made sweeping changes within the DOD and the US Army. His intent was to institute organizational and behavioral processes that would improve efficiency in the military. McNamara focused on analytical models for decision making and acquisition in an attempt to make the decisions less intuitive and more scientific.[44]

Though his focus lie primarily with systems and structure, it led to a secondary effect of rapid turnover of key personnel who had previously held significant influence within their organizations. In some instances, McNamara created entirely new organizations while completely disbanding existing groups.[45] McNamara's change of structure included a shake-up of personnel which undoubtedly had the additional effect of demonstrating to the replacements the magnitude of McNamara's power and his desire to bring about change. Additionally, his appointment occurred concurrently with the arrival of a young and inexperienced president, John F. Kennedy. President Kennedy's security strategy shifted from one of massive nuclear retaliation to flexible deterrence. The new strategy recognized that there was a significant threat to American interests by way of small scale conflicts occurring worldwide. Vietnam was a perfect example of such a small scale conflict. Massive retaliation had no effect in such an environment, so the military needed to have the ability to operate in both large scale nuclear conflict as well as small scale insurgencies.

When McNamara took his position he was faced with not only his own perceptions about how the military conducted business, but also with how he would transform the DOD to meet the needs of the flexible response strategy. McNamara wanted the most efficient and cost effective approach to his transformation. The AR-15 fit neatly into that mold. The testing initially showed it to be more effective, easier to support, and cheaper to produce. It represented revolutionary changes in small arms technology that could be easily embraced as the latest improvement in cutting edge technology.[46] The ARPA report combined with the DOD Comptroller's report and interest from both the Air Force and Navy led the Secretary of Defense to request

information from the Army as to their views on effectiveness of the AR-15, M-14 and AK-47. The reports he received made him question how small arms acquisition was conducted and resulted in his active involvement.

When Secretary McNamara read the various reports he was baffled that they could be so contradictory even though their testing occurred at the same time. As a result, on 12 October 1962 McNamara ordered the Secretary of the Army, Cyrus Vance, to reevaluate the AR-15, M-14, and the AK-47. McNamara wanted resolution and clarity on the issue and his concerns were soon also voiced by the President himself. The comptrollers report had been provided to the President in summarized form which resulted in Kennedy instructing the Secretary of Defense on 6 November to prepare a report to the president addressing the controversy. President Kennedy, a life NRA member and gun buff had been given two AR-15s from Colt. He had written Colt a letter telling them how much he enjoyed shooting the rifles. This is a clear example of the influence of civilian organizational culture from both the NRA and from civilian industry on potential military decision processes. It appears however, that Colt's favorable opinion of the rifle won out over the NRA's less favorable opinion. With the President's request to McNamara, there began a third series of testing and an eventual change in philosophy by Army Ordinance leaders responsible for small arms procurement. McNamara wanted answers from the Army and he wanted them to be backed up by objective, quantifiable science.

One of the most significant items to note during the reevaluation was that the Army was unable to reproduce the performance reported in both the ARPA and Comptroller's evaluation of the rifle. McNamara's request to be provided a quantitative

comparison of the M-14, AR-15, and AK-47 had significant results. Many of the results of testing conducted in late 1962 to answer the questions raised by Secretary McNamara were favorable to the AR-15. In the final report, the recommendations were to continue use of the M14 by US Army Forces in Europe except for airborne and Special Forces units, correct noted deficiencies to the AR-15; and equip Air Assault, Airborne, and Special Forces units with the rifle. Additionally, the report recommended slowing M14 fielding, and continuing work on the SPIW program with a goal of providing marked improvement in the long term.[47] The final paragraph of the report clearly depicted the cultural differences within the Army regarding the AR-15. It stated,

> It should be noted that there is a wide disagreement at all levels both as to the worth of the AR-15 and the wisdom of introducing it into the US Army. These conclusions and recommendations are mine as Commanding General, US Army Combat Developments Command.[48]

Though he didn't recommend widespread fielding of the rifle in the report, Lieutenant General John P. Daley's first statement in the conclusions section of the report provided insight into his opinion of the rifle. The opinion was,

> If the basic decision were to be made now, without reference to the impact resulting from the decisions already made, in my opinion the preferable rifle for world-wide usage would be the AR-15. Even in these circumstances, however, I would not standardize the AR-15 without an expedited improvement program to correct the unreliability of the rifle-ammunition combination and the poor night firing capabilities. Both appear correctable. [49]

General Daley's comments represented the effect of decisions made as a result of cultural influence.

Another example of divergent opinions and clashes of organizational culture was evident in testing done by the Infantry Board in 1962 which resulted in a report

completed the same month as General Daley's. In that report, Colonel William M. Summers concluded,

> In view of the weapons currently available in the US Army, no consideration should be given to the adoption of the AR-15 rifle until all of the deficiencies noted in annex B of this report are corrected.[50]

Annex B listed 13 shortcomings which included sight adjustment, extraction, magazine, cartridge, and trigger pull to name a few. This appeared to be somewhat in-line with General Daley's conclusion. Where it diverged, however, is in the following statements, "After correction of the deficiencies, the AR-15 rifle would be suitable for employment in the submachine-gun and special operations roles," and, "The M14 rifle should be retained as the basic weapon for the rifle role." In the same report, the M16 was more accurate than the M14 out to 500 meters and only slightly less accurate at 600 meters. Additionally, the AR-15 was significantly more accurate than the M14 in automatic mode at all ranges tested.[51] Though the M14 was having its share of problems, it is clear that there was belief that its problems could be overcome and it would be the better choice for world-wide service.

The problem with a purely statistical approach was that the statistics could be easily influenced by the research methodology used. For example, testing of the rifle in Vietnam reduced the ability for researchers to maintain valid test controls and conditions. Additionally, testing in a purely controlled scientific environment was able to come close, but never completely replicated the environment of combat. Data from weapon testing could also be skewed through the selection of criterion for success and test conditions. Opponents and proponents of both the M-14 and AR-15 cited these reasons for their weapons success or failure throughout the testing of the rifles.

January 9, 1963, the Army Chief of Staff, General Earl Wheeler, reported to McNamara that a proper weapon for universal use in the army had to, "be adaptable to the American soldier anywhere in the world." Additionally he noted that it was a change from the NATO standardized 7.62 round that had essentially been forced upon the European allies when they had preferred a smaller caliber round. Additionally, he argued that the M14 was notably superior to the AR15 at ranges beyond 400 meters. Finally, and the most significant condemnation of the rifle was that it was still early in the rifle's development and still had technical problems that needed to be worked out before it was accepted for universal use.[52]

McNamara continued to feel that there were unexplained reasons for such divergent results and conclusions in testing. As a result of this, he commissioned an Army Inspector General inquiry into the AR15 tests and evaluation. The first IG inquiry resulted in no findings of biased evaluation.

Introduction of Bias in Testing

As a result of the late 1962 test findings Cyrus Vance began to question the impartiality of the tests and commissioned a second Inspector General investigation to look into the manner in which the tests were conducted. The Inspector General was given instruction by Secretary of the Army Vance on 21 December 1962 which directed an investigation on the objective evaluation of the M16, M14 and AK-47. The investigation was required to include:

1. Instructions (formal, informal, official, or unofficial) which may have been issued with respect to such tests at any echelon within the department of the Army.

2. The conditions under which such tests have been or are being carried out.

3. The conduct of the tests themselves.

4. The methods by which the results of the tests are recorded.

5. The methods by which such tests are evaluated

6. The attitude towards such tests by any personnel in any way connected with their conduct or evaluation.[53]

As a result of the investigation, the Inspector General concluded that the methods of evaluating the test data and the treatment of the data demonstrated that the results of the US Army Infantry School and the US Army Infantry Board were subjective and favored the M14. This same bias was found in answering all of the questions laid out by the Secretary of Defense in his request for investigation. So though the Infantry board had been one of the greatest proponents of the 1958 concept that resulted in the M16, they were now demonstrating an adverse reaction to the idea of the concept.

One of the most significant findings came from an official memorandum covering the results of an informal planning conference in which the representative from the Infantry Board stated "The US Army infantry Board will conduct only those tests that will reflect adversely on the AR-15."[54] The statement was later denied and the IG could find no further evidence, yet it raised the question as to how prevalent bias in testing had been.

In the final report, the Inspector General came back with findings that Ordinance Department and Infantry Board leadership had shown undue favor to the M14. There were other examples of adjustment to test procedures and assumptions made without scientific validation that worked their way into the testing process. Two such examples

are found in the lethality tests conducted at Aberdeen Proving Grounds and Infantry board testing conducted at Fort Benning. IG investigation into the lethality tests found that the rifles and ammunition used in the test were the same as those used in the ARPA Vietnam test that had such spectacular claims of lethality. The test found that the ARPA claims that the bullet was explosive on impact could not be duplicated. However, the Army surgeon that was responsible for analyzing the wounds made during the test found that both the AR15 and M-14 produced wounds which would result in, "a casualty or identical degree of incapacitation."[55] Infantry evaluators present at Aberdeen for the tests stuck to the assumption that heavier bullets are more effective which resulted in one infantry test officer stating that, "The M14 was more lethal than the AR15."[56] Though the adherence to an assumption even in the face of contradicting science seemed counter to the way testing and evaluation should have been conducted, it was nothing when compared to the bias present at the Infantry Board.

