KILLER ROBOTS: DEATH TO THE PROFESSION OF ARMS?

BY

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The undersigned certify that this thesis meets master's-level standard of research, argumentation, and expression.

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DISCLAIMER

The conclusion and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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ABSTRACT

This paper explores how technology influences change in the profession of arms, at both the organizational level and individual level. The profession of arms is defined here using the four key characteristics—namely expertise, responsibility, corporateness, and ethics and ethos—and the four key military virtues—specifically discipline, courage, competence, and self-sacrifice or selfless service—as identified in the 2017 version of *The Armed Forces Officer*. The paper starts by exploring the definitions of these characteristics and virtues and briefly discusses the Air Force's evolving focus on itself as a profession.

Two case studies are used to explore the relationship between the profession of arms and technology. For each case study, technology is considered from two different angles. The first case study, involving, intercontinental ballistic missiles (ICBMs), begins by evaluating organizational-level decisions during the development phase to see how the four professionalization characteristics influenced or were influenced by the development of this technology. The analysis continues by considering these same characteristics in light of how missileers employed ICBMS. The employment section also discusses the four military virtues' role in this interaction between the professional and the technology.

The findings from this first historical case study are then applied to a future-oriented case, which considers how the profession of arms could influence and be influenced by the potential development and employment of artificial intelligence, specifically lethal autonomous weapon systems. Based on the findings from both case studies, recommendations, such as using *The Armed Forces Officer*, or similar book as a lifelong teaching tool and the Air Force studying itself as a profession, are made for how the profession of arms can be prepared to shape the development and employment of transformative technologies like artificial intelligence.

CONTENTS

Illustrations

Figure

Appendix

Chapter 1
Introduction

In the late eighteenth century, French artillery officer Jean Baptiste Vacquette de Gribeauval reimagined the design and application of field artillery. His innovations improved the accuracy and mobility of these weapons and changed warfare on the European continent after the French Revolution. Gribeauval's dedication and foresight demonstrate many of the qualities we expect of our officer's today. His new artillery also changed the profession of war itself against the desire of many members of the military profession. As described by William H. McNeill in *The Pursuit of Power*: "A weapon that could be used to kill soldiers impersonally and at a distance of more than half a mile offended deep-seated notions of how a fighting man ought to behave…Artillerymen with their cold-blooded mathematics seemed subversive of all that made a soldier's life heroic, admirable, and worthy."[1] The ability of militaries' to impersonally kill has only increased in the centuries since Gribeauval, although the casualties in World War I, World War II, and the Vietnam War demonstrate that a soldier's life was, and is, still dangerous.

Today's weapons demonstrate increased distance and reliance on impersonal killing, as demonstrated by the current use of remotely piloted aircraft to conduct so-called "drone strikes." The impersonal killing might be expanded by creating autonomous weapon systems that leverage artificial intelligence (AI). This latter development offers the possibility of removing ever larger numbers of soldiers from the battlefield and the decision-making process. If, and when, this happens, will the military still be considered a profession?

Context

General Sir John Hackett, the first to coin the term "Profession of Arms" during a series of lectures at Cambridge University in 1962, argued that historically the military

[1] McNeill, William Hardy, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000* (Chicago: Univ. of Chicago Press, 1993), 170–72.

has contained elements of a profession since at least the times of ancient Greece.[2] He defines the function of the profession as "the ordered application of force in the resolution of a social problem."[3] Hackett considers the early nineteenth century to be the period when true military professionalism emerged. The Prussians led the transformation by removing aristocratic birth as a requirement for officership and instituting rigid education requirements with promotion based on competence. The Prussians were also the first to recognize the importance of formal, continuing professional military education for its future leaders of the *Landeswehr*[4] with General Johann David Waltz von Scharnhorst's creation of the *Kriegsakademie*[5] in 1810.

Hackett argues professionalism emerged in the U.S. military between the Civil War and World War I when it became relatively isolated from civilian society.[6] Historian Reed Bonadonna, in *Soldiers and Civilizations*, highlights that the military profession transformed again after World War II. Specifically, Nuremberg and other war crime trials called into question what a soldier's moral obligation ought to be beyond what his or her nation might dictate as a military necessity. The creation of the United Nations and its peacekeeping force also established new standards for expected conduct, particularly as these forces engaged in many new types of operations around the world beyond traditional state-on-state conflicts.[7]

The profession of arms is influenced not only by the organizational and cultural factors mentioned above, but also by technological innovations like Gribeauval's artillery. Technology's influence on the profession of arms may be positive with the military recognizing how to best use a new weapon system, or the profession may fail to

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[2] Hackett, John Winthrop, *The Profession of Arms (Officer's Call)* (Washington, D.C.: Center of Military History, 2007), 3.
[3] Hackett, John Winthrop, 2.
[4] *Landeswehr* is a German term for national army or militia.
[5] The *Kriegsakademie* is the first institution in Europe focused on the study of war and other academic disciplines pertinent for military officers.
[6] Hackett, John Winthrop, 22–25.
[7] Reed R. Bonadonna, *Soldiers and Civilization: How the Profession of Arms Thought and Fought the Modern World into Existence* (Annapolis, Maryland: Naval Institute Press, 2017), 256–57. Types of operations include, amongst others, observer missions, traditional and multidimensional peacekeeping missions, peace enforcement missions, and disaster relief operations. For more on these missions, see Michael Doyle and Nicholas Sambanis's seminal work *Making War and Building Peace.*

acknowledge a new innovation requires new ways of conducting war. As a positive example, the development of gunpowder and the introduction of the infantry firearm in the late sixteenth/early seventeenth century contributed to the increasing professionalization of armies. While very inaccurate, early firearms were useful because little training was required to make them effective on the battlefield. This enabled states to quickly mobilize and regenerate large militaries. Future-minded military thinkers like Maurice of Nassau and Gustavus Adolphus realized the best way to integrate this technology from both a tactics and doctrinal perspective was smaller formations of combined arms with pikemen and musketeers working together with the cavalry.[8] This adjustment required extensive drill and standardization of movements in loading and firing of muskets in order to integrate varied roles and maximize firepower. Smaller formations required more leaders at multiple levels who could exercise initiative.[9] The early firearm demonstrates a case where the military successfully integrated a new technology and improved its effectiveness.

An example at the opposite end of the spectrum is the military profession's failure to recognize the significance of the machine gun and other technological advances before World War I. Despite several recent conflicts including the American Civil War, the Boer War, and the Russo-Japanese War, European militaries failed to recognize that the machinegun's firepower favored defensive operations. Instead the militaries observed what they wanted to see, rather than objectively analyzing each conflict. For example, Europeans observing the Russo-Japanese War thought Japanese bayonet charges demonstrated the continued importance of offensive maneuvers without recognizing that bayonet charges were possible only because of the extended supply lines for both sides that reduced available firepower. The Boer War showed that cavalry could outflank positions that were fixed in place by firepower; this appeared to support the primacy of the offensive, rather than predicting the flank and counter-flank moves that would develop along the Western Front during World War I.

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[8] Bonadonna, Reed R., *Soldiers and Civilization: How the Profession of Arms Thought and Fought the Modern World into Existence* (Annapolis, MD: Naval Institute Press, 2017), 111–15.
[9] Hackett, John Winthrop, *The Profession of Arms (Officer's Call)*, 20–22.

Furthermore, officers did not want to entertain the possibility that future wars had little or no role for the cavalry or for bayonets. In their minds, morale could only be maintained by large formation, offensive charges commanded and directed by officers. A man in a defensive position, especially if he were a minimally trained reservist, could not be expected to maintain the morale necessary to win.[10] The military's application of the machine gun before and during World War I demonstrates the profession failing to understand that a technology fundamentally changed how the military should organize, train, and equip. Because the technology did not fit the profession's paradigm, the militaries' did not recognize that the planning and conduct operations might also need to adapt. These examples suggest the military profession plays a critical role in successfully integrating new technologies by recognizing the changes the technology will bring to the profession.

Historians and sociologists debate the role of technology in shaping history and society. At one end of the spectrum, technological determinists argue technology itself changes society; once the technology is invented, society adjusts as needed. For example, Karl Marx argued that the invention of the steam engine caused the proliferation of factories that, in turn, gave birth to a bourgeois society. At the other end, social constructivists point out that humans invent technology, so ignoring the social context is wrong. Technology plays a role, but it must be understood in a wider social, economic, political, and cultural mix.[11]

An adaptation of these opposite views, offered by Thomas Hughes, is that the technological determinism and social constructivism viewpoints interact because society shapes and is shaped by technology. He calls this technological momentum and argues that social constructivism is more applicable to young systems when politics or society can decide why the new technology is needed and what is should be used for. Once the technology matures, he says technological determinism kicks in, and the technological

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[10] Howard, Michael, "Men against Fire: Expectations of War in 1914," *International Security* 9, no. 1 (Summer 1984): 46–55.
[11] Marx, Leo and Smith, Merritt Roe, "Introduction," in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge, Mass: MIT Press, 1994), xii–xiii.

system starts to shape society because society makes decisions based on the existing system.

As an example of this view, Hughes describes the development of the Wilson Dam on the Tennessee River. During World War I, the U.S. needed to increase its indigenous supply of nitrogen compounds due to shipping losses. Creating these nitrogen compounds required large amounts of electricity, so the U.S. government decided to build the Wilson Dam and hydroelectric plant. Once the war ended, the U.S. demand for nitrogen compounds decreased, and the U.S. was left with a dam it no longer needed. The Wilson Dam became a solution in search of a problem, and the dam attracted a variety of project proposals. The dam eventually became a critical part of the Tennessee Valley Authority and President Franklin D. Roosevelt's New Deal.[12] If the dam had not already existed, it may not have been part of the New Deal. The two military technology cases of firearms and machineguns described earlier appear to support the idea that society can shape the use of technology when it is first invented. In the first case, Maurice of Nassau realized firearms enabled a new type of highly regimented formation ideal for national armies. In the second case, Europeans forced the machine gun to fit within an existing paradigm that favored the offensive.

Purpose

The purpose of this research is to explore how technology influences the profession of arms, and whether the profession of arms can influence the development and employment of transformative technology, like artificial intelligence (AI). The profession of arms is explored at two levels of analysis, to include the profession as an organization—which makes decisions in regard to the development of technology—and the individual professional, as a user who figures out how to employ that technology. The development of AI, and the employment of lethal autonomous weapon systems, calls this latter element into question by taking over key tasks historically performed by humans. If the U.S. wants a profession to continue to protect and defend it, understanding AI's

[12] Hughes, Thomas P., "Technological Momentum," in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Merritt Roe Smith and Leo Marx (Cambridge, Mass: MIT Press, 1994), 110–12.

potential impact on the definition of the profession of arms may enable the military to find a balance when the needs of the technology and the profession are in conflict.

Case Study Selection

The development and employment of ICBMs have characteristics that might resonate as the U.S. pursues AI and autonomous weapons systems. From a development perspective at the organizational level, inter-service competition played a role as the military services competed for capability and resources. Intra-service competition posed challenges for the Air Force as it considered the proper balance between unmanned missiles and piloted aircraft. AI may cause similar debates as it offers to replace the man with a machine. The decisions made during the development phase of a technology influences the identity of the service itself and the range of potential options for how the technology can be employed.

From an employment standpoint, ICBMs may offer lessons to consider with respect to AI because both seem to remove the professional from danger and the decision-making process. Missileers—the military personnel charged with operating and deploying ICBMs—had no influence or insight into the national-level decision-making process for employing these weapons. They were, and still are, expected to follow checklists and execute the Emergency War Order received electronically. One possible use of AI involves accelerating the decision-making process for military leaders by having the AI correlate and process information from a myriad of sources to recommend a course of action. Although military leaders may still have final say on approving the recommended course of action, leaders would have little insight into how that course of action was arrived at, much like missileers. Additionally, missileers were completely removed from the battlespace; they executed their mission from bunkers in the U.S. Facing danger on or near the battlefield and the possibility of giving one's life for one's country was a hallmark of military service before this development. Autonomous weapons system powered by AI combine both aspects of removal: removal from immediate danger and the decision-making process. These aspects could have serious repercussions for the profession of arms if a balance is not found between the demands of the profession and the need to maintain a strong and capable force whether that be humans or robots.

Framework and Scope

This study uses *The Armed Forces Officer* as a framework to define and investigate the key components of the profession of arms. Chapter 2 begins by discussing the definitions of the characteristics and virtues of the profession of arms which are used in the case studies. The 2017 version of *The Armed Forces Officer* will specifically be used here since it explicitly defines characteristics and virtues of the profession of arms. This chapter and Appendix A briefly outline the multiple revisions made to this book since 1950. The section concludes with a review of the Air Force's efforts to evolve how the serve instills a sense of professionalism in its members. Although the Air Force and Army currently include military officers, enlisted, and civilians in the profession of arms, the scope of this study is limited to officers since they are the formal leaders and decision makers. For the purposes of this study, the terms *profession of arms* and *profession* are used interchangeably in relation to an organization like the Air Force or Strategic Air Command. In turn, the terms *professional* and *a member of the profession of arms* refer to an individual officer who carries out a specific function within the profession. There are nuances in the meaning of these different terms, but an exploration of these differences is beyond the scope of this study.[13]

The case studies in Chapters 3 and 4 analyze technology from both the development and employment perspectives. The development section looks at the profession as an organization making decisions with regard to developing a technology. The four characteristics of expertise, responsibility, corporateness, and ethics and ethos, as identified in *The Armed Forces Officer*, are used to analyze how the profession as an organization influences or is influenced by the development of a technology. In the employment section, the focus is on the individual service member employing the technology. In addition to the four characteristics of a profession, the four military virtues of discipline, courage, competence, and self-sacrifice and selfless service are also used to explore technology's influence on the professional employing the technology and the professional's ability to influence its employment. Figure 1 provides a layout of the methodology described above.

[13] For further discussion on the possible differences between these terms, see *Soldiers and Civilizations.*

Technology	*Development*	*Employment*	
Profession of Arms	Organization as a Profession… w/ Four Characteristics • Expertise • Responsibility • Corporateness • Ethics and Ethos	Individual as a Professional… w/ Four Characteristics • Expertise • Responsibility • Corporateness • Ethics and Ethos	and 4 Virtues • Discipline • Courage • Competence • Self-Sacrifice or Selfless Service

Figure 1. Methodology for Case Studies
Source: Author's Original Work

Using insights from Chapter 3 and analyzing the unique aspects of AI, Chapter 4 looks specifically at lethal autonomous weapon systems. Using the findings from these case studies, Chapter 5 concludes with some general findings on the relationship between technology and the profession of arms, offering several recommendations for our leaders in the Department of Defense.

Significance

Today's news stories include countless new developments in the fields of drones, autonomous driving vehicles, robots, and artificial intelligence. The 2017 version of *The Armed Forces Officer* views the profession of arms as being of an enduring nature. Society's expectations of the military may require a change to the profession of arms, but technology should not require the profession to adjust its basic components due to new capabilities.[14] However, the few brief examples from World War I and earlier suggest that technology does influence change in the profession of arms, perhaps at both the organizational level and individual level. Exploring and better understanding this interaction may improve the decisions made regarding the development of a specific technology, as well as how to employ it. If the profession of arms—and the nation served by that profession—are to avoid the mistakes of the past, then this interaction between

[14] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer* (Washington, D.C.: National Defense University Press, 2017), 67.

technology and the profession as an organization developing technology and as an individual employing technology requires thoughtful consideration.

Chapter 2

Who Are We?

Although the roots of the Western concept of the profession of arms are evident as early as ancient Greece, this study primarily focuses on how the conception of the profession of arms has evolved after World War II. This time period was chosen because thereafter technology in the form of ICBMs began removing military members from both the battlefield and the decision-making process. This chapter starts by defining and focusing on the characteristics and virtues of the profession of arms as defined in the 2017 version of *The Armed Forces Officer*; these terms are the framework for discussing ICBMs and AI in future chapters. Previous versions of the book demonstrate how the concept of the profession of arms within the military has changed over time. The chapter then expounds on the writings of sociologist Morris Janowitz, for these demonstrate a recognition, since the 1960s, that technology has some influence on the profession of arms. Finally, the Air Force's focus on the profession of arms after gaining independence in 1947 provides background for follow-on chapters as they look at the relationship between technology and the profession of arms.

The Armed Forces Officer in 2017

The 2017 version of *The Armed Forces Officer*, as described later in this chapter, is a significant departure from previous versions of this book. Each edition has sought to improve its utility and currency by considering the U.S. military operational and steady state experiences that have occurred since the former edition. In the 2017 foreword, Chairman of the Joint Chiefs of Staff, General Joseph T. Dunford, highlights that since the first version was written in 1950, "at the dawn of the nuclear age and the emergence of the Cold War, it addressed an officer corps tasked with developing a strategy of nuclear deterrence, facing unprecedented deployments, and adapting to the creation of the Department of Defense … to manage the threats of a new global order."[1] Regarding the

[1] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer* (Washington, D.C.: National Defense University Press, 2017), ix.

current version, he asserts: "Now, in the second decade of the twenty-first century, our nation is again confronted with a volatile and complex security environment," and "This new edition … articulates the ethical and moral underpinnings at the core of our profession."[2] In comparison to all previous editions, the 2017 version explicitly lists and defines characteristics and virtues of the profession of arms. This section focuses on how these attributes are defined and described. Other significant content in the book is explored later below during the discussion of the 2007 *The Armed Forces Officer.* This provides an opportunity to compare the two versions.

Characteristics of the Profession of Arms

The profession of arms chapter describes four characteristics of a profession: expertise, responsibility, corporateness, and ethics and ethos. Except for ethics and ethos, these characteristics match those previously described by Samuel Huntington in his 1957 book, *The Soldier and the State*.[3] Using these books and other historical and current writings, this section explores the four characteristics and considers their possible relations with technologies like ICBMs and AI.

