

Touching the Face of God: Religion, Technology, and the United States Air Force

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ABSTRACT

The goal of my project is a detailed analysis of the technological culture of the United States Air Force from a Science and Technology Studies (STS) perspective. In particular, using the metaphor of the Air Force *as* religion helps in understanding a culture built on matters of life-and-death. This religious narrative—with the organizational roles of actors such as priests, prophets, and laity, and the institutional connotations of theological terms such as sacredness—is a unique approach to the Air Force. An analysis of how the Air Force interacts with technology—the very thing that gives it meaning—from the social construction of technology approach will provide a broader understanding of this relationship. Mitcham’s dichotomy of the engineering philosophy of technology (EPT) and the humanities philosophy of technology (HPT) perspectives provides a methodology for analyzing Air Force decisions and priorities. I examine the overarching discourse and metaphor—consisting of techniques, technologies, experiences, language, and religion—in a range of historical case studies describing the sociological and philosophical issues of the Air Force. As the Air Force is the offspring of the U.S. Army, these examples begin with the Civil War era and the invention of the Gatling gun before moving to the interwar period’s Air Corps Tactical School and its seminal organizational thinking about the aircraft. Moving to the more modern times after the birth of the Air Force, I describe and compare the Advanced Airlift Tactics Training Center and the Air Mobility Warfare Center, two organizations interacting with technology from different organizational archetypes. The final example is the Department of Defense Readiness Reporting System, an information technology application at the focal point of cultural change affecting not just the Air Force but the entire Department of Defense. Finally, I will conclude with a chapter on policy considerations and recommendations for the Air Force based on the Air Force religion, a balance of both people and technology, and with an eye toward the future of U.S. military operations. The primary goal is to answer three questions: is the U.S. Air Force truly a religion? If so, how should that affect its approach to technology and technological change? With an eye toward consciously building the future, how has the Air Force religion shaped the organization in the past?

Dedication

This dissertation is dedicated to my spouse Sue, who put up with “lost” weekends, evenings, holidays and more, as well as the piles of books strewn across the living room floor for months and months and months. Thanks for the support—as always. All my love—HB.

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High Flight

Oh! I have slipped the surly bonds of Earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
Of sun-split clouds, — and done a hundred things
You have not dreamed of—wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air....

Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace
Where never lark nor even eagle flew—
And, while with silent lifting mind I've trod
The high untrespassed sanctity of space,
Put out my hand, and touched the face of God.

--John Gillespie Magee, Jr.

Chapter 1 Introduction

When the chips are down, there is no “rational” calculation in the world capable of causing the individual to lay down his life. On both the individual and collective levels, war is therefore primarily an affair of the heart. It is dominated by such irrational factors as resolution and courage, honor and duty and loyalty and sacrifice of self. When everything is said and done, none of these have anything to do with technology, whether primitive or sophisticated. So it was at a time when war was limited to face to face clashes between hide-clad, club-armed cavemen, 50,000 years ago; so it will be when laser-firing flying saucers permit it to be fought over interplanetary distances 100, or 500, or 1,000 years hence.

*-Martin van Creveld
(314)*

The mastery of flight—dreamed of by humans for thousands of years—heralded a new age of possibilities. That unremarkable December day at Kitty Hawk planted the seeds of an astonishing cultural change across America as imaginations soared and utopian futures seemed right at hand. Technology—long a source of fascination for many Americans—became a beacon of salvation and prosperity, and the unrestrained hope in a new, technologically-sophisticated future soon developed religious overtones of prophecy and belief. The United States Air Force has its organizational and cultural roots firmly planted in this era.

The Air Force¹ is an organization created and enabled by the mystery and technology of flight.² This exploration of the Air Force will pull three chief strands from the seamless web of science and technology studies: the sociology of religion, the social construction of technology, and Mitcham's engineering philosophy of technology (EPT) / humanities philosophy of technology (HPT) perspectives. The sociology of religion will provide a new way of understanding the Air Force, one that recasts organizational decisions about technology and technological change in theological terms. The social construction of technology enables use of an analytic framework to ferret out the relevant social groups and the meaning they impart to the technology. The EPT/HPT perspectives instantiate the concept of co-construction and provide a methodological approach for the case studies.

A theme of this dissertation is the discourse and metaphor associated with the Air Force. When General Thomas White begged President Eisenhower for the acquisition of the B-70 bomber³ by saying it was necessary for the morale of the Air Force (Builder, Icarus Syndrome 151), his actions were less about the needs of the country and more about the worship of a new and mighty totem. The examination of the Air Force religion and technological paradigms begins with an understanding of the science and technology studies tools used throughout the dissertation.

¹ Throughout this dissertation, "United States Air Force" and "U.S. Air Force" (both shortened to USAF), and "Air Force" (aka "AF") all refer to the same entity.

² In particular, powered, sustained, heavier-than-air flight.

³ Nicknamed the "Savior" by the commander of the Strategic Air Command—not because it would save America from the Soviet threat, but because it would save the manned bomber mission from replacement by intercontinental ballistic missiles (Builder 151).

Science and Technology Studies and the Air Force

The interdisciplinary Science and Technology Studies (STS) field combines philosophy, sociology, history, and policy to create a nexus of thought on issues surrounding scientific pursuits and technological innovation. When discussing technology, it is imperative to realize the meaning includes more than just objects and tangible artifacts—it also includes processes, and explicit attention must be given to these processes, as well as the outcomes, associated with technological change for a useful analysis (Thomas 10).

Philosopher Joe Pitt defines technology⁴ as “humanity at work” (xi) while another author defines it as the “body of knowledge possessed by individuals by virtue of their membership in particular social organizations” (Kaldor 416); Edwin Layton defines technological knowledge as “knowledge of how to do or make things” (603). Arnold Pacey defines a “general meaning of ‘technology’” as encompassing not just the restricted technical aspects but also the cultural and organizational aspects of technology practice (4-7). Particularly with technological matters, the STS perspective tries to better understand how society and technology are co-constructed—that is, how “users and technology are seen as two sides of the same problem” (Oudshoorn and Pinch 3). Toward that end, I first develop the metaphor of the Air Force as a religion by leveraging sociological analyses of religion.

Emile Durkheim, a noted sociologist who published The Elementary Forms of Religious Life in 1912, tied distinctive traits of humankind together with the main object of religion: “first and foremost a system of ideas by means of which individuals imagine the society of which they are members and the obscure yet intimate relations they have with it” (227). A sociologist and contemporary of Durkheim, Max Weber built upon Durkheim’s foundation by developing higher-order concepts like soteriology, mystery, and theodicy in The Sociology of Religion (ch. 9-10). Emilio Gentile outlines the ways in which politics as a civil religion has its historical roots in many democracies (especially in America) and how that metaphor affects and influences the culture and political practices.

Another STS concept is the social construction of technology (SCOT) theory of technological change, as described by Pinch and Bijker (Social) and subsequently expanded (Bijker, Do Not Despair; Bijker, Of Bicycles; Pinch, SCOT: A Review; Klein and Kleinman). SCOT will be the overarching analytic framework for evaluating and assessing the case studies, and aids in identifying the relevant social groups, those groups’ interpretative flexibility of the artifact, rationales for closure of the controversy,

⁴ Throughout this dissertation, I will use the term “technology” in its broad sense to include processes as well as objects and artifacts. Where the term is meant in a more restricted sense and the context is not obvious, I will use phrase “technological artifact” to help distinguish the intent.

and the wider sociopolitical milieu surrounding the artifact. The intent is to use SCOT concepts to work toward an understanding of sociotechnical change within the Air Force using descriptive case studies across a broad range of situations. I will use the “heterogeneity of social interactions” (Bijker, *Of Bicycles* 6) to discover and define the interpretive flexibility of the various social groups within the Air Force involved with a particular technology.

As a method for approaching the co-construction of society and technology, I will use Carl Mitcham’s engineering philosophy of technology (EPT) / humanities philosophy of technology (HPT) perspectives discussed in Thinking Through Technology. Mitcham, a philosopher, defined EPT as “analyses of technology from within, and oriented toward an understanding of the technological way of being-in-the-world as paradigmatic for other kinds of thought and action,” while HPT is defined as “the attempt of religion, poetry, and philosophy to bring non- or transtechnological perspectives to bear on interpreting the meaning of technology” (39). The underlying argument of the EPT/HPT framework is that a robust philosophy of technology must include a balance of both approaches (Mitcham 137). By considering the internal workings of technology as compared to the meaning of the technology by the relevant social groups, I will highlight disconnects and imbalances in organizational approach to technological change. Essentially, I am modifying Mitcham’s concepts to a degree by focusing on the difference between the broader social issues and the specific technological issues in an effort to use the construct as a pedagogical device.

The EPT/HPT perspectives, coupled with the elements of discourse and metaphor, will drive the approach to the case studies and capture the co-constructed nature of Air Force technology and people. These specific case studies will leverage the foundation of discourse and metaphor to produce a generalized template of the Air Force approach to technology and technological change, and suggest policies that may provide support to those organizational processes. The case studies do not provide an authoritative history of a particular technology or organization; rather, the intent is to provide *a* history, one that illuminates the connection between the meaning of decisions and cultural identity.

The overall goal is the exploration of the discourse—“a way of knowledge, a background of assumptions and agreements about how reality is to be interpreted” (Edwards 34)—associated with military technology in order to develop and elaborate a new historical narrative. Similar to Paul Edwards’ template in The Closed World, I define my elements of discourse as consisting of technique, technology, experience, and language (15). These elements provide a method of analyzing the components of discourse to understand the role each plays in the overall construct. Metaphor allows the translation of uncertain or obscure areas of experience into terms of the familiar, restructuring our

thinking and setting conditions for the literal interpretation of the metaphor (Edge 135). As metaphor is the primary thrust of the military religion model, I isolate it from discourse and treat it separately.⁵

The intent of the discourse and metaphor analysis is to uncover the political choices, socially constituted values, and complex interactions between the various relevant social groups regarding technology and technological change. The overall goals are to understand first the relationship between religion and the Air Force culture, while also considering how a religious metaphor affects technology and technological change. Additionally, the point of the case studies is to illuminate how religious metaphor has shaped the Air Force in the past, in order to provide policy recommendations for the future.

In general, Christianity is the dominant religion considered throughout this dissertation, for three reasons. First, it is the religious tradition with which I am most familiar, so the concepts and structures come naturally to me. Secondly, Christianity—Protestant and Catholic traditions, along with associated minor sects—constitutes the dominant religion of America, which of course is important to the U.S. Air Force.⁶ Finally, with over 80% of the members identifying with Christianity, the Air Force is also the most “Christian” of the Services and also more “Christian” than America at large which is 77% Christian (Goldberg 101-103). In sum, this overarching STS framework of SCOT, EPT/HPT, and discourse and metaphor provides a methodology for discovering and describing those factors that create the Air Force worldview.

⁵ Throughout this dissertation, unless otherwise noted, all references to “military” are presumed to be United States military forces. A reference to “Services” means one of the four “Title 10” [United States Code] military Services: U.S. Army, U.S. Navy, U.S. Marine Corps, and U.S. Air Force. The U.S. Coast Guard is a “Title 14” Service under the Department of Homeland Security, and in those instances in which it is called to military service, rolls up under the Navy.

⁶ James Aho’s research indicates that a society’s military ethic is usually “interrelated with its prevailing religious mythology” (3).

Dissertation Structure

This introductory chapter is a broad-brush initiation to the subject material and intended approach for this dissertation. In order to situate readers unfamiliar with aviation and Air Force history, chapter two provides a brief summary of the era that gave birth to the institution and the development of the organization. It will not be a rote historiography; instead, it will focus on finding the STS threads throughout the co-history of aviation and the Air Force. The goal is to show threads from the historical underpinnings of aviation and the Air Force to the military religion model while providing some historical context, and information for better understanding Air Force terms and organizational structures (e.g., “joint” and “unit”) in the case studies.

Note that this historiography tries to avoid the concept of “progress” or similar master narrative, instead striving to capture particular social aspects and the wider sociopolitical milieu associated with flight from a social construction viewpoint. As Keith Jenkins remarked, “history is a discourse, a language game; within it ‘truth’ and similar expressions are devices to open, regulate and shut down interpretations” (39).⁷ While understanding that there are multiple ways to interpret any situation, my objective with the case studies is to provide *a* history to highlight an “out-of-the-box” perspective on the Air Force as an institution and its response to technology and technological change.

Chapter three will develop the underlying Air Force religion model and explain its roots and nature. After a brief description of culture in general and military culture in particular, I will develop the outline of a military religion: a system of beliefs, values, myths, rituals, and symbols, along with holy scriptures, martyrs, temples, sermons, commemorative holidays, and even sacred history (Gentile xiii-xiv). Overlaying the culture of the Air Force on the military religion model will demonstrate its utility and applicability in this context. This model provides the lens through which to view the rest of the dissertation, and captures the cultural basis of the Air Force and its relationship to the religious environment of America.

Chapter four presents the details on the STS methodologies used throughout the case studies. This chapter will describe in detail the STS threads of SCOT and the EPT/HPT concept, along with other minor STS themes, and explain how they are applicable to the Air Force, and how I intend to use those concepts in exploring the Air Force’s relationship to technology. Another STS-related theme is that of knowledge management and knowledge-making; I argue that the way in which the operational field

⁷ As a side note, another interesting quote by Jenkins: In the end history is theory and theory is ideological and ideology just is material interests” (23-24).

units manage and make use of knowledge is different from the way higher headquarters does, and that the boundary between them causes disconnects and communication lapses across the organization.