The Infantry Board rifle test plan approved by General Besson was modified by COL William M. Summers when it arrived at Fort Benning. COL Summers reported to IG investigators that he was justified in his modifications of the test plan. Though the Infantry board had supported development of the AR15 just years earlier, its view of the competition between the M14 and AR15 in 1963 strongly favored the M14.[57] The official range requirement was dropped to 400 meters with the SPIW concept. For the AR-15 testing, however, Summers expected that the rifle should be capable of hitting a bulls-eye at 500 meters when fired by the average soldier. He made this conclusion because the longer ranges were included in the marksmanship instruction courses. The accuracy of the AR15 proved to be very good during the tests and only began to show decreases in

accuracy at the ranges well beyond the established standard set forth through scientific research into historical combat engagement ranges. Summers, when asked why the data from the test didn't validate the recommendations responded that their recommendations were based on the extended range that would be encountered in combat. Summers' assumptions demonstrated the Infantry Board's adherence to the marksman tradition more than it did to actual scientific analysis of modern combat conditions. In the end, the rifle was tested against standards established in 1954 even though ORO research had proven those standards to be inaccurate and unlikely in combat.[58].

Eventually, McNamara acted as a result of what he saw as a flawed program and order purchase of the weapon. The bias, however, continued even after his involvement. When the Army rifle production base plan was developed, Secretary McNamara approved the plan with provisions. Among those provisions was one that stated:

> To exploit the advantages of this commercial development, the modifications and changes necessary to place the weapons system in development should be accomplished by request to the manufacturer concerned in consultation with the weapons designer.[59]

Results of later congressional investigation showed that the Army never implemented the provision calling for inclusion of the weapon designer. In so doing, they maintained a pattern of behavior that was counter to the development of the AR-15.

As the IG findings came to light, the SPIW development continued. According to the research done by the SPIW program, the Army hoped to produce a rifle that would surpass both the M14 and AR15 in effectiveness. Army ordinance leadership reported that their intent was to have full scale production of that weapon within four years.

After the round of testing conducted in 1962 the Secretary of the Army, in concurrence with the Army Chief of Staff and Commanding General, Combat

Developments Command (CDC), the AR-15 was approved for purchase to be used by airborne, special forces, and light units as well as those units and personnel deploying to Vietnam. With the procurement of the AR-15, the Secretary of Defense ordered that further acquisition of the M-14 would be ended.

Even though the Commander of CDC stated that the rifle should not be standardized until certain improvements were made to address deficiencies noted in the testing those changes were not rapidly made. His concerns over the rifle-ammunition combination and poor night firing capabilities were not dealt with until much later. As the designated DOD agent for AR-15 procurement, the Army delegated the responsibility to the Army Materiel Command Project Manager for Rifles. The Project Manager for Rifles was given the following implementation guidance from the Secretary of Defense:

> Beginning with FY64 procurement, only one rifle, rather than separate service versions, is to be produced, it is to be produced with minimum delay, and that modifications of the weapon and its ammunition to be concurred in by all 4 services. Only such modifications as are absolutely necessary should be made.[60]

McNamara made the order to conduct a limited one-time purchase of 85,000 rifles for the Army and 19,000 for the Air Force. M14s would be retained and used by units serving in Europe with NATO. By doing this, McNamara was able to address the concerns of the NATO alliance, yet provide weapons to a customer who had found the AR-15 suitable. Only after McNamara ordered that the program continue and purchase be made of the rifle with minimum modifications did the rifle come into service. What happened to the SPIW program, the AR-15 procurement, and its effectiveness in Vietnam opened another round of debate that resulted from the weapon's shaky start.

SPIW Delays

The original promise by the Ordinance Department in 1959 was for there to be a flechette firing weapon by 1962. Though there were prototypes available for testing, the testing proved that there were numerous technical problems with the concept to be overcome. For example, the flechettes had such low mass that they required a muzzle velocity of greater than 4,000 feet per second to be effective. The prototypes proved to be very unreliable during testing. Problems with SPIW were not limited to the weapons themselves but also to the cartridges they fired. The tiny sabot flechette ammunition required very tight tolerances and delicate balancing and finishing to be accurate. This resulted in a production process that made it impossible for the SPIW concept to be cost effective. When compared to the alternative presented at the time, the M16, the SPIW had no ricochet capacity and easily deformed and deflected when striking foliage and rain. Another important point is that the SPIW .22 caliber prototypes tested had an even more significant barrel water retention problem than the M16 had, yet the M16 had been determined unacceptable due to the water retention problem in its early testing.

With all of the noted deficiencies, SPIW continued to be the touted as the great hope for a leap in effectiveness that the Army desired. But with the known deficiencies the great hope may have been nothing more than a political tool to delay large scale acquisition of the M16. In essence it could be perceived as an elaborate delay tactic to outlast the tenure of McNamara.[61]

The SPIW had its fair share of honest proponents that bought into the feasibility of the concept. The SPIW became another example of how characteristics for rifle

development resulted in requirements that were often arbitrary judgments by the leadership of the program.

Marksmanship Beliefs Continue

As the rifle programs received more scrutiny, and the traditional ways of viewing the role of the rifle in combat were challenged, there were still those who held fast to the concept of the long range marksman. Examples of such beliefs are found within the professional military journals throughout the 1960s.

One such article, written in the January 1964 edition of Infantry Magazine, stresses the need for long range marksmen. SSG Fred H. Bost, the author of the article "Teach Him to Hit", wrote, "There is little doubt that combat marksmanship needs constant improvement. The nuclear battlefield will, of necessity, place an unprecedented strain on individual marksmanship skills." Bost went on to list arguments common among Infantry Branch discussions regarding marksmanship. He stated that units would be widely dispersed and commanders may not have machineguns thereby relying upon their riflemen for long range fire. He also used what had become the timeless argument of conservation of ammunition stating, "Conservation of ammunition will be the watchword; re-supply will be aggravated by troop dispersion – particularly if we do not enjoy air superiority." As had been demonstrated throughout the history of the Ordinance Corps, this argument was often used to effect both doctrine and weapons development.

Bost presented a mentality typical of those who have difficulty in periods of change. He mentioned that shooters at the Army Marksmanship Unit, the Army's competitive shooting team, had a favorable opinion of the M14. His comments went so far as to say, "when shooting accurate ammunition the company M14 rifle may be the

finest weapon ever placed into the hands of US troops." Additionally, he stated that, "Everyone agrees that the ability of a rifleman to put one round on target is the basic skill from which combat firepower is built." But, the reality of 1964 was that everyone didn't believe in marksmanship as the cornerstone of infantry combat. On the contrary, the research conducted by ORO began significant debate on the necessity of marksmanship over firepower and began a considerable level of support within the Army for SPIW. It is important to remember that the M14 had experienced significant growing pains in its development as well. The M14 was the same rifle that originated from an acquisition program that Secretary McNamara labeled as "disgraceful". Here again was evidence of the differing cultural views regarding small arms, their roles, and their acquisition. Because the organizations involved were all systems intertwined in a much larger system, these differences ultimately lead to conflict. It is interesting to note that Bost's article was published the same year that the purchase of the M16 was mandated by the Secretary of Defense. It was also the year the M16 would begin to see significant action in Vietnam, and would receive both commendation and criticism as a result of that action.

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[1] John W. Chambers, and Fred Anderson, *The Oxford Companion to American Military History (*New York: Oxford University Press, 1999), 518.

[2] Office, Chief of Staff, Army Office of the Assistant Vice Chief of Staff, Office of the Director, Weapon Systems Analysis, *An Annotated Bibliography of M16A1 Rifle System Tests*, Washington D.C., 15 April 1968

[3] The John F. Kennedy Library and Museum, "Campaign of 1960," www.jfklibrary.org/Historical+Resources/JFK+in+History/Campaign+of+1960.htm

[4] Gregory Palmer, *The McNamara Strategy and the Vietnam War: Program Budgeting in the Pentagon*, 1960-1968. (Westport, Conn.: Greenwood Press, 1978), 48-51.

[5] Ibid., 3.

[6] Ibid., 19.

[7] Ibid., 21-22.

[8] Ibid., 23-25.

[9] M. Fortun and S. S. Schweber. “Scientists and the Legacy of World War II: The Case of Operations Research (OR),” *Social Studies of Science* 23, no. 4 (Nov. 1993): 605

[10] Thomas L. McNaugher, *The M16 Controversies: Military Organizations and Weapons Acquisition.* (New York: Praeger, 1984), 53.

[11] Edward Clinton Ezell, *The Great Rifle Controversy: Search For the Ultimate Infantry Weapon From World War II Through Vietnam and Beyond* (Harrisburg, PA: Stackpole Books, 1984), 166.

[12] Ibid.

[13] Ibid.

[14] Ibid., 167-169.

[15] Ibid., 172.

[16] McNaugher, 55.

[17] Ibid.

[18] US Congress. House Committee on Armed Services, Special Subcommittee on the M-16 Rifle Program. 1967. *Report of the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives,* , 90th cong., 1st sess., 1967, 5322.

[19] Ibid.

[20] Duncan Long, *The Complete AR-15/M16 Sourcebook: What Every Shooter Needs to Know* (Boulder, Colo.: Paladin Press, 2001), 17.

[21] Henry R. Shelton, “The M16 Rifle Decade of Evolution,” (US Army War College Research Element Case Study,Carlisle Barracks, PA: US Army War College, 1969), 8.

[22] US Congress. House Committee on Armed Services, Report, 5322.

[23] Ibid.,5323.

[24] McNaugher, 68-69.

[25] Ezell, 174-177.