Expertise. *The Armed Forces Officer* states expertise is "built over time on a base of practical experience, which yields fundamental principles and abstract knowledge; which normally must be mastered through specialized education…which can then be applied to the solution of specific, practical problems."[4] Specialized education is built by using specialized knowledge that must grow over time as combat experience leads to new lessons learned, new technology leads to new ways of conducting operations, and new missions are levied upon the military.[5] This specialized knowledge, or expertise, is unique to a particular profession. For example, the medical profession retains special expertise to care for the human body; it maintains and controls a body of

[2] Swain, Richard M. and Pierce, Albert C., xi–xii.
[3] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations* (Cambridge: Belknap Press of Harvard University Press, 1957), 8.
[4] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 19.
[5] Swain, Richard M. and Pierce, Albert C., 19–20.

knowledge on how best to do this as new procedures and medicines change the care that can be provided.[6]

For Huntington, the expertise required of the military relates to "the management of violence." *The Armed Forces Officer* also uses Huntington's phrase and the duties he says an officer must have the expertise to conduct: "(1) organizing, equipping, and training; (2) planning of its activities; (3) direction of its operations in and out of combat."[7] However, Huntington defines the function of the military as "successful armed combat," but the *The Armed Forces Officer* says that while this may be the primary mission of the military, it is not the only mission that may be required.[8] This reality holds ever more true since the end of the Cold War, for the military has increased its participation in other missions sets to include humanitarian aid and disaster relief, peacekeeping operations, and exchanges that build partnership capacity.

According to *The Armed Forces Officer*, an officer's organizational and planning expertise is also applicable to this wide range of activities. Organizational and planning expertise can be gained through technical training, operational assignments, and professional military education. The latter is a critical component of the profession of arms with officers. Huntington, for example, thought officers needed to spend approximately one-third of their professional life in formal schooling.[9] As the book highlights, continuing self-development is one of the hallmarks of a profession and its individual members.[10]

As part of this education, both Huntington and *The Armed Forces Officer* highlight the importance of studying history to build an officer's expertise. Experience, built over centuries, should lead to organized reflections which can be studied by officers. These reflections also lead to abstract principles which can be applied to current problems.[11] In Clausewitzian terms, studying history helps an officer understand the

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[6] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 8.
[7] Huntington, Samuel P., 11.
[8] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 21.
[9] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 13.
[10] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 20.
[11] Swain, Richard M. and Pierce, Albert C., 20.

nature of war, which can include principles which do not change over time. How does studying history help members of the profession of arms better understand the character of war, which is unique to each respective time period? The character of war, or how war is fought, evolves due to technological, legal, ethical, and cultural influences.[12] As Clausewitz highlights, historical "examples should be drawn from modern military history."[13]

As new technologies in the form of new weapon systems are introduced, the profession must determine if its members still have the right blend of expertise. The new technology could be an improvement of what the military already uses, it could lead to a revolution in military affairs, or the technology may exist somewhere in between those two extremes. A challenge for the profession of arms is recognizing that a different type of expertise may be needed because a new weapon system could change the conduct of operations.

Responsibility (or Service to Society). A profession must provide a service to society; in exchange, the society, or in the military's case the government, grants the profession certain unique privileges and power, such as the ability to promote and punish its members as the profession deems fit. In Huntington's view, unlike other professions, the military holds a monopoly on providing security to the state.[14] However, *TAFO* argues this monopoly has eroded in multiple ways. Consider nuclear deterrence, for example. After World War II, military professionals lacked the expertise on how to deter war, so civilians from a variety of other fields weighed in and wrote the nuclear deterrence theory we use today, unlike most military theory which came from individuals with military experience. The fear of nuclear war also led to portions of the management of violence being held at higher levels of authority and reduced military officers' responsibility.[15]

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[12] Hoffman, F. G., "Will War's Nature Change in the Seventh Military Revolution?," *Parameters* 47, no. 4 (Winter 2017): 23.
[13] Clausewitz, Carl von, *On War*, ed. Michael Eliot Howard and Peter Paret, First paperback printing (Princeton, N.J: Princeton University Press, 1989), 173.
[14] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 14–15.
[15] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 22–23.

Another area that challenges military responsibility is the contractor and consulting fields. Many retired military officers now provide their expertise and experience to political decision makers.[16] The Army, in particular, worries that soldiers think their professionalism is challenged by private security firms providing the same service but with different privileges and power.[17] This erosion of responsibility and what it means for a profession is revisited in both case studies.

Huntington also discussed the limit of the military profession's responsibility to the nation. In his view, military officers must stay apolitical and execute whatever mission they are given by civilian leaders, or "he cannot impose decisions on his client which have implications beyond his field of special competence."[18] In Clausewitzian terms, civilian leaders should tell the military profession what end to achieve and then let the military profession determine which means and ways to use to accomplish that end. Therefore, the expertise component should focus solely on military skills to achieve victory when tasked.[19] However, Clausewitz also reminds readers that war is never autonomous from, but rather an instrument of, policy.[20]

Writing three years after Huntington and partially in response to his views on responsibility, Morris Janowitz identifies Huntington's view as the "absolutist" approach in *The Professional Soldier*. While victory may sometimes be the goal, Janowitz argues that in light of nuclear weapons, sometimes the military may be tasked to achieve ends that do not equate to victory. This task requires military officers to have some expertise in political and social issues that the nation may try to influence through military means. As part of the collective profession, individual officers need to understand the social and political ramifications of military action and advise civilians leaders when military action

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[16] Swain, Richard M. and Pierce, Albert C., 22–23.
[17] Avant, Deborah, "Losing Control of the Profession through Outsourcing?," in *The Future of the Army Profession*, ed. Don M. Snider and Lloyd J. Matthews, Rev. & expanded, 2. ed (Boston: McGraw-Hill, 2005), 285. For further discussion on the subject of privatizing security, see Deborah Avant's other publications; "The Privatization of Security and Change in the Control of Force" and *The Market for Force: The Consequences of Privatizing Security.*
[18] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 16.
[19] Sarkesian, Sam C., *Beyond the Battlefield: The New Military Professionalism*, Pergamon Policy Studies on International Politics (New York: Pergamon Press, 1981), 44.
[20] Clausewitz, Carl von, *On War*, 88–89.

might not accomplish desired political objectives.[21] This "pragmatist" approach seems to hold more sway today especially after seventeen years of experience in the Global War on Terrorism where the military must work with the Department of State, non-governmental organizations, and other civilian agencies to accomplish counterinsurgency objectives.

Corporateness. Corporateness has two primary components: a shared identity and the need to control membership in the profession. For the military, shared identity comes from uniforms, rank, insignia, and other cultural norms that enables both society and military members to recognize the military as a distinct profession. This can be subdivided into further, separate shared identities based on military service across different branches as well as specialty (specific career fields within each branch). Controlling membership in the profession is achieved by setting accession requirements and evaluating performance in training environments and throughout an officer's career, as he or she is considered for increased rank and responsibility.[22]

Huntington also described officers as belonging to both a bureaucratic organization and bureaucratic profession. The bureaucratic organization delineates authority by office, so the office determines the role and responsibility of the officer. For example, a squadron commander has different authorities in comparison to a division chief on a joint staff. The bureaucratic profession distinguishes competence based on rank, which also has a time component, and rank determines who can fill specific offices.[23] Having a higher rank means an officer should be able to, and expect to, fill an office with more authority than someone with lower rank. This differs from other areas of employment where the position a person fills determines his or her rank in the company; thus, someone with far less time in a company or in the work force, but more expertise, could outrank and have greater authority than someone with more time. The way the military profession links rank with expertise to fill an office is unique in society.

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[21] Janowitz, Morris, *The Professional Soldier, a Social and Political Portrait* (Glencoe, Ill.: Free Press, 1960), 264–65.
[22] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 24–25.
[23] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 16–17.

Ethics and Ethos. *The Armed Forces Officer* adds the fourth component of ethics and ethos to the military profession primarily due to the lessons learned from the past fifty years of combat experience and society's changing expectations of how the military profession should conduct itself. Professional ethics are the moral standards, much of which can be found in the Uniformed Code of Military Justice and the Code of Conduct.

After the Korean War, the DOD was concerned with public perception and media reports that many U.S. prisoners of war collaborated with the North Koreans and demonstrated a lack of attachment to U.S. ideals by being "brainwashed" and denunciating U.S. involvement in the war. In 1955, the Defense Advisory Committee on Prisoners of War was appointed to define policy and prescribe training to provide members "with every means we can devise to oppose the physical, mental, and moral persuasion employed by nations within the Soviet orbit."[24] The committee found the services lacked a sufficient training program to teach responsibilities while in captivity. The investigation also confirmed that "the U.S. Armed Forces have never had a clearly defined code of conduct applicable to American prisoners after capture" and that the services' traditions of loyalty and fortitude did not substitute for a comprehensive codification of expected behavior.

These findings led the committee to recommendation of the six-article Code of Conduct the services use today. The committee recommended this code be applied and taught uniformly across the services with training adapted for each rank from enlisted to commander. Training would give service members the expertise needed as a POW and the responsibility to properly conduct themselves as described by the code.[25] Interestingly, the Code of Conduct was not part of *The Armed Forces Officer* until the 1988 version of the book. This may have been due to the fact that 1988 was the first version not written by S.LA. Marshall, and he chose to keep his 29 propositions on how

[24] Davis, Vernon E., *The Long Road Home: U.S. Prisoner of War Policy and Planning in Southeast Asia* (Washington, D.C.: Historical Office, 2000), 9–12.
[25] Secretary of Defense's Advisory Committee on Prisoners of War, "POW: The Fight Continues after the Battle," August 1955, 15–26.

officers should conduct themselves during combat.[26] In 1978, the last edition published before 1988, Marshall added a proposition about a lack of operational security during Vietnam War, which accounted for a large number of American casualties. However, none of his propositions discuss how an officer should conduct himself if captured.[27] This is one example of how professional ethics have slowly been introduced as a concrete characteristic of the profession of arms and changed the content of *The Armed Forces Officer.*

A professional ethos, on the other hand, is "felt more than known."[28] It is what a military officer must be rather than what he or she must do. A service's core values are part of this ethos, but the ethos also includes customs and behaviors not written in any official document. *The Armed Forces Officer* says this ethos is the foundation of esprit de corps, or the "sense of unity and of fraternity in its routine existence which expresses itself as the force of cohesion in the hour when all ranks are confronted by common danger."[29] In relation to ICBMs and artificial intelligence, what happens when a service subculture or a new capability allows officers to be physically distanced from the dangers of the battlefield? Can an ethos and esprit de corps survive when there is almost no future possibility of danger that provides cohesion and camaraderie?

The Armed Forces Officer says the ethics and ethos characteristic also leverages requirements on the other three requirements of the military profession. A dedication to life-long learning to acquire the necessary expertise comes from the core values and expectations of what an officer should be. Ethics and ethos mean responsibility to society and the nation must be conducted in a certain way, and for officers to have both the courage to act and accept accountability for their actions. This fourth component also implies that corporateness must include mutual respect, a commitment to the development of each other's expertise, and a commonly held insistence on a high

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[26] Marshall, S. L. A., *The Armed Forces Officer* (Washington, D.C.: United States Government Printing Office, 1950), 255–63.
[27] Marshall, S. L. A., *The Armed Forces Officer* (Washington, D.C.: United States Government Printing Office, 1975), 186–93.
[28] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 25.
[29] Swain, Richard M. and Pierce, Albert C., 26.

standard of conduct. *The Armed Forces Officer* admits that some of these additional requirements on the first three components are partially aspirational, but it still demonstrates a significant departure from how Huntington first wrote about expertise, responsibility, and corporateness, emphasizing that members of a profession need to continually reflect on what the definition and requirements of their profession should be.[30]

As defined by Huntington and *The Armed Forces Officer*, the four characteristics are a useful construct to define the boundaries of a profession. Expertise defines what the profession must know and do and responsibility requires that this expertise provide a service to society. Corporateness obliges the profession and society to recognize a unique identity and membership requirements. Finally, ethics and ethos instills the belief that the profession must provide a service to society in a moral manner and that its members must internally adhere to certain standards. Figure 2 (below) summarizes the core definition of each characteristic. These four characteristics apply to both professional organizations and to individual professionals. Therefore, in both case studies, expertise, responsibility, corporateness, and ethics and ethos are considered with respect to how the Air Force develops technology and how officers, as professionals, employ that technology.

Four Characteristics of a Profession:

Expertise: Specialized knowledge and skill in a significant field; granted exclusive authority to practice that field by society, ie; doctors, lawyers, military officers

Responsibility: Provides a service critical to a functioning society

Corporateness: Shared identity and wish to exert control over membership in the profession

Ethics & Ethos: The moral standards the profession is committed and held to and the collective and internal sense of what each member must be

Figure 2. Summary of Key Characteristics of a Profession
Source: Author's Original Work

[30] Swain, Richard M. and Pierce, Albert C., 32–34.

Military Virtues

The 2017 version of *The Armed Force Officer* also adds a discussion on military virtues. This section expands on the new emphasis on ethics and ethos being part of a profession. This also fits in with the view that: "Part of what it means to be a member of a profession is having a deep commitment to a set of abstract values and principles that define the profession."[31] *The Armed Forces Officer* defines a virtue as "a "persisting, reliable and characteristic" feature that produces a disposition in an individual to behave in a certain desirable way."[32] The book also highlights that virtues represent values, so the military services' values are a form of virtue.[33] However, the book identifies four basic virtues: discipline, courage, competence, and self-sacrifice as central to the character of individual officers. Unlike the characteristics, which can apply to both the profession and the members of the profession, virtues apply to the individuals in the profession of arms.

Discipline. Discipline is inherent in both an officer's commission and oath. General Dwight D. Eisenhower described discipline as, "simply the certainty that every man will obey orders promptly, cheerfully and effectively."[34] Taking this a step further for officers, discipline could also be equated to Clausewitz's requirement for a military genius to have determination or "a propensity for daring, pugnacity, boldness, or temerity."[35] According to *The Armed Forces Officer*, "discipline seems to be somewhat out of fashion as a limit upon freedom of action, but it is essential to the reliability of the military force."[36] While Clausewitz did not desire or require every officer to be a military genius, discipline should fall somewhere between simply obeying orders and demonstrating determination.

Courage. Courage is a key virtue for a military member involved in combat. However, courage has both a physical and moral component. Physical courage is

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[31] Sarkesian, Sam C. and Connor, Robert E., *The US Military Profession in the Twenty-First Century: War, Peace, and Politics*, 2nd ed, Cass Military Studies (London ; New York, NY: Routledge, 2006), 27.
[32] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 31.
[33] Peter Olsthoorn and Routledge, *Military Ethics and Virtues: An Interdisciplinary Approach for the 21st Century* (London; New York: Routledge Taylor & Francis Group, 2013), 6.
[34] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 38–39.
[35] Clausewitz, Carl von, *On War*, 102–3.
[36] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 38.

required for anyone facing danger on or near the battlefield. Moral courage relates more to responsibility and having the courage to act and voice dissent when required. Returning to ethos and military subcultures being removed from danger, some authors question whether a person can have a warrior ethos, or if military virtues can survive, if he or she does not face physical danger. Specifically writing in regard to remotely piloted aircraft (RPA), Robert Sparrow argues that this technology requires no physical courage, and the amount of moral courage is in debate since the morality of killing based on pixels on a screen is in question. Sparrow questions whether RPA pilots require any courage, and if they do, whether it is unique to the courage required of non-military professions, like police officers or doctors.[37] In an earlier chapter of the 2017 edition, the warrior ethic is also discussed and says a defining moral quality is absent "when one is not *willing* to go into harm's way." In such cases, a person is not a soldier but merely a technician of death. How can willingness be demonstrated or verified if a particular technology, like RPAs or ICBMs, does not require its operator to be in harm's way? Furthermore, "the military ethic is based on a commitment to disciplined service under conditions of unlimited liability, whether or not one has a military occupational specialty that involves combat."[38] Can this willingness and commitment legitimately exist when there is little to no possibility of combat or danger?

Competence. To qualify as a profession, the military must have unique knowledge, or expertise. Members within this profession must individually have the required expertise to perform a specific mission or job. When all service members demonstrate competence, the military assures the nation that the military profession can perform the service they have been entrusted with without needless oversight or limitations. Competence also relates back to expertise in the need to train others and to continually expand an officer's own competence through self-study and seeking mentorship.[39]

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[37] Sparrow, Robert, "War without Virtue?," in *Killing by Remote Control: The Ethics of an Unmanned Military*, ed. Bradley Jay Strawser (Oxford ; New York: Oxford University Press, 2013), 93–95.
[38] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 9.
[39] Swain, Richard M. and Pierce, Albert C., 39–40.

Self-Sacrifice or Selfless Service. *The Armed Forces Officer* does not explore self-sacrifice beyond saying it is a "measure of commitment to a cause as opposed to a simple search for martyrdom."[40] According to Chris Coker in *Waging Without Warriors?,* this definition has a uniquely Western way of war connotation. Coker distinguishes between two aspects of war: instrumental and existential. The Western way of warfare, as created by the Greeks, prioritized the existential warrior who realized his own humanity through war beyond accomplishing the objective of the state. Dying on the battlefield helped justify the cause of the war itself. Coker quotes German philosopher Georg Wilhelm Hegel, "Freedom dies for fear of dying." The instrumental aspect of war consists of both the political reason for the war and the technologies associated with increasing the odds of winning. Coker explains that by focusing on technological solutions rather than the human aspect war, the U.S. way of war has become almost entirely instrumental. The U.S. questions what tools are required to kill the enemy rather than what it will take to convince citizens to die for a belief.[41] In a similar vein, sociologist Charles C. Moskos argues the military is moving away from an institutional theme, where the profession is a calling, to an occupational theme where members see their occupation only as a job.[42] Although the profession of arms still includes self-sacrifice and unlimited liability, technologies that distance soldiers further from the battlefield do challenge the continued existence of the warrior ethos and the true applicability of self-sacrifice as a virtue.