The case studies begin with chapter five and describe the U.S. Army's⁸ organizational reluctance to recognize the dramatic change in land warfare heralded by the Gatling gun, and the institutional obstacles to the prophets of the new technology. While focused on the Civil War era, the case study timeline spans from the 1860s through the start of World War I. This chapter will provide an initial synergizing of the STS concepts into a case study, while also providing a look into the culture of the military Service that eventually spawned the U.S. Air Force. It is important to understand the culture of the Army to see which elements comprise the Air Force, as well as understand the new components adopted that differed from the parent Service. Additionally, during this period the Army and Navy operated essentially completely independently, and so this is the starting point for tracing the changes "jointness"⁹ has produced within the U.S. military.

The next case study examines primarily the interwar activities of the Air Corps Tactical School (ACTS), spanning from the late 1910s through World War II (WWII). The fledgling aerial strategists of the time came together at the ACTS to develop aviation doctrine for employment of airpower in future warfare. In particular, the pitched battles between the bomber and fighter prophets and the resulting doctrine not only fashioned the WWII use of airpower but had lasting impact on the culture and technology of the Air Force. The seeds of joint "deconfliction" are in this case study, as the Air War Plan for World War II was developed in nearly complete isolation from the ground campaign, but the plans were sandwiched together into the overall campaign.

Chapter seven concerns the Advanced Airlift Tactics Training Center (AATTC), an organization created in 1984 to fill a need for tactically sophisticated airlift crews in the Air Force after the hard lessons of Vietnam. Chapter eight describes the history and organizational endeavors of the Air Mobility Warfare Center (AMWC), created in 1994 to consolidate many small training and innovation centers scattered around the country under one centralized organization. The AATTC sprung from among the laity via a prophetic vision, while the AMWC was the brainchild of a high priest; they are parallel case studies as the former describes a prophetic organization's contribution to the acquisition and training/employment of Air Force technology, and the latter describes a priestly organization's contribution to those same goals.

⁸ The U.S. Army is the parent Service of the U.S. Air Force.

⁹ "Joint" refers to the ability of the Services to work together as a cohesive, integrated team during combat operations. The concept of joint operations is discussed in detail in later chapters.

Together, these two chapters describe the movement from integration toward the “interdependence” level of joint operations, as the AATTC and AMWC both embraced other Services and coalition partners in the pursuit of tactical and technological improvements. The case study timeline for both chapters runs from activation of the organizations through the end of 2005. While Hughes cautions that historians lack perspective when dealing with the recent past (x), this dissertation intends to capture the current state of the Air Force with recommendations for the future, so the immediate past has relevance.

Chapter nine describes the activities of a most high priest in inculcating cultural change throughout the Department of Defense in the meaning and utility of readiness information. Affecting all military Services, the radical change in readiness assessment has particular impact to the Air Force due to its unique approach to readiness as well as its worship of technology (to include information technology). While the time span starts in the 1960s in order to provide historical context to the complexities of military readiness issues, the focus for the case study is 1999 through the end of 2007. This case study formalizes the interdependence of the Services, and sets the stage for policy recommendations on how the Air Force religion model should be applied to weave the Air Force in tightly with the rest of the joint team.

Chapter 10 starts with a discussion of the issues of technology, the issues of cultural change, and the issues of joint and then applies these thoughts to the Air Force in light of the AF religion model, concluding with a short review of the 2008 resignations of the Secretary of the Air Force and Chief of Staff of the Air Force. The recommendations will apply the military religion model and themes of discourse and metaphor to illustrate the relative balance between HPT and EPT perspectives, while still supporting the historical strengths of the Air Force and arguing that religious models of cultural change and technology are most appropriate to the U.S. Air Force rather than business models.

The concluding chapter will present a brief summary of the dissertation along with conclusions and possible other avenues of exploration for future projects. Additionally, the application of the military religion metaphor to the interdependence of the U.S. military may provide insight on discourse with other Services, as well as on issues such as possible new Services (for example, a proposed independent U.S. Space and Missile Force). The goal is to leave the reader with a synopsis of the underlying themes and a sense of the validity and utility of STS to the U.S. Air Force.

The Alpha¹⁰

In short, my aim is to argue three fundamental truths concerning the U.S. Air Force: it is a religion, this religious nature influences its approach to technology and technological change, and senior leaders are most successful when they use the AF religion to harmonize the extant culture with their goals by understanding the organization's history. I will use the tools of STS to explore these issues, develop the case studies, and refine the concepts presented briefly in this chapter.

Some of the case studies and examples will be somewhat esoteric, and possibly arcane, but that is often the case with cultural artifacts and dogma. The underlying themes of religion will be omnipresent throughout this dissertation, just as those themes permeate and co-construct the culture of the Air Force. "Come now, and let us reason together..." (King James Bible Isaiah 1:18).

¹⁰ "I am Alpha and Omega, the beginning and the ending..." (King James Bible Revelations 1:8).

Chapter 2

In the Beginning: A Brief Air Force History

*Fly, fight, and win.*¹¹

-T. Michael Moseley
(Mission)

On December 17, 1903, the Wright brothers achieved manned, controlled, powered, heavier-than-air flight. This act inspired thousands to brave risk and injury to become pilots, even during wartime when the chances of returning alive were slim, and over the past century millions of people across the globe have looked up with awe at the spectacle of flight. The goal of this chapter is two-fold: to briefly describe the American cultural romance with aviation, and intertwine those passions and hopes with a brief history of the U.S. Air Force. “Technological utopianism has been and remains a central and even dominant thread in American culture” (Corn 154) and it not only gave birth to, but also remains a central tenet of, the Air Force. “Flight is fraught with symbolism, the stuff of legend and myth” (Singer 3).

¹¹ The mission of the United States Air Force.

In the Beginning was the *Flyer*

Manned, powered, heavier-than-air flight has been a fantasy of humans for centuries, with legends of Icarus and other mythical heroes challenging the gods and the godlike power of flight, usually with disastrous consequences. With the flight of the Wright brothers on December 17, 1903, a new age dawned of human mastery over the aerial domain, and as the world learned of the invention, the excitement was palpable and overwhelming. Robert Wohl argues, in both *A Passion for Wings* and *The Spectacle of Flight*, that aviation was perceived as a primarily aesthetic event for the first half of the 20th century. Joseph Corn agrees with this premise in his book *The Winged Gospel* with phrases like “miraculous machines,” “seductive prophecies,” and “technological utopianism” (ix-x), going even further and explicitly linking the aviation age with religion.

Wohl introduces his first text by saying “this is the history of a complex of emotions – the passion for wings – and the impact that it had on Western culture” (Wohl, *A Passion* 1)—and even today, aviation and the Air Force religion remains a complex of emotions. Wohl includes a wide range of photographs, paintings, and other images in an attempt to capture the awe and spectacle associated with aviation’s early period, “dimly” representing the “intoxication of flight” (Wohl, *A Passion* 3).

The “conquest of the air” was the popular phrase in 1909 for the goals of the aviation-minded, a phrase that resonated with the young men of the era (Wohl, *A Passion* 69). During air meets, large enthusiastic crowds would “flock” to the events and by the end “everyone was delirious, women cried” (qtd. in Wohl, *A Passion* 205). When the first airplane flew over Chicago in 1910, a throng estimated at over one million people witnessed the event; a minister present wrote, “never have I seen such a look of wonder in the faces of a multitude” (qtd. in Corn 4). By 1911, aviation had completely enthralled Western imaginations; an estimated 300,000 spectators showed up for the start of a city-to-city air race by a small group of eight aviators (Wohl, *A Passion* 125-127). Other spectacles of flight drew huge crowds watching from rooftops, required police to restrain those unable to purchase tickets to sold-out events, and sometimes infantrymen were necessary to hold back frenzied mobs from storming flying machines and their pilots (Wohl, *A Passion* 149-151, 255).

Corn attributes the mass hysteria to the golden new era aviation promised; in the 1920s, the “winged gospel” promised “enhanced mobility, enlarged prosperity, cultural uplift, and even social harmony and perpetual peace” (x). Setting the stage for this utopianism was the dawn of the industrial age in mid-1800s America; Leo Marx describes the concept of machine power fulfilling ancient mythic prophecy as evoking exuberance, especially in America (201-203). Part of the American reverence for flying machines in general stems from Christianity’s concepts of flying angels and the heavens

constituting the divine sanctuary of God. It also relates to the historical association of flying with spiritual matters (Corn 47-49): when Americans “searched for language appropriate to the excitement they felt for the airplane, they inevitably borrowed from this Christian tradition” and the idea that flying was somehow divine (Corn xiv, 47). In the early, heady days “enthusiasm for aviation and hope for the aerial future generally rested on traditional Christian beliefs” (Corn 49), a tendency that continues through the present and is exemplified in the strong identification with Christianity among members of today’s U.S. Air Force.

The religious metaphors extend back to the very beginning of aviation; a French journalist, in trying to capture the “ascetic and spiritual qualities” of Wilbur Wright in 1908, likened him to a monk on a high mountain peak—“the soul of Wilbur Wright is just as high and faraway” (qtd. in Wohl, *A Passion* 27). One famous French aviator, Jean Conneau, wrote a 1912 international bestseller describing his exploits in the “magical realm of ‘aerial mysteries’” having been “transformed by the miracle of flight” (qtd. in Wohl, *A Passion* 129-130). Corn equates the early days of aviation to a secular religion, with the airplane as its god, ritual ceremonies (especially prevalent on the December 17th anniversary), transformation of the human condition, miracles, and a messianic vision of technological utopianism (x).

While technical prophecies often seemed right at hand, the social and moral realms were not as quickly realized. The aviation creed spoke to “questions of ultimate meaning and purpose and to the underpinnings of one’s faith in god,” and many Americans expected the airplane to “foster democracy, equality, and freedom ... to purge the world of war and violence” (Corn 31, 34). Part of the excitement arose from the mastery of the air, the control over the natural elements and subjugation of the very heavens to the needs of humanity. Unlike slow and ungainly dirigibles, or limited and dangerous unpowered gliders, the airplane moved readily in three dimensions at the will and whim of a human.

Perhaps the proximity of death is what ultimately gave meaning to flight, “which was nothing but a metaphor for our longing for higher forms of being” (Wohl, *A Passion* 255). In his introduction, Wohl remarks that one of the “more disturbing realizations was the extent to which flight was identified with an attraction toward death – the death of the aviators themselves, to be sure, but also increasingly after 1911 the death of people on the ground” (Wohl, *A Passion* 3). Part of the mystique and fascination with early flight was the reckless daring required of the men (and for the most part, it was men) who flew. The early aircraft were less than reliable mechanically, while the pilots often had little training and experimented via seat-of-the-pants rather than any scientific understanding of the principles of flight. Many of the early pilots and inventors were injured or killed in aviation accidents—for instance, 30 aviators were reported killed during the first six months of 1911 (Wohl, *A Passion* 133), and in general

each flight had a “50 per cent chance of engine failure” and the “annual toll taken by the grim reaper was about 33 1/3 per cent of all those who stepped in a plane” (Arnold and Eaker 34-35). This specter of death and danger endured through the end of World War II.

The Wright brothers were apparently well aware of the military possibilities of their invention, and in January 1905 noted that the “most likely clients ... were governments that could ill afford to risk falling behind technologically in the race to develop ever more sophisticated and destructive engines of war” (Wohl, *A Passion* 15). In 1909, one commentator believed that freedom of the skies meant an age of peace, because only “fools’ would dare fight when armies employed flying machines,” while in 1915 the editor of *Flying* magazine stated that airplanes would eliminate factors causing war within another decade (Corn 37-38). Orville Wright himself prophesied in 1917 that the airplane would soon make wars impossible (Corn 44). These attitudes, as observed later in history, were lamentably in error, but demonstrated the cultural hopes fostered by the sublimity and boundless freedom embodied in the airplane.

Initially, the U.S. Army rejected the overtures from the Wright brothers, who first offered their invention to U.S. Government, stating the Army would only consider practical operational devices (Wohl, *A Passion* 15). Eventually, however, the Army seized on the idea of using a manned, powered, heavier-than-air vehicle for military purposes,¹² and in September 1908 Orville flew a prototype Army flyer around Ft. Myer, DC, bringing tears to the eyes of “hard-boiled” newspaper reporters (T. P. Hughes 103). With the first flight piloted by a military man in the United States occurring in 1909 (Arnold and Eaker 26), by the time America became involved in World War I, aviation had become part of the military forces and was just starting to integrate into the mainstream U.S. Army.

¹² Note that a close friend of the Wrights’ told them their invention would reduce conflict as once the existence of the airplane became known “the knowledge will deter embroilments” (qtd. in T. P. Hughes 101)—another errant prediction mirroring that of the machine gun, atomic weapon, and other inventions seeming sure to bring peace.

World War I

While the 1914 dominant image of aviators was that of “sportsman,” after 1915 it transformed to the flying ace—the “airborne knight armed with a machine-gun” (Wohl, *A Passion* 203), a “throwback to the knights of King Arthur” (Arnold and Eaker 36). The dramatic duels—dogfights—pitted “man against man,” recalling days when battle was valorous and chivalric (Corn 11). Pilots killed in crashes behind enemy lines were often buried with military honors by the opposing side, with the victor visiting the gravesite to mourn his fallen nemesis. Aviators were “freed from much of the ruck and reek of war by their easy poise above it [and could] take time and pains to be gentlemen-warriors” (qtd. in Corn 11).