[26] McNaugher, 76-77.

[27] Long, 24

[28] US Congress. House Committee on Armed Services, Report, 5323.

[29] Shelton, 10.

[30] Ezell, 186.

[31] Shelton, 10.

[32] Ibid.

[33] Louis J. North, "The M16 Rifle – Tested in Combat," (US Army War College Research Element Case Study, Carlisle Barracks, PA: US Army War College, 1969), 25.

[34] Walter J. Howe and E.H. Harrison, "The AR-15 Rifle," A*merican Rifleman Guide to Black Rifles*, 2006, reprinted from *American Rifleman*, May 1962, 16.

[35] Ibid., 18.

[36] Ibid., 20

[37] Ibid., 20-21

[38] Ibid., 20

[39] Chambers, and Anderson, 424-425.

[40] Chambers and Anderson, 425.

[41] Carl W. Borklund, *Men of the Pentagon, From Forrestal to McNamara* (New York: F. A. Praeger, 1966), 210-212.

[42] Chambers and Anderson, 425.

[43] North, 55.

[44] Merritt R. Smith, *Military Enterprise and Technological Change: Perspectives on the American Experience* (Cambridge, Mass.: MIT Press, 1985), 303-305. and Chambers and Anderson, 425.

[45] James E. Hewes, *From Root to McNamara: Army Organization and Administration, 1900-1963* (Washington: Center of Military History, US Army, 1975), 344-351.

[46] McNaugher, 54-55

[47] Army Combat Developments Command, Fort Belvoir VA, *Rifle Evaluation Study*. 20 December 1962. DTIC, AD A 046 961. 6.

[48] Army Combat Developments Command, *Rifle evaluation study*, 7.

[49] Army Combat Developments Command, *Rifle Evaluation Study*, 6-7.

[50] Army Infantry Board, Fort Benning GA, *Comparative Evaluation of AR-15 (Armalite) and M14 Rifles.* 7 December 1962, DTIC, AD B 013 105, 16.

[51] Army Infantry Board, *Comparative Evaluation of AR-15 amd M14 Rifles*, 16-24.

[52] Ezell, 189.

[53] US Congress. House Committee on Armed Services, Report, 5329.

[54] Ibid., 191.

[55] McNaugher, 92

[56] Ibid.

[57] Ibid.

[58] Ibid., 93.

[59] US Congress. House Committee on Armed Services, Report, 5332.

[60] US Congress. House Committee on Armed Services, Report, 5331.

[61] J. A. Stockfisch, *Plowshares Into Swords: Managing the American Defense Establishment* (New York: Mason & Lipscomb, 1973), 173.

CHAPTER 4

1964 to 1968: THE TEST OF COMBAT

Secretary McNamara's decision to conduct limited purchase of the rifle for use among light and special units and units going to Vietnam, set conditions for the most significant evaluation of the rifle - combat. Though ARPA sent the rifle to Vietnam as part of a combat evaluation by the South Vietnamese Army, the test was limited in scope and duration. The result of day-to-day use by American soldiers in combat proved to be a significant departure from the ARPA results. The Ordinance Department operated well outside their cultural norms when fielding the M16. When forced to execute the purchase and fielding of the rifle, they were asked to execute a program in a manner that they were completely unfamiliar and in an environment counter to their culture of methodical testing. Combat use of the rifle was also the impetus to bring several other organizational cultures deeper into the M-16 rifle acquisition system, not the least of these were combat units, US congressional committees, and the American people.

Due to the rapid fielding of the rifle along with events outside of their control, Army ordinance leaders operated in an environment that was difficult for them to predict the outcome. Their actions were reactionary with respect to the fielding of the M16 rifle. Politics strongly affected the fielding of the rifle and resulting change in the Ordinance Department culture. Political pressure drove the Ordinance Department to depart from its traditional methods of acquisition and eventually brought its failures to light. Sadly, the four years from 1964 to 1968 not only demonstrated the failures of the M16 during its initial use in combat, but also failure of the system that should have prevented them. The

rapid change in the way America viewed its defense strategy stressed the systems and patterns of behavior throughout all of the organizations related to national defense.

Investigation of the failures is equally an analysis of the system as an analysis of the changes forced into the system by Secretary of Defense Robert McNamara. The change in strategy resulted in budgetary changes. The Army Ordinance Department's previous culture of thrift conflicted with the new culture of spending expected from the Secretary of Defense as America faced increased involvement in the Vietnam War. The M16 represented this cultural change well from 1964-1968.

Marine Input to the Debate

Marine opinion of the M16 after their 1963 tests was not favorable. They objected most significantly with the ammunition it fired. The Marines did, however, become enamored with another of Eugene Stoner's designs, the Stoner 63. Stoner designed the Stoner 63 for Cadillac-Gage, Incorporated as the AR15's progress with the Army stagnated. In 1964, Commandant of the Marine Corps, General Wallace Greene, pushed for testing and evaluation of the Stoner 63 as a potential future replacement for the Marine's M14s. Though the Marine Corps had advocated general acceptance of the M14, they saw a need for a better future system. Additionally, as the SPIW had for the Army, the Stoner 63 provided unique, attractive features not found in other rifles. The Stoner 63 was a system of small arms that provided the capability of modular stocks, barrels and ammunition feed systems to tailor the weapon to specific requirements.[1] The Stoner 63 family of small arms could provide the Marine Corps an appealing, economical and flexible weapons system.

Because General Greene emphatically supported the system and the Army was the proponent for acquisition of small arms for the services, the Marines ended up raising the small arms program back into the limelight. This occurred just when Army officials felt the issue would quietly recede into the background and either SPIW was procured or political change occurred. The Army met Marine interest in a new rifle with apathy and slow progress. Continued efforts to invigorate the testing eventually led to the Deputy Secretary of Defense. McNamara's deputy placed new pressure on Army leadership to answer concerns over the Army's management of small arms programs. General Harold K. Johnson who replaced General Wheeler as Army Chief of Staff took active measures by initiating major reevaluation of the Army's small arms program.[2] The reevaluation program, the SAWS study, opened the door for significant support of the M16.

Small Arms Weapons System Study (SAWS)

The SAWS evaluations provided the military leaders a quantifiable, scientific evaluation of the M-16 rifle in 1966 and validated the HVSC cartridge concept. Data from the SAWS tests in conjunction with technical hurdles sparked the downward spiral of the SPIW program and eventually its demise.

The tests that made up the SAWS study consisted of:

1. Engineering and service tests conducted by the Test and Evaluation Command

2. Troop tests in Europe, the Continental United States, Alaska, and the Caribbean.

3. Field experimentation conducted by the Combat Developments Command Experimentation Center (CDCEC) at Fort Ord, California.

4. Computer simulation of rifle combat conducted by the Combined Arms Research Office, an operation run by Booz-Allen Applied Research under contract to the US Army Combat Developments Agency at Fort Leavenworth, Kansas.

5. Computerized projections of optimal systems parameters, conducted by the Ballistics Research Laboratories at Aberdeen Proving Grounds, Maryland.

6. Cost data studies conducted by the US Army Weapons Command.[3]

Analysis of the results and their interpretation demonstrated the influence of organizational culture on the development of weapons systems. Interpretation of the data by two different organizations resulted in two separate outcomes and recommendations.

The interpretation of the SAWS results by the Army Staff relied heavily on the computer simulation done at Fort Leavenworth because it was the only evaluation that included the projected SPIW capabilities. Though there were no fully operational SPIW systems, scientific models existed that could be applied to the computer model. Reliance on the computer simulations, the inability to cost effectively produce the cartridges, and the demonstrated inability to produce a reliable SPIW weapon with available technology demonstrated a failure in the scientific process. The Army's desire to search for and produce data to support the programs desired by the organizational culture identified a bias in testing that destroyed the validity of the test.

The second group to review the data was the newly created Force Planning and Analysis Office (FPAO). An organization created by McNamara's reforms to conduct systems analysis, the FPAO provided an office for the Army similar to McNamara's OSD systems analysis office. Its membership consisted of Army civilian leadership as well as military leadership. Significant to the SAWS analysis was the selection of Dr. Jacob A.

Stockfisch as the civilian co-director of the office. Dr. Stockfisch formerly served as the chief scientific advisor to the Fort Ord CDCEC portion of the SAWS test. As a scientist, he approached the data from a purely scientific approach but brought with him his experience from the CDCEC tests. As a result, the FPAO review of the SAWS data placed greater value on the operational testing conducted at Fort Ord. Because there were no operational SPIW weapons for testing at Fort Ord, operational testing did not include the concept. As a result of this different approach, Dr. Stockfisch and his staff produced an evaluation that strongly supported adoption of the AR-15. The Fort Ord data produced results that demonstrated superior performance of the AR-15. In fact, the FPAO established that the lighter weight, high rates of fire and sustainability of the AR-15 weapons system made rifle squads armed with it more efficient and effective and therefore more capable.[4] Their findings resulted in the Secretary of the Army sending a memorandum to the Secretary of Defense which recommended rifle procurement for the immediate future be limited to the XM16. Additionally, he recommended that steps be taken to replace .30 caliber rifles as quickly as possible (M-1 and BAR) and that long term procurement should replace M-14s in the inventory. It further recommended additional production sources be provided in the FY68 budget, and that active research and development continue to enable further improvements to US military small arms.