The Armed Forces Officer considers these four virtues to be a basic requirement for every military officer. First, discipline encapsulates what an officer must do, in accordance with what is stated in the commissioning oath. Every officer, as a professional, must have physical courage to act in dangerous environment and moral courage to voice dissent when needed and be held accountable for mistakes. Competence is similar to expertise in that an officer must have knowledge to perform a specialized mission. Finally, self-sacrifice and selfless service requires that an officer demonstrate

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[40] Swain, Richard M. and Pierce, Albert C., 40.
[41] Coker, Christopher, *Waging War without Warriors? The Changing Culture of Military Conflict*, IISS Studies in International Security (Boulder, Colo: Lynne Rienner Publishers, 2002), 6–59.
[42] Sarkesian, Sam C. and Connor, Robert E., *The US Military Profession in the Twenty-First Century*, 32.

full devotion to a cause by being willing to give his or her life or time. Figure 3 provides a brief definition of each virtue. The four virtues apply to the professionals employing technology but not to the organization; therefore, the virtues will only be used in the employment section of the case studies.

Four Virtues of the Military Professional:

Discipline: Embodied in an officer's oath to obey the lawful orders of the President and superior officers

Courage: Physical - the ability to decide and act in a dangerous environment; Moral – willingness to speak and be held accountable for actions

Competence: Individual requirement to have expertise to perform a specific mission

Self-Sacrifice or Selfless-Service: Measurement of commitment to a cause through willingness to give life or time

Figure 3. Summary of Key Virtues of the Military Professional
Source: Author's Original Work

Previous Versions of *The Armed Forces Officer*

The Armed Forces Officer evolved with each new edition. A review of these editions demonstrates how the concept of the profession of arms has changed over time. This evolution also shows how the concept was more nebulous in the original 1950 version when ICBMs were first being developed. Appendix A summarizes the key sections and developments found in the 1950, 1960, 1975, and 1988 versions. Because of the differences between how the 2007 and 2017 versions of *The Armed Forces Officer* view the potential role of technology on the profession and the progressive similarity in their definition of the profession of arms, a brief comparison of the two versions follows.

2007 Version and Revisiting the 2017 Version

The 2007 version of *The Armed Forces Officer* is the first to contain a chapter specifically on "The Profession of Arms." However, rather than using the four characteristics that are used in the 2017 version, the 2007 book breaks the profession into two components: functional and moral. The functional component consists of the missions and tasks assigned to the military by society, and these missions and tasks require competence. This closely equates to the characteristics of responsibility and

expertise identified in the 2017 edition. Unlike the functional component, which can demand different levels of technical competence depending on a member's specialty, the moral component is common across the profession regardless of specialty.

The moral component is divided into three ethical categories: The Individual in the Profession, The Profession at Work, and The Profession and the Society. The first category includes the virtues all members of the profession must have, but the 2007 version does not identify virtues as the 2017 *The Armed Forces Officer* does in the chapter entitled, "The Officer in the Profession of Arms." The Profession at Work deals with the conduct and ethics of war, such as the just war tradition. Two important criteria for this study within just war theory are the *jus in bello*, or justice in war, concepts of discrimination and proportionality. Discrimination is the responsibility to distinguish between combatants and noncombatants and to only target the former. Proportionality requires that the harm done during a military operation should not outweigh the good the operation aims to accomplish. The section on The Profession and Society includes how the military should relate to civilian political leadership and society in general.

The 2007 version of *The Armed Forces Officer* also discusses Huntington's three characteristics of the profession of arms; however, it highlights that developments since the 1980s, which led to a post-industrial society, challenge the concept of professions. The authors of the 2007 version seemed unsure on whether the Huntington model could survive global media and an increasing requirement for integration between civil and military actions. In the chapter on the profession of arms, the authors highlight: "The same technology that yields unparalleled success on the battlefield can also detach the warrior from the traditional ethos of the profession by insulating him or her from many of the human realities of war."[43] By 2017, this concern seems to be gone, and instead the 2017 edition quotes then Chairman of the Joint Chiefs of Staff General Martin E. Dempsey from a 2013 West Point speech: "You've all heard that warfare is changing, technology is taking over, the Army is a thing of the past. But you know, the most sophisticated piece of warfighting equipment in this picture is this squad leader and he

[43] *The Armed Forces Officer.*, 18.

hasn't changed all that much really since the days of the Roman Legion."[44] This view of the profession of arms having an enduring nature may be accurate, but how can the military's choices regarding the development and employment of technology ensure this remains true?

In the foreword to the 2007 version, Congressman Ike Skelton says *The Armed Forces Officer* should be the first book in every new officers' library to help them explore what it means to be a member of the profession of arms.[45] Whether it has actually been the first book in officers' libraries is unknown since historical records of distribution could not be found. What started out as a philosophical exploration of what an individual officer needed to be and do as a good leader in combat and in preparation for combat became more focused on codifying the profession of arms as a whole and defining what an officer needed to be and do within that structure. By the 2017 version, there are clearly identified and defined characteristics and virtues of the profession of arms with a simpler layout and narrower focus than early versions. This is a natural progression as the U.S. left World War II and emerged as the new global superpower, and over time found itself taking on an increasingly broad array of missions in a post-industrial, technology-driven society.

Morris Janowitz and the Impact of Technology

Morris Janowitz was one of the first to recognize the impact technology would have on the profession of arms. As a sociologist, he focused on how different groups and institutions interact with each other.[46] In addition to Janowitz's delineation between "absolutist" and "pragmatist" views on the profession of arm's responsibility to society, in his 1960 book, *The Professional Soldier*, Janowitz hypothesized that modern technology itself was changing the military profession. Rather than requiring rigid discipline, the new technical and mechanized military needed to emphasize initiative and morale to retain and motivate highly skilled individuals.[47] The 2017 version of *The*

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[44] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 67.
[45] *The Armed Forces Officer*. (Washington: Potomac Books : National Defense University Press, 2007), xii.
[46] Feaver, Peter D., "The Civil-Military Problematique: Huntington, Janowitz, and the Question of Civilian Control," *Armed Forces and Society* 23, no. 2 (Winter 1996): 166.
[47] Janowitz, Morris, *The Professional Soldier, a Social and Political Portrait*, 31–36.

Armed Forces Officer, in its description of discipline as one of the military virtues, seems to disagree with this viewpoint, but it may be a matter of properly defining the term and finding the balance between obedience and Clausewitz's determination as discussed when analyzing discipline as a virtue.

Janowitz also thought this new reliance on technology narrowed the gap between the military and civilian professions with fewer members of the military profession conducting tasks thought of as purely military. For example, Janowitz says the percentage of solely military occupations dropped from 93.2 percent during the Civil War to 28.2 percent after the Korean War, with this latter percentage being even lower in the Air Force and Navy. World War II resulted in the military profession overcoming much of its traditional hesitancy to adopt new technology, but in Janowitz's view, the military profession still failed to strategically evaluate the need or requirements for weapon systems and instead focused on perfecting current weapons systems. He cites the jet engine as an example of military reluctance to adopt innovative technology, which was first designed in 1929 and first flight tested by the U.S. in 1942, but not implemented as the standard engine for aircraft until the Korean War.

This reluctance to adopt innovative technology is still pertinent today as the profession discusses alternatives such as the next generation fighter (and whether it should be manned or unmanned) or the aircraft carrier (and what its role will be in a contested environment).[48] In Chapter 3, the development and employment of ICBMs follows this trend, and at this point in its development, AI could be used to make incremental changes to the profession of arms or it might result in innovative and revolutionary change.

The Profession of Arms in the Air Force

Since its inception in 1947, the Air Force has taken steps to develop itself as a profession of arms that reflect an evolution in thinking similar to the development of *The Armed Forces Officer* over the past seven decades. Steps include the development of professional military education (PME), the creation of core values, and most recently the

[48] Janowitz, Morris, 3–25.

establishment of the Profession of Arms Center of Excellence (PACE). This section provides a brief synopsis of how these three initiatives evolved.

Professional Military Education

The first classes graduated from Air Command and Staff College (ACSC) and Air War College (AWC) in June 1947 under the larger umbrella of the newly created Air University. Broadly speaking, the original curriculum of ACSC focused on preparing students for squadron command, and AWC focused on topics relevant to strategic targeting.[49] The curriculum of these two schools has been responsive to change when the Air Force assesses its field grade officers need new expertise to fulfill the responsibilities levied on it by the nation. In 1954, the Air Force established Squadron Officer School (SOS) for company grade officers. This school has fluctuated in length from five to twelve weeks as the focus and purpose of the school has responded to similar pressures faced by ACSC and AWC.[50]

In 2015, Air Education and Training Command commissioned RAND to study what the Air Force could do to increase professionalism within the service. RAND looked at a variety of events from 1990 to 2015, such as major combat operations, ethical violations, and accidents, and found that efforts to focus on professionalism were greatest immediately after a major ethical violation when no major combat operation was taking place at the same time.[51] When RAND looked at how well the current ACSC and AWC curriculum incorporated subjects related to the profession of arms, the study found that course objectives primarily related to connecting Air Force core values with mission accomplishment but did little to establish a commitment to the profession of arms or establish a culture around this profession. The in-residence program fared better than correspondence courses, but inclusion of profession of arms subjects decreased as officers progress up the PME pyramid.[52] Recommendations from the report included

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[49] Heiman, 1st Lt D. E., "History of Air University: 20 November 1945 to 30 June 1947" (Air University, 1947), 225–56.
[50] Kane, Robert B., "Squadron Officer School (AETC)" (U.S. Air Force, August 19, 2009), http://www.afhra.af.mil/About-Us/Fact-Sheets/Display/Article/433121/squadron-officer-school-aetc/.
[51] Li, Jennifer J. et al., *Enhancing Professionalism in the U.S. Air Force*, Research Report, RR-1721-AF (Santa Monica, Calif: RAND Corporation, 2017), 73–74.
[52] Li, Jennifer J. et al., 54–58.

promoting a clear definition of professionalism for the Air Force, ensuring Air Force leaders epitomize the institution's standards and expectations for professionalism, and establishing goals and standards for studying professionalism during PME.[53]

Creation of Core Values

The Air Force core values are: Integrity First, Service Before Self, and Excellence in All We Do. To create a "values-based Air Force," these core values were adopted in 1995 by then Secretary of the Air Force Sheila E. Widnall and then Chief of Staff of the Air Force General Ronald R. Fogleman. Previous to this, then Chief of Staff of the Air Force General Merrill A. McPeak published six core values: integrity, courage, competence, tenacity, service, and patriotism; however, this longer list was not given the attention and priority needed to be incorporated into all facets of Air Force education and training opportunities. Immediately after introducing the new core values, General Fogleman directed Air Education and Training Command to develop a strategy that would "address Core Values in the accession stage and build upon this foundation in the training and education processes, tailoring the focus each step of the way. Such a career-long approach to Core Values will help frame our strategic direction and bolster the professional and personal stature of our people."[54]

To implement this strategy, the Air Force focused on three components: the schoolhouse, the field, and a continuation phase. At every formal schooling opportunity during an individual's career, the core values would be emphasized and reinforced. The field component, or operational assignments, emphasized ensuring the core values were applied both top-down from leadership and bottom-up by removing processes or policies that might compromise the core values within the operational environment. Finally, the continuation phase focused on ensuring the enduring basis of the core values through the creation of booklets, a website, and performance feedback.[55]

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[53] Li, Jennifer J. et al., 76.
[54] Tower, Lt Col Pat and Dunford, Lt Col Doug, "Air Force Core Values Guru's Guide," 3–5, accessed April 21, 2018, https://www.gocivilairpatrol.com/media/cms/Gurus_Guide2_642B47DEF42FD.pdf.
[55] Tower, Lt Col Pat and Dunford, Lt Col Doug, 9–10.

The Profession of Arms Center of Excellence

In 2015, the Air Force established PACE as the central organization "responsible for collaborating and coordinating an Air Force institutional-wide professionalism strategy, standardizing/synchronizing Air Force-wide professionalism courses, building and providing world-class professionalism tools for local use, and enhancing unit climate assessments with professionalism solutions."[56] PACE was created in response to recent cheating scandals in the both the Air Force and Navy, in addition to other ethics lapses. In 2014, Secretary of Defense Chuck Hagel established a military professionalism office and designated a special assistant for military professionalism in response to these same violations.[57]

PACE's goal is to enrich and enhance the Air Force profession of arms by helping to provide deliberate, institution-wide strategies focused on supporting professionalism. In its 2015 Strategic Roadmap, PACE defines the Air Force Profession of Arms as: "A vocation comprised of experts in the design, generation, support and application of global vigilance, global reach and global power serving under civilian authority, entrusted to defend the Constitution and accountable to the American people." The roadmap also identifies officers, enlisted, and civilians as Air Force professionals.[58] This definition of a professional is a progression from Huntington who thought only officers were members of the profession of arms since enlisted did not have the education needed to attain expertise.[59]

The Air Force has gradually increased its focus on professionalism, starting with the establishment of core values in the 1990s. Aspects of the profession of arms seem to have been present in PME schools since their establishment, but a deeper study of annual curriculum content would be needed to fully verify this contention. The recent

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[56] Profession of Arms Center of Excellence, "Strategic Roadmap: United States Air Force Profession of Arms," May 2015, 6.
[57] Li, Jennifer J. et al., *Enhancing Professionalism in the U.S. Air Force*, iii.
[58] Profession of Arms Center of Excellence, "Strategic Roadmap: United States Air Force Profession of Arms," 3–4.
[59] Huntington, Samuel P., *The Soldier and the State; the Theory and Politics of Civil-Military Relations*, 17–18.

establishment of PACE offers a promising advocate for reflection on the profession of arms as the Air Force considers new roles and technologies.

Conclusion

Although the U.S. military has a long history as a profession, it was not until recently that the military started to think about what this should mean in an explicit manner, as evidenced by the gradual change in the content of *The Armed Forces Officer*, the establishment of service core values in the 1990s, and the creation of profession of arms centers of excellence.[60] *The Armed Forces Officer* evolved from philosophical exploration of the requirements needed to be a good, ethical leader in the 1950s, to a more explicit guide that defines the profession as having four characteristics: expertise, responsibility, corporateness, and ethics and ethos. This last characteristic is an addition to Samuel Huntington's original breakdown and reflects how ethics and morality have increased in importance as part of the profession of arms since the 1950s. The addition of ethics reflects a variety of events such as POW experiences during the Korean War, various atrocities—like the My Lai massacres—during Vietnam; and operations in Iraq and Afghanistan resulting in publicized civilian casualties.

Morris Janowitz, Chris Coker, and other writers recognized that technology influenced the profession, and the 2007 version of *The Armed Forces Officer* also recognizes the role of the post-industrial society on the profession. The 2017 version seems to reject this view by not discussing technology except for General Dempsey's quote on leaders not changing. To help reconcile the differences in these views on the role of technology, the next chapters look at how the characteristics of the profession of arms potentially influenced or were influenced by the development and implementation of ICBMs, and how this same relationship could apply moving forward as the momentum surrounding AI continues to gain traction.

[60] Li, Jennifer J. et al., *Enhancing Professionalism in the U.S. Air Force*, 15.

Chapter 3

Death From A Different Continent

Intercontinental ballistic missiles (ICBMs) were the first military weapons that led to its operators being completely removed from the battlefield.[1] For the other sides of the nuclear triad during the Cold War, aircraft and their respective aircrew still had to approach the battlefield or a target in order to be effective, and submariners knew they played a game of cat and mouse with the adversary using intelligence collection assets and other submarines to locate their position. In contrast, missileers only faced the same danger as every other U.S. citizen. If the U.S.S.R chose a counter-force strategy, targeting U.S. nuclear forces, missileers faced slightly greater danger than if a counter-value strategy, targeting U.S. cities, was chosen; however, it was still different from what other combat arms specialties faced. Missileers were also separated from the decision-making process because they were sequestered in remote launch control centers and expected to execute launch orders with no awareness of or inputs into the political or military situation while on alert.

This chapter uses the characteristics and virtues of the profession of arms described in the 2017 version of *The Armed Forces Officer*—as summarized in Figures 2 and 3—for the guiding framework to examine how the development and employment of ICBMs influences and is influenced by the profession of arm. While these characteristics and virtues were not explicitly defined when ICBMs were first developed and put on alert in the 1950s, looking back to see how the current characteristics apply to that timeframe provides utility for leaders making decisions on how to develop and employ future technologies. The development section of this chapter focuses on the ICBM and how the characteristics of the profession of arms might have influenced the military organization's thoughts and decisions in relation to this technology.

The employment section explores how the characteristics and virtues of the individual professionals operating ICBMs were influenced by this technology.

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[1] The German V-2 rocket also distanced its operators from the battlefield during World War II, but its range was not necessarily sufficient to remove them completely from the theater of operations like ICBMs. The V-2's inaccuracy also negated the need for detailed targeting decisions.

Development and employment of ICBMs started with Atlas I and Titan I systems that needed to be fueled upon the receipt of a launch order. In the 1960s, the Air Force then moved to the silo-based, solid-proprellant Minuteman and the silo-based, liquid-propellant Titan II that had greater range and payload capacity. Finally in the 1970s and 1980s, the Peacekeeper was built to be both highly accurate and capable of carrying numerous payloads. Although the Midgetman was never operationally developed, it was meant to be an inexpensive option that could be deployed in large numbers to complicate Soviet targeting solutions.