Initially the airplane was used for intelligence-gathering, for locating the enemy and observing engagements on the battlefield. As the aviators saw possibilities for more active participation they identified the need for offensive capability in order to contribute to the fight, both the ability to drop small hand-held bombs, and the capacity for aerial warfare. One problem in adapting the airplane for aerial combat was the issue of targeting while both the combatants were moving in three dimensions. The initial solution was to place a machine gun along the axis of the airplane, but the need for synchronization between the machine gun and the propeller blades remained a problem despite some creative solutions¹³ (Wohl, *A Passion* 207-208).

As solutions were found to the machine gun synchronization problem, the era of single-seat fighters was birthed. Oswald Boelcke, a German WWI ace and a seminal influence on the early German air force (Wohl, *A Passion* 222-223), was delighted with a single-seat armed aircraft: “I have attained my ideal with this single-seater, now I can be pilot, observer and fighter all in one” (qtd. in Wohl, *A Passion* 214). During and for a few years after World War I, the fighter aircraft and its solo pilot dominated military aviation in the United States.

The airborne crusaders seldom remarked on the dichotomy between the chivalrous aerial combat and the destruction from their bombing and strafing rained down on hapless foot soldiers. Wohl speculates that the “elevated position of aviators in the sky encouraged, and perhaps even dictated, a spectatorial attitude toward war on the ground” (Wohl, *A Passion* 241). This separation contributed to the omniscient and omnipotent—Godlike—feelings of the aviators, and the nobility and majesty found in the battlefield of the sky (Wohl, *A Passion* 240).

Journalists and the military alike stoked the mythology of the fighter ace. Italy’s top fighter ace was awarded his country’s highest honor while “thousands of his admirers mobbed the streets outside”

¹³ For instance, armored propeller blades—although those involved with the occasional dangerous ricochet (Wohl, *A Passion* 207-208).

(Wohl, *A Passion* 243). Eddie Rickenbacker participated in a staged dogfight with a captured German airplane, and the film was played in Paris and throughout the United States (Wohl, *A Passion* 244). The generally enthusiastic response by the public stemmed from the prewar mystique of aviation, the easily quantifiable exploits, and the image of a cushy life well behind the front. The portrayal of the ace—fighting and triumphing alone, usually against difficult odds—encouraged the hero worship of individual pilots rather than just the top generals as was customary in the mainstream Army. This feting of individual heroes was quite unusual compared to the faceless, nameless Army soldiers down in the trenches with little likelihood of individual recognition or fame.

World War I served to reinforce the image of the sky as a privileged male domain by relegating female volunteers to non-aviation roles or at best limited, non-combat reconnaissance flights (Wohl, *A Passion* 282). Indeed, compliant and willing women were often the rewards for the successful aces, with a constant stream of letters containing indecent proposals to the most successful pilots. Women were decidedly not allowed in combat situations, and were generally not well regarded in the military boy's club.

As the Great War wound down, the era of military aviation was just starting to unfold. “The urge to dominate, to master, to conquer, was the motivation that drove men to fly ... Death was the price that men would have to pay in order to live like gods in a world of fast machines” (Wohl, *A Passion* 288). While use of the airplane was not fully realized in the Great War—primarily due to a lack of doctrine (Holley)—the imagination of the aviators and the American population were captured by the possibilities. The interwar period provided a respite from aerial battle, and an opportunity to develop disciplined tactics and doctrine in preparation for future wars.

The Interwar Period

The lull after the Armistice saw the political and aesthetic uses of the airplane increase significantly—“no other machine seemed to represent as fully humankind’s determination to escape from age-old limitations, to defy the power of gravity, and to obliterate the tyranny of space and time” (Wohl, *The Spectacle* 1-2). Especially in the 1920s and 1930s, men and women alike believed flying was a sacred and transcendent calling that more than justified its cost in lives, speaking of a “sense of awe that merged on mysticism and a feeling of contact with the divine” (Wohl, *The Spectacle* 2, 4)

The public’s embrace of “airmindedness”—meaning an enthusiasm for airplanes and believing in their potential to better human life—fostered a culture of barnstormers with “evangelical dedication” and other “flying missionaries” (Corn 12-13). Aviation rituals of a religious nature continued in the American public sphere, such as the spreading of “sacred sand” from Kitty Hawk on a runway in Dayton, flights of remembrance, and the dedication of a historic marker at the site of the first flight in the dunes of Kitty Hawk (Corn 64-65).

Wohl believes the development of aviation and cinema affected both domains and tied them together in the American cultural consciousness (Wohl, *The Spectacle* 3-4, ch. 3). Corn notes that many members of the filming community became pilots, contributing to the popularity of the aviation genre (11-12). During this “romantic” time (Wohl, *The Spectacle* 6), imaginations continued to cast the aircraft as the savior and great hope of humankind. In 1927, after his triumphal flight to Paris, Lindbergh crisscrossed the United States in a three-month marathon, logging 22,000 miles of flying in 82 stops, with an estimated 30 million Americans (one in four) turning out to see him (Wohl, *The Spectacle* 37-41).

The common public perception of (usually male) aviators invoked images of “an extraordinary combination of active energy, courage, decision of purpose, a quick eye, clearness of judgment, the utmost presence of mind, and great physical dexterity,” a veritable “breed apart” and a “modern superman” (qtd. in Corn 74). On the military front, Billy Mitchell in his eminent *Winged Defense* stated that “moral qualities are required that were never before demanded of men” (163) while General “Hap” Arnold described military pilots as “athletic, serious-minded, industrious” rather than the “bookworm type” (qtd. in Worden 4). Eventually, the air apostles came to realize the error of this overly wrought description—few average citizens would be interested in aviation if they did not match the perception, slowing the adoption of the messianic vision and lessening the possibilities of the winged gospel.

Women pilots made inroads into the masculine world of aviation and while comprising only one-thirtieth of all aviators nonetheless were placing in air races, flying as commercial pilots, and selling

airplanes (Corn 71-73). Corn speculates that women were attracted to aviation due to its symbolizing of freedom and power, which was often lacking in women's daily lives (73). Women pilots did provide a sort of "antidote" to safety concerns; in the mid-1930s, one woman air race winner commented that "if a woman can handle it ... 'the public thinks it must be duck soup for men'" (qtd. in Corn 75). Eventually, women ended up working themselves out of a job; by the 1940s, women in aviation were most commonly stewardesses, providing nurturing, caring, and reassurance ("typical" female roles) to passengers while the men flew the airplane from the cockpit (Corn 87-89).

Meanwhile, the U.S. Army was struggling to both embrace the possibilities of military aviation, while simultaneously controlling aviation's popular and wayward prophets. U.S. Army pilots completed the first non-stop cross-country flight in 1923, and people all along the route of flight listened intently for the sound of the engines or a glimpse of the historic machines, while a great throng gathered in San Diego to excitedly welcome the heroic pilots, referred to as "prophets of a dream" (qtd. in Corn 14).

Of all the U.S. Army aviation prophets of this era,¹⁴ Billy Mitchell is probably the most famous and is generally considered the progenitor of the separate U.S. Air Force. A flamboyant figure, with custom-tailored uniforms, gold-headed swagger sticks, and a penchant for drama, during World War I he was either worshipped or at the very least admired by the other pilots (Perret 5-6). In the interwar period his "true flair for public-relations work," demonstrated in the quick distribution of newsreels across the nation of his aerial bombardment of battleships including the *Ostfriesland*, increased his heroic and prophetic stature (Franklin 94). While his post-war public agitating for a separate air force resulted in his 1925 court martial, nonetheless he won—in a move toward independence, the U.S. Army Air Corps was created in 1926 with "better prospects than the former Air Service had ever enjoyed" (Perret 13).

The U.S. Army was recognizing the almost magical force of aviation—on Memorial Day 1931, a twenty-one mile aerial procession overflew Washington DC, amazing spectators with the beauty and novelty of flight that "elevated the spirit as it thrilled the eye" (Perret 14). Geoffrey Perret's book Winged Victory acknowledges the religious theme of aviation—references to acolytes, shrines, worship, creed, sacredness, prophets and more are sprinkled liberally throughout his mainstream history of aviation in World War II. Being "air minded" was "almost the same as being American" in the new air age of the late 1930s, and "ever since World War I airmen had counted on a flattering press to keep them in business" and the Army's airmen continued to take full advantage (Perret 57).

¹⁴ There are usually considered to be three primary prophets of aviation during the 1920s and 1930s: Billy Mitchell, Hugh Trenchard with the Royal Air Corps, and Guilio Douhet of the Italian military (Builder, *Icarus Syndrome* 44).

The Air Corps Tactical School (ACTS), originally created in 1920 as the Field Officer's School, played a crucial prophetic role in developing key doctrine and establishing organizational roles and subcultures. In particular, the ACTS extended some of the lessons learned from World War I by focusing on the role of aircraft dedicated to bombing efforts. In one example, German zeppelins, and late in the war Gotha airplanes, had made bombing runs against the Londoners (Builder, *Masks of War* 30, 46-47), and the lessons learned by the British were captured and embedded in the nascent airpower doctrine. While the bombing campaigns were limited in scope and utility, they terrorized the citizenry and foreshadowed the change from preeminence of the fighter heroes of WWI to the bomber crews of WWII. The ACTS brought together a number of key airpower apostles who were able to shape doctrine and dogma in preparation for the continuation of the Great War—World War II.

World War II

The airpower apostles implemented their doctrine, embodied in the Air War Plans Division, Plan 1 (AWPD-1), during World War II. Using one of the major lessons to come from the Great War—the need for bombing doctrine (McFarland, *America's* 25)—the airmen sidestepped the established bureaucracy in order to develop their plan independent of the Army, and their resulting product was incorporated into the War Department's overarching Victory Program (Perret 49-52).

The airpower theories of ACTS were influenced by the teachings of Giulio Douhet, an Italian airpower theorist who published *Il dominio dell'aria* (The Command of the Air) in 1921 based on the lessons learned from World War I. Douhet believed that airpower heralded a new era in warfare in which control of the skies meant victory, due to the ability to inflict horrible damage upon the enemy's civilian populations with the intent of forcing a self-preservation instinct among those civilians to end support for the war.¹⁵ In what is a common technological utopianism theme, he believed that the new technology—the airplane—would make future wars shorter and more humane;¹⁶ the decisive blows deep at the heart of the enemy would quickly decide the outcome (Wohl, *The Spectacle* 216). Billy Mitchell was an advocate of this strategy and during the interwar period had used his fame to press for not just for the ethical absolution of city bombing strategies, but also argued that an air force—a separate Service—could win wars all by itself using such tactics (Franklin 95-96; Spaatz 12).

The “supreme spectacle” during WWII occurred in the heavens over Japan and Europe as the sky, filled with the men who flew the aircraft, came into its own as a significant military battlefield. Cities were engulfed in “raging storms of flame” as the bombers delivered their deadly cargo in pitched aerial battles (Wohl, *The Spectacle* 4). As one observer noted, new technologies like the airplane and radio “brought peoples closer together physically but had had the effect of increasing their moral distance and diminishing their mutual sympathy ... the conclusion [was] that the more people came to know their neighbors, the less they liked them” (qtd. in Wohl, *The Spectacle* 213).

Beginning on Valentine's Day 1942, the British fully implemented Douhet's theories, sending hundreds—up to 1,000 bombers at a time—against German cities, abandoning precision bombing of military targets in favor of civilian cities, to put “their cities to the torch with incendiary bombs” (Wohl, *The Spectacle* 245). President Franklin D. Roosevelt was also a believer in strategic bombing, ordering

¹⁵ Note that AWPD-1 did not include the bombing of civilians as legitimate targets (Meilinger 28); however, as the war dragged on eventually the Douhetian strategy of city bombing was adopted.

¹⁶ As will be discussed in chapter five, the Gatling gun was intended to make wars shorter and more humane. This was also said of nuclear weapons and other technological developments—as Corn notes, technological utopianism seems to be a trend of American imagination, with technological saviors always at hand (xi).

the production of 500 heavy bombers per month even before the United States had entered the war (Wohl, *The Spectacle* 250). Perret states that “mass production ... was the key to the magic kingdom of the skies” (38), and no one was better than America; between the bombings and the mobilization of the industrial base, by April 1944 Germany’s western front had only 300 fighters to oppose 12,000 Allied aircraft (Meilinger 43).¹⁷

Mitchell, along with others during the interwar period, had pressed to overcome the “technological and moral constraints” limiting the effectiveness of aerial bombardment, and after huge Allied losses in men and machines, the U.S. lifted the constraints against bombing of civilians in order to save American lives (Franklin 87, 106-107). The lessons of WWI—the importance of offensive action by aircraft, and the demoralizing effect of city bombing—were never explicit axioms, but lurked behind doctrine all throughout WWII (Builder, *Icarus Syndrome* 47). By the time Germany was defeated, there were few ethical questions about the “frenzy” to firebomb Japanese cities (Franklin 107).