Where the Army Staff had held fast to its belief that SPIW was the way of the future and used data that marginally supported that belief, the FPAO, a product of OSD reform, used their organizational charter and beliefs to produce a finding that ran completely counter to the Army Staff. The test observations, in light of the fact that they were derived from the same data, demonstrate a clear influence of organizational culture

on the small arms weapons program. Previous to the SAWs study the conflict resulted in Army leadership making minor concessions to appease outside pressures. After the SAWS findings, however, the senior Army leadership chose a different course.

The Deputy Secretary of Defense approved the Secretary of the Army's recommendations except for the immediate replacement of the M-1 and BAR and the long term phase-out of the M-14. He did not want to commit to such action until completion of a cost effectiveness evaluation and research into the ramifications to NATO arrangements. The Deputy Secretary of Defense's reservations provided additional evidence of political and economic factors in the culture of the Army. Those factors blatantly influenced the procurement of the M16 rifle.

Initial Rifle Purchase and use in Vietnam

The initial purchase of rifles for the Army in 1964 was for the purpose of supplying airborne, airmobile divisions and brigades, and Special Forces.[5] Dr. Robert A. Brooks, Assistant Secretary of the Army reported to a special senate subcommittee looking into the M16 program that use in Vietnam in 1965 had demonstrated that the rifle, "was highly suitable for infantry units fighting in that environment."[6] In December 1965, the Army decided to provide M16A1 rifles to all maneuver battalions deployed in or to Vietnam. This action was the result of a request by General William Westmoreland, top American general in Vietnam, earlier that year.[7] General Frank S. Besson, commander of the Army Materiel Command, supported Westmoreland's request for more rifles and stated to the Army Vice Chief of Staff, "I honestly believe the M-16 is a better rifle for jungle and rice paddy warfare."[8] There was no scientific data at that point

to support this claim, only the initial reports from the first ARPA trials in Vietnam. The evidence of its effectiveness came later.

Initial use of the rifle by the 1st CAV during the battle of Ia Drang resulted in some reports questioning the effectiveness of the rifle. Some soldiers using the rifle stated that there seemed to be instances where enemy soldiers, after being shot several times, were capable of taking several steps before falling.[9] With regard to reliability, CPT Joseph W. Kinzer, in an interview conducted 11 June 1968 by the US Army Center for Military History, noted that the rifle required more maintenance to ensure reliability than did the M-14 or M1. He observed as an advisor to an ARVN Airborne unit that the ARVN soldiers maintained their weapons well and they had no significant problems with the rifle.[10]

Jungle Warfare and Paradigm Shift

The first major conventional combat units deployed to Vietnam in 1964 The Army armed many of the front line combat forces in 1965 and 1966 with the M16 while support units continued to use M14 and M1 carbine rifles. Additionally, the South Vietnamese forces that US troops fought alongside used a combination of M14s, M1 carbines and the older M1 Garand rifles of World War II fame. Westmoreland faced the dilemma of fighting an opponent whose weapons provided greater firepower than his own. The AK-47, began to show up more often on the battlefield throughout the 1960s and had limited range but was capable of high rates of fire with lethal effects. Americans noted engagement ranges were often 300 meters or less in the jungle which supported the earlier research conducted by ORO regarding engagement ranges. At those ranges, the

AK-47 was fully capable of effective engagement while the environment mitigated the greater range of the M14.

Initial reports from units equipped with the M16 were favorable yet as time drew on and numbers of weapons fielded grew, problems began to surface. News reports began to surface that criticized the reliability of the weapon and tied its reliability to losses of American life. Those reports brought significant public attention to the topic. As a result of the public attention, Political leadership eventually felt obliged to look into the facts.

Views on Marksmanship and Future Systems

As had been the case throughout US small arms development, there remained vocal support for the traditions of the marksman rifleman. Articles from Infantry magazine in 1968 continued to promote the concept of well aimed single shots to disable the enemy and questioned the shorter range requirements. At the same time the articles questioned the Army's direction regarding marksmanship, they promoted the significance of SPIW and its capability to revolutionize warfare.

The dichotomy shown in some of the articles about the loss of marksmanship skills and future SPIW weapons represents the conflict felt throughout the Infantry Branch as they pressed on through their change in cultural beliefs and behaviors. There were however, signs of a shift in the culture occurring as the M16 began to demonstrate capability to provide what the soldier needed. In a 1968 Infantry Magazine article entitled "Third Degree Burns" by Captain James T. Collins, the question of the necessity of an intermediate cartridge was asked. Collins analyzed the history of intermediate cartridges and how they stood the test of battle.[11]

Collins proposed that in searching for the best rifle cartridge, previous generations attempted to solve specific problems through cartridge design just as the Army of 1968 attempted to address new problems on the battlefield. Essentially, Collins demonstrated an awareness of patterns of behavior within the Army that used experiments in ballistics to increase the effectiveness and efficiency of troops. He pointed out that during the Civil War some forces were supplied with the Shaler sectional bullet which had three projectiles stacked upon each other. Collins closely compared the Shaler bullet with the 7.62 NATO duplex load that was available in 1968. He also pointed out that the idea of a cartridge with power between that of a pistol and a high powered rifle was nothing new. Collins used the article to lay out for the reader a history of small caliber military rifle development. The greatest value of his article in looking at the clash of cultures regarding the M16 rifle program however, is in his statements on the M16. Collins wrote, "Unaware of the problems presented by small bore weapons in years past, or perhaps just not remembered by persons aware of them, the use of the M16 and 5.56mm cartridge spread." His dislike of the 5.56mm round continued to include personal observations, presumably from Vietnam, in which he derided claims of the round's effectiveness.[12] Collins' opinions were shared by many, but final review of the M16 rifle program by Congress would bring to light much of the controversy and clarify the weapon's strengths and weaknesses.

Ichord Committee Meetings

On 15 May 1967, Congress became actively involved in investigating the M-16 rifle program. This investigation spawned from strong statements by the news media of the rifle's poor performance in Vietnam. Additionally, Congress used the investigation to

look into foreign sales and additional contracts for the rifle. The committee's findings had lasting effect on the M16 rifle program.

The Committee on Armed Services created a special sub-committee to look into the program named, "The Special Subcommittee on the M-16 Rifle Program." The honorable L. Mendel Rivers, chairman of the House Committee on Armed Services established the special subcommittee by letter. Members of the committee consisted of Mr. Richard Ichord, of Missouri, Mr. Speedy O. Long, of Louisiana, and William G. Bray of Indiana. The committee became commonly referred to by the name of the committee chairman, Mr. Richard Ichord. The Ichord investigation covered a wide range of issues that plagued the M16 rifle and brought to light several failures in the program which resulted from organizational conflict.

The first to address the committee was Dr. Robert A. Brooks, Assistant Secretary of the Army (Installations and Logistics) who was sworn into the position on 16 October, 1965. His initial prepared statement laid a foundation of the program and addressed congressionally requested issues which included foreign sales, lubricants, funding, and sources of production. He concluded his prepared statement with the following message:

> In summary, the M-16A1 rifle has been well received by US Army personnel and has been by far the most popular individual weapon to be introduced in the recent history of the Army. To my knowledge, US Army combat commanders in Vietnam are unanimous in their opinion that it is an excellent weapon for the conditions there.[13]

Dr. Brook's statement before Congress could have been challenged for its accuracy regarding universal acceptance and popularity among soldiers. Senator Ichord responds to the initial statement by Dr. Brooks with:

> Back in 1961 Secretary McNamara made a statement that the procurement of the M-14 rifle had been quite disgraceful. Now, we are just starting out with

> this investigation. I have done considerable preliminary study, myself, as have other members of this committee. I am not going to use that term to describe the development, testing, and procurement of the M-16 rifles, but I will say, in what studying I have done thus far, it is a study in confusion.[14]

Throughout the hearings Congressman Ichord stated that he felt the rifle was a good rifle, capable of performing its assigned mission. He did state that there were discrepancies in the reporting, however. Ichord pointed out that there were unfavorable reports regarding the M16 that came out of Vietnam, particularly among Marine Corps units. He also noted that the committee interviewed 35-40 soldiers who had returned from Vietnam and every one of them said that if they went back, they would prefer to go back to combat with an M-16. Many of them reported that the rifle required greater care in maintenance and that the rifle was more delicate than the M14 or M1, but that it was lighter, had greater firepower and was effective at incapacitating their targets. The committee expressed concern over the reports of failures among the Marines and vowed to address those reports.[15]

The committee identified the 1966 SAWs study as the most comprehensive study of the available weapons systems done at the time and requested the results. After reviewing the SAWS data the committee determined that both the M16 and M14 were suitable, but that the M16 had clear advantages. Of significant note was a line of questioning by Congressman Bray asking why the Army's policy changed so markedly with regards to the acquisition of the M-14 and the M-16 rifles. He asked why in 1961 policies changed so quickly.[16] The policies changed quickly due to new leadership. McNamara's leadership as well as the leadership of those he put into key positions as he reorganized the defense acquisition process resulted in enormous cultural change within

the organizations these leaders influenced. As previously noted, Air Force leadership had played a key role.

While interviewing Air Force representatives during the inquiry, their statements continued to tout the reliability, service life, and quality of the weapon. The Air Force found the rifle to meet their needs and perform to their expectations. The Air Force qualified their statements by highlighting that the conditions the Air Force used the rifle in were different from those experienced by a front line infantry soldier. The weapon's primary use in Vietnam for the Air Force consisted of airfield base defense. The Air Force stated that they had well-established training program within the Air Force which taught weapon use and maintenance. Their training consisted of approximately 300 rounds of live fire at home station prior to deployment to Vietnam.