Development of ICBMs

The path to developing ICBMs started as World War II was ending. Operation Paperclip was the U.S. effort to find German rocket scientists and technology before the Soviet Union found them.[2] After this initial effort though, the development of missiles stalled because the military saw no need for them. Budgets were drawing down with the end of the war and the U.S. had an obvious advantage over potential adversaries with its strategic bombers and atomic weapons. However, which service would control future development of this technology was of vital importance. While the Army Air Forces, and then the Air Force, did not want to relegate pilots to the sidelines, the Air Force also recognized the possibility that these "pilotless" aircraft might one day negate the need for pilots.[3] In this light, the Air Force needed to retain control of the future development and operational control of missiles because this would increase its share of the budget and ensure its upcoming independence far into the future. The Navy and the Army also had compelling reasons for why they should have a significant role in missile development and employment.[4]

Based on this conflict between services, arguments over control seem to put the expertise, responsibility, and corporateness characteristics of the profession of arms in conflict with each other due to inter-service competition. The services prioritize

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[2] Weinberger, Sharon, *The Imagineers of War: The Untold Story of DARPA, the Pentagon Agency That Changed the World.* (New York: Vintage Books ;, 2018), 19–20.
[3] Beard, Edmund, *Developing the ICBM: A Study in Bureaucratic Politics* (New York: Columbia University Press, 1976), 30–35.
[4] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011" (Air Force Space Command, 2012), 3.

corporateness since a new technology potentially increases the prestige of the service. The competition for status can come at the expense of responsibility because the services' proposals for a technology may not be in the best interest of the U.S. which also challenges whether the service is using its expertise correctly. Inter-service rivalry is not necessarily a bad thing nor were the services incorrect in their assertions for a technology. Competition does call into question of how the characteristics of the profession of arms should relate to each other in the case of advocating for a technology.

In 1953, once it was proven that a thermonuclear missile could be miniaturized to fit on a ballistic missile, ICBMs received a renewed emphasis from the Air Force.[5] That year, Assistant Secretary of the Air Force for Research and Development Trevor Gardener organized the Strategic Missiles Evaluation Committee. This committee was primarily composed of experts from academia and industry to advise the military on the feasibility of various missile programs across the services to avoid unnecessary duplication.[6] In *The Professional Soldier*, Janowitz uses ICBMs as an example of how new technology forces the profession of arms to rely on outsiders for some of its required expertise to develop and maintain new weapons systems.[7] The end result was two-fold. First, the Western Development Division was created in 1954 under then Major General Bernard A. Schriever in order to accelerate development of the Atlas and Titan missiles. Second, in 1957, Secretary of Defense Charles Wilson assigned all missiles with a range greater than 200 miles to the Air Force, ending the Army's missile development programs.[8]

In 1957, Gardener's replacement, Richard Horner, spoke at the first annual awards banquet of the Society of Experimental Test Pilots. Speaking to an audience concerned with the survival of their profession as pilots, Horner struck an interesting balance between expertise, responsibility, and corporateness when he said: "it is difficult

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[5] Gantz, Lt Col Kenneth F., *The United States Air Force Report on the Ballistic Missile* (Garden City, New York: Doubleday & Company, Inc., 1958), 17.
[6] Beard, Edmund, *Developing the ICBM*, 156–58.
[7] Janowitz, Morris, *The Professional Soldier, a Social and Political Portrait* (Glencoe, Ill.: Free Press, 1960), 31–32.
[8] Brzezinkski, Matthew, *Red Moon Rising: Sputnik and the Hidden Rivalries That Ignited the Space Age*, 2007, 79.

to postulate a military engagement of any kind where the flexibility and discrimination of man's judgement and power of reasoning wouldn't be superior at some stage of the conflict…The strongest advocates recognize missiles as complementary to, rather than a replacement for the manned aircraft."[9] Horner's personal expertise told him unmanned missiles were a critical component of deterrence, but unmanned missiles threatened how the Air Force defined its corporateness, which centered on pilots. Pilots' particular expertise would still be needed for at least some part of a conflict for the foreseeable future, so Horner probably did not want marginalize pilots or threaten the identity of the Air Force. Horner's sense of responsibility may also have told him he needed to find a balance in capability between missiles and manned aircraft to ensure a capable Air Force with a strong corporate identity.

In the case of the Minuteman, the competence, courage and discipline of Colonel Edward Hall to develop a solid-propellant ICBM demonstrates the influence one professional can have on the development of a weapon system. Colonel Hall had been involved with solid-propellant technology since World War II and he did not hesitate to lobby for a solid-propellant ICBM even though his view was not initially popular with Air Force leadership. Without his dedication, it is doubtful whether the Minuteman would have been developed and operational so quickly; many Air Force leaders thought the technology was too advanced and were more concerned with getting the liquid-propellant Atlas and Titans operational.[10]

In Hall's view, the solid-propellant ICBM needed to remain simple, reliable, survivable and affordable because "by keeping the missile small and the weapons cost low, we can more reliably afford to size the force so that sufficiently large portion of the force will survive, irrespective of actions taken by the enemy."[11] In 1958, due in part to the launch of Sputnik and competition from the Navy's Polaris Intermediate Range Ballistic Missile program, the future Minuteman program received approval to begin

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[9] Mindell, David A., *Digital Apollo: Human and Machine in Spaceflight* (Cambridge, MA: The MIT Press, 2008), 17–19.
[10] MacKenzie, Donald A., *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance*, 4. pr (Cambridge, Mass.: MIT Press, 2001), 152–55.
[11] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 99–101.

research and development. The Minuteman system ended up becoming more complex and expensive than originally envisioned by Colonel Hall, with more dispersed sites and hardened bunkers, but a smaller total inventory of missiles.

The Air Force also explored the possibility of a portion of the Minuteman force being mobile via a railcar platform as a more credible second-strike platform. In 1959, the commander of Strategic Air Commander (SAC), General Thomas S. Power, was the main proponent of this concept of deceptive mobility which fit with his responsibility to provide a survivable nuclear deterrent force. While testing did validate the operational feasibility of a mobile Minuteman force, the program was cut by Secretary of Defense Robert McNamara in 1961. He thought the program was too expensive and manpower intensive, and he was privately concerned about its safety and proximity to population centers. Instead, McNamara had the Air Force focus on increasing the number of fixed missile sites, updating the launch system so each missile could be separately targeted vice launched in salvos of ten with more targeting options, and adding a "stop" launch capability to prevent an inadvertent missile launch.[12]

While the Minuteman and Titan systems began their first few years of operational deployment, the Air Force was already articulating requirements for its next missile, eventually known as the Peacekeeper. As stated in 1963, it was to have a larger payload, improved accuracy, and be capable of cold launching like ballistic missile submarines. From the Air Force's viewpoint, this missile should provide counterforce capability, or the ability to accurately strike Soviet nuclear and military targets.[13] A counterforce capability is more palatable, and thus potentially usable, than a counter-value, mutually assured destruction ICBM designed purely to deter the use of nuclear weapons by any nation through the threat of attacking cities. However because it is more usable, society's ethical concerns with using nuclear weapons increases which leads to a tension between the responsibility to provide military options to protect society and society's definition of acceptable options.

[12] Spires, David N., 110–16.
[13] MacKenzie, Donald A., *Inventing Accuracy*, 226–29.

From a responsibility perspective, the Air Force should plan for how best to use every weapon in its arsenal for every possible contingency. While the Single Integrated Operational Plan for all out thermonuclear war existed at one end of the spectrum, later plans based on flexible response, "no cities," or Thomas Schelling's theory of compellence, required a wider range of planning options.[14] While ethics, at least publicly, were admittedly of less concern in the military before the Vietnam War, there was little discussion within the military about the ethics of nuclear weapons and their ability to meet the *jus ad bellum* and *jus in bello* concept of proportionality and the *jus in bello* concept of discrimination.[15] Within the academic and religious communities, however, there were many written debates and protests on the morality and ethics of nuclear weapons and how to comply with the just war principles of discrimination and proportionality before the Vietnam War.[16] In the words of Bernard Brodie in 1959, "Today, on the contrary, we speak of limited war in a sense that connotes a deliberate hobbling of a tremendous power that is already mobilized and that must in any case be maintained at a very high pitch of effectiveness for the sake only of inducing the enemy to hobble himself to a like degree."[17] In this sense, ICBMs are both responsible and ethical because they prevent the possibility of total war or a major conflict between two superpowers.

The stated requirements in 1963 for the eventual Peacekeeper were further refined in 1971 to add improved survivability, variable-yield warheads, and multiple independently targeted reentry vehicles (MIRV) capability. Like the Minuteman, the Peacekeeper also faced intra-service competition because many in the Air Force preferred funds go to a new bomber, the eventual B-1. This problem was solved with the defense

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[14] Schelling's theory of compellence rested on convincing the other side that if a transgression happened punishment would follow; Craig, Campbell, *Destroying the Village: Eisenhower and Thermonuclear War* (New York: Columbia University Press, 1998), 152–55.
[15] Kultgen, John H., *In the Valley of the Shadow: Reflections on the Morality of Nuclear Deterrence*, Conflict and Consciousness, v. 7 (New York: P. Lang, 1999), 362–63.
[16] Krauthammer, Charles, "On Nuclear Morality," in *War, Morality, and the Military Profession*, ed. Malham M. Wakin, 2nd ed., rev. and updated (Boulder, Colo: Westview Press, 1986), 501.
[17] Brodie, Bernard, *Strategy in the Missile Age*, New RAND ed (Santa Monica, CA: Rand Corp, 2007), 311.

budget increases implemented by President Ronald R. Reagan in the 1980s.[18] As debate over the need for a new missile increased during the 1970s, survivability became one of the main justifications for, as well as one of the pitfalls of, the new missile. The Minuteman was assessed as vulnerable to newly developed Soviet ICBMs, so decision makers perceived the U.S. nuclear deterrence capability to be at risk.

However, the Air Force and political leaders never agreed on how to make Peacekeeper invulnerable. Because of the Air Force's desire for a new bomber, the Air Force preferred to use Minuteman silos because this option was inexpensive and feasible unlike proposals that prioritized making the Peacekeeper mobile. However, the Air Force's choice did not meet political leaders' desire for survivability. Whether Air Force leaders' expertise led them to think the Soviet threat was overstated, the U.S. should only pursue a first-strike strategy negating the need for survivability, or that any basing option which guaranteed survivability would threaten B-1 funding is debatable.[19] Over forty basing models for the Peacekeeper were evaluated during the 1970s, but none were deemed acceptable. The Soviet ICBM threat continued to grow as a concern, and the search for an acceptable, feasible, and affordable survivability option continued into Reagan's administration.

In 1983, President Reagan established a Commission of Strategic Forces, led by retired Lieutenant General Brent Scowcroft, to focus on modernization of the nuclear force and how best to deploy Peacekeeper. The Scowcroft Commission's final recommendation was to develop a new, small, single-warhead ICBM; to reexamine all basing alternatives with an emphasis on hardened land vehicles for both the small missile and the Peacekeeper; and to immediately deploy Peacekeepers in Minuteman silos to get an operational capability that would encourage the Soviet Union to negotiate new arms control agreements.[20] The small ICBM, termed the Midgetman, was unique in that the recommendation for it came from outside the military expertise. The justification for it

[18] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 136–37.
[19] MacKenzie, Donald A., *Inventing Accuracy*, 227–29.
[20] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 142–43.

was similar to Colonel Hall's original justification for the Minuteman; the Midgetman would be an inexpensive missile that could be deployed in large numbers to complicate Soviet targeting.

While the Midgetman never made it past the development phase due to budget concerns and the end of the Cold War, it raises another possible connection between responsibility and technology. As a technology matures and political leaders develop their own expertise on the weapon system, political leaders may discount the advice of military leadership and offer their own advice on requirements. How military leaders handle their responsibility to provide expert military advice to political leaders, whose expert view might differ from the military's, requires its own special type of expertise in order to communicate outside of the profession effectively.

Although the characteristics of the profession of arms, expertise, responsibility, corporateness, and ethics and ethos, seem to play a role in the development of ICBMs, this role does not appear to be unique compared to other weapon systems development. The profession's expertise and responsibility led to the recognition that ICBMs were a necessary and critical weapon system to deter the Soviet Union and prevent a major conflict. The Air Force's corporateness made it reluctant to adopt ICBMs since they threatened the preeminence of the pilot, but corporateness also influenced the Air Force to want to control ICBMs since they would contribute to the prestige of the service.

The ethical component garnered greater attention outside of the military than it did inside. As Janowitz highlighted, the expertise for new technologies frequently needs to come from experts that do not exist within the profession of arms. As a technology matures, political leaders may think their expertise equals or exceeds the military profession's expertise, and politicians may make decisions or demands that differ from military advice or requests as they did with the Midgetman.[21] The tensions between the characteristics due to inter- and intra-service competition seem to be fairly standard during the development of many technologies. However, recognizing the tension between the characteristics of the profession of arms during the development phase of a weapon system due to these competitions would be a helpful step towards enriching the

[21] Janowitz, Morris, *The Professional Soldier, a Social and Political Portrait*, 28–30.

conversation and boundaries on these characteristics especially as new technologies, like artificial intelligence, threaten the status of the military as a profession.

Employment of ICBMs

In a speech to future officers in 1965, former SAC Commander General Power said of missileers: "Such awesome responsibility calls for mature and competent men who can be relied on to do their job instantly and expertly whenever they should receive the order. Their constant preparedness and proficiency, paradoxically enough, make us confident that this order will never be given."[22] General Power was demanding missileers embody the characteristics and virtues of the profession of arms to ensure the deterrent capability of ICBMs. His speech also suggests the profession of arms has its own deterrent power. When the force can display high levels of expertise, responsibility, corporateness, and ethos, an adversary will theoretically be less likely to attack because they know their opponent is formidable. However, the history of the missileers shows that while the intent of General Power's speech was met; missileers achieved preparedness and proficiency while also experiencing a lack of motivation. Exploring the interplay between the ICBM as a technology and the virtues and characteristics of the missileers responsible for the weapon system may shed some light on how to frame and discuss the profession of arms beyond organizational, societal, or cultural lenses.

Before beginning, a brief description of the different employment mechanisms for the operational missiles discussed in the "Development of ICBMs" section is warranted. Atlas and Titan II missiles were liquid fueled missiles and required frequent maintenance and large crews of ten or more men. Crews needed to be located next to a missile, so it could be fueled and prepared for launch as quickly as possible. The main difference between the Atlas and Titan II from an employment perspective is that the Atlas had to be raised and fueled immediately prior to launch, while a Titan II could launch in less than a minute because it could be stored in its silo already fueled. The Minuteman and Peacekeeper missiles are solid propellant missiles and did not require the same amount of maintenance as the Titan II with its more volatile liquid fuel. A two-member crew

[22] Smith, Capt Pierce L., "Motivation of Minuteman Missile Crews" (Air Command and Staff College, 1965), 11.

controls a flight of ten missiles located miles away from the crew's underground launch control center. Regardless of missile variant, missileers are expected to execute launch commands immediately upon receipt with no insight or input into the decision on when or how to use the ICBMs.

Today, the Minuteman is the only operational ICBM. Current missileers are still expected to execute launch orders upon receipt without any questions. The organization responsible for ICBMs transitioned from SAC to Twentieth Air Force under Air Combat Command in 1992. Twentieth Air Force then transferred to Air Force Space Command in 1993 and finally to Global Strike Command in 2009. However, the focus of this section is primarily on the missiles themselves rather than the impact the organizational hierarchy and other non-technological aspects might have had on the individual missileers.

Employment Versus the Characteristics and Virtues

General Curtis E. Lemay, the second commander of SAC from 1948-1957, created a culture that demanded standardization and perfection. As a professional, he recognized the importance of nuclear weapons to the national security policy and took steps to increase the professionalism of every airmen in SAC. However, technology also played a role in how the SAC culture of "Peace is Our Profession" impacted missileers in comparison to their bomber pilot counterparts. Missileers sat in a sterile bunker to control their missiles while pilots had the challenge and responsibility to fly their plane to the correct launch point.[23]

Expertise. An important component of expertise is technical competence, or becoming proficient at a job or craft. Similar to other weapons systems training in the Air Force, missileers go through initial training at a centralized school and then receive additional training at their assigned missile unit to become mission qualified. Missileers also receive continuation training throughout the length of their assignment to ensure they retain the required skills and knowledge and learn any new information since their last training event. However, because missile alert duty is highly regulated with strict

[23] Michel, Marsall L., *The Eleven Days of Christmas: America's Last Vietnam Battle*, 1st ed (San Francisco, Calif: Encounter Books, 2002), 1–6.

adherence to checklists and processes to ensure nuclear safety and surety, missileers have few opportunities to exercise their technical competence or ingenuity. For example, when a new Minuteman missile crew assumed alert duties, they had to follow a 246-step checklist to ensure the functionality of all equipment in the command capsule.[24] Constant assessment for compliance with checklists and the career threatening repercussions if a crew member failed an assessment meant ingenuity or expertise was rarely valued.[25] SAC senior leadership assumed the missile crews would remain highly motivated because of the importance of their mission, the camaraderie that should develop from crews working together in a small space, and the protection from deployments. In reality, motivation remained a continual problem.[26]

To increase motivation and expertise, SAC instituted Olympic Arena in 1967. This week-long competition involved four combat-ready crews from each missile wing (to include Titan II or Peacekeeper units) as they helped spread new ideas and encouraged participants to find more efficient and effective ways to conduct operations and maintenance (with the requisite checklists updated of course).[27] During employment, as in the development phase, competition can be an important component in encouraging an increased focus on some or all of the characteristics of the profession of arms. Starting in the 1970s, SAC also allowed officers to move between Titan II and Minuteman, to move from operations to maintenance, and to volunteer for career broadening opportunities. This step was ideal to cultivate the profession of arms for missileers; the additional opportunities increased an officer's expertise across the spectrum of missile operations and gave the officer the opportunity to experience other roles and missions.

To increase the retention of Minuteman missileers and to potentially increase their expertise, SAC worked with the Air Force Institute of Technology to create the

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[24] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 121–22.
[25] Stout, Col Angela G., "Organizational and Cultural Erosion of the ICBM Nuclear Enterprise" (Maxwell AFB, AL: Air War College, February 15, 2010), 5–6.
[26] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 123.
[27] Spires, David N., 81.