General Curtis E. LeMay was particularly interested in firebombing the Japanese homeland, given that the houses were made of flammable materials, fire departments not particularly capable, and fires easy to start via area bombing (Nalty, Shiner and Watson 293-295). Additionally, there seemed to be little concern for the moral aspects of bombing the Japanese civilians; whether because of the alien Asian culture, Japanese atrocities during the war, retaliation for Pearl Harbor, or simply numbing from the extended fight against the Axis, the decision to use incendiaries dropped by B-29 bombers was readily made (Nalty, Shiner and Watson 295-296).¹⁸

Wohl notes that a chief difference is that unlike the plethora of fighter aces of WWI, there were very few “bomber aces” from WWII—the bomber crew, obscured from view by the shell of the aircraft, tended to be more faceless and nameless and seemingly less heroic (*The Spectacle* 263-275). He goes on to speculate that perhaps the real reason was that the bomber crews were not engaging the enemy in one-on-one combat so much as delivering explosives or incendiaries to cities full of civilians (Wohl, *The Spectacle* 266).

This lack of individual heroes coupled with the mechanistic meat grinder of WWII contributed to the diminishing of the aviation religion; by the 1950s, the fanatical technological utopianism had waned as the “seductive prophecies of the winged gospel ... proved beyond the capacity of mere machines”

¹⁷ The industrialization of war is one of McNeill’s “twin processes that constitute a distinctive hallmark of the twentieth century,” with the other process being the politicization of economics (294).

¹⁸ Desperation often seems to change the ethical calculations—such as the adoption of mines and torpedoes by the Confederates during the Civil War (Roland 256), the use of machine guns by world powers during WWI, and civilian bombing during WWII.

(Corn x). In many ways, humanity coping with the exhaustion and release from war developed a more rational approach to the airplane; it was more of an “ambivalent agent in human affairs” or perhaps “even a menace” (Corn 65).

By the end of World War II, the doctrine of massive aerial bombardment and mass slaughter of civilian populations was considered morally legitimate and necessary for the greater good.¹⁹ Douhet’s belief that “a man who is fighting a life-and-death fight... has the right to use any means to keep his life” was now the way of war and had become the doctrine of choice (qtd. in Wohl, *The Spectacle* 215). The ending of WWII with the unleashing of the nuclear genie foreshadowed the Cold War to come and the cultural and institutional responses to the nuclear age.

¹⁹ However, the debate still continued to some degree or other. For example, see “The Morality of Obliteration Bombing” (Ford).

The Cold War Era

World War II changed many things, including re-shaping the winged gospel into a more militaristic religion. In the December 17, 1949 ceremonies at Kitty Hawk hundreds of airplanes participated—but every one belonged to the U.S. military, reflecting the loss of the idealistic spirit previously associated with aviation (Corn 67). As Corn describes the ceremonies of that day, they were much different from the religious rituals of the interwar era; instead, the impressive displays of aerial power were “somewhat terrifying”—an emotion that could not now be dissociated from airplanes (Corn 68-69). Even more telling, those December 17, 1949 events took place shortly after the Soviet Union detonated its first nuclear weapon, heralding the true beginning of the Cold War and undermining any prophecy of peace, global democracy, transcendent social reform, or end of war. The United States became polarized into a fight against the “evil” Soviet Union yet certain of a triumphant outcome for the side of good (Tilford 21).

The post-WWII United States Strategic Bombing Survey concluded that the bombings had failed to halt German war production or break the back of the populace—partially because only one-third to one-half of the bombs dropped hit the right city (Kaplan 71); however, in the rush to détente with the Soviets, strategic bombing was the plan of choice for going “toe to toe with the Russkies” (Pickens). The efficacy of the strategic bombing air power theory was “accepted as validated beyond question because of the atomic bomb,” (Builder, *Icarus Syndrome* 133) and despite a great deal of debate, by 1947 both the Protestant and Catholic churches in America had essentially blessed the use of nuclear weapons, thus giving a “blank check to the militarists” (Boyer 229).²⁰

Congress created the U.S. Air Force on September 18, 1947 out of the U.S. Army, establishing an independent military Service dedicated solely to aviation. Many felt that this action was long overdue; General Jimmy Doolittle believed the reason the U.S. waited until after WWII was that before then “we had to talk about air power in terms of promise and prophecy instead of in terms of demonstration and experience” (qtd. in Futrell, *Ideas Vol 1* 75). World War II demonstrated the utility of a separate air arm, and the Cold War solidified the independence and utility of the U.S. Air Force; President Eisenhower believed that “air power could provide cheap defense against the public’s worst nightmares” (Builder, *Icarus Syndrome* 149).

The dominance of the Air Force bomber community—over the fighter and airlift communities—continued unchallenged from WWII until near the end of Vietnam. The formative years during World

²⁰ National Security Council Report 68 (NSC 68) codified the need for atomic superiority and requisite command of the air to deter the USSR (May 57).

War II produced a great deal of cohesion among the fighter pilots, as well as a very strong affiliation—a “marriage of man and machine”—between the pilots and their technological steeds (Worden 10). Colonel Mike Worden argued that the fighter pilots tended to experience less anxiety and tension than the bomber crews due to the different type of sorties and missions flown (12), a contributing experience to the crystallization of the subcultures following WWII. The bomber elites—epitomized by General LeMay²¹—used their power and position to keep tactical (fighter) airpower marginalized, and essentially ignored the role and value of fighters, instead concentrating all their energies on nuclear war strategies and massive bombardment (Builder, *Icarus Syndrome* 139-141).

The bombers maintained a psychological dissociation from the effects of the napalm and high explosives, becoming an “icon of power, speed, beauty, cooperation, and technological ritual,” but over the course of time continued to lose glory among Americans (Franklin 118-119). The Air Force leaders pursued faster, more powerful bombers, such as the B-70, a triple-sonic aircraft nicknamed “the Savior” by the commander of the Strategic Air Command (Builder, *Icarus Syndrome* 151).²² Builder finds it significant that the post-World War II Air Force was not interested in ballistic missile technology but instead saw its future “in manned jet aircraft carrying the atomic bomb” (Builder, *Icarus Syndrome* 33)—less about fighting a war and more about man and machine.

The Air Force future also included guided missiles and space satellites—mostly to keep other Services from infringing on the Air Force’s sky-turf—and eventually during the 1960s and 1970s they more or less became part of the institution. However, the high priests of the Air Force gave these alternative roles and missions short shrift because leadership was more closely tied to airplanes instead of airpower (Builder, *Icarus Syndrome* 34-35). Builder argues that the disparate means to what should have been the unifying end—airpower—caused any sense of mission, purpose, or noble cause within the Air Force to evaporate, resulting in a cultural crisis (Builder, *Icarus Syndrome* 35-36).

Another minority subculture getting short shrift was the women in the Air Force, who fared poorly during the Cold War era. The total number of positions authorized for women had fallen to 4,700 by 1965, with reductions occurring even in those career fields and specialties in which women had served during World War II (Boyne, *Beyond* 238). The situation turned around starting in late 1965 with the assignment of then-Colonel Jeanne Holm as the Director, Women in the Air Force. Over time,

²¹ The “omnipresent” General LeMay built the Strategic Air Command, and was the vice chief of staff for four years prior to his selection as the Air Force chief of staff in 1961 (Worden 61). As the chief of staff, he cemented the dominance of the bomber community (Worden 89).

²² It was so named because it would “save” the bombers from obsolescence by the ballistic missile.

women were able to enter almost all non-combat positions, and the previously all-male monastery of flight school finally opened to women in 1975 (Boyne, *Beyond* 238).

During the course of the Cold War, the atomic bomb came to define the identity of America—“the great golem we have made against our enemies is our culture, our bomb culture—its logic, its faith, its vision” (qtd. in Kaplan 1). Within the Air Force, the Research and Development (RAND) Corporation fostered a culture of “rational analysis”—the idea that a managerial focus would solve the problems of doomsday (Kaplan 4).²³ These “thermonuclear Jesuits” along with the “members of their congregation” created assumptions and insight “worshipped as gospel truth” and mythical dogma of the path of peace through Armageddon (Kaplan 11). Bruce Franklin declares that the American cultural forces “leading toward a religion of the superweapon found their appropriate icons and rituals in the airplane” (91).

The Air Force created RAND partially because “the military had only the vaguest of ideas about how to use [new technological] inventions; thinking about new problems was not an integral feature of the military profession” (Kaplan 52). One of the purposes of RAND was to provide a civilian think-tank of academic and other professionals, especially experts in systems and operational analysis, to help the high priests develop strategy. The relationship revealed the Air Force cultural bias for supreme technological totems;²⁴ for example, when RAND analyst Ed Paxson presented a study identifying a cheap turboprop as the best bomber for a strategic campaign against Russia, the “Air Force officers, almost of all whom were pilots, hated the study. They didn’t care about systems analysis. They liked to fly airplanes. They wanted a bomber that could go highest, farthest, fastest. And that obviously meant some sort of turbojet model” (Kaplan 89).

Builder describes the Air Force’s love of technology as a catechism: “if the Air Force is to have a future of expanding horizons, it will come only from understanding, nurturing, and applying technology” (Builder, *Icarus Syndrome* 155). He notes that it is a “circle of faith” requiring the Air Force to foster technology, so that the “inexhaustible fountain of technology” can ensure the future of the Air Force (Builder, *Icarus Syndrome* 155-156). In 1959 during a statement to a House of Representatives committee, General White stated that the Air Force will “always want to see technology move faster because we realize that it is from the area of new developments that our lifeblood stems” (qtd. in Futrell, *Ideas Vol 2* 193). Worden called technology in the Air Force both an “instigator and a messiah” for the airpower advocate, supporting the idea that “technological zeal would make doctrinal dreams seem real” (36). The worship of technology exacts a price—the continual lust for new and superior

²³ See Jardini for more information on RAND’s systems analysis and its effect on the Great Society.

²⁴ The word “totem” used here in its religious sense as technological artifacts are considered sacred by the Air Force religion (see chapter three). For more insight on totemism, see [Totemism](#) (Levi-Strauss).

technologies tends to cause disruption within airpower doctrinal concepts, and it is often difficult for the Air Force to accept radical teachings (Builder, Icarus Syndrome 161-162).

During Vietnam, General William Westmoreland, the commander of the Military Assistance Command Vietnam (MACV), “believed that Vietnam was primarily a ground war and that the purpose of airpower was to support the ground effort” (Meilinger 77). Additionally, it was during Vietnam that the military in general, and Air Force in particular, became enamored with statistics and tallies rather than operational success resulting in war by “managerial effectiveness” rather than end state (Tilford 116-118). While B-52s and the bombers played a significant role in Vietnam, it was the fighters performing the close air support role for the Army—aircraft assisting ground troops during engagements—that changed the dynamics of the Air Force subcultures. This shift of emphasis from bombers to fighters brought a sea change to the Air Force as suddenly tactical aviation pursued its own interests and developed separate doctrine and strategies for the application of airpower. During a five year period from 1973 to 1982, this new relevance of fighters to warfare eventually allowed the “fighter mafia” to rise to dominate Air Force leadership (Worden ch. 8), especially with the gradual reduction of Cold War tensions. The fighter community took charge of the Air Force in 1982 with the ascension of General Charles A. Gabriel to the top position in the institution: Chief of Staff of the Air Force.

The Cold War environment—of nuclear drills, duck-and-cover, and the drone of bombers on continual alert ready to bring about the end of civilization, squelched airmindedness in the broader American society. As Corn notes, many youngsters and some of their elders still found aviation fascinating, but the magic and sense of promise linked the airplane had largely faded (Corn 132-133). By about 1950, the trinity of chief tenets of the winged gospel had lost most of their credibility: airplanes would not bring peace, aviation did not foster freedom and equality, and the ubiquity of “an airplane in every garage” was far from realized (Corn 136-137).

By the 1950s, the dream of “personal wings” and a sublime aviation-centered future had faded, and no longer resonated throughout American culture (Corn 110).²⁵ The winged gospel lost its appeal in the broader culture, but continued to find a supportive subculture in the newly created United States Air Force. The Air Force became the extant manifestation of the winged gospel, and encoded a military religion upon its culture resulting in the Air Force religion. In America, the airplane was no longer worshipped as a virtual god—except by the Air Force at the altar of technology (Builder, Icarus Syndrome 155).

²⁵ Note that Americans tend to have great affection for “spectacular technology,” as argued in American Technological Sublime (Nye xiii).

After the Fall of the Wall

Many military analysts considered Gulf War I to be the harbinger of a Revolution in Military Affairs (RMA), an event marked by “new information gathering, precision guidance, and air-defence suppression techniques” among other high-technology capabilities promising to revolutionized war (Biddle, Land 104-107).²⁶ Some argue that the RMA will, if anything, increase the importance of employment strategies and provide an advantage to those who emphasize the “canon of orthodox modern tactics and doctrine” (Biddle, Land 110). The first six weeks of the war consisted of the air offensive which established the conditions for a land war unprecedented in speed and low casualties—“one of the single most crushing military defeats in the history of warfare”—and established air power as necessary, and in some cases sufficient, for winning wars (Hoyt 21, 23).