A demonstration of how the M16 weapon was misunderstood and misrepresented was found in an article by the *Army Times.* The article led one of the congressmen on the Ichord committee, Congressman Speedy O. Long, to believe that the commander of Pacific Command did not want to purchase the rifle due to its performance. In actuality, the commander's concern about the rifle stemmed from what its cost would do to his budget if he was required to buy it. He was not concerned at all with the rifle's performance.[17] Because the rifle represented such a significant shift in thinking about how a rifle should look and perform in combat, there appeared to be a significant amount of misunderstanding about the rifle. Transformational thinkers looked past precedent and identified that the rifle provided significant advantages to the rifleman in the field. The Ordinance Department evolved through its history into an organization that approached change slowly and methodically. The Ordinance Department, encumbered by politics and

economics became averse to change. With the M16, they faced change at an alarming rate and had no organizational systems to deal with it. Their aversion to the M16 was undoubtedly less an aversion to the rifle as the rapid change that it represented. Other organizational cultures, unencumbered by a cultural aversion to rapid change were more able to accept the rifle. As with the Air Force, the combat soldier saw it as a welcome change.

In 1967 the US Army Human Engineering Laboratories conducted research consisting of a questionnaire designed to identify how small arms were used in Vietnam. Their published report gave the responses of 83 combat troops who predominantly used the M14 rifle and .45 caliber pistol. The questionnaire was given entirely to US Marines, most of whom were from the 3d Marine Division. The report supplemented data from troops that were carrying the M16 rifle.[18] In the questionnaire, the Marines noted that they only saw their enemy some of the time when they shot. Only 10 percent of the respondents said that they always aimed, with 89 percent saying they aimed most of the time or some of the time; 48 and 41 percent respectively. 78 percent said that they fired more than once at a target all or most of the time. Most of the Marines, 84 percent, identified that their targets were normally 300 yards or less when they shot. The majority didn't carry a bayonet and cleaned their rifle once a day. 71 percent responded that they would rather have a more accurate rifle than one that fires faster. 94 percent also reported that when they saw a soldier he was either running or hidden. One respondent is quoted as saying, "I believe from what I've heard that the M16 is a better weapon (more accurate, farther range, shoots faster.)" Another said he wanted, "A lighter faster firing rifle than the M14." Numerous comments asked for either the M16 directly, or asked for

a lighter rifle with greater firepower. There were, however, some comments supporting the M14. For example, “The M14 is about the best weapon that an infantryman can use,” and, “I got the best.”[19]

Soldiers issued the M16 spoke highly of the rifle and its performance in Vietnam. Their training, often conducted prior to deploying to Vietnam, allowed them time to gain familiarity with the rifle prior to using it in combat. Though the Marine Corps had a long standing marksman tradition which continues to this day, Marine observations in response to the small arms questionnaire demonstrated a willingness to accept the M16 rifle. Additionally, though they had no first-hand experience with the rifle, they acknowledged the M16’s accuracy and lethality.

The most significant criticism of the rifle during the Vietnam War consisted of media reporting of Marine units in Vietnam encountering reliability issues which were reported to have killed Marines in combat. There was little written during the 1960s that refered to the small caliber rifle lacking lethality. In light of the troubles the program faced in development, a conclusion can be drawn that the M16 might not ever have been more than a one time purchase if not for its successes in Vietnam. Though the initial purchase was an interim solution covering the inadequacies of the M14 program prior to SPIW program delivery, it provided the opportunity for those outside the acquisition process to have greater influence in the weapon’s future. Additionally, the purchase requirement forced the Army to accelerate testing and modifications to the rifle necessary for success in the harsh environments. Had the rifle been forced to follow the methodical process that encumbered the M14, it too might have come to an end when fortunes changed, businesses lost interest and funding for Army growth diminished. The war in

Vietnam provided a fertile political and economic climate for development of the M16. With funding rising and combat leaders in Vietnam singing the rifle's praises, the M16 program took on a life of its own, unstoppable by Marine attempts to purchase the Stoner 63

The reality of the SPIW program is that it was a concept doomed from the onset. A program that showed potential on the drawing board, SPIWs technical limitations could never have produced a rifle capable of combat in Vietnam. Though promoted as a more efficient and lethal system on the modern battlefield, the results of testing showed a different reality. In actuality, the projectiles of the SPIW program were even more susceptible to deflection and deformation when encountering vegetation than the 5.56mm cartridge which drew criticism during the M16 testing. Additionally, the rifles tested during the SPIW program had greater problems functioning in wet environments than had the M16. In the end, the only real options were between the M14 and the M16. SPIW was nothing more than a concept that technology could not support.

Where the M16 encountered problems due to its rapid fielding, the M14 suffered from the opposite problem. Because the rifle developed over a decade it drew attention from the McNamara management team as being a failed embarrassment to the acquisition process. McNamara himself noted that it was absurd to have separate organizations developing weapons and ammunition. As a result, he reformed the acquisition organization of the Army to be more like the Air Force.[20] The comparison of those systems raises some important questions that point to varied acquisition cultures. For example, during the time of missile and satellite development the Air Force was receiving the lion's share of the defense budget. As a result, the Air Force had no established

culture of thrift. They also were not encumbered by the kind of institutional bureaucracy developed within the Army. Having only become its own service 20 years earlier and centered on technology that was less than 60 years old the Air Force saw technological change differently than the Army. A perfect example of the difference in acquisition culture between the Air Force and the Army is in the M16 program itself. The Air Force was able to acquire the rifle through sheer force of will while the Army had significant obstacles both within and outside the organization to contend with.

Ichord Committee Final Report

The hearings and report by the Ichord committee, provides the historian a detailed and accurate synopsis of the M16 program and sheds light on the complexity of Army acquisition during the 1960s. The subcommittee met its charter to investigate the development, history, distribution, sale, and adequacy of the M-16 rifle. The committee's hearings lasted from 15 May to 22 August 1967 and included members of the military, industry, and civilian leaders in the DOD. Additionally, they traveled to Vietnam and throughout the United States visiting training and manufacturing facilities in order to conduct field investigations. The findings were thorough and addressed many aspects of the M16 program. Much of the important information they gathered came from their visit to Vietnam.

During the ten day trip to Vietnam which started 1 June 1967, the subcommittee members visited Army and Marine infantry units equipped with the rifle and logistics support and maintenance units involved with the rifle. The subcommittee found that initial failures of the rifle by both Marine and Army units were the result of improper maintenance and lack of repair parts. The Army took action to solve the problem by

sending technical assistance teams to Vietnam. The success of the team was evidenced in the interviews conducted by the subcommittee members of soldiers serving in front line combat units. During those interviews committee members interviewed hundreds of soldiers and Marines of which only two stated a preference for the M-14. The soldiers reported having had malfunctions in the past but that training in maintenance and the improvements in the supply of replacement parts and cleaning supplies resulted in few of the soldiers having problems with their rifles by the time the interviews were conducted. The Army's requirement to fix the problem resulted from failures that occurred earlier in the program.

Ichord Committee investigation brought to light significant details regarding the initial purchase of rifles in 1964. Their research demonstrated that the Army initially only desired to conduct a limited purchase of the rifle. Their findings are supported by numerous Army documents and correspondence. On 5 April 1963, a memorandum sent from the Secretary of the Army to the Secretary of Defense outlined the procurement plan of the M16 rifle. The plan stated the assumption that the total procurement would be 104,000 rifles in 1964 (85,000 Army, and 19,000 Air Force) and 33,500 in 1965 to complete Air Force requirements for 80,000 rifles. The memorandum stated that the MACV request for 20,000 rifles was not considered.[21] The plan called for sole source purchase from Colt Firearms which would take 29 months to complete. Within the memorandum was a list of essential changes to be implemented in the AR-15 prior to purchase. The Secretary of the Army expected agreement by all of the services on the required changes which included: a manual bolt closure device (forward assist), redesigned magazine to make it more durable and reliable, and modification of the

chamber throat to assist in extraction of the entire cartridge upon clearing the weapon, elimination of the slope at the rear sight to improve night firing, and determination of the optimal rifle twist to stabilize the standard bullet. The first three listed modifications were seen as interrelated and not considered separate issues. The recommendations are significant because they pointed out that there were identified problems with the functioning of the automatic cycling of the bolt in the loading and reloading process before the rifles were purchased. Malfunctions with the reloading cycle in Marine combat units serving in Vietnam eventually raised the criticism of the rifle in the public forum and brought the issue to light with Congress. The memorandum also stated that competitive contracting was the source of ammunition and that the standards specifications were being developed to assure high quality.

The Ichord committee also found numerous examples of failures to coordinate between various organizational cultures. Additionally, they noted several examples of modifications recommended without benefit of standart testing and evaluation procedures. For example, the Secretary of Defense directed to seek the counsel of the designer when considering any changes, the guidance was not fully implemented. One such inquiry directed at Mr. Stoner regarding his opinion on using WC-846 gunpowder (ball propellant) occurred only after the decision had been made to use ball propellant in all Army small arms. Additionally, COL Harold W. Yount, the AR-15 project manager, testified to the Ichord committee that the decision to add manual bolt closure device considered essential before manufacture was not justified by test results.[22] His testimony pointed directly to the influence of culture when he answered Mr. Ichord's question of where the decision to add the bolt closure devise came from if it was not supported by

data. His answer was, “Well, as many decisions which were made on this rifle, this decision emanated from the Department of the Army staff, sir. It was further coordinated with the DOD and Secretary McNamara personally approved it.”[23] The decision to change the barrel twist of the rifling was apparently made in an effort to improve accuracy of the rifle in cold conditions. Witnesses testifying to the subcommittee reported that the change from a 1-14 twist to a 1-12 twist resulted in a reduction in the lethality of the round by 40 percent. As a result of this, the subcommittee questioned the requirement to have a rifle perform the same at -65 degrees as it does at 125 degrees.[24] With these problems, however, the committee found the rifle fully capable despite failures in project management and combat unit leadership.