Minuteman Capsule Education Program in 1963. Since crew duty was fairly routine with significant down time, SAC senior leaders thought providing a program which allowed Minuteman missileers to earn advanced degrees would make the career field more attractive while also addressing some of the monotony and motivation concerns with alert duty.[28] In reality, most crew members found it very difficult to study while on alert duty due to noise, unexpected drills, and fatigue; thus, academic requirements had to be met during off-duty time.[29] While the program was frequently in danger of being eliminated by the Air Force due to budgetary and effectiveness concerns and went through several modifications with the types of degrees offered, SAC managed to keep the program until the command was deactivated in 1992. Although the Air Force continues to fluctuate on whether a master's degree contributes to an officer's promotability, SAC seemed more focused on the motivation and recruitment aspects of the Minuteman Capsule Education Program rather than increasing the expertise of their missileers.

Responsibility. Continuing on the motivation issue, as silos and command bunkers for Titan II and Minuteman missile systems were built in the late 1950s, many in the Air Force were questioning how to keep missileers motivated because of the recognition that duty would be monotonous. For example, in 1958, the Ballistic Missile Division, Headquarters Air Research and Development Command, requested the Personnel Laboratory, Wright Air Development Center conduct a survey of potential problems and solutions related to morale, motivation and retention. The study suggested that proper management and leadership practices offered the greatest potential for alleviating motivation problems for ICBM sites.[30] In 1961, Air Force Manual 190-4, *Information Policy and Procedures*, stated motivation is tied to making service members aware of their responsibilities to national security.[31]

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[28] Spires, David N., 125–27.
[29] Smith, Capt Pierce L., "Motivation of Minuteman Missile Crews," 23–24.
[30] Stewart, E.S., "A Survey of Potential Morale, Motivation, and Retention Problems at Ballistic Missile Sites" (Lackland AFB, TX: Wright Air Development Center, October 1958), ii–iii.
[31] Ingersoll, Lt Col George L., "Discipline and Morale of Missile Alert Forces" (Air War College, 1961), 25.

For SAC nuclear forces, responsibility was verified through the Personnel Reliability Program (PRP) because the missileers were expected to provide was unquestioned obedience to Emergency War Orders (EWO). The PRP evaluates a missileer's medical and psychological capability to launch a missile. If an officer states he or she is unwilling to launch a nuclear missile due to ethical or mental reservations, the officer is removed from the career field.[32] Personnel in this program, which also includes other career fields such as bomber pilots and nuclear munitions maintainers, are expected to constantly evaluate their own behavior and the behavior of other personnel in the program, and report any detrimental information to a supervisor or commander.

In addition to these personnel measures, the Air Force built additional safeguards into the missile systems. For Minuteman, in addition to both crew members needing to approve the launch of any of their ten missiles, the launch order needs to be approved by two additional crew members in the squadron.[33] Nuclear forces, and ICBMs more specifically, constrain individual action and responsibility in a unique and stringent manner to meet the DOD's overall responsibility to ensure nuclear weapons are not launched without proper approval.

Corporateness. The Air Force has struggled to create a positive sense of identity within the missile career field. As one half of the Air Force's portion of the nuclear triad, missileers should theoretically receive recognition equal to their pilot counterparts. Over the years, however, missileers have complained of being treated like second-class citizens. Missileers did not receive special pay for alert duty, sitting alert was not tracked like flight hours, and the missile badge went through various iterations on whether it existed and who was qualified to wear it.[34] In 2011, the Defense Science Board conducted an independent assessment of the progress made toward reinvigorating the Air Force nuclear enterprise. Among its finding, the study found that replacing the missile

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[32] Rush, Lt Col Thomas J., "A Critical Look at the Need for the Air Force's Human Reliability Program" (Washington, D.C.: Industrial College of the Armed Forces, February 28, 1975), 6–7.
[33] Harris, Maj Stephen L., "Personnel Reliability Program within ICBM Operations Squadrons" (Maxwell AFB, AL: Air Command and Staff College, March 1984), 10–15.
[34] Allgaier III, Maj William A., "Enhancing the Missileer's Image" (Maxwell AFB, AL: Air Command and Staff College, April 1979), 73–75.

badge with the space badge when the two career fields merged sent a message that space operators were more important than missileers. Also, missileers felt their weapons system received little attention in professional military education or recruiting advertisements. Furthermore, the fact that not all missileers were volunteers further hurt their sense of corporateness as valued members of the Air Force.[35]

Corporateness varied across the missile systems. For example, Atlas I crews had a strong sense of identity because they were doing something new, and fueling a missile and preparing it for launch was a dangerous business. Early Titan II and Minuteman crews felt the same way, but once processes and procedures for the technology became settled, monotony set in. Titan II crews faced an additional challenge because their weapon system faced the possibility of phase-out from 1967 until the final decision to end the program was made in 1981. Because of this uncertainty, Titan II sites were slow to receive system upgrades and programs that might improve morale. For example, a program similar to the Minuteman Education Program was never established for Titan II.

According to Maj Donald Sherman, while crew duty in the Titan II was more challenging compared to Minuteman, the crews felt less valued.[36] This may have contributed to the catastrophic Titan II accidents in Rock, Kansas in 1978 and in Damascus, Arkansas in 1980, which did not result in any damage to the nuclear warheads, but resulted in a total of three deaths. In both cases, human error, due to lack of training and incorrect procedures, was identified as the culprit. As a result, Titan II received new training programs; however, the accidents helped finalize the decision to deactivate the weapon system. Perhaps due to the increased attention the Titan received and finally having its status decided, Titan crews won or placed in the top three for all the Olympic Arena competitions from 1983 until the last year it competed in 1986.[37]

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[35] Defense Science Board, "Independent Assessment of the Air Force Nuclear Enterprise" (Washington, D.C.: Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics, April 2011), 27–28.
[36] Sherman, Maj Donald H., "Boredom and Monotony: Their Effect on Titan II Crew Morale" (Maxwell AFB, AL: Air Command and Staff College, May 1969), 50–52.
[37] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 88–94.

Peacekeeper crews had a much higher sense of corporateness. As the missile neared operational status in 1985, SAC handpicked Peacekeeper crew members from current Minuteman crews. The selection criteria remained stricter than Minuteman throughout the life of the Peacekeeper, so crew members felt they were part of a unique and elite weapon system. Unlike Titan II, Peacekeeper morale remained high through the years its fate was in jeopardy until its decommission in 2005. The high morale may have been tied to a view that the Peacekeeper helped end the Cold War.[38] Being part of an elite technology versus a neglected technology kept on a shoestring budget can make a positive difference for corporateness.

Ethics and Ethos. If ethics are defined as what an officer, or in this case missileer, must do, then there does not seem to be anything unique to ICBMs when compared to other career fields. The Uniformed Code of Military Justice and moral standards expected of officers are the same regardless of the weapon system. Although there are ethical concerns with ICBMs and nuclear weapons in general, this is separate from ethics in a profession of arms context. If an officer has ethical concerns with launching a nuclear ICBM, the PRP screening process should prevent him or her from becoming a missileer. Ethos, or what an individual missileer should be, seems to be more pertinent. As previously stated, motivation was a concern before the first missile crew went on alert, and a consistent question throughout many of the reports and theses on missileers was how to increase their motivation.[39]

Can a missileer live up to the Air Force Core Values of: Integrity First, Service Before Self, and Excellence in All We Do if the motivation to do his or her job is low? For example, the need for excellence may have been perceived by missileers to be lessened due to the highly regimented, checklist oriented culture. Excellence was demanded in evaluations and inspections, but this was downward directed rather than being sought from an internal source of motivation. The external demand for excellence with low internal motivation may also have influenced the cheating scandal at

[38] Spires, David N., 162–66.
[39] Stewart, E.S., "A Survey of Potential Morale, Motivation, and Retention Problems at Ballistic Missile Sites," 1–5.

Malmstrom AFB in 2014, demonstrating a lack of integrity among the career field. One of the possible solutions then Secretary of Defense Deborah L. James offered was to relook at missileer training to reinvigorate the importance of the core values and ethical requirements to meet high levels of expertise responsibility and corporateness.[40] Cheating does not appear to be a historical problem for missileers. While the ICBM impacts the motivation of missileers which may impact their ethos, the cheating incident was likely due more to cultural problems, like the external demand for excellence, than a technological problem.[41]

Discipline. The missile career field seems to embody the notion of discipline as obeying orders. Missileers are on alert in preparation to receive EWOs. They are required to execute specific checklists to carry out that EWO. During alert duty, missileers can expect no-notice exercises or inspections to verify the crew's ability to accurately execute an EWO and to reinforce the required degree of discipline. Missileers need to have discipline to handle "hundreds of hours of monotony interrupted by a few hours of stark terror" as described by a Minuteman crew member[42] However, there is little need to execute initiative or offer advice, although initiative can be taken to improve checklists and processes as evidenced by the Olympic Arena competitions. Before Minuteman became operational, early studies recommended incorporating a degree of indoctrination during training programs and relying on leaders to keep their crews focused.[43]

Courage. As previously discussed, courage has both a physical and moral component. ICBMs do not appear to challenge the concept of moral courage outside of the already discussed moral and ethical concerns of launching a nuclear missile. From a physical courage perspective, a missileer faces little danger beyond what most U.S. citizens face in the possibility of a nuclear war. This was less true for Atlas and Titan crew members since their missiles were liquid fueled, but a workplace hazard is not the

[40] McCullough, Amy, "Systemic Problems," *Air Force Magazine*, March 2014, 44–46.
[41] McCullough, Amy, 46.
[42] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 125.
[43] Butler, Col John E., Jr., "Men, Missiles and Morale" (Air War College, 1961), 25.

same as facing danger on the battlefield. Since the mid-1960s when Minuteman numbers were steadily increasing, many missileers have been non-volunteered into the career field due to low retention.[44] Besides the perceived monotony of the job, another reason for the lack of volunteers may have been the lack of physical danger associated with missileer duties. It is difficult to display a willingness to go into harm's way when it is not a possibility. Referencing the 2017 *The Armed Forces Officer's* discussion on being a soldier versus a technician of death, with the former being willing to go into harm's way, a related hypothetical question is this: how many missileers volunteer for the career field because they want to be removed from danger or be home with their family instead of having to deploy?[45] For those missileers motivated by either of those factors, were they technicians or soldiers? As described by Colonel A.W. Stephens in a 1958 issue of *Air University Quarterly Review*: "Unlike pilots and navigators of manned systems, officers and airmen associated with a weapon system of major offensive capability will never in their operational role make a tactical or strategic decision based on evolution of a battle situation."[46] This distinction influences both the physical courage and warrior ethos aspects of the profession of arms for the service as a whole and also for specific career fields. Does this distinction change the meaning of the profession of arms for missileers? What does this portend as the military pursues technologies supported by AI that will also keep more soldiers away from the physical battlefield?

Competence. Since competence can largely be equated back to the discussion on expertise, the only additional component of competence to reflect on is the expectation to expand knowledge through self-study and mentorship.[47] If a missileer's motivation is low, it seems unlikely that he or she will spend free time studying deterrence theory or other important military concepts related to his or her job. While more of a political problem than a technological one due to the end of the Cold War and the preeminence of

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[44] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 124.
[45] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer* (Washington, D.C.: National Defense University Press, 2017), 9.
[46] Engell, Lt Col Arthur T., "The Morale of the Missileer: A Study of the Minuteman Launch Control Officer" (Air War College, 1964), 14.
[47] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 40.

the Global War on Terrorism, the 2013 "Flight Plan for the Air Force Nuclear Enterprise" stated that with the exception of small community, the Air Force had lost its "understanding of the nuclear mission, its requirements, and the severity of risk inherent in nuclear operations."[48] This small community may have solely resided within the missile career field because their only mission remained nuclear deterrence, unlike bombers who started supporting operations in Iraq and Afghanistan. However, this highlights the responsibility the military has to retain expertise in the missions it is tasked to support and conduct.

Self-Sacrifice or Selfless Service. As discussed in the previous chapter, the Western way of war can be envisioned as containing an instrumental and an existential component. ICBMs take away the existential aspect because the missileer is pushing buttons rather than facing an opponent on the battlefield. While the instrumental aspect involves identifying the tools required to kill the enemy, ICBMs are unique in that their main purpose is to deter major conflicts rather than kill the millions the missiles are capable of. Returning to *The Armed Forces Officer*, its definition of self-sacrifice prioritizes commitment to a cause over a search for martyrdom, which relates to the existential component. Missileers can display commitment to a cause, but without the sense or possibility of danger, what are they being asked to sacrifice?[49] Being confined in an underground bunker with one other person for 24 hours or more can require selfless service, but is it a unique aspect of the profession of arms? Firefighters and some police shifts have been identified as having the same combination of long periods of boredom with repetitious tasks and no insight into when an alarm will sound.[50]

This employment section was not meant to belittle or challenge the professionalism of missileers, but to question whether certain technologies require the military to reconceptualize the profession of arms. ICBMs seem to challenge some of the traditional definitions of the characteristics and virtues of the profession of arms, but the missileer profession can claim success because the U.S. has never launched an ICBM

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[48] U.S. Air Force, "Flight Plan for the Air Force Nuclear Enterprise," June 26, 2013, 25.
[49] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 40.
[50] Engell, Lt Col Arthur T., "The Morale of the Missileer: A Study of the Minuteman Launch Control Officer," 33.

outside of a test environment, and the few accidents that did happen did not involve nuclear fallout. Compared to other weapon systems which experience higher accident rates during training and operations, this is an impressive accomplishment.

Conclusion

Examining the development and employment of ICBMs suggests that technology influences, and is influenced by, the profession of arms, both at the organizational level and specifically in the missileer career field. During the development phase, the military services' desire for control of the technology to gain increased budget share and prestige seemed to generate conflict between the expertise, responsibility, corporateness, and ethics of military professionals. For intra-service competition, the corporateness characteristic influenced the decisions over the requirements for manned aircraft and unmanned missiles. As the technology moved from conception to an established weapon system, political leaders competed with the expertise of military leaders over survivable deployment options for the Peacekeeper and the utility of developing the Midgetman.

During employment, ICBMs seemed to negatively influence many of the characteristics and virtues of the profession of arms for the individual missileer. Checklist-driven operations negated the need for missileers to develop a high degree of expertise and led to a lack of motivation to gain expertise as expected of professionals. Competitions, like Olympic Arena, provided some impetus overcome the motivation problem. Responsibility was guaranteed by PRP rather than relying on missileers' recognition of the vital role they played in ensuring the security of the nation. For corporateness, the Air Force struggled with making missileers feel like an equal partner with pilots in defining the identity of the service. A lack of motivation and the monotonous nature of alert duty may challenge to ability of missileers to display a high level of ethos and dedication to the core values.

For the virtues, the rigid alert duty requirements guaranteed discipline, and competence faced challenges similar to expertise because of the similarity between expertise as a characteristic and competence as a military virtue of the profession of arms. Missileers complete removal from the battlefield questions the need for physical courage, and the ability to demonstrate a willingness to sacrifice oneself. As the military expands its use of remotely piloted vehicles and moves toward autonomous weapon systems, the

ICBM case study presents some issues to consider on how these weapon systems could influence the profession of arms, and how the profession can combat those influences for both the development of the technology and for the people who operate the technology.

Chapter 4
Death by Algorithm

ICBMs were developed as a new world order, based on two superpowers, became established, and the Cold War established the clear need for ICBMs to strengthen the U.S. deterrence posture. Today, artificial intelligence (AI) is also gaining momentum as the world appears to be entering another new world order, but what this new order will end up looking like is currently unknown. Unlike ICBMs, AI also has many civilian applications, increasing the uncertainty on where this technology will be implemented and how it will support national security.

This chapter specifically focuses on one specific type of artificial intelligence known as lethal autonomous weapon systems (LAWS). The chapter considers the impact LAWS could have on the profession of arms if they are developed and employed. LAWS would use algorithms to identify and engage targets which could be human or risk human lives as collateral damage. This chapter is primarily hypothetical since LAWS have not yet been developed or employed by the U.S. Since ICBMs and LAWS remove the professional from danger and from portions of the decision-making process, the findings from the previous chapter will help guide the discussion on how the development and employment of LAWS could interact with the profession of arms.

Defining Artificial Intelligence

The term artificial intelligence encompasses many ideas, from the algorithms Amazon uses to suggest items for purchase to super intelligent machines that can learn for themselves. Before exploring the potential interrelationship between AI and the profession of arms, definitions of basic terms are needed to frame the discussion. The October 2016 White House Report, *Preparing for the Future of Artificial Intelligence* authored by the National Science and Technology Council Committed on Technology and *DODD 3000.09, Autonomy in Weapons Systems* are used to provide baseline definitions with current military applications described where applicable.

Narrow AI

Artificial intelligence can loosely be divided into two types: narrow and general. Everything the commercial and defense industries are currently pursuing fall under

narrow AI. As its name implies, narrow AI "addresses specific applications such as playing strategic games, language translation, self-driving vehicles, and image recognition."[1] Established in April 2017 by then Deputy Secretary of Defense Robert Work, the Algorithmic Warfare Cross-Functional Team, also called Project Maven, is a military application of narrow AI which has the task "to turn the enormous volume of data available to DOD into actionable intelligence and insights at speed."[2] Project Maven's initial focus is to provide algorithms to support object detection and classification in support of full motion video (FMV) processing, exploitation, and dissemination (PED). This effort offers the possibility of removing the need for intelligence analysts to perform initial evaluation tasks that are manpower intensive, and it would free analysts to focus on deeper analysis.