The Air Force came into its own during Gulf War I—“air power had come of age” as Carl Builder describes the triumphs of the Air Force (10). The Air Force was at the pinnacle of its history during Gulf War I—a team exploiting technology and people to maximum effect. Many of the lessons of Vietnam, such as the need to minimize the role of “Washington planners” and to maintain a continuous high operations tempo, remained learned and provided the Air Force with a chance at redemption (Tilford 200). As a caveat on those successes, while the Iraqi army was considered the fourth largest in the world based strictly on numbers, various analysts have noted that the Iraqi army was a “paper desert lion” (Tilford 195) with poor training, little useful doctrine, and too heavy a reliance on unmotivated conscripts with marginal military skills (Biddle, Victory 176).²⁷

Despite the successes of Gulf War I, by the mid-1990s, institutionally the Air Force lost focus and a sense of careerism and opportunism came to the fore (Builder, Icarus Syndrome xiv-xviii). Several organizational re-shuffles coupled with a focus on allegiance to a subculture (fighter, bomber, transport) resulted in a loss of the overarching vision for airpower and a subsequent “airline” mentality rather than a warrior focus. Boyne captures the post-Gulf War I issues: the “pell-mell process of downsizing and reorganizing to a degree unprecedented for a victorious force” (313).

In Builder’s 1994 RAND study he declared that the Air Force “can best prepare for an uncertain future by attending to institutional fundamentals—to our sense of identity and purpose” (Builder, Icarus Syndrome xi). His assessment was that the aviator’s “real affection was for their airplanes and not the

²⁶ Hoyt describes the RMA as being about technological leaps in the means of destruction, the means of delivery, and the means of control (23). He also notes that the “revolution” took eighty years to accomplish due to the slow maturation of doctrine and crucial supporting technologies (25).

²⁷ Werrell calls Iraq “an incompetent enemy” and states that the war was fought under “essentially ideal diplomatic, political, military, and geographic conditions” making it more of an anomaly than confirmation of a true revolution in military affairs (3).

concept of air power” (Builder, *Icarus Syndrome* 32), and in his conclusions he encouraged the Air Force leadership to re-focus the organization on its core purpose, redefine the meaning of modern air power, and inspire a commitment to higher purposes (Builder, *Icarus Syndrome* ch. 24).

In the 1990s, the Air Force participated in a number of significant combat operations including the 1995 Operation Deliberate Force in the former Yugoslavia to end a civil war, and the 1999 Operation Allied Force in Kosovo to prevent ethnic cleansing. Consisting of 11 days of NATO strikes, Deliberate Force was intended to deter civil war by limiting Serbian freedom of maneuver and logistics capabilities (Lambeth, *Transformation* 173-174). The use of airpower was not to win a war, but rather achieve a desired outcome; that is, an end to the conflict and the effort is generally considered successful.

Allied Force was an “oddly sterile, even strange war” as the NATO alliance used air power exclusively, and with only a single aircraft loss—a U.S. F-117 (Rip and Hasik 381-382). The U.S. relied heavily on precision, high-technology weaponry and complicated rules of engagement (ROE) to prosecute the limited objectives—and despite “a lack of tactical success,” managed to achieve the desired end state (Rip and Hasik 382). Die-hard air power advocates claimed the Kosovo campaign was the first example in history of a ground army beaten completely via air power (Rip and Hasik 417), although the complicated web of political motives and actions make that an overly-simplistic explanation.²⁸

In October 2001, the U.S. launched Operation Enduring Freedom (OEF) and invaded Afghanistan to rout the Taliban—with air power once again kicking off the effort and being a strategic part of the Joint team. The subsequent 2003 invasion of Iraq, known officially as Operation Iraqi Freedom (OIF) but more colloquially as Gulf War II,²⁹ also relied heavily on air power to prepare the battlespace and set the conditions for success in the ground war. As the years have passed in Iraq, the transport community and other support functions (such as space, security forces, etc) have been the primary day-to-day Air Force contribution to on-going operations, rather than the Combat Air Forces, setting the conditions for a shift in what it means to be a Warrior-Airmen.

Not only is the meaning of gender roles changing within the functional composition of the Air Force, but attitudes toward women in the organization have been changing as well. During Desert Shield, women were allowed into the combat zone—the first large-scale deployment to include women

²⁸ Note that not everyone in the Air Force thought it was an unquestioned victory; the then-Chief of Staff of the Air Force, General Fogleman, stated that he felt “the application of air power was flawed” (qtd. in Lambeth, *Transformation* 224).

²⁹ An excellent area for further study would be the parallels between World War I and its continuation via World War II, and likewise the continuation of Gulf War I via Gulf War II.

in U.S. history—and by 1996, women comprised 16 percent of the Air Force, and 99% of the career fields were open to women (Boyne, *Beyond* 239). The restriction against women in combat aircraft was lifted in 1993, with Jeannie Flynn becoming the first woman pilot assigned to an operational fighter, the F-15E (Boyne, *Beyond* 239).

Colonel (retired) Thomas X. Hammes notes that the revolution in military affairs as articulated in “Joint Vision 2010,” “Joint Vision 2020,” and other strategic documents underscores how technology is the primary driver of change, and “increased technical capabilities of command and control [is the] key factor shaping future war” (6). But Hammes is critical of too much technology as well, arguing against too strong a focus on the technology at the expense of the individual; he says that “the first and by far most important shift we must make is to stop emphasizing technology and start focusing on people” (232). The Air Force has remolded itself a number of times, and is presently undergoing a tighter integration with the other Services as the continuing road toward “jointness”—the ability of the different Services to operate smoothly as a team—becomes interdependence. As the Air Force strives to maximize revolutionary possibilities for warfare, while simultaneously tries to adapt to the exigencies of the current operations, it is likely that process-dominated and knowledge-intensive operations will characterize the emerging security concerns of the future (Hoyt 29).

America at large finds the Air Force an admired organization, and those men and women who fly are highly respected. The vision of personal wings “resonates with long-held American values. It taps into our embrace of individualism, privacy, and love of nature,” although Corn admits that the public at large is nowadays relatively indifferent to those old aviation prophecies of transcendence and democracy (140-141).

The Modern U.S. Air Force

Often, the prophecies of the modern Air Force fall short. Corn wrote that through at least 1916, the prophecies comprising the “creed of the winged gospel... tended to promise something beyond the capacity of mere machines to deliver, something unattainable and utopian” but usually god-like and omnipotent (42). The recent cut of 40,000 manpower positions to fund the ultra-totem known as the F-22, the promises of omniscience offered by satellite technologies, and the belief in airpower to dominate future conflict are all flawed catechism. Nonetheless, the Air Force “faith rests on theory and technology” and in particular a strong reverence for that technology (Builder, *Masks of War* 104-105), with solid overtones from the early twentieth century winged gospel’s airmindedness.

Air Force Organizational Structure

Even organizationally, the Air Force has ties to the mythology of flying. An Air Force “Wing” is the large field organization roughly synonymous with an Air Force Base; perhaps it is called a Wing because “the natural function of the wing is to soar upwards and carry that which is heavy up to the place where dwells the race of gods” (qtd. in Wohl, *A Passion* i). In military parlance, the “unit” has long been considered the basic building block of military forces. Consulting Joint Publication 1-02 (JP 1-02), “Department of Defense Dictionary of Military and Associated Terms,” the Department-wide³⁰ definition of “unit” is:

1. Any military element whose structure is prescribed by competent authority, such as a table of organization and equipment; specifically, part of an organization.
2. An organization title of a subdivision of a group in a task force. ... Headquarters and support functions without wartime missions are not considered units. (Joint Chiefs of Staff [JCS], JP 1-02 566)

Some units are quite small, consisting of perhaps a dozen individuals, while other units may have hundreds of members. In addition, smaller units can be aggregated into larger organizations that are still considered “units,” such as the Air Force’s Operations Group that consists of between 300-750 personnel grouped into subordinate units. Formal designation as an official unit requires published orders establishing the organization,³¹ along with a manning document and the issuance of a unit identification code (UIC) and, for Air Force units, a personnel accounting symbol (PAS) code.³²

³⁰ Naturally, any references to “Department” means the “Department of Defense.”

³¹ In the Air Force, these are known as “G-Series orders” (DAF, AFI 38-101 65).

³² A unique code for tracking the unit manpower.

The lowest level formal unit in the Air Force is the “numbered flight”³³ (Department of the Air Force [DAF], AFI 38-101 12), which usually consists of 50 or fewer manpower positions, or “billets.”³⁴ The basic unit of the Air Force is the squadron, which can consist of hundreds of manpower billets, usually not to exceed 700 (DAF, AFI 38-101 12). There are other types of formal units, such as field operating agencies, direct reporting units, and Centers, but these are usually support entities rather than warfighting organizations.

Squadrons and flights are assigned to Groups, which are technically “establishments”—organization entities consisting of a headquarters unit and subordinate units (DAF, AFI 38-101 8). Lower level establishments are then assigned to higher level establishments, such as Wings. Establishments are considered “units” up to the major commander (MAJCOM) level, and when referring to such as a unit the reference includes the subordinate units as well as the HQ element (DAF, AFI 38-101 8). Typical operational Wings consist of four Groups—Operations, Maintenance, Mission Support, and Medical,³⁵ plus the Wing headquarters element. See Figure 1 for a representational structure (partial schematic) of the typical³⁶ Air Force standard Wing (DAF, AFI 38-101 19):

³³ Note that there are also “alpha” and “functional” flights, which are usually administratively organized elements of a formal unit (such as a squadron). Only “numbered” flights are true units (DAF, AFI 38-101 58).

³⁴ A unit may not be fully manned; so while there may be a specified number of positions, or “billets,” there may be fewer individuals in fact assigned to the organization.

³⁵ Although the Medical Group is usually not part of the Wing’s core mission, and the medical officers are not “line” officers and so unable to command a non-Medical Wing.

³⁶ The words “typically” and “generally” are used throughout this chapter—there are always exceptions to the rule.

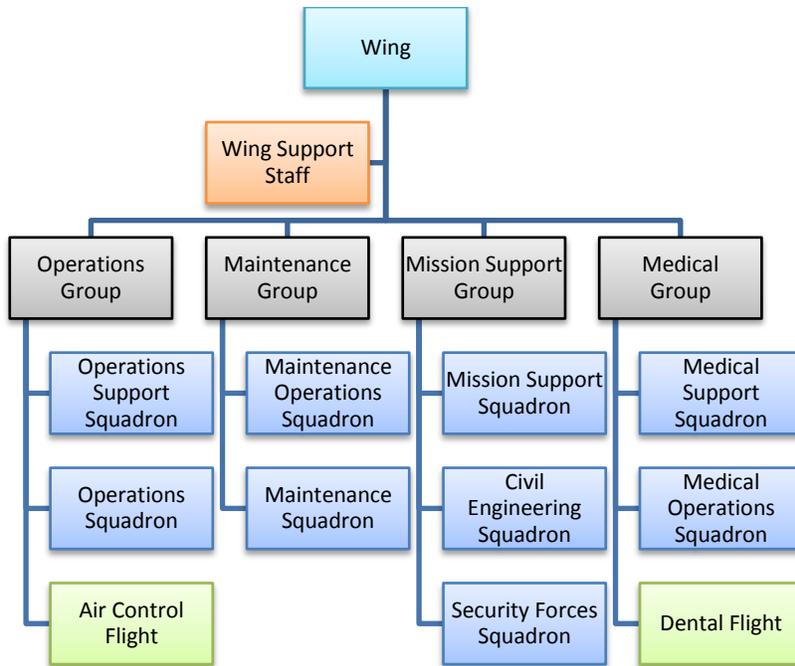


Figure 1 - Representational Wing Structure

In the Air Force, Wings are aggregated under a Numbered Air Force (NAF) establishment, and NAFs are then assigned to a Major Command (MAJCOM), such as the Air Mobility Command (AMC). The MAJCOMs report to the Headquarters, United States Air Force (HQ USAF) which is composed of the Secretariat—the Secretary of the Air Force (SAF) and his or her staff—and the Air Staff—the support staff which works for the Chief of Staff of the Air Force, or CSAF (DAF, AFI 38-101 10). The Air Staff is the organization that sets the policy and provides guidance for the entire Air Force, to include the air Reserve Component, which consists of the Air Force Reserve Command (AFRC)³⁷ and the Air National Guard (ANG).

See Figure 2 for a representation of the Air Force organizational structure (DAF, AFI 38-101 10-12):

³⁷ Organizationally, AFRC functions as a MAJCOM, while the National Guard Bureau’s Air Directorate staff is a field operating agency (FOA) of the Air Staff. A minor detail for the sake of clarity.