Information gathered from questioning Army units found that all but one had favorable reports regarding the weapon’s performance, and the Army’s resourcing of repair parts and cleaning supplies. The one unit that reported unfavorable opinions towards the M16 was the 1st Cavalry Division. 40 percent of those interviewed stated a preference for the M14. They reported that they experienced problems with the selector switch sticking, stoppages due to dirty ammunition, and failures to extract. The committee members noted that there was evidence of shortages of cleaning equipment. Close analysis of the situation in the 1st Cavalry Division found that soldiers were not following prescribed procedures for care of their weapon and its associated magazines and ammunition. What made the situation worse was that a December report of the Army Weapons Command technical assistance team stated:

> 1st, 2nd, and 3rd echelon instruction was not given to the combat brigade of the First Cavalry Division. This Division stated that they were not having any

> trouble with the rifle and requested that the instruction be given only to the small arms shop of their maintenance battalion.[25]

The committee found that the preventative maintenance training prescribed for every user of the rifle had not been provided to the soldiers of the 1st Cavalry Division by the time of their June visit. Performance within the 1st Cavalry proved to be similar to performance of the rifle within the Marines.

Of the Marine units the committee spoke to, 50 percent experienced malfunctions with their M16. Of the malfunctions, the most prevalent and dangerous in combat proved to be failures to extract. The rifle's incidences of failures to extract were increase with improper or infrequent maintenance. The failure to acknowledge the maintenance requirements peculiar to the M16 was evident in the order of one Marine battalion commander to only have one cleaning kit per four Marines in the field. Additionally, Marines reported that they lacked the proper lubricating fluid for the weapon.[26] The Marines stated they had very little instruction in the care of the weapon and there were no written instructions to assist them in understanding the maintenance requirements. Additionally, the committee found that sufficient cleaning kits available at the battalion levels, but not at the company level. Instead of the approved cleaning solvent and lubricant, the Marines were using Diesel fuel to clean their weapons. Where logistical problems regarding cleaning supplies were addressed rather easily, the history of resourcing ammunition demands of a nation at war proved to be more problematic.

The ammunition used in the design of the AR-15 was commercial ammunition that contained DuPont's IMR 4475 propellant. Du Pont first produced IMR (Improved Military Rifle) powder in 1936. IMR powder, used for military small arms since the

1920s, had a long service life. Rifles that fired rounds using IMR powder included the M14 and the M1 Garand. Du Pont was the sole manufacturer of this product in the 1960s.

After significant testing by both the Air Force and the Army, established specifications stated a requirement for a muzzle velocity of 3250±30 feet per second with a chamber pressure not to exceed 52,000 pounds per square inch. When the Army attempted to procure ammunition that met the standard from commercial manufacturers, the manufacturers asked for lower standards in order for them to produce the cartridges. Eventually, on 8 October 1963, Remington Arms Co. received a contract for 19 million rounds. The specification required IMR 4198 but stated that IMR 4475 was considered equal and interchangeable. Remington, however, decided to load the rounds with WCC-846 propellant which was a ball propellant. Final analysis of the change in ammunition found that the ball powder produced both more carbon fouling during burning, and increased the cyclic rate of the rifle. The Army found that both of these factors contributed to increased rates of jamming and failure. The fixes they instituted consisted of a mechanical change to the weapon's recoil buffer as well as increased training on weapons maintenance and rates of preventative maintenance.[27] The reason for use of ball powder that came out in the investigation was a desire by the Army to save money. By using ball powder no longer suitable for cannons to charge small arms cartridges they were able to reduce waste of cannon powder. Once again, the culture of thrift negatively effected military decisions.

On 19 October 1967, the Special Subcommittee on the M-16 Rifle Program published their official report. The final five pages of the report listed thirty one separate

findings and recommendations regarding the program. Number eight on that list was the finding,

> That the sole-source position enjoyed by Olin Matheson on ball propellants for many years and their close relationship with the Army may have influenced the decision makers at Army Munitions Command, Army Weapons Command, and the Army Material Command. The House Armed Services Committee repeatedly has cautioned the military departments against sole-source procurements.[28]

The observation by the sub-committee recognized the influence of the defense industrial culture on the military acquisition process. The establishment of those close relationships produced cultural systems that influenced the systems of other cultures. Sole-source contracting was an easy system to establish which allowed familiar situations and reduced conflict which organizations try to avoid. Point eleven states, "certain modifications made to the rifle at the insistence of the Army were unnecessary and were not supported by the test data."[29] Point eleven reinforced that decisions favored cultural behavior patterns and values instead of quantitative analysis. Point twenty-four of the report goes further and states,

> The bias and prejudices of individuals associated with Army commands or agencies responsible for development and testing of new weapons made it extremely difficult for higher authority to obtain objective information upon which decisions should have been made relative to the rifle program.[30]

Point twenty-four identified values systems influencing the testing and evaluation process. The systems established by the acquisition program were also called into question by the congressional leaders when they made the following recommendation,

> That the Army system of development, production, and introduction of a new weapon into the inventory should be thoroughly reviewed to determine if the rifle program is typical of the manner in which the Army operates. The manner in which the Army rifle program has been managed is unbelievable. The existing command structure was either inadequate or inoperative. . . . It appears that under

> the present system problems are too slowly recognized and reactions to problems are even slower.[31]

The fact that outside agents viewed the Army small arms acquisition system as being slow to change points to its cultural tendency to maintain the status quo and resist significant change. What is important to note here is how this interaction between the political culture and the military culture resulted in an attempt to reform their system.

The conclusions of the Ichord committee bring together the successes and failures of the M16 rifle program which occurred during a period of dramatic change within Army organizations and culture. The lessons of the M16 program go beyond acquisition and touch upon the importance of the human dimension and value of strong leadership in times of change. These lessons should not be lost on generations that followed.

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[1]Thomas L. McNaugher, *The M16 Controversies: Military Organizations and Weapons Acquisition* (New York: Praeger, 1984), 118-119.

[2]Ibid., 119.

[3]Ibid., 120.

[4]Ibid., 121.

[5]US Congress. House Committee on Armed Services, Special Subcommittee on the M-16 Rifle Program United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program, *Hearings Before the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives, 90th Cong., 1st sess, 1967,*4434.

[6] Ibid.

[7] Ibid.

[8] McNaugher, 123.

[9] Harold G. Moore, *After Action Report, Ia Drang Valley Operation,* 1st Battalion, 7th Cavalry, 14-16 November 1965, unpaginated.

[10] CPT Joseph W. Kinzer, interviewed by the US Army Center for Military History, 11 June 1968.

[11] James T. Collins, “Third Degree Burns,” *Infantry* 58, no. 6 (1968): 19-23.

[12] Ibid.

[13] US Congress. House Committee on Armed Services, Special Subcommittee on the M-16 Rifle Program United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program, *Hearings Before the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives, 90th Cong., 1st sess, 1967,* 4436.

[14] Ibid., 4436-4437.

[15] Ibid., 4453.

[16] Ibid., 4480.

[17] Ibid., 4481-4482.

[18] Small arms in Vietnam: M14 rifle and .45 caliber pistol, 1

[19] Small arms in Vietnam: M14 rifle and .45 caliber pistol, 8-11

[20] Thomas L. McNaugher1989. *New Weapons, Old Politics: America's Military Procurement Muddle* (Washington, D.C.: Brookings Institution, 1989), 63-64

[21] US Congress. House Committee on Armed Services, Special Subcommittee on the M-16 Rifle Program. 1967. *Report of the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives,* , 90th Congress, 1st sess., 1967, 5381.

[22] Ibid., 5334.

[23] Ibid.

[24] US Congress. House Committee on Armed Services, Report, 5335.

[25] Ibid., 5348.

[26] Ibid., 5349-5350.

[27] Ibid., 5350-5355.

[28] Ibid., 5369.

[29] Ibid.

[30] Ibid., 5370.

[31] Ibid., 5370-5371.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Conclusion

It is clear through a study of history that organizations involved in defense acquisition existed with differing cultures that interacted with and influenced each other. The most significant interactions fell along the political and economic lines, with changes in either variable dramatically influencing numerous cultures within the greater complex system. Analysis of the M16 rifle acquisition program highlights the effects of politics and economics on the interaction between organizations and also points to the effect that behavior rooted in historical tradition has on an organization's culture. The marksman tradition within the Army was just such an example. The interplay between various organizations with differing views resulted in some organizations dramatically changing their perspective and some entrenching themselves in their cultural paradigms. Eventually, the culture with the most control of the political and economic realms had the greatest influence on the other cultures in the system. The M16 acquisition program highlighted that when organizations sought to influence the culture of other organizations conflict resulted. It showed that conflict resulted in both positive and negative effects.