Another intelligence application is automatic language translation. The National Security Agency is pursuing narrow AI technologies that automatically detect speech and then translate and transcribe the speech into searchable text. Like Project Maven, this offers the capability to free analysts from a difficult, but basic, task of listening to and transcribing countless hours of recordings. AI can do this task faster, and it can theoretically do this for an unlimited number of languages, unlike humans who require a year or more to learn a single language.[3]

The military is also pursuing technologies that automate vehicles much like what the commercial sector is doing with self-driving cars. According to the Department of Defense *Unmanned Systems Integrated Roadmap, FY2013-2028,* the military services want autonomous vehicles to conduct tasks that are dangerous but simple. This could include designing self-driving trucks that would deliver supplies to soldiers at a base or

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[1] Executive Office of the President National Science and Technology Council Committee on Technology, "Preparing for the Future of Artificial Intelligence," October 2016, 7.
[2] Work, Robert, "Establishment of an Algorithmic Warfare Cross-Functional Team (Project Maven)" (Deputy Secretary of Defense, April 26, 2017), 1, https://www.govexec.com/media/gbc/docs/pdfs_edit/establishment_of_the_awcft_project_maven.pdf.
[3] Office of Research and Technology Applications, "National Security Agency Technology Transfer Program," nd, 17, https://www.nsa.gov/what-we-do/research/technology-transfer/assets/files/nsa-technology-transfer-program.pdf.

air or ground based vehicles that could search for threats in support of human operations.[4] The Air Force is also pursuing a "loyal wingman" program to pair unmanned F-16s with manned F-35s. The F-16s will fly autonomously while conducting tasks delegated by the F-35 pilot.[5] Narrow AI, as currently envisioned by the military, seems to free manpower from basic tasks and to enhance the capability of a pilot or ground team by supplying a robot partner.

General AI

General AI can also be referred to as artificial general intelligence (AGI), and it is the conceptual idea that a machine can exhibit behavior and conduct cognitive tasks at least as well as a human. General AI is currently not possible, and experts in the field disagree on whether the possibility of general AI is decades or centuries away.[6]

Machine and Deep Learning

Machine and deep learning power narrow AI applications. Machine learning uses historical statistical data to detect patterns in a limitless data set. According to National Science and Technology Council Committee on Technology, "The goal of machine learning is to create a trained model that will generalize."[7] By generalizing, it will be accurate for not only what the model has been trained to recognize but for new cases that fall within similar parameters. An example of machine learning is the object recognition in Project Maven. In human decision making, the decision maker may not be able to articulate exactly why a decision was made that accounts for all information or cognitive biases. With machine learning, the exact algorithm or decision process is known, but since machine learning is limited by the information sources it has access to, knowing exactly what information was used and how it was used may be difficult for humans interfacing with the system.[8]

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[4] Department of Defense, "Unmanned Systems Integrated Roadmap, FY2013-2028," November 30, 2012, 70–72.
[5] Drew, James, "Pentagon Touts 'Loyal Wingman' for Combat Jets," *Flight Global*, March 30, 2016, https://www.flightglobal.com/news/articles/pentagon-touts-loyal-wingman-for-combat-jets-423682/.
[6] Executive Office of the President National Science and Technology Council Committee on Technology, "Preparing for the Future of Artificial Intelligence," 7.
[7] Executive Office of the President National Science and Technology Council Committee on Technology, 9.
[8] Executive Office of the President National Science and Technology Council Committee on Technology, 8–9.

Deep learning is a subset of machine learning based on layers of analysis. Using Project Maven's object recognition as an example, the first layer recognizes it is looking at an object. The second layer would then take that information and be able to recognize the object as two trucks. The next layer might use signals intelligence to associate activity in those two trucks, and the layers continue to grow up to the limit of the processing power of the machine. For a machine to replace humans in conducting FMV PED, deep learning must occur to reach the necessary accuracy and provide context similar to what a human brain can do.[9]

Semi-Autonomous, Autonomous, and Lethal Autonomous Weapon Systems

With this basic understanding of artificial intelligence, weapons systems can apply these capabilities and processes in many ways. *DODD 3000.09, Autonomy in Weapons Systems,* defines a semi-autonomous weapon system as: "A weapon system that, once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator." This includes weapons systems that have a "human in the loop" or a "human on the loop." An example of a "human in the loop" system includes lock-on-after-launch munitions, such as air-to-air missiles sent to targets by the pilot; however, once the missile leaves the rail on the jet, the missile uses its own internal seekers to terminally guide to the target. The pilot retains responsibility for selecting the target before the missile is launched. To clarify, current technology does not use artificial intelligence in this process, but a future application could include guiding missiles to targets using object recognition.

A "human on the loop" weapon system includes those where the system can acquire its own targets, while the human still retains control over which targets to engage.[10] An example of this is the U.S. Phalanx systems which automatically detects, tracks, and attacks threats to Aegis-class cruisers. Unfortunately, this system did not work in 1988 when the USS *Vincennes* shot down Iran Air Flight 655, a civilian airliner, that was taking off; the weapon system mistakenly identified the civilian aircraft as an

[9] Executive Office of the President National Science and Technology Council Committee on Technology, 9–10.
[10] Department of Defense (DOD) Directive 3000.09, "Autonomy in Weapons Systems," November 21, 2012, 14.

Iranian F-14 that was descending toward the USS *Vincennes*. Although the system misidentified the aircraft as a threat, a human ultimately made the decision to engage the target. Viewing the Phalanx system as an early version of machine learning, this accident is also an example of where a human can make a bad decision based on several factors: he or she does not see all the data the system is using, he or she did not understand how the data is being correlated, and he or she was presented incorrect or confusing information.[11]

An autonomous weapon system (AWS), "once activated, can select and engage targets without further intervention by a human operator."[12] According to DODD 3000.09, this includes systems that still allow a human to override this process. A current example that meets this definition is the Counter-Rocket, Artillery Mortar (C-RAM) system, which automatically detects and engages threats to deployed forces at forward operating bases.[13] In accordance with DODD 3000.09, AWSs may currently only be used for static defense of manned installations and onboard defense of manned platforms. The directive further clarifies these must be *human-supervised* AWSs which may not be used to select or engage humans as targets.[14] The C-RAM is only supposed to target and engage rocket, artillery, and mortar fire; however, the possibility exists for it to accidentally select and fire at an aircraft or other misidentified human target similar to the USS *Vincennes*. Like semi-autonomous systems, there are multiple errors that can occur during the detection and engagement processes due to faulty machine learning, but are these errors more numerous or dangerous than those due to human cognitive failings?

When an AWS can target and engage a human, it becomes a lethal autonomous weapon system (LAWS). DODD 3000.09 does not specifically define LAWS; while it does not currently allow them, the guidance does enact a rigorous approval process in the event where a LAWS needs to be approved in the future.[15] Internationally, the United

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[11] Tegmark, Max, *Life 3.0: Being Human in the Age of Artificial Intelligence*, First edition (New York: Alfred A. Knopf, 2017), 111.
[12] Department of Defense (DOD) Directive 3000.09, "Autonomy in Weapons Systems," 13.
[13] Caton, Jeffrey L., "Autonomous Weapon Systems: A Brief Survey of Developmental, Operational, Legal, and Ethical Issues" (U.S. Army War College: Strategic Studies Institute, December 2015), 41.
[14] Department of Defense (DOD) Directive 3000.09, "Autonomy in Weapons Systems," 3.
[15] Department of Defense (DOD) Directive 3000.09, 7–8.

Nations (UN) Convention on Certain Conventional Weapons (CCW) discusses legal, military, ethical, and other concerns related to LAWS, but currently, a common definition of the term is lacking. For example, some nations think remotely piloted aircraft (RPA) should be included in the definition of LAWS. The U.S. disagrees with this interpretation since RPAs are controlled by humans. As of the Obama administration, the U.S. advocates that any weapon system, regardless of whether it is autonomous, must follow *jus in bello* concepts of war such as distinction and proportionality.[16] With this background, it is time to explore how the development and employment of LAWS could influence and be influenced by the profession of arms.

Development of LAWS

The *Unmanned Systems Roadmap FY2013-2028* highlights the importance of autonomy in unmanned systems to overcome anti-access and area-denial threats in future conflicts. The Defense Advanced Research Projects Agency (DARPA) is currently pursuing technology that could support or become LAWS, but since LAWS are not operational, nor is it guaranteed they ever will be, this section explores how the characteristics of the profession of arms could potentially interact with the development of this technology.[17]

Expertise

Each service needs to understand what a LAWS can do, what its limitations and advantages are, and what missions are appropriate for its use. This expertise can be developed through table top exercises or using algorithms in a simulation environment to see how the use of LAWS might change a conflict. Expertise will likely need to come from outside the military for the actual development of the technology. Returning to ICBMs, although the military did not have the resident expertise needed to develop a nuclear weapon, a multi-stage missile, or the guidance systems to get the missile to a target, military professionals do understand how the pieces fit together to make a capability appropriate for certain missions. Military professionals may need a deeper

[16] Executive Office of the President National Science and Technology Council Committee on Technology, "Preparing for the Future of Artificial Intelligence," 37–38.
[17] Department of Defense, "Unmanned Systems Integrated Roadmap, FY2013-2028," 67.

understanding of AI technology because an algorithm, rather than a human, will probably make and execute the decision to launch a weapon.

This loss of full control in the decision-making process may require military professionals to be more knowledgeable about algorithm capabilities. The *Unmanned Systems Integrated Roadmap, FY2013-2038* highlights the need for the DOD to carefully consider the implications of autonomy.[18] *DoDD 3000.09* lays out responsibilities for organizations within the DOD for development and employment of AWS which includes ensuring interfaces and tactics, techniques, and procedures to enable optimal human-machine interoperability.[19] The profession also needs to fully understand the potential costs and benefits of LAWS, before a decision is made on whether to develop this technology, so the military can provide expertise advice to political leaders on this subject.

Responsibility

Through the lens of the profession having a responsibility to provide security to the nation, LAWS raises a variety of debates. One concern is that China, Russia, and other adversaries are likely pursuing LAWS. Specifically, China discusses the possibility of battlefield "singularity," where the human mind is unable to keep pace with speed of decision making and operations powered by AI. This relates to Colonel John Boyd's Observe-Orient-Decide-Act (OODA) Loop. Boyd discusses the importance of having a faster OODA Loop to be successful in combat. If China, or any other country, allows AI to conduct the steps in the OODA Loop, they could have an insurmountable advantage over the U.S.—assuming both that the algorithms are designed correctly and that US does not design its own algorithms for the OODA process.[20] Using AI, China could gather a limitless number of discrete data points. The algorithm could then make sense of that data and arrive at a decision to execute a course of action in seconds as compared to a human brain which needs minutes, hours or days to make a similar decision depending on

[18] Department of Defense, 16.
[19] Robert Jervis, *Perception and Misperception in International Politics*, New edition (Princeton, New Jersey: Princeton University Pres, 2017), 64–67.
[20] Kania, Elsa B., "Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power" (Center for a New American Security, November 2017), 16.

the situation. Using LAWS, a course of action can be implemented immediately because LAWS do not require training, rest, food, or other human needs to be combat effective, with the exception of an energy source to ensure continuous capability.[21]

Although the UN CCW continues to debate the proper use or a possible ban on LAWS and the academic and scientific communities are raising many ethical concerns, a potential adversaries use of AI for decision-making and LAWS may necessitate the U.S. develop this technology. For example, spiral theory highlights that nations must respond to the actions and intentions of other states by making decisions that they think will increase the security of their nation.[22] This often includes a cycle of a nation developing a new capability and then another nation developing a technology to counter that capability.[23] If China or another nation develops LAWS, the only counter-move for the U.S. may be to develop an AI and/or LAWS capability because of the required speed of decision-making.

Responsibility also includes the expectation that the military will behave within expected norms. As stated within *The Armed Forces Officer*, the American people give the military profession "a high degree of discretion in the use of lethal force to accomplish assigned missions." This discretion is not absolute because a "society, especially in a democratic political system, always reserves the right to intervene when it thinks that military values and practices should change to conform to public norms."[24] If society, and therefore potentially Congress, thinks LAWS violate U.S. societal norms, should the military forcefully argue for LAWS based on the necessity in the previous paragraph and find ways to change the norm? This is an important dilemma to settle before LAWS are needed so the military is prepared for the right conflict parameters.

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[21] Brundage, Miles et al., "The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation" (Future of Humanity Institute, University of Oxford, Centre for the Study of Existential Risk, University of Cambridge, Center for New American Security, Electronic Frontier Foundation, OpenAI, February 2018), 40.
[22] Jervis, *Perception and Misperception in International Politics*, 66–67.
[23] Luttwak, Edward, *Strategy: The Logic of War and Peace*, Rev. and enl. ed (Cambridge, Mass: Belknap Press of Harvard University Press, 2001), 30–31.
[24] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer* (Washington, D.C.: National Defense University Press, 2017), 22.

Corporateness

LAWS could threaten the corporateness of the military as a whole or the services individually. If AGI becomes feasible, the military could cease to exist as a profession; if implemented, the AGI could become the professional because it can learn and act beyond a narrowly defined algorithm. However, because AGI may not be feasible for decades or centuries, this is conjecture.[25]

In the Narrow AI sense, the question is which roles can or should a service transition to LAWS or AWS and still retain its service identity. From a corporateness perspective, the Air Force may be reluctant to transition too many of its combat or mobility aircraft to an AWS because without pilots, the service loses its identity. However, military necessity or the need to match or exceed other nations' capabilities, as discussed in the previous section, could require that a certain number of pilots be replaced by machines. This possibility echoes the concern pilots had when ICBMs were first being developed. The Air Force may need to find the right balance between those roles which a LAWS absolutely must do to maintain a competitive advantage and what pilots can still do, without risking competitive advantage, to maintain service identity.

Ethics

Within the military, the *Unmanned Systems Integrated Roadmap, FY2013-2038* acknowledges there are potential ethical and legal issues associated with LAWS. However, it treats these issues as solvable when it states: "Autonomous capabilities give rise to questions about what overarching guiding principles should be used to help discern where more oversight and direct human control should be retained."[26] Within public and academic circles, there is a more vigorous debate on the ethics of LAWS. From a *jus ad bellum* (or decision to go to war) perspective, the concern is that LAWS will lower the threshold for intervention or war because a nation or group who uses them

[25] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, *Just Ordinary Robots: Automation from Love to War* (Boca Raton, Florida: CRC Press, 2016), 253.
[26] Department of Defense, "Unmanned Systems Integrated Roadmap, FY2013-2028," 15.

is not risking human lives. A similar concern already exists for remotely piloted aircraft.[27]

Jus in bello raises many concerns for LAWS. First is the question over whether a LAWS can discriminate between combatants and non-combatants better than humans can. In *Just Ordinary Robots*, authors Lambèr Royakkers and Rinie van Est highlight that many scientists question whether sensors or algorithms will ever be good enough to understand the wider context to successfully distinguish between these two categories, especially in a counter-terrorism fight. On the other hand, U.S. robot engineer, R.C. Arkin, argues that a machines would lower the possibility of mistaking non-combatant, or unlawful target, for a combatant, or lawful target, because it would not be susceptible to human cognitive biases.[28] A similar question exists for the *jus in bello* concept of proportionality which states that the harm likely to be caused by an operation should not outweigh the good likely to be achieved.[29] Can an algorithm determine whether the potential damage a strike or engagement might cause is disproportionate to possible gains trying to be achieved?[30]

Finally, who can be held responsible for the conduct of a LAWS if it makes a mistake which results in civilian casualties? Royakkers and van Est highlight two competing viewpoints. The first argues that the manufacturer of the weapon systems or writer of the algorithm should be held responsible if the mistake happened due to an error in design. However, if a decision was made to implement a LAWS in a situation or context it was not designed for, or if it was given the wrong parameters, then the other viewpoint argues that the commander who made that decision would be held responsible.[31]

Robert Sparrow argues that eventually humans may need to be removed from almost all decision-making processes if LAWS are developed because a human is too

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[27] Caton, Jeffrey L., "Autonomous Weapon Systems: A Brief Survey of Developmental, Operational, Legal, and Ethical Issues," 38.
[28] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, *Just Ordinary Robots*, 266–67.
[29] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 47.
[30] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, *Just Ordinary Robots*, 266.
[31] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, 271–77.

slow. Even if a human is left on-the-loop, the LAWS loses its advantage in speed of the decision-making process because the system may be forced to perform slower so the human can understand and interrupt its actions if necessary. In this case, the question is who is held responsible for the LAWS making its own decisions?[32] Sparrow highlights that because of this dilemma over responsibility perhaps LAWS should not be developed until an international standard can be developed because humans will not be able to resist the temptation of removing themselves from the loop regardless of current policy or statements found in documents like the *Unmanned Systems Integrated Roadmap, FY2013-2038.*[33] Still others, like Vice Chairman of the Joint Chiefs of Staff General Paul J. Selva and former Under Secretary of Defense for Acquisition, Technology, and Logistics Frank Kendall III, question what should be done if non-Western nations and groups, like China or terrorists, do not espouse the same ethical concerns.[34] If these potential adversaries decide to use LAWS, this returns to the responsibility to defend society dilemma to determine whether military necessity requires development of a similar capability or maintenance of ethical norms. On the other hand, "U.S. employment of military applications of AI may also be influenced by public opinion and a global campaign against 'killer robots'."[35]

Examining the development of LAWS through the lens of the characteristics of the profession of arms raises many questions that should be considered now. Like ICBMS, there is a tension between responsibility and ethics. There are many ethical concerns with the employment of LAWS, but once the technology is feasible, the profession may have to advocate for its development to maintain a competitive advantage and fulfill its responsibility to protect the nation. LAWS also require careful thought on the identity of a service. If the Air Force replaces pilots with AWS or LAWS, the level of corporateness experienced by pilots will be impacted. Developing the right expertise

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[32] Sparrow, Robert, "Killer Robots," *Journal of Applied Philosophy* 24, no. 1 (2007): 67–68.
[33] Sparrow, Robert, 74–75.
[34] Freedberg, Sydney J., Jr. and Clark, Colin, "Killer Robots? 'Never,' Defense Secretary Carter Says," *Breaking Defense*, September 15, 2016, https://breakingdefense.com/2016/09/killer-robots-never-says-defense-secretarycarter/.
[35] Kania, Elsa B., "Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power," 38.

in advance of deciding to develop LAWS is critical to ensuring the best possible decisions are made before the profession is forced to act because of political decisions or competitor actions.