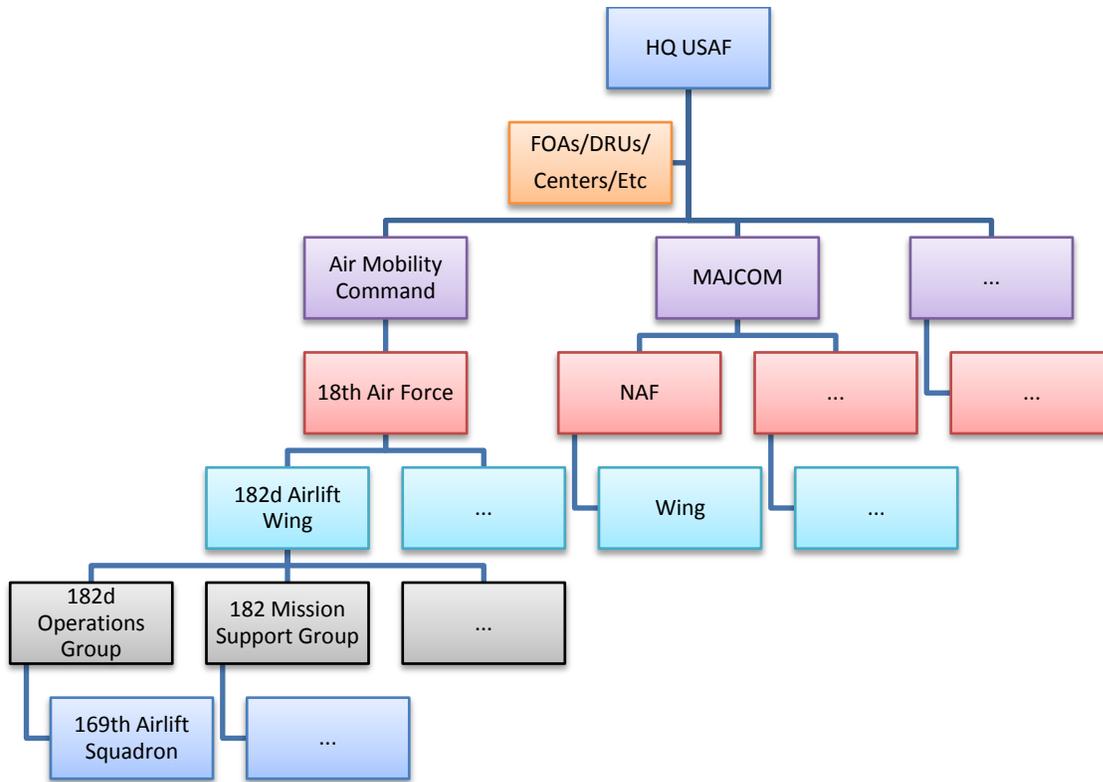


Figure 2 - Representational Air Force Structure

Air Force C-130 Community³⁸

The Air Force’s C-130 community figures prominently in the chapters on the Advanced Airlift Tactics Training Center (AATTC) and the Air Mobility Warfare Center (AMWC), warranting a brief bit of specific background information on that community. The C-130s are part of the transport (also known as mobility) subculture of the Air Force, which is part of the Mobility Air Forces (MAF) construct of the Air Force in recognition of the subculture and unique contribution.³⁹ Likewise, there is a Combat Air Forces (CAF) consisting of the fighters, bombers, and rescue assets, and a Special Operations Forces (SOF) construct consisting of the special-purpose assets such as MC-130 Talons, AC-130 Spooky gunships, CV-22 tilt-wing Osprey, and others.

The loss of tactical preeminence within the airlift C-130⁴⁰ community began with the shuffling between major commands, and the differences in the command philosophies regarding tactics. With

³⁸ Disclaimer: the author is a C-130 navigator in the Air National Guard (a component of the U.S. Air Force).

³⁹ The MAF consists of all Air Mobility Command (AMC) assets, and those assets of the Pacific Air Force (PACAF), United States Air Forces Europe (USAFE), and Air Force Reserve Command (AFRC) for which AMC is the lead command (e.g., Cargo (C-x—such as the C-130), Tanker (KC-x—such as the KC-135), and similar airframes).

⁴⁰ “Airlift C-130s” meaning those intended primarily for cargo and passenger transport, not the special-purpose variants such as the rescue HC-130s and so on.

the first delivery in 1956, C-130s were assigned to the Tactical Air Command (TAC), the major command of the “combat” forces, with the intent of ensuring the theater tactical-level airlift was properly trained and able to operate in the same vicinity as the fighter assets. However, on December 1, 1974 the airlift C-130s were transferred to the Military Airlift Command,⁴¹ which traced its roots back to the Military Air Transportation Service (activated in 1948, shortly after the creation of the separate U.S. Air Force).

There was a distinct lack of enthusiasm for tactical skills on the part of the Military Airlift Command (MAC) during the late 1970s and 1980s. Still clinging to its roots as more of a strategic cargo and personnel delivery service than a warfighting entity, the pendulum swung toward the airline mentality and the focus became on-time takeoffs and precise paperwork, with little stress on wartime survivability and tactics. Some crewmembers referred to their jobs as “truck drivers,” delivering the stuff where it needed to go without getting into the whole warfighting business.

Initially, the bulk of the airlift C-130 fleet remained within the Air Mobility Command when it supplanted MAC upon its activation on June 1, 1992. However, as then-Air Force Chief of Staff General Merrill A. McPeak⁴² tweaked the alignment of forces, the airlift C-130s were moved to the Air Combat Command (ACC)⁴³ on October 1, 1993. After four years in ACC, the airlift C-130s were moved back to AMC where they are still presently assigned (Air Force Link).

Historically, the Air Force has relegated transport assets to second-class status due to a lack of “real” warfighting capability as compared to the daring fighter pilots—in 1941 Arnold and Eaker noted the requirements for transport as “not unlike the civil air transport” (14). In a “feminine” support role,⁴⁴ the genderization of the transport aircraft has long created a schism between the aviation subcultures within the Air Force, and as the current operations are relying more on transport and ground support forces than ever in the history of the Air Force, a cultural shift is occurring within the institution. The figure below captures the C-130 Command timeline (Air Force Link):

⁴¹ MAC was activated on January 1, 1966, and eventually became part of the Air Mobility Command in 1992.

⁴² General McPeak was the Air Force Chief of Staff from October 1990 to November 1994.

⁴³ ACC was activated on June 1, 1992 along with AMC. ACC received the assets from the deactivated Tactical Air Command (TAC) along with the bomber and missile units of the deactivated Strategic Air Command (SAC).

⁴⁴ See chapter four for further exploration of this concept.

Command and C-130 Timeline

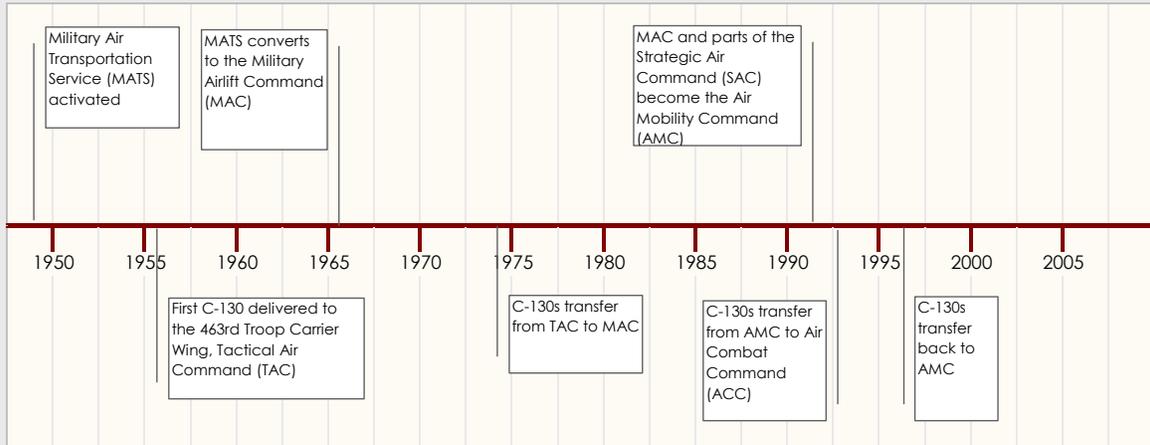


Figure 3 - Command and C-130 Timeline

A Brief History of Joint

The Air Force does not operate in isolation, but is part of a joint team consisting of the military Services, each using their core specialty to maximum advantage. The requirement for “jointness” in the U.S. military was embodied in the 1986 Goldwater-Nichols Act (GNA), legislation intended to force the military Services toward a more joint environment. I will briefly describe the history and implications of “joint” as applies to the Air Force, so the reader can better understand the current strategic thinking for jointness in the U.S. military as impacts the AF culture.

The Goldwater-Nichols Act

There were a number of stumbling blocks for a joint U.S. military in the era prior to the Goldwater-Nichols Act. According to James R. Locher III, a professional staff member on the Senate Armed Services Committee during the period leading up to the GNA, the four Services were considered to have “excessive power and influence...which had precluded the integration of their separate capabilities for effective joint warfighting” (10). Dr. Kim R. Holmes, a policy expert who wrote a pre-GNA paper on defense reorganization, says there was “no firm institutional basis for making ‘joint’ or all-service decisions” (6). This led to a state of constant infighting as each Service vied for resources against the others. Even worse, according to General Colin L. Powell, the Joint Staff could only reach agreement with the Service chiefs on advice to civilian leadership by “pumping out ponderous, least-common-denominator documents” (qtd. in Locher 12).

Operationally, the U.S. military did not excel during the long period from Vietnam through Grenada. While there were many contributory causes for the disconnects and failures, many were tied directly to a lack of jointness between the different Services. Congress wanted to have a more unified military, and the intent of the Act was to promote “jointness at the expense of the authorities of the Military Services” (Center for Strategic and International Studies [CSIS] 14). According to a report from the Center for Strategic and International Studies (CSIS), the GNA was intended to “accelerate jointness within the U.S. armed forces by fundamentally redesigning the manner in which they were organized, trained, commanded and employed” (CSIS 14).

Among other things, one of the most immediate results from the GNA was the better alignment of the Joint Chiefs and the combatant commanders (COCOMs) to ensure they had the authorities they needed to provide quality military advice and execute the responsibilities they were assigned. Another explicit objective was to achieve a more efficient use of defense resources by promoting joint

perspectives in requirements and acquisition processes by outlining the creation of entities such as the Joint Requirements Oversight Council (JROC) (CSIS 16).

However, it was not an overnight transformation. During the period leading up to enactment of the GNA, then-Secretary of Defense Caspar Weinberger was very hostile to the reforms contained in the act, and even after the passage of the GNA appears to have ignored the legislation as much as possible (Blechman, Durch and Graham 35-36). Admiral William J. Crowe, Jr., the Chairman of the Joint Chiefs during the period the reforms took place, is quoted as saying it was a difficult time and one had to tread carefully to prevent the Service chiefs from “circling the wagons” and engaging in a destructive insider’s campaign (qtd. in Blechman, Durch and Graham 36).

Ten Year Retrospective

By 1996, the Goldwater-Nichols Act was widely considered as very successful. Ms. Katherine Boo, a long-time public policy correspondent, in her article for the Washington Monthly said the GNA “helped ensure that [Gulf War I] had less interservice infighting, less deadly bureaucracy, fewer needless casualties, and more military cohesion than any major operation in decades” (1). She goes on to note the “minimum of memos and meetings” which contributed to the focused unity of command efforts in prosecuting the war.

The Institute for National Strategic Studies (INSS) held a Ten Year Retrospective Symposium on the GNA, resulting in over 400 attendees and a book documenting the key speakers and presentations. Interestingly enough, most of the speakers at least touched on the need for additional integration within the Department of Defense, and many described their recommendations in depth (Quinn 19, 33, 52, 71).

At this symposium, General John M. Shalikashvili presented a report on the successes of the GNA, and broke the GNA down into 11 areas and assigned grades to the Services’ progress in those areas—although his scorecard seems a bit enthusiastic with four As, six Bs and only one C (71). Shalikashvili had recently published Joint Vision 2010 (JV2010)—“the alpha, not the omega” (72)—a joint-level document designed to integrate the Services’ separate visions into a cohesive warfighting framework, which he called “our bridge to the next level of jointness” (72). However, this same document was heavily influenced by Shalikashvili’s lead, General Wesley K. Clark, who according to a key action officer working on JV2010 had “clear ideas...where he [Clark] wanted to go. He was very clear that it essentially would be an extension of the Army’s vision, Force 21, with emphasis on people,” hardly demonstrating a true joint perspective (National Defense University [NDU] 12). In a similar vein, Allan English, a Canadian military officer who wrote a text on military culture, declared:

This [focus on operational level of war with land warfare being the key to victory] led to the U.S. Army's quest, supported in some aspects by the USMC, for the predominance of its vision of joint warfare. The vision was accepted by the US Joint Chiefs of Staff and enunciated in 1996 in "Joint Vision 2010." The idea that a "joint" vision might not be a unifying concept or that there could be different ideas of what "joint" warfare should be in practice can be difficult to grasp... (English 119)

Colonel (retired) T.X. Hammes, a 30-year veteran of the Marine Corps, isn't enamored with JV2010 either, writing that it basically outlines how increased command and control capabilities are the key factors for future operations but fails to do more than paint technology as the primary driver of change (Hammes 6).⁴⁵

And there were still disconnects during Gulf War I, despite it being touted as a new era in jointness. In a 2003 "Newshour with Jim Lehrer" transcript, Vice Admiral Timothy Keating recalls how during Gulf War I the air tasking order (ATO) had to be delivered "like a newspaper" with someone physically picking up the printout and flying it to the Navy ships so the naval aviators could do their mission planning (Online NewsHour). Years after the GNA, the crucial mechanism for dissemination of the all-important air war plan was still not integrated across the Services despite large headquarter staffs tasked and authorized to promote "joint."

Twenty Years Later

As the "Beyond Goldwater-Nichols" report notes "outdated organizational structures remain a problem... [to include] the continuing imbalances in the tooth-to-tail ratio" (CSIS 19). Less headquarters bureaucracy "bogged down in protracted coordination processes" would allow for more operational personnel to actually get the mission done and prevent excessive attention to details (CSIS 19)—a phrase that brings to mind the concept of the infamous Pentagon PowerPoint Rangers.⁴⁶

While JV2010 and its follow-on JV2020 are good conceptual vehicles for focusing the Joint and Service headquarters staff, trickle-down implementation to the operator level has been either minimal or on such a slow timeline as to be ineffectual. For example, in 2004 Marine units in Iraq could not order something as simple as chemical light sticks through the Army supply system, strategic-level information systems did not communicate with each other, and Army regulations allowed ammunition

⁴⁵ Note that Hammes is likewise critical of Joint Vision 2020 as it does not foster thinking about fighting and winning wars irrespective of technology (8).