The M16 rifle acquisition program from 1958 to 1968 provides an excellent case study on military systems development and the many influences that drive decisions regarding acquisition. The significant shift in thinking that coincided with the M16 program ranged across the entire spectrum from the strategic to the tactical level. Foreign policy and national security strategy that shifted from total war to limited war provided a fertile ground for Army changes to take place. The cultural shift in defense strategy took

place at a time of significant changes in civilian leadership. The resulting cultural change resulting from the new leadership included the desire to abolish bureaucracy and institute analytical business practices throughout the DOD. It was a monumental effort to solve the department's problems more effectively and efficiently. Secretary McNamara's changes in the system resulted in new organizations gaining influence and old organizations losing power. That influence was both political and economic and provided the foundation for McNamara to make sweeping change. One of the organizations that saw the turmoil of this reorganization was the Army's Ordinance Department and its associated depot system. As new leadership that embraced McNamara's changes took charge, cultural norms within organizations began to change. Eventually, they established conditions for a rifle that had little acceptance within the Army to become the standard for American forces serving in Vietnam and the following three and a half decades.

Today the M16 stands as the longest continuously serving rifle in American military history. The M16A1 and its descendants have served on every continent and in every war the US fought in the last 40 years. Many small arms experts today consider the M16 the standard by which all other assault rifles are judged. It is important to also note that every major army in the world, to include our former Soviet enemies developed HVSC rifles for service as their standard rifle.

Contemporary conflicts in both Afghanistan and Iraq have again raised the question as to the suitability of the M16 rifle and its .223 caliber cartridge for combat due to the long range engagements encountered in desert warfare. Many modern ballisticians propose a heavier round to increase lethality at longer ranges but do not promote abolishing the concept of the HVSC rifle. What has come to light in contemporary

conflict is the need to provide units with a capability to engage targets at long range with a rifle and marksman capable of such engagements. The concept of a one rifle for many purposes born from a culture of thrift was abolished with the M-14 program in 1964.

It must be noted that at Camp Perry's high power matches each year gun enthusiasts will often find a rifle of AR-15 origin winning the competition which includes match grade M-14s. Argument about which rifle is more accurate continues just as it did twenty years ago when the M-14 began to win matches over the tried and true M1.

In the end, the M16 was a rifle that due to politics and economics rose to fame too quickly and as a result had some growing pains. Due to the inability of the small arms industry and Army Ordinance Department to work closely together to efficiently field the M16 without fault, American soldiers in Vietnam were not provided the rifle they could have been. The fault does not lie in one culture, but in all that collided during the procurement of the rifle. Colt's desire to produce and sell a rifle in the midst of potential business failure, the Ordinance Department's long standing beliefs that they were the experts on what the Army needed, and McNamara's lack of trust for the Army bureaucracy resulted in a program that took 10 years to finally find resolution.

Throughout US small arms development there have been trends which demonstrate the Army Ordinance Department's culture of thrift and "make do" attitude. From early examples of depot closures at the end of the revolutionary war, to outdated powder stocks following the war of 1812, Army small arms advances during periods of peace have been slow and incremental as a result of budgetary constraints. Though the Army had concluded its participation in World War II and the Korean War, emphasis on nuclear deterrence and the start of the cold war put the Army back into the necessity of

executing development within a culture of thrift. When changes in strategy occurred during the Kennedy administration resulting in increased Army budgets, the conditions were set for a change in the Ordinance Department's cultural thinking. It was, however, a product of its historical environment and somewhat a slave to the mentality of doing things because that was always how it had been done. There were examples of innovative thought and cultural change, but they never were strong enough to change the organization from a grass-roots level. It took the defense reorganization act of 1958 and a Secretary of Defense who would use all of the power vested in him by that act to force a cultural change from above.

The problem with such a rapid change forced upon an organization was that it failed to acknowledge that efficient change required the buy-in of the members of the organization undergoing change. As a result of the conflict caused by forced cultural change within the Army the M16 was fielded before adequate improvements were made to make it suitable for combat. The M16 was not a bad choice, merely a choice implemented too quickly. McNamara and his staff failed to realize that some of the seemingly lethargic aspects of the small arms acquisition program were beneficial to the development of suitable small arms. Many rifles in American military history had lengthy acquisition testing process' that resulted in better rifles fielded to the troops. The management reforms of McNamara and the methodical evaluation of the Ordinance Department, when skillfully integrated, had the potential of producing outstanding results. Conflict resulting from differences in organizational culture, however, prevented efficient integration. The demonstrated bias that was evidenced in the 1962 Inspector General investigation, the results of testimony made during the Ichord committee

hearings, and executive summaries written by officers involved, show that the M16 program was indeed influenced by organizational culture. Furthermore, articles from the era printed in the Infantry Branch's professional publications demonstrated a culture of marksmanship that pervaded a significant portion of the branch. The culture of thrift dominated Ordinance actions and the marksmanship tradition dominated Infantry Board actions. It cannot be said that there weren't proponents of the M16 rifle in both the Ordinance Department and the Infantry Board, but the decision makers that affected policy often made decisions in favor of their cultural bias. Two influences that outweighed Ordinance and Infantry tradition proved to be the Secretary of Defense and combat commanders in Vietnam. The Secretary of Defense was willing and able to exercise his powers as established by the defense reorganization act of 1958 thereby enabling him to make sweeping change. Additionally, combat commanders were empowered by the conflict in Vietnam as their urgent requests for better equipment could not be ignored.

The cultural influence of the civilian political leadership had the most significant effect on the success of the M16. Civilian political leadership had drafted the 1958 defense reorganization act. Additionally, civilian leadership drafting a change in national defense policy provided the environment for change in the Army. The Ichord subcommittee also brought many of the M16 weapon programs successes and failures to light.

Recommendations

Certain factors must be considered when implementing organizational change. If not dealt with properly, organizational change can affect the participants so greatly that

the organization becomes less effective as it attempts to find direction. Since organizations are made up of people, understanding the human dimension is essential. The interaction of humans within an organization contributes greatly to the development of the organizations culture. Charismatic, powerful leaders can strongly influence the culture of the organization they lead. This lesson goes well beyond the field of acquisition or the development of weapons systems. It speaks to organizational leadership and battle command. Leaders must recognize that their decisions, actions, behavior and example can so strongly influence their organizations that the culture of the organization can be transformed through their leadership. Changes can result that were never intended by the leadership, but were rather the result of second and third order effects resulting from otherwise insignificant action.

The greatest failure in the M16 program was in the management of the organizational change that took place throughout American politics, military and society. The concept of open system organizations took root in the late 1950s and systems analysis began to recognize the human element of an organization. With that realization, efforts were made to control that human element; however the implementation was not done in a manner that precluded such things as backlash.

Application to Modern Transformation and Acquisition

As the DOD progresses on a transformational path amidst a period of conflict, it must beware the influence of organizational culture on change. Transformational change requires an organizational culture that recognizes and respects varied opinions, beliefs, and points of view. Without this respect for variety and diversity, transformation will be either difficult, or fail entirely. The US Army has a long history of identifying the need

for change and adapting to the environment. The Army's adaptation, however, has not always been without difficulty or cost in careers or lives. Such cost of transformation is tragic. If transformative events are handled with solid leadership and based upon sound, valid decisions, transformation should have no costs beyond economics. As was witnessed in the M16 acquisition process, the transformation to the new rifle was effective, but very inefficient.

Soldiers and leaders of the 21st century face an ever changing environment with new technology and concepts arriving faster than old systems can be learned. This environment requires the use of systems that are flexible, yet founded on principles of critical reasoning and analysis. The new culture prevalent in military affairs must be to embrace change as an advantage. If this value pervades cultural behavior, systems within a complex system see problems as something that must be dealt with collaboratively and holistically instead of controversially. If a culture of change is embraced, it influences more than just transformational change and acceptance of new weapons, it influences military doctrine. As the military continues to embrace joint warfare and sees value in the varied cultures of the different services, examples are provided which demonstrate the lessons of the 1960s have not been entirely lost.

GLOSSARY

Assault Rifle. A rifle designed to fire an intermediate cartridge with the purpose of providing effective accuracy out to at least 300 meters with the ability to fire in semi-automatic or automatic fire (burst fire is considered automatic fire).

Automatic. A weapon that continues to fire and reload automatically for as long as the trigger is depressed.

Ballistics. Study of the passage of a projectile from the instant of firing to the end of its flight.

Battle Rifle. A military rifle chambered for a full power rifle/machine gun cartridge.

Burst Fire. Control which fires a defined number of rounds each time the trigger is depressed.

Caliber. (1) The diameter of a projectile or the inside of a barrel; and (2) Designation of the cartridge a weapon is designed for.

Cartridge. Unit or round of ammunition, normally comprising the cartridge case, projectile, propellant, and primer.

Flechette. Long, thin bullet; fin stabilized and (in small arms) contained within a sabot for firing.

Intermediate Cartridge. Cartridge which is intermediate in power between the pistol rounds use in a submachine gun and full power rifle/machine gun rounds.

Machine gun. Automatic weapon of less than 20mm caliber.

Receiver. Body of the gun to which the barrel and operating mechanism are attached.

Rifle Grenade. Grenade intended to be fired by a rifle. It fits to the end of a barrel and either captures the bullet or permits it to pass through.

Sabot. Sleeve into which a sub-caliber projectile is fitted. It falls away after departing the weapon’s barrel.

Semi-automatic. A rifle that automatically fires, ejects, and reloads each time the trigger is pulled.

Small arms. Weapons intended to be carried by a soldier rather than fitted to a mounting.

SPIW. Special Purpose Individual Weapon. A project in the 1960s to develop a weapon that would fire multiple projectiles at a time to improve probability of hit and lethality.