Employment of LAWS

Since the Air Force does not have a current LAWS to evaluate from an employment perspective, let us suppose the Air Force decides to develop an autonomous drone that independently carries out missions within initial parameters set by military professionals. Missions might include finding and destroying physical or human targets in support of counter-terrorism operations, finding and destroying integrated air defense systems in support gaining air superiority, and a host of other missions. Military leaders might have the ability to redefine the operational parameters for the autonomous drone mid-mission, but for this hypothetical system, military professionals maintain minimal oversight of this LAWS. This hypothetical scenario stays within the currently feasible bounds of narrow AI, so the LAWS is constrained by the specific mission orders rather than being able to develop its own mission parameters which AGI could enable.

Employment Versus the Characteristics and Virtues

Unlike ICBMs which leave missileers in the loop to execute launch orders, a LAWS may have no such professional. If LAWS eliminates the need for a pilot, then the professionals engaged with this hypothetical weapon system are assumed to be those who will receive mission parameters and then translate these into rule sets for the system to follow. For example, the mission parameter might be to defeat the integrated air defense system (IADS) of a country. The professional might then need to devise a set of laws or strategies that bound the LAWS to strike only those targets which will lead to the defeat of the IADS. This section explores how the hypothetical LAWS could affect the characteristics and virtues of the profession of arms for these operators and the Air Force. The section also queries how these characteristics and virtues could shape the decisions made on how to employ the LAWS. Again, because there are no LAWS currently under development to examine, many of the questions presented are hypothetical. However, they are important factors for current leaders to consider.

Expertise. The *Unmanned Systems Integrated Roadmap, FY2013-2038* states that: “to ensure accuracy and correctness of a decision-making process within the

software…requires a continual process in which the observe-orient-decide-act (OODA) loops in the software are continually updated via manual analysis, training, and operator understanding of algorithm inputs and outputs."[36] This statement suggests that the professional who creates the rule sets for LAWS would need to understand the system's algorithmic capabilities to ensure the system is programmed correctly to accomplish assigned missions. The expertise to develop algorithms may reside with contractors, but the professional probably needs to have some level of understanding of these algorithms to identify possible faults or limitations before a LAWS is deployed. This requirement to understand LAWS' capabilities may also require the Air Force to develop professionals with expertise in developing algorithms. The *Unmanned Systems Integrated Roadmap, FY2013-2038* states that automation is reliant on the software writer and developer who create the algorithms.[37] However, the ethics portion of the Development section highlights that relying on outside expertise to develop algorithms may cause problems from the perspective of who can or should be held responsible for the LAWS action. This concern is another reason why expertise in developing algorithms may need to reside within the profession by actual military members instead of contractors. LAWS do not eliminate the need for expertise, but the technology may create the need for new types of expertise within fewer air force specialty codes.

Monotony and motivation may not be a concern since a LAWS, unlike ICBMs, would be operationally employed. Additionally, setting mission parameters so the LAWS conducts the right actions could be highly stressful for fear of making a mistake if this task cannot be reduced to a checklist. On the other hand, once the LAWS is deployed, the operator's role could be boring. He or she may need to supervise multiple LAWS at once or just one, depending on the level of supervision/control the Air Force decides to retain. Trying to maintain vigilance of a system the operator is not actively controlling could be monotonous until something goes wrong. For example, the Patriot air and missile defense system's 2003 fratricide accidents in Iraq led one scholar to ask:

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[36] Department of Defense, "Unmanned Systems Integrated Roadmap, FY2013-2028," 67.
[37] Department of Defense, 67.

"How do you establish vigilance at the proper time? 23 hours and 59 minutes of boredom followed by one minute of panic."[38]

Shannon Vallor questions whether LAWS will prohibit military professionals from retaining the skills necessary to make decisions during combat because they might only be involved in the decision-making process when the LAWS needs approval to launch an attack or counterattack. As she states, "an expert supervisor of another's decision, in order to be worthy of the authority to override it, must have acquired expertise in making decisions of the very same of similar kind…How would such a supervisor ever become qualified to make that judgement, in a professional setting where the decision under review is no longer regularly exercised by humans in the first place?"[39] What level of control must the profession retain over a LAWS to retain this expertise?

Responsibility. For ICBMs, responsibility revolved around ensuring the proper checklists were followed immediately upon receipt of an emergency war order. With this hypothetical LAWS, responsibility increases because the professional must define the correct rule sets, or the system could target and destroy the wrong things. On the other hand, responsibility could be diminished because the operator will have little control over the LAWS once it is launched. Even if minimal human supervision over the LAWS is maintained, the system will be able to make the decision to engage faster than a human could process, so errors cannot be fixed until after the first one has occurred.[40] This returns us to the ethical dilemma of who should be held responsible if a LAWS kills a non-combatant. Like expertise, this characteristic also suggests that operators may need to have a deep understanding of algorithms' capabilities and limitations.

If the LAWS operator retains responsibility for its actions, then the operator will need to trust that the LAWS and its algorithms will act as intended or the operator may be unwilling the launch the LAWS for fear of being held responsible for its mistakes.

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[38] Hawley, John, K., "Patriot Wars: Automation and the Patriot Air and Missile Defense System" (Center for a New American Security, January 2017), 7.
[39] Vallor, Shannon, "The Future of Military Virtue: Autonomous Systems and the Moral Deskilling of the Military," in *2013 5th International Conference on Cyber Conflict (CYCON 2013): Tallinn, Estonia, 4 - 7 June 2013*, ed. Karlis Podins and Institute of Electrical and Electronics Engineers (Piscataway, NJ: IEEE, 2013), 12.
[40] Scharre, Paul, "Autonomous Weapons and Operational Risk," February 2016, 5.

According to John D. Lee and Katrina A. See, "trust can be defined as the attitude that an agent will help achieve an individual's goals in a situation characterized by uncertainty and vulnerability."[41] In this case, the agent is the LAWS. However, designing trust in a system is challenging because trust is a concept that is not easily reduced to quantifiable parameters. Andrew Ilachinski highlights that testing and building trust between the human and the machine must happen throughout the system's life-cycle. According to the 2016 Defense Science Board, "Establishing trustworthiness of the system at design time and providing adequate indicator capabilities so that inevitable context-based variations in operational trustworthiness can be assessed and dealt with at run-time is essential not only for the operator and the Commander, but also for designers, testers, policy and lawmakers, and the American people."[42]

Corporateness. LAWS could negatively influence the corporateness of its operators. It is difficult to imagine eliminating pilots altogether since they are a symbol of the service.[43] However, if pilots are kept for key mission areas that Air Force deems too risky to assign to a LAWS, then the professionals in control of these systems might face challenges similar to those experienced by the missileer career field. On the other hand, controlling LAWS might be seen as a highly prestigious profession because a LAWS can carry out diverse mission sets that increase the operational flexibility of the military. How this potential career field is perceived may depend on how the Air Force frames the story of this new profession and if promotion rates reinforce the narrative that states this new profession is an important one.[44]

The Air Force may want to pull professionals from other career fields to fill a tour as LAWS operators. If a deep understanding of algorithms is a required component of a LAWS operator's expertise, then it may be impractical to pull a pilot, missileer, or some other professional for a three to four year tour because the required training may be too

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[41] Lee, John D. and See, Katrina A., "Trust in Automation: Designing for Appropriate Reliance," *Human Factors* 46, no. 1 (Spring 2004): 51.
[42] Ilachinski, Andrew, "AI, Robots, and Swarms: Issues, Questions, and Recommended Studies" (Center for Naval Analyses, January 2017), 184.
[43] Bolman, Lee G. and Deal, Terrence E., *Reframing Organizations: Artistry, Choice and Leadership*, 6th edition (Hoboken, New Jersey: Jossey-Bass, A Wiley Brand, 2017), 242–47.
[44] Bolman, Lee G. and Deal, Terrence E., 276–77.

long. The Air Force could also pull LAWS' operators from other career fields. The Air Force used experienced bomber crews to fill the initial Atlas ICBM units, but this caused problems with retaining experienced bomber crews.[45] Since employing LAWS will theoretically eliminate some manned aircraft mission sets, pilots may be available to cross-train into a new career field. Regardless of whether these operators come from new accessions, cross-trainees, or loaned from other career fields, making them feel valued will be critical to retaining professionals with algorithmic knowledge.

Ethics and Ethos. Again, viewing ethics as what an officer must do, LAWS do not seem to levy any special requirements on the professional who would employ this system. The operator of the LAWS would need to define rules sets that are in compliance with the Uniformed Code of Military Justice and the Law of Armed Conflict (LOAC). The challenge lies more with whether an autonomous system can be trained to discriminate and discern all possible LOAC violations before engaging a possible target.[46] From an ethos perspective, or what an officer must be, the Air Force Core Values of: Integrity First, Service Before Self, and Excellence in All We Do may pose different challenges to the operator of a LAWS in comparison to a missileer. Many of the missileers' challenges seem to revolve around monotony and motivation. If an operator retains the capability to set mission parameters for a LAWS, lack of motivation and monotony may not be of the same degree unless he or she were given checklists to execute pre-set options for missions. However, excellence may be difficult to achieve if the LAWS makes most of the decisions. Because of the difference in machine versus human OODA loops, the operator will only be able to supervise the mission once it is launched rather than control it.[47] Supervision may lead to boredom as discussed in the Expertise section. Integrity may also be challenged because it will be easy for an operator to blame the algorithm if something goes wrong with a mission. This problem

[45] Spires, David N., "On Alert: An Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011," 49.
[46] Arkin, Ronald, C. and Ulam, Patrick, "Overriding Ethical Constraints in Lethal Autonomous Systems" (Atlanta, GA: Mobile Robot Laboratory, Georgia Institute of Technology, 2012), 2.
[47] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, *Just Ordinary Robots*, 275.

further emphasizes the need to determine what level of expertise military professional need to have in developing or understanding algorithms.

Discipline. The idea of obeying "orders promptly, cheerfully, and effectively" is difficult to apply to LAWS.[48] Notionally, the operator will need to set up mission parameters as ordered by a higher official. Will the profession need or want the operator to display ingenuity in how these parameters are set? If ingenuity is displayed, the operator may task the LAWS to do a mission that its algorithm cannot handle which returns to the ethical problems of LAWS because the LAWS make mistakes that result in striking an unauthorized target or disproportionate collateral damage.[49] Discipline may be preferable to ingenuity for AI and LAWS, but it needs to be a discipline that fully understands the algorithms being used.

Courage. The operators of LAWS may need moral courage to raise concerns if they are commanded to task a LAWS with a mission it cannot or should not do. Due to lack of expertise in algorithms, senior commanders could be unaware an algorithm cannot be designed to do everything or that there may be ethical limit to what the LAWS can do. Like ICBMs, the LAWS operators will have little need for physical courage. However, the need for ethical and moral courage will be high. Again returning to the 2017 version of *The Armed Forces Officer*'s discussion of a soldier versus a technician of death, LAWS seem to lean further to the technician side of the equation. The DOD uses robots and remotely piloted aircraft to remove professionals from dangerous missions.[50] LAWS can increase this removal of professionals from danger if used for complex, dangerous missions currently required to be carried out by a manned aircraft. Another possible advantage is that LAWS might be more fair and rational than a human because the LAWS does not have to deal with the fear of being killed.[51] If a warrior ethos requires a willingness to die, how can LAWS operators experience that same sense if they are physically removed from the battlefield and the possibility of death?[52]

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[48] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 38–39.
[49] Scharre, Paul, "Autonomous Weapons and Operational Risk," 7.
[50] Royakkers, Lambèr M. M. and Est, Quirinus Cornelis van, *Just Ordinary Robots*, 258.
[51] Tegmark, Max, *Life 3.0*, 110.
[52] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 9.

Competence. The Center for New a American Security highlights three components for meaningful human control of an autonomous system: "human operators are making informed, conscious decisions; human operators have sufficient information about the target, the weapon, and the context to ensure the lawfulness of their actions; and design and testing of the weapon and training for human operators to ensure effective control over the use of the weapon."[53] How much training will a LAWS operator need to attain the necessary level of technical competence in designing, or at least understanding, algorithms to accomplish these components? Dr. John Hawley, who led the Army's effort to improve the vigilance of Patriot operators after the 2003 fratricide events, questions whether there is such a thing as being adequately trained to control near-autonomous or autonomous operations. He highlights the difficulty of maintaining vigilance and the necessary level of situational awareness to intercede in a LAWS' operation in a timely manner.[54]

Another challenge for gaining necessary competence is that LAWS are tightly coupled, complex systems. Complexity involves the possibility for many things to go wrong, and tight coupling means it is difficult or impossible to stop a process once it has started.[55] For these types of systems, Normal Accident Theory says that "a priori innocuous individual and seemingly unrelated events accumulate and align to spawn major system malfunctions that can, in turn, induce catastrophic results."[56] Said a different way, a set of seemingly minor mistake or faults can result in greater damage than the sum of the individual events would suggest. However, the fact that a system is complex and tightly coupled makes identifying risks and possible failures difficult, if not impossible, to predict. This may lead to the "spectre of complacency in complexity."[57] The operator has to assume the LAWS know what it is doing, or the system has to be slowed down to a point where the operator can understand everything going on which

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[53] Horowitz, Michael C. and Scharre, Paul, "Meaningful Human Control in Weapons Systems: A Primer" (Center for a New American Security, March 2015), 15.
[54] Hawley, John, K., "Patriot Wars: Automation and the Patriot Air and Missile Defense System," 9.
[55] Harford, Tim, *Adapt: Why Success Always Starts with Failure*, 2012, 201–2, http://rbdigital.oneclickdigital.com.
[56] Ilachinski, Andrew, "AI, Robots, and Swarms: Issues, Questions, and Recommended Studies," 100–102.
[57] Ilachinski, Andrew, vii.

negates most of the advantages of autonomy.[58] Designing training to enable enough competence to design or understand algorithms may be possible. Determining how to create competence to maintain vigilance over LAWS will be a bigger challenge.

Self-Sacrifice or Selfless Service. Like ICBMs, LAWS do not involve an existential aspect. The operator will set mission parameters rather than engaging an opponent on the battlefield to prove his or her humanity. LAWS epitomize Coker's instrumental component in the Western war of war because they are the perfect definition of a tool to kill an enemy.[59] Like missileers, the operator of a LAWS would not face danger unless their control center is at risk of being targeted by the adversary. Emphasizing commitment to a cause in support of motivating selfless service, rather than self-sacrifice, may be a better way to frame this virtue for professionals with a low probability of facing danger.[60]

Analyzing a hypothetical LAWS through the lens of the characteristics and virtues of the profession of arms demonstrates that the Air Force must make the right decisions in relation to both the development and employment of the system to ensure LAWS are operated by professionals. One decision appears to be the need to develop expertise and competence in the development and understanding of algorithms within the service rather than trusting this task to contractors. The amount of training this will require due to ethical and responsibility concerns suggests this expertise should reside in a new career field which could lead to problems with corporateness. Analyzing the impact LAWS will have on the profession before it is employed will help ensure the LAWS employment is designed in such a way to not threaten the characteristics of the virtues. The analysis may also lead to a decision the characteristics or virtues of the profession of arms need to change, but the goal is to anticipate the need for this decision before it has to be made.

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[58] Ilachinski, Andrew, 182.
[59] Coker, Christopher, *Waging War without Warriors? The Changing Culture of Military Conflict*, IISS Studies in International Security (Boulder, Colo: Lynne Rienner Publishers, 2002), 57–59.
[60] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer*, 40–41.

Conclusion

> *Artificial intelligence, the thinking goes, will enable the United States to field better weapons, make better decisions in battle, and unleash better tactics.*
>
> —Belfer Center
> *Machine Learning for Policy Makers*

> *I am starting to believe very, very deeply that it is also going to change the nature of war.*
>
> —Former U.S. Deputy Secretary of Defense Robert O. Work

The possibility of LAWS demonstrates the importance of evaluating technology through the lens of the profession of arms. During the development stage, the characteristics of the profession of arms, responsibility, corporateness and ethics and ethos, raise serious issues with regards to developing LAWS. Developing expertise on AI and LAWS is critical to ensuring informed decisions are made during the development stage. For the employment stage, developing expertise in algorithm development seems to be a critical variable in ensuring LAWS do not threaten the other characteristics. Like ICBMs, LAWS present problems for the virtues of courage and self-sacrifice because the operator is removed from immediate danger. As removal from the battlefield becomes more common, the military may need to design a new type of warrior ethos for these professionals. If the profession of arms wants to remain a profession, it is important to make the right decisions concerning technology as well as the people who operate the technology.

Chapter 5

Does the Human or the Robot Win?

The Air Force is sometimes accused of being too in love with technology. In *The Armed Forces Officer* chapter on service identity, former Chief of Staff of the Air Force General John P. Jumper describes the Air Force identity in the following terms: "As Airmen we master the technology to control the speed and time compression of the vertical dimension in air space."[1] If technology is a core component of the Air Force's identity, then understanding technology's role within the profession of arms is critical in preventing technology from consuming the profession.

Discussion

The literature on the profession of arms became much richer after World War II and the U.S. military's entrance to the world stage as an enduring presence. In 1950, *The Armed Forces Officer* was then Secretary of Defense George C. Marshall's effort to create a common ethical and moral grounding for all U.S. military officers. The content of new versions of this book changed over time to become less a philosophical discussion of the profession and more explicitly focused on codifying and defining the characteristics of the profession of arms. A wide variety of academic writers have weighed in on the military profession during this same time period to discuss the concept of the profession of arms and the military's interaction with society, politics, and technology. Literature on the latter has been less prevalent with authors who do focus on technology questioning whether the military can retain its warrior ethos as technology removes individual professionals from the battlefield. The findings of ICBMs' and AI's interaction with the profession of arms are summarized in Figure 4 for the development portion and Figure 5 for employment.

[1] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer* (Washington, D.C.: National Defense University Press, 2017), 140.