⁴⁶ Staff officers who, due to the nature of their jobs, become expert with Microsoft PowerPoint are often derisively referred to as "PowerPoint Rangers."

dumps much closer to aircraft operations than Air Force regulations stipulated. The underlying problem is the lack of an organizational process to remedy these problems, so the Marines “acquire” the light sticks they need, Airmen fat-finger information from one information technology (IT) system into another, and everyone hopes for the best with the ammo dumps.

A recent Service Chief,⁴⁷ speaking at the National Defense University (NDU) to students at the Industrial College of the Armed Forces and the National War College, described the road toward jointness as deconfliction, integration, and now interdependence. He described the first step as simply deconflicting operations, to reduce fratricide and eliminate redundancy in operations. The next step was integration, demonstrated in Gulf War I, in which there was central planning of the overall

campaign and the unit tasked to accomplish a particular objective could be from any of the four Services capable of accomplishing the mission.⁴⁸ Today, with the small size of the Services and fiscal restrictions, he argued the new era of jointness is the recognition of each Service’s dependence on working as an integral team to accomplish the national objectives. Figure 4 attempts to capture this concept graphically.

A 2004 journal article extended this idea of interdependence, postulating three types of interdependence: pooled, sequential, and reciprocal (Paparone and Crupi 39). The authors declare that reciprocal interdependence is

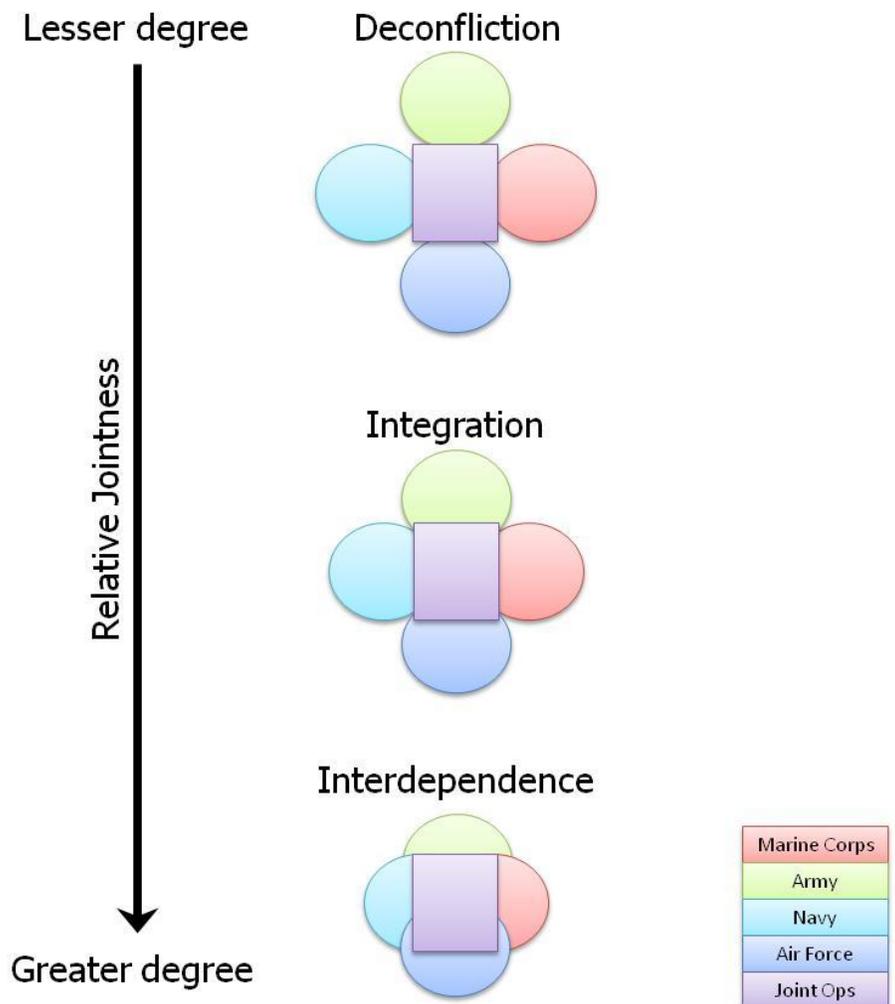


Figure 4 - Relative Jointness

⁴⁷ Name and Service withheld due to NDU’s non-attribution policy.

⁴⁸ E.g., one would not task the Air Force to perform a submarine mission.

the true goal, but that it requires “trust and reliability as mainstay values” in addition to further education and development for future leaders for the highest level of integrated, reciprocal interdependence (Paparone and Crupi 41).

These definitions provide a way to indicate the degree of jointness through establishment of metrics to focus the implementation of a reciprocal interdependence level of jointness. For example, interdependence can be understood to be an ability to readily communicate with units or between IT systems from different Services; to have full situational awareness of where all friendly units are located in the battlespace and be able to interact with any of them; to operate as easily from another Services’ installation as your own Services’ installation; and so on. It would be possible to set up some key performance parameters and objectives to quantify and qualify what it means to be joint, and how far along each Service is in the quest for full implementation of the GNA and jointness.

While more of the higher headquarters functions and some of the requirement and acquisition processes are now better integrated, and the naval aviators can finally get direct online connectivity to the ATO, at the tactical warfighter level there is still much to be done in pursuit of truly joint operations, even after 20 years of Congressional direction. Interdependence will require more than just sharing ATOs, but will mean redefining how the Services work together.

Conclusion: To Slip the Surly Bonds

This chapter has briefly highlighted the transcendence of aviation, especially in the early 20th century, and illuminated the strong ties such discourse still has within the Air Force. The goal was to ensure the intertwined themes of aviation and religion were unquestionably established in order to set the stage for the rest of the dissertation.

The intent was to briefly craft *a* history of aviation and the Air Force, providing enough detail to give the reader a basis for situating the case studies within the wider sociopolitical milieu,⁴⁹ as well as tying together some of the themes of religion, culture, and technology previous described. Even the tragic events of September 11, 2001 tend to reaffirm the omnipotence of aviation, and the role of aircraft as the giver and taker of life.

As Wohl notes, it is sometimes difficult to grasp the fervor and veneration invoked by aviation, especially to the modern person who sees aircraft as a banal way to get somewhere else faster (The Spectacle 2). Rickenbacker, the famed WWI ace, summarized the feelings of the true believers in his preface to a friend's 1949 book on aviation by claiming that pilots "have always felt inwardly that what they were doing was all part of some mysterious Universal Plan [and that they] were just chosen pawns of the Creator" (qtd. in Corn 26). To the true believers—those intimately tied with the Air Force who identify strongly with the religion of air power—the Air Force is still about the majesty and mastery of the heavens.

⁴⁹ One of the aspects of the social construction of technology (SCOT) framework, discussed in the chapter on science and technology studies (STS).

Chapter 3

U.S. Air Force as Religion: An Exploration of Culture

"...and like religions they inspired fanatical enthusiasm, implacable hatred, generous sacrifice, ferocious brutality, hope of redemption, and campaigns of annihilation."

*-Emilio Gentile
(xxiii)*

The United States Air Force is the youngest military Service of the United States, just recently celebrating its 60th anniversary of independent existence. With ties to the United States Army reaching back past the dawn of human heavier-than-air flight, the U.S. Air Force has venerated traditions, hallowed rituals, sacred myths, and holy doctrine. The Air Force culture also has a strong respect for the well-established hierarchy, a deeply instilled reverence for senior members, a bureaucracy famous for resistance to change, and beliefs about salvation from very real mortal danger.

All of these are characteristics of religions, as described by Durkheim, Weber, Gentile, and others. I will use these characteristics to describe a model of "military religion"⁵⁰ with particular focus on the U.S. Air Force, using the notion of a "civil religion" as my overarching template (Gentile). By using

⁵⁰ This chapter does not intend to address, nor imply addressing, any metaphysical questions. The use of the term "religion" does not mean to impute any significant theological meaning other than to provoke discussion with the examination of parallels between religious and military sociological phenomenon.

this template, it is then possible to examine in a new light the Air Force's organizational resistance to change, approach to technology and technological change, integration with other military Services, and systemic cultural issues.

The military—and the Air Force in particular—represents a unique cultural group, in which the members subsume their personal identity, enter into binding contracts requiring explicit obedience even in dire circumstances, and consecrate even their lives to the organization. To ignore the explicit and tacit religious nature of the organization is to overlook a great deal of what it means to be a part of the organization, and an understanding of how the organization truly functions. This chapter will start by describing military culture, and then identifying the essential characteristics of a military religion. Using various artifacts of the Air Force culture, I will show how the Air Force maps onto the military religion model and demonstrate the validity of the model. The chapter will conclude by touching on some additional insights, such as Air Force religious demographics as compared to the other Services and America as a whole.

Military Culture

Culture is a slippery term, one that often everyone “knows” but has trouble defining well or consistently—as evidenced by the claim that as many as 250 definitions exist today (English 15). Some argue that the manner in which militaries fight is “more a function of their culture than their doctrine” highlighting the supremacy of culture in military organizations (Johnston 30, 35-36). However, military cultures do change over time, sometimes by choice and sometimes not, and so I will touch on the varying impetus for change, with an eye toward technology’s relationship to such change.

Edgar Schein, from the Sloan School of Management at MIT, defines culture as “*a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems*” [emphasis in original] (17). The basic, underlying assumptions are unwritten and invisible, taken for granted by the people of the organization and/or society; examples are relationship to environment and the nature of human activity/relationships. At the next level up are the espoused beliefs and values, those socially validated philosophies of the organization that lead members of the group to behave in certain ways. Lastly, there are the artifacts, the visible creations, art, technology and visible/audible behavior patterns of the members of the group; examples are dress codes, language, traditions such as rites and ceremonies, and legends and anecdotes (Schein ch. 2).

Focusing this description on military cultures it is critical to grasp the motivations and perceptions of the individuals who constitute the larger institution, which also helps understand their collective reactions to technology and change. Culture within the organizational behavior discipline is generally described as the collection of values, attitudes, and beliefs that provide people with a common way of interpreting events. A more relevant definition for my purposes would be the motivations, aspirations, norms, and rules of conduct of an organization (English 15, 5).

Dr. James Burk, chair of the Sociology Department at Texas A&M, correlates this latter definition to the military world with his notion of four central elements of the military culture: 1) discipline, 2) professional ethos, 3) ceremonial displays and etiquette, and 4) cohesion and esprit de corps (448). This taxonomy provides a good method for breaking out the primary components of military culture into manageable pieces for review, and these categories are used later in this chapter.⁵¹ Related to these four central elements are other issues directly driven by, or which are direct drivers of, culture such as the role of technology and organizational flexibility.

⁵¹ Note that these four categories are fairly similar to Hinde’s six elements of religions (12).

“Technology is not about tools, it deals with how Man works” is a quote from an older text by Peter F. Drucker, the business legend who contributed much strategic thinking about American business efforts in the 20th century (vii). The book is Technology, Management and Society, originally published in 1970 from papers and journal articles written in the years prior. Ahead of his time, Drucker grasped many of the concepts of postmodernists, deconstructionists and so on, and among Drucker’s contributions was a way of looking at technology within the context of culture. His underlying theme was that technology is really more about people, about making a person “effective,” than it is about the object or artifact itself (viii). He noted that technology must be considered as a system, a “collection of interrelated and intercommunicating units and activities,” and noted these activities may include humans as well as other objects or natural processes (53-54).

Applying some of Drucker’s broad concepts to a military paradigm, Allan English, a Canadian Forces military member who authored Understanding Military Culture, describes the interrelation between culture and technology by showing how military culture influences new technologies, which also in turn influence the military culture in a self-promulgating feedback loop (5). While not using the term “co-constructed” he describes it well, and via flexibility and coping strategies also provides indicators of an organization’s reaction to change. U.S. military organizations are evolving away from rigid “machine-like” cultures toward more flexible, professional cultures (English 39-40).

Organizational flexibility relates to the difference between adaptive and non-adaptive organizational behavior, which contributes to the overall responsiveness of the culture in connection with an organizations’ coping strategies. As described by English, adaptive cultures which help organizations adjust to environmental change generally have excellent performance, with leaders paying close attention to their constituencies and initiating change as required, while non-adaptive cultures have cautious leaders out to protect their own interests (30). He notes that the U.S. military culture exhibits some of the characteristics of a non-adaptive culture, which helps explain its tendency to resist change (8). Organizations with effective coping strategies tend to have strong systems of reference for its members in dealing with internal and external challenges (English 15). Poor coping strategies, coupled with a tendency toward non-adaptive behavior, result in an organization which resists change and instead attempts to deal with issues using tried and true methods, rather than alter the organizational culture and processes to create a new paradigm.

The current U.S. military culture is summarized by Admiral (retired) William A. Owens, former Vice Chairman of the Joint Chiefs of Staff who wrote that during the Cold War “military innovation was evolutionary, predictable, controllable and steady”—and that that was just as military institutions prefer

(205-206). Owens also referred to case studies that have indicated “big changes in military capabilities took place when new weapons or other military equipment had been accompanied by shifts in tactics, doctrine, and organization” (208). The big changes in capabilities only takes place when the human elements—tactics, doctrine and organization—are flexible and adaptable and are able to change to meet the new environment.