Submachine gun. Compact, hand-held machine gun normally designed to use pistol ammunition.

BIBLIOGRAPHY

Books

Axelrod, Robert M., and Michael D. Cohen. 1999. *Harnessing Complexity: Organizational Implications of a Scientific Frontier.* New York: Free Press.

Borklund, Carl W. 1966. *Men of the Pentagon, From Forrestal to McNamara.* New York: F. A. Praeger.

Brown, Shannon A. 2005. *Providing the Means of War: Historical Perspectives on Defense Acquisition, 1945-2000.* Washington, D.C.: Center of Military History and National Defense University, US Army.

Chambers, John W., and Fred Anderson. 1999. *The Oxford Companion to American Military History.* New York: Oxford University Press.

Doughty, Robert A. 1996. *American Military History and the Evolution of Warfare in the Western World.* Lexington, Mass.: D.C. Heath and Co.

Ezell, Edward C. 1984. *The Great Rifle Controversy: Search for the Ultimate Infantry Weapon From World War II Through Vietnam and Beyond.* Harrisburg, PA: Stackpole Books.

Falk, Stanley L., and Theodore W. Bauer. 1972. *The National Security Structure.* Washington: Industrial College of the Armed Forces.

Goodfriend, Arthur. 1943. *How to Shoot the US Army Rifle, a Graphic Handbook on Correct Shooting.* Washington, D.C.: The Infantry Journal, inc.

Hallahan, William H. 1994. *Misfire: The History of how America's Small Arms have Failed our Military.* New York: Scribner's.

Hartcup, Guy. 1993. *The Silent Revolution: The Development of Conventional Weapons, 1945-85.* London ; New York: Brassey's.

Hewes, James E. 1975. *From Root to McNamara: Army Organization and Administration, 1900-1963.* Washington: Center of Military History, US Army: for sale by the Supt. of Docs., US Govt. Print. Off.

Hicks, James E. 1957. *U. S. Firearms, 1776-1956* . Beverly Hills, Calif.: Fadco Pub. Co.

Hix, William M. 2003. *Rethinking Governance of the Army's Arsenals and Ammunition Plants.* Santa Monica, CA: Rand.

Horton, Frank B., Anthony C. Rogerson, and Edward L. Warner. 1974. *Comparative Defense Policy.* Baltimore: Johns Hopkins University Press.

Hughes, David R. 1990. *The History and Development of the M16 Rifle and its Cartridge.* Oceanside, Calif., USA: Armory Publications.

Knox, MacGregor, and Williamson Murray. 2001. *The Dynamics of Military Revolution, 1300-2050.* Cambridge, UK ; New York: Cambridge University Press.

Kotter, John P. 1996. *Leading Change.* Boston, Mass.: Harvard Business School Press.

Kuhn, Thomas S. 1962. *The Structure of Scientific Revolutions.* Chicago: University of Chicago Press.

Lewis, Berkeley R. 1956. *Small Arms and Ammunition in the United States Service.* Washington: Smithsonian Institution.

Long, Duncan. 2001. *The Complete AR-15/M16 Sourcebook: What Every Shooter Needs to Know.* Boulder, Colo.: Paladin Press.

Long, Duncan. 1985. *The AR-15/M16: A Practical Guide.* Boulder, Colo.: Paladin Press.

McNaugher, Thomas L. 1989. *New Weapons, Old Politics: America's Military Procurement Muddle.* Washington, D.C.: Brookings Institution.

McNaugher, Thomas L. 1984. *The M16 Controversies: Military Organizations and Weapons Acquisition.* New York: Praeger.

Palmer, Gregory. 1978. *The McNamara Strategy and the Vietnam War: Program Budgeting in the Pentagon, 1960-1968.* Westport, Conn.: Greenwood Press.

Pegler, Martin. 2002. *Firearms in the American West, 1700-1900.* Marlborough: Crowood.

Roherty, James M. 1970. *Decisions of Robert S. McNamara; a Study of the Role of the Secretary of Defense.* Coral Gables, Fla.: University of Miami Press.

Rosenberg, Alexander. 1995. *Philosophy of Social Science.* Boulder, Colo.: Westview Press.

Smith, Merritt R. 1985. *Military Enterprise and Technological Change: Perspectives on the American Experience.* Cambridge, Mass.: MIT Press.

Stockfisch, J. A. 1973. *Plowshares into Swords: Managing the American Defense Establishment.* New York: Mason & Lipscomb.

Sweeney, Patrick. 2005. *The Gun Digest Book of the AR-15.* Iola, WI: KP Books, A Division of F+W Publicaitons.

Whetten, David A., and Kim S. Cameron. 2002. *Developing Management Skills.* Upper Saddle River, NJ: Prentice Hall.

Periodicals

Collins, James T. "Third Degree Burns," *Infantry* 58, no. 6 (1968): 19-23.

Dean, William R. "I Don't Like Rifles," *Infantry* 56, no. 2 (1966): 4.

Fortun, M., S. S. Schweber. 1993. "Scientists and the Legacy of World War II: The Case of Operations Research (OR)," *Social Studies of Science* 23, no. 4 (Nov.): 595-642.

Howe, Walter J. and E.H. Harrison, "The AR-15 Rifle," A*merican Rifleman Guide to Black Rifles*, 2006, reprinted from *American Rifleman*, May 1962, 16.

Government Documents

Committee on Armed Services, US House of Representatives. 1967. *Hearings Before the Special Subcommittee on the M16 Rifle Program, Committee on Armed Services, US House of Representatives,* . 90th Cong., 1st sess., 8 August.

Committee on Armed Services, US House of Representatives. 1966. *Report of Special Subcommittee Following Visit to Southeast Asia,Committee on Armed Service, US House of Representatives.* 89th Cong., 2nd sess., 19 July.

United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program. 1968. *M-16 Rifle Procurement Program. Hearings,* 90th Cong., 2nd sess., Washington: US Govt. Print. Off.

United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program. 1968. *M-16 Rifle Procurement Program; Report,* 90th Cong., 2nd sess., Washington: US Govt. Print. Off.

United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program. 1967. *Hearings Before the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives,* 90th Cong., 1st sess., May 15, 16, 31, June 21, July 25, 26, 27, August 8, 9, and 22, 1967. Washington: US Govt. Print. Off.

United States. Congress. House. Committee on Armed Services. Special Subcommittee on the M-16 Rifle Program. 1967. *Report of the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services, House of Representatives, ,* 90th Cong., 1st sess., October 19, 1967. Washington: US Govt. print. Off.

United States. Congress. Senate. Special M-16 Rifle Subcommittee. 1968. *Additional Procurement of M-16 Rifles. Hearings,* 90th Cong., 2nd sess., June 19 and 20, 1968. Washington: US Govt. Print. Off.

Army Combat Developments Command, Fort Belvoir VA, *Rifle Evaluation Study*. 20 December 1962. DTIC, AD A 046 961.

Army Infantry Board, Fort Benning GA, *Comparative Evaluation of AR-15 (Armalite) and M14 Rifles.* 7 December 1962, DTIC, AD B 013 105

Army Infantry Board, Fort Benning GA, *Product Improvement Test of XM16E1 Rifles and Associated Items – Air Delivery*. 22 May 1964. DTIC, AD 821 418.

Army Materiel Command, Washington DC, *M14 Rifle Cost Analysis Report*. October1968. DTIC, AD 677 383.

Army Weapons Command, Rock Island IL, *Market Analysis Study of Rifle 7.62mm, M14.* 18 November 1964, DTIC, AD 834 507

Development and Proof Services, Aberdeen Proving Ground MD, *Comparative Evaluation of AR15 and M14 Rifles.* December 1962, DTIC, AD 445 825

Development and Proof Services, Aberdeen Proving Ground, Maryland. 1964. *Final Report, Comparison Test of Rifle, 5.56mm, M16.*

Human Engineering Laboratories, Aberdeen Proving Ground MD, *Small Arms Use in Vietnam: M14 rifle and .45-Caliber Pistol*. January 1967. DTIC, AD 649 517

Moore, Harold G., *After Action Report, Ia Drang Valley Operation*, 1st Battalion, 7th Cavalry, 14-16 November 1965

Office, Chief of Staff, Army Office of the Assistant Vice Chief of Staff, Office of the Director, Weapon Systems Analysis, *An Annotated Bibliography of M16A1 Rifle System Tests*, Washington D.C., 15 April 1968

US Army War College Research Element Case Study. *The M-16 Rifle Decade of Evolution 1957-1967*. By Shelton, Henry R. Carlisle Barracks, PA: US Army War College, 3 March 1969.

US Army War College Research Element Case Study. *The M-16 Rifle – Tested By Combat*. By North, Louis J. Carlisle Barracks, PA: US Army War College, 3 March 1969.

Other Sources

McNaugher, Thomas L. 1979. *Marksmanship, McNamara, and the M16 rifle: Organizations, Analysis, and Weapons Acquisition.* Santa Monica, Calif.: Rand Corp.

Risch, Erna, "Evolution of the Ordinance Department," *Supplying Washington's Army*, http://www.army.mil/cmh/books/RevWar/risch/chpt-11.htm

The John F. Kennedy Library and Museum, "Campaign of 1960," www.jfklibrary.org/Historical+Resources/JFK+in+History/Campaign+of+1960.htm

CPT Joseph W. Kinzer, interviewed by the US Army Center for Military History, 11 June 1968.

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