Characteristics	*ICBM Development*	*AI Development*
Expertise	Technological expertise outside military. Military's expertise determined operational requirements	Technological expertise outside military. Military expertise needed to determine operational requirements
Responsibility	Required development of ICBMs to maintain strong deterrence posture	If adversary develops LAWS, must U.S. do the same to maintain competitive capability?
Corporateness	Inter-service and intra-service competition	Intra-service competition
Ethics and Ethos	Not a concern in the 1950s	Possible demands of society or UN CCW ban

Figure 4. Summary of Development Findings
Source: Author's Original Work

Studying ICBMs' interaction with the profession of arms suggests the characteristics of expertise, responsibility, corporateness, and ethics and ethos, help frame the discussion around the development of technology. Although the military profession did not have the technical expertise to develop ICBMs, the Air Force used its expertise to determine the operational requirements for this weapon system to provide a credible deterrent capability. In a similar manner, responsibility influenced the services' recognition that developing ICBMs was necessary to help deter the Soviet Union grew as a superpower. Corporateness led the services to compete for control of missiles so they could increase their portion of the military budget and the prestige of their service. A sense of corporateness also influenced the Air Force to resist fully embracing missiles as a weapon system because pilots feared missiles threatened their profession and status as the center of the Air Force's identity. The ethical characteristic did not receive attention from the profession while developing ICBMs perhaps due to the fact that ethics were not a characteristic of the profession of arms at that time. U.S. society may have been more concerned with having a response to Sputnick in 1957 than whether nuclear weapons and

ICBMs were ethical.[2] Figure 4 provides a brief description of these findings for the interaction of the profession as an organization and the development of ICBMs with regard to the four characteristics of a profession.

Applying these lessons to AI and the development of LAWS, the professions expertise should be used to determine the possible operational requirements of AI and LAWS. Would LAWS need to provide a deterrent capability? Would they need to be used in support of counterterrorism or other types of operations? Allowing outside technical experts to build a system without operational requirements enables technological determinism and prevents the military from shaping the capability it needs or wants. Responsibility induces a dilemma on what the right answer should be to the following question: If a potential adversary makes full use of AI, is the U.S. required to follow suit to ensure it can fulfill its role of defending the nation? If the U.S. society believes LAWS are unethical and contrary to their perception of what the U.S. military should be or if political leaders decide to establish a global norm that discourages the use of LAWS, what advice should the military give?

Following Morris Janowitz's pragmatist approach, the military needs to provide military advice that recognizes both the military and political ramifications of decisions related to the development of technology. Although inter-service competition may not be a factor for AI since it can be applied existing service missions, intra-service competition will influence the corporateness of the services if they decide to replace manned missions with autonomous weapon systems. Finally, ethics may play a larger role in the development of AI in comparison to ICBMs. Society may decide LAWS are unethical which could discourage political leaders from approving the development of LAWS, or a global norm or international ban may prevent development by nations. On the other hand, society may desire the U.S. develop LAWS to maintain a military advantage over potential adversaries regardless of ethical considerations. Figure 4 highlights the differences between the development of ICBMs and AI from a profession of arms perspective. Examining technologies such as AI and LAWS through the lens of the four

[2] Brzezinkski, Matthew, *Red Moon Rising: Sputnik and the Hidden Rivalries That Ignited the Space Age*, 2007, 172–73.

characteristics of the profession of arms highlight the conflicting concerns the nation's leaders and the military must address as they consider the path forward.

Characteristics and Virtues	*ICBM Employment*	*AI Employment*
Expertise	Checklist driven	What level of expertise is needed? Understanding or ability to write algorithms?
Responsibility	Personnel Reliability Program to build trust in missileer	Operator needs to trust the LAWS
Corporateness	Missileers felt less valued than pilots	Need to value all professions within the Air Force and maintain service identity
Ethics and Ethos	Monotony and lack of motivation	Possible lack of control over system leads to monotony and lack of motivation?
Discipline	No unique impact	No unique impact
Courage	Distance from the battlefield	Distance from the battlefield
Competence	More than just checklists, ie; deterrence theory	What depth of understanding of algorithms and their decision-making process?
Self-Sacrifice or Selfless Service	Soldier vs. technician of death	Soldier vs. technician of death

Figure 5. Summary of Employment Findings
Source: Author's Original Work

From a profession of arms perspective, the employment of ICBMs demonstrates some possible similarities and differences for the employment of a hypothetical LAWS. Air Force leaders recognized that boredom and monotony might be a problem for missileer crews before ICBMs became operational, but they struggled to find solutions that adequately addressed the problem because leaders like General LeMay decided the requirements of the responsibility characteristic demanded a highly regimented and checklist-driven employment mechanism. As summarized in Figure 5, AI, on the other hand, may or may not require professionals with a high degree of expertise in the

development and understanding of algorithms to ensure a LAWS carries out a mission within set parameters. Boredom could also be a problem for operators of these systems since, at most, the operators would only be supervising the actions of the LAWS.

Finding ways to maintain operator vigilance so he or she is prepared to intervene before a LAWS makes a major mistake will be critical. ICBMs appear to have different responsibility concerns because the Air Force uses PRP to ensure missileers can be trusted to launch a missile when ordered. LAWS would seem to be different because, rather than the Air Force needing to trust the operator, the operator must trust that the algorithm will do the right thing once launched. Without trust, the operator may be hesitant to launch a LAWS for fear of being held responsible for its mistake. The characteristics of corporateness and ethos presented challenges for ICBMs and will likely do the same for LAWS. A major new weapon system like ICBMs, and potentially LAWS, needs to be integrated into the service's identity without marginalizing the new or the old professions within the service. Ethos for missileers was challenged primarily by lack of motivation and monotony driven by checklist-centric alert duty. For a LAWS operator, issues with ethos could revolve around the lack of control the operator has over the system once it launches which could pose problems with achieving the Air Force Core Values of Excellence in All We Do and Integrity First. The difference between the responsibility characteristic for the employment of ICBMs and AI and the two technologies similarities for corporateness and ethics and ethos are listed in Figure 5.

For the virtues identified in the 2017 version of *The Armed Forces Officer,* both weapon systems seem to require a high degree of discipline, although neither ICBMs or LAWS seem to have a unique interaction with this virtue. Both weapon systems challenge the need for physical courage since they remove their operators from the battlefield. Because of this distance, missileers and operators of LAWS have few opportunities to demonstrate a willingness to die or sacrifice themselves in support of a cause. The services need to determine how to maintain a warrior ethos, when there is no requirement to demonstrate these virtues in a manner similar to a soldier or pilot, to prevent missileers or operators of LAWS from becoming "technicians of death." Finally, competence should include missileers understanding nuclear deterrence theory since ICBMs are one leg of the nuclear triad, and expertise in this theory needs to be

maintained within the Air Force. LAWS operator may require a high degree of competence in understanding algorithms and how an algorithm in combination with a particular rule set might lead to mistakes during execution. Figure 5 summarizes the similarities in the interaction between the military virtues and the employment of ICBMs and AI.

Returning to Hughes' technological momentum concept, the military needs to shape the development and employment of a technology while it is still in a conceptual phase. This is the period when an organization and its leadership has the ability to shape what the weapon system should be and how it should be employed. The military and political leaders tried to find a new solution for Peacekeeper to increase its survivability, but it was difficult to overcome the momentum of an ICBM force deployed in silos. Budgetary pressures were also certainly involved; however, part of the problem with finding a survivable solution may also have been that the technology and the profession were set with missileers sitting alert in launch control centers. Carrying this concept forward to AI suggests the military needs to actively study and shape the development and employment of AI and the potential use of LAWS before this technology starts being widely used and takes on a momentum of its own. To preserve the characteristics and virtues of the profession of arms, the military should analyze technology's potential impact on the individual characteristics and virtues early in the development phase and before it is employed to adjust the technology and its desired use to fit within the bounds of the profession of arms.

Recommendations

If technology can both influence, and be influenced by, the profession of arms as argued in this study, a number of steps exist that the military can consider to better understand and manage this interaction. As the formal leaders, officers need a thorough grounding in the meaning and importance of the characteristics of the profession of arms. A possible starting point would be to issue all cadets in every commissioning source a current copy of *The Armed Forces Officer* and make the book part of the schools' leadership curriculum. The book could then be revisited during every level of professional military education, or more advanced writings on the profession of arms could be studied for officers to gain a richer understanding of the concepts and

components of the profession of arms. Case studies on how societal, political, moral, or technological concerns influenced the profession of arms should be included to help developing leaders understand when the profession of arms needs to be responsive to these concerns or when the profession needs to influence the concern in a way that does not change the profession.

If *The Armed Forces Officer* becomes a baseline, it may need to include a section on future challenges to emphasize the profession is not a static concept. For example, once only active duty officers were considered members of the profession, and now everyone, to include officers, enlisted, reserves, guardsmen, and civilians, are considered professionals.[3] The current version of *The Armed Forces Officer* seems too dismissive of the role technology could have on the warrior ethos when it highlights: "The military ethos is a warrior ethos…This seems unlikely to change, even in the era of cyber-conflict and unmanned attack aircraft."[4] This is also significant change from the 2007 book's view: "The same technology that yields unparalleled success on the battlefield can also detach the warrior from the traditional ethos of the profession by insulating him or her from many of the human realities of war."[5] Simply stating that every Airmen, Marine, Shipmate, or Soldier is a warrior does not make it so. Chris Coker, Robert Sparrow, Reed Bonadonna, and others, question if the warrior ethos can be maintained for those professionals who watch and conduct war from a distance. *The Armed Forces Officer* or another profession of arms manual needs to discuss how to maintain a warrior ethos when a significant portion of its members no longer go near the battlefield.

Within the Air Force, the service should consider studying itself as a profession. For example, the Army conducted its first study on the Army as a profession in 2000 after a gap of thirty years.[6] This led to the Army publishing its first doctrine on the profession of arms entitled, *ADRP-1, The Army Profession* in 2013. The Air Force may

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[3] Profession of Arms Center of Excellence, "Strategic Roadmap: United States Air Force Profession of Arms," May 2015, 4.
[4] Swain, Richard M. and Pierce, Albert C., *The Armed Forces Officer,* 9.
[5] *The Armed Forces Officer.*, 18.
[6] Snider, Don M., "The U.S. Army as a Profession," in *The Future of the Army Profession*, Rev. & expanded, 2. ed (Boston: McGraw-Hill, 2005), 6–7.

not need to develop similar doctrine, but as the 2015 RAND Project Air Force study on Air Force professionalism highlights, the service needs "to devote more attention to ensuring the ensuring that Air Force members have a shared understanding of the meaning of Air Force professionalism."[7] The Profession of Arms Center of Excellence (PACE) Strategic Roadmap currently defines the Air Force Profession of Arms as: "A vocation comprised of experts in the design, generation, support and application of global vigilance, global reach and global power serving under civilian authority, entrusted to defend the Constitution and accountable to the American people." The Roadmap goes on to say that as an Air Force professional, "An Airman (Active Duty, Reserve, Guard or civilian) is a trusted servant to our Nation who demonstrates unquestionable competence, adheres to the highest ethical standards and is a steward of the future of the Air Force profession."[8] The characteristics of the profession of arms can be found in those definitions, but according to RAND, they do not resonate with the actual professionals.

Another potential problem is that the Air Force may need to distinguish officers, enlisted, and civilians as being different types of professionals. These three groups require different levels of expertise and responsibility and have a certain degree of distinctiveness for corporateness. Quoting Don Snider who led the study of the Army as a profession: "From the members of the Army officer corps, as the commissioned agents of the American people responsible for the continued stewardship of the profession of its soldiers in the global war on terrorism, more is expected legally and morally."[9] On PACE's website, there is a civilian toolbox, but the majority of its resources apply to everyone. Recognizing and distinguishing the differences between officers, civilians, and enlisted should enrich the profession of arms discussion for all members and help each group remain accountable at the applicable level. As potentially transformative technologies like AI become a reality, the Air Force needs to take a critical look at how technology could influence the profession of arms so it is prepared to adjust the

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[7] Li, Jennifer J. et al., *Enhancing Professionalism in the U.S. Air Force*, Research Report, RR-1721-AF (Santa Monica, Calif: RAND Corporation, 2017), 76.
[8] Profession of Arms Center of Excellence, "Strategic Roadmap: United States Air Force Profession of Arms," 4.
[9] Snider, Don M., "The U.S. Army as a Profession," 33.

employment of the technology or the profession as needed. The ability to do this requires an in-depth knowledge of what defines the profession of arms.

Areas for Further Study

This study only touched on the possible interaction between technology and the profession of arms. Expanding this research to include additional types of weapon systems will help enrich the military's understanding of whether different types of technologies influence the profession differently depending on a technology's role, mission, or the danger involved for its operator. This study also largely ignored potential social, cultural, or political issues that may have influenced the technology or the profession. Additionally, the need to build trust into human-machine teaming for AWS requires further study to understand the benefits and limitations of trust. The level of expertise needed by the operator of a LAWS, such as the hypothetical one used in this study, also warrants further consideration. Normally, the military relies on contractors for highly technical functions like developing algorithms. If many of the military's traditional functions are replaced by algorithms and autonomous weapons systems, could the contractor be considered the professional for these systems? Studying different options in the delineation of expertise for AI will help leaders make informed decisions as development in AI continues.

Another area that merits further consideration is the military virtues. While reviewing writings on the profession of arms, many different lists of virtues were discovered. The characteristics of the profession of arms are broad enough that they can probably adjust as needed to social, political, or technological changes. The virtues may be the more flexible portion of the profession of arms that can change if needed. For example, listing only selfless service as a virtue rather than self-sacrifice and selfless service together may resonate better for those professionals who operate a weapon system remotely. This relates back to the Air Force needing to study itself as a profession as recommended in the previous section. Further research on the profession of arms and its role with technology will aid in fully understanding this interaction.

Conclusion

Since man first learned to forge bronze into weapons, technology has played a critical role in ensuring success in war.[10] Today, artificial intelligence and autonomy offer many possibilities for military applications. Understanding the interaction between technology and the profession of arms should enable the military to shape this interaction in a proactive and advantageous manner. As more weapon systems move professionals further from the battlefield and the decision-making process, the military needs to consider how to effectively maintain the characteristics and virtues of the profession of arms to ensure the military profession is not replaced by robots.

[10] McNeill, William Hardy, *The Pursuit of Power: Technology, Armed Force, and Society since A.D. 1000* (Chicago: Univ. of Chicago Press, 1993), 1.

Appendix A

History of *The Armed Forces Officer*

This appendix discusses changes in the format and content of the various editions of *The Armed Forces Officer.*

1950-1975 Versions

S.L.A. Marshall, the author of the 1950, 1960, and 1975 versions, wrote in the 1975 edition that then Secretary of Defense George C. Marshall inspired the writing of the book "due to his personal conviction that American military officers, of whatever Service, should share common ground ethically and morally."[1] This emphasis on the moral and ethical aspects of military service seems similar to the 2017 version; however, the moral and ethical components are not as explicitly discussed in the early versions. The chapters that most closely relate to considering the profession of arms include: "The Meaning of Your Commission" and "Forming Military Ideals." However, both of these chapters are fairly esoteric, or philosophical, explorations of these topics with no terms or characteristics codified. A chapter on responsibility and privilege more closely resembles the characteristic of corporateness, as it discusses the greater privileges that come with greater responsibility. The rest of the book primarily focuses on how to lead and identifies the officer's main calling as "the management of men in the practice of arms," which resembles Huntington's "management of violence."[2] The book also includes a chapter on how to manage finances, the need for insurance, and the importance of keeping an inventory of household goods.

After the 1950 version, a couple of chapters were removed and minor adjustments were made to other chapters, but the book remained largely unchanged through 1975. In the introduction to the 1975 book, S.L.A. Marshall stated modifications have been made based on a quarter century of experience, but his object was not to reflect on lessons learned from the Korean or Vietnam Wars. This suggests that Marshall viewed the profession of arms as being of an enduring nature that does not change as society, the

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[1] Marshall, S. L. A., *The Armed Forces Officer*, 1975, ii–iii.
[2] Marshall, S. L. A., *The Armed Forces Officer*, 1950, 39.

military, or technology changes. As previously mentioned, although it was created in 1955, the Code of Conduct is not discussed in any of Marshall's versions. Perhaps what these three versions best try to represent is encapsulated in this quote from the 1975 edition: "Love of country is still the only possible refuge for intelligent American men and women in service; it is their sword and shield and the emblem of their advance."[3]

1988 Version

The 1988 version of *The Armed Forces Officer* includes significant updates while keeping a similar format. This version adds a chapter on joint and allied duty, reflecting the passage of the Goldwater-Nichols Act in 1986. In a new chapter, "What Is an Officer?, good officers are defined as "competent at the profession, demonstrate by example the highest standards of moral and ethical behavior and continue to try to become better."[4] This definition relates back to the expertise characteristic of the profession but does not seek to codify characteristics or set definitions. In another new chapter entitled "Where Is the Real Service?," the book states "The Armed Forces' real mission takes place wherever a service member is assigned."[5] Whereas Marshall's versions seem to focus more on leadership in preparation for and execution of combat roles, this version recognizes there are complicated, technical support functions, removed from the immediate battlefield, that are critical to successful combat. However, the book still seeks to strike a fairly broad and simple balance as the authors state in the Introduction: "Old-fashioned concepts of service, of loyalty, of duty and of being better than you think is possible are included because they work and apply in a complex and volatile world that sometimes seems to lack a foundation for action."

2007 Version

The authors of the 2007 version recognized that the book was published while the U.S. was at war and that the world had changed in political, technological, and military realms since 1988. This version was also written by eleven authors from the military

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[3] Marshall, S. L. A., *The Armed Forces Officer*, 1975, ii–iii.
[4] McMahon, Currey Sr. and Causten, Brian P. John, *The Armed Forces Officer* (Washington, D.C.: United States Government Printing Office, 1988), 5.
[5] McMahon, Currey Sr. and Causten, Brian P. John, 21.

service academies and other military universities, rather than consisting of what one author or a small group of authors thought should be included; however, the book retains the original goal “to define the common ethical core of all officers.”[6]

[6] *The Armed Forces Officer*. (Washington: Potomac Books : National Defense University Press, 2007, xiv.

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