The relationship between the headquarters elements and the “operational,” or field, components of the organization strongly influences the organization’s ability to change, especially in military cultures. The dichotomy between large, distant organizational headquarters functions that oversee funding and policy, and the field units actually performing the operations and achieving the goals of the organization, is often contentious. English cites William F. Bell, a lieutenant colonel in the U.S. Army, who suggests that policies can create a gap between an organization’s stated and espoused values and its actual or operational values (28). Bell argues that these unavoidable schisms have negative effects on organizational culture due to unintended second and third order consequences, but these consequences can be minimized by introducing feedback mechanisms to track the implementation of policies (qtd. in English 29).

How a culture relates to and interacts with other, outside cultures is also an important piece of the puzzle. Communication failures tend to exacerbate institutional cultural gaps, and Schein in his text Organizational Culture and Leadership argued that many communications failures or teamwork problems are really breakdowns of intercultural communications (9-10, 114). Elaborating on this concept, English posits “achieving organizational integration requires understanding subcultures and designing intergroup processes to allow communication and collaboration across sometimes strong subcultural boundaries” (17). Within this context, a crucial requirement for U.S. joint military operations revolves around an understanding and appreciation of the unique cultures of each of the Services—and within each Service, an understanding across the different subcultures of the value each brings to the mission of that Service. Rather than technology or even doctrine it is the culture of the different Services that determines whether joint interdependence will flourish.

Socialization is the key to cultural communication in an organization (English 23) and is likewise important for understanding how one culture interacts with outside cultures. Socialization is part of an on-going, implicit “teaching” process between old members and new ones, and so messages passed to newcomers need careful assessment to ensure they meet the overall goals of the organization. For example, the Air Force leadership is often perceived as favoring technology over people, such as

testimony to Congress that favors the technological over the human.⁵² The 2006 downsizing of 40,000 positions, as announced by General T. Michael Moseley, Chief of Staff of the Air Force from 2005-2008, was to use “people” to pay for modernization of weapon systems. Conversely, the great military innovations of history are not marked by technology, but by human developments and cultural artifacts.

This Air Force predisposition to technology affects attitudes across the board. As an example, Steven Biddle, a professor at the U.S. Army War College, produced a model of Gulf War I that, in an unusual move, incorporated both technology and human factors in reviewing the conflict. He attributes the low Coalition casualties not primarily to overwhelming technological superiority, but rather a combination of technological superiority and a very low skill level on the part of the Iraqi forces (140). Biddle further claims that protecting modernization at the expense of training and readiness places too much emphasis on technology and not enough on the role of skill in using the technology on the battlefield (174).

However, the Air Force also tends to favor quantitative processes and physical artifacts that can be counted, measured, and easily categorized. This tendency produces a preference for technology, which can be readily demonstrated, touched, and measured, and for which there is a history of performance and systems of measure and feedback. Meanwhile the human element, in many ways representing inverse qualities from technology, has some but not all of these characteristics. The number of Airmen is easily quantifiable, but a particular individual’s contribution to mission success or innovative talents may be less tangible and therefore a harder problem to solve—and hard problems are usually avoided in favor of those readily useable in performance evaluations. Biddle observed that more than thirty years have been spent developing a better understanding of the technical performance of weapons, but very little time or effort spent understanding the skills of the operators (178-179).

Certainly, the U.S. Air Force has a high dependence on advanced technology and systems and highly skilled personnel operating and maintaining such with a high degree of autonomy. An analyst of the U.S. defense entity describes the U.S. Air Force as worshipping at the “altar of technology” having been born from the “miracles of technology” which gave humanity the gift of flight (Builder, *Masks of*

⁵² As one example, the “Posture Statement of the U.S. Air Force” as briefed to the House Armed Services Committee on February 27, 2003. The Posture Statement commented on the establishment of a new Headquarters Air Force (HQ USAF) directorate, Warfighting Integration (AF/XI), whose mission was to bring together “the operational experience and the technical expertise of diverse elements (C4ISR, systems integration, modeling and simulation, and enterprise architecture specialties)” (Roche 42). In highlighting early successes of the new directorate, the Posture Statement gives examples of assisting funding efforts and a modernization initiative, but nothing highlighting people-based activities.

War 19). William J. Durch, a senior associate, and Pamela L. Reed, a senior research assistant, both at the Henry L. Stimson Center, sum it up as follows:

Technology is still the Air Force's guiding light: instead of nuclear weapons, precision guidance; instead of aircraft over targets, aircraft launching standoff weapons. But despite the march of technology, those aircraft will have pilots, because the pilot "strapping on an aircraft" is the essence of the Air Force. (Blechman, Durch and Graham 125)

This section has captured the key concepts associated with military culture—discipline, ethos, ceremonies, and cohesion—with an eye toward the Air Force in particular. For the Air Force, these concepts are based on or have their roots in the underlying religious metaphor, requiring an understanding of the religious nature of the Air Force in order to understand the organizational behavior. With this in broad cultural information in mind, it is time to develop the model of a military religion.

Military Religion

Religion involves “feeling, thinking, acting, and relating” along with transcendence⁵³ (Hinde 11) and in this section, my goal is to deconstruct “religion” down into core elements as relevant to my purpose in defining a “military religion.” The approach of this chapter is one of an “internal” focus, recognizing that the Air Force has a number of outside influences⁵⁴ over which it has very little control, such as policy from the legislative branch. Therefore, the somewhat-fuzzy boundary for my model will be those factors internal to the organization and, more or less, the cultural workings of the Air Force itself.

Hinde provides six components associated with most religions: structural beliefs; narratives; rituals, prayer, and sacrifice; code of personal and group conduct; religious experience; and social aspects (12). My model blends Schein’s levels of culture, Burk’s military culture, and Hinde’s religion elements using some of the foundational studies of religion. With this perspective in mind, I will develop the underlying precepts, key doctrine, organizational roles, and cultural manifestations of a military religion.

Underlying Precepts

The underlying precepts in this context are those almost-unconscious principles that drive a religion. They are the foundational and universal building blocks, and are required for understanding and describing religious activities—in Schein’s cultural terminology, the “basic assumptions.” Durkheim puts it, “no one can engage in a religious ceremony of any importance without first submitting to a sort of initiation that introduces him gradually into the sacred world” (314)—I start the initiation to the concept of a military religion by considering the purpose and meaning of religion.

In 1912, Emile Durkheim performed a thorough analysis of “functional” religion and this is my starting point because he identifies elemental traits, characteristics, and meanings involving religious activities. His purpose was to “arrive at what is most elemental and fundamental in religious life” (303). His canonical study of primitive aborigines in Australia provides an epistemological framework for my model of military religion. Durkheim identifies three distinctive traits of humankind: reason, identity, and community, which are necessary and sufficient conditions for religious activities to occur (xx). He ties these traits together in describing the main object of religion: “first and foremost a system of ideas by means of which individuals imagine the society of which they are members and the obscure yet

⁵³ The transcendence for the Air Force religion involves the transcendence of flight, as related in the prior chapter.

⁵⁴ Think of “natural causation” issues beyond the understanding (and sometimes anticipation) of a Western religion.

intimate relations they have with it” (227). Emilio Gentile, a professor of political science at the University of Rome, developed a more expanded definition of religion:

Religion’s strength is to be found in its power to mold and transform the character of a human mass by inculcating shared feelings, interests, and ideas in the individuals that make it up. It thus produces a formidable power to generate enthusiasm and action and to channel individual and collective energies toward a single purpose, the triumph of their beliefs. (6)

Durkheim found the following underlying precepts central to all religions, and they are applicable to a military religion: effervescence, the sacred and profane, and negative and positive cults.

“Effervescence” is Durkheim’s term for essentially a collective consciousness, a moment when human beings find themselves transformed through the performance of rites, a transport of individuals beyond themselves. The participants feel an external force that causes them to feel grander and joined with each other (xli). Durkheim, of course, was very focused on totemism,⁵⁵ and so in these effervescent moments, the participants would also feel a strong kinship to the totemic being, a strong bond and sense of power associated with the totem, and usually the effects would remain after the effervescent experience through totemic symbols (xli). The effervescent transformation fades over time, requiring repetitive performance of the rites to rekindle the feelings (Durkheim xlii).

Max Weber’s seminal text on the sociology of religion provides interesting comparisons and contrasts to Durkheim’s work. While not as interested in the functional decomposition of religion into elemental parts, Weber nonetheless did touch on some of the same themes as Durkheim—for example, the equivalent to Durkheim’s effervescence was “ecstasy” or “orgiastic” experiences (3). Similarly, Gentile’s parallel to effervescence was that of an almost religious fervor which confers a transcendent virtue (5). Dr. James Aho cites something akin to effervescence as well, while describing “bliss” as one of the promises of religion, and using other terms such as “awestruck,” “mesmerized,” and “spellbinding experience” (4-5).

Another central precept is the dichotomy between the sacred and profane. Sacredness is an “extraordinary quality that ordinary objects acquire only within moral communities”—a “superadded” quality, but only real within a collective conscious (Durkheim xliii, 414). These objects—which can be physical artifacts of technology, natural objects or phenomenon, people, animals, ideas, etc—are set

⁵⁵ The aborigine tribes in Australia at the time of Durkheim’s research practiced totemism, which then drove the analysis in his text. Totemism is a specific relationship of an object, usually a natural object and in the purest manifestations of totemism an animal, with a particular social group. “In the fully developed type of totemism, the brotherliness of the group comprises all the fraternal responsibilities of an exogamous clan...these developments culminate in a series of quasi-cultic obligations following from the common, though not universal, belief that the group is descended from the totem animal” (M. Weber 39).

apart and forbidden, sacred items which require elaborated deference (Durkheim xlvi). He weaves this theme of the sacred and profane throughout his text, and it is elemental to descriptions of individuals interacting with their community. Weber acknowledges the sacred/profane divide, but with a slightly different spin: “The alteration of any practice which is somehow executed under the protection of supernatural forces may affect the interests of spirits and gods ... the sacred is uniquely unalterable” (M. Weber 9). There are degrees of sacredness and profaneness, which add to the complexity of the notion. Only the collective community can attribute a particular level of sacredness (or profaneness) to an object or person, and this assignment can always be changed by their collective will. Not only must the sacred and profane be kept separate, but also within each sphere the objects of a higher level must usually be kept apart from the more mundane.

A third key precept is the notion of intertwined positive and negative cults, or rites. The purpose of rites is to separate the sacred and profane by establishing a “discontinuity” between them through one’s actions (Durkheim 303). Weber describes this as a “religious ethic,” which is the prescriptive and proscriptive rules of behavior (sets of customary practices whether on rational grounds or otherwise) for adherents to a religion (ch. 3). When successful, the rites (or practices) keep the domains separate and act as a means of control over the faithful.

The set of abstinences or “negative acts” is the system of practices which Durkheim terms “negative cult.” They are “negative” because rather than describe obligations that must be carried out, they instead are prohibitions⁵⁶ (Durkheim 303-304). Failure to respect the prohibitions of the negative cult results in punishment, or at the very least blame and public disapproval, because of the state of “sin”⁵⁷ engendered by the transgression. Weber’s description of the “rationalization of taboos” essentially emulates Durkheim’s negative cult, along with the requirement to sanction malefactors to prevent evil from overtaking the group (39). After all, the purpose of the prohibitions is to enforce respect for the sacred object, and if continued blatant disrespect were allowed, the belief structure of the community would be at risk.⁵⁸

The primary prohibition is that of contact, the intent of which is to prevent the sacred from touching the profane. This can take the form of physical contact, the consumption of certain foods,

⁵⁶ Durkheim allows as how the term “taboo” is equivalent but seems to shy away from that word (304). In contrast, Weber tended to embrace the use of the word “taboo” (xxxi).

⁵⁷ Durkheim never clearly defines this term, and uses it sparingly. However, he appears to use it to mean a “ritual lapse,” which affects the moral existence of the community because it undermines the collective beliefs (411-412). For comparison, Weber defines sin as “any infraction of the [religious] ethic” (44).

⁵⁸ The notion of peer pressure—for both positive and negative behaviors—appears well ingrained in the human psyche.

speech, eavesdropping on sacred conversations or rituals, and the like (Durkheim 306-310). It is noteworthy that the negative cult causes some form of suffering,⁵⁹ with pain as its necessary condition (Durkheim 317). However, these sufferings are absolutely essential, and without them “there is no religion” (Durkheim 320). In this manner, the negative cult prepares the way for the societal communing associated with the positive cult.

The positive cult (or rites) tends to be feasts, observances, celebrations, and ceremonies, in which assembled groups perform rituals to share their faith, reinforce representations,⁶⁰ and recreate the moral being on which society depends (Durkheim 350-353). The positive cult is about bringing the community together, reducing the importance of the individual, and renewing collective associations. There are a number of specific categories of rites associated with the positive cult, but the one most relevant to my discussion are the representative rites.

Representative rites are those engaged in remembering the past and making it “present” in the group’s mind, usually by means of a dramatic performance. The rite serves to maintain the vitality of beliefs and retention of the collective memory of past events (Durkheim 376-379). As Durkheim summarizes: “the glorious memories that are made to live again before their eyes, and with which they feel in accord, bring about a feeling of strength and confidence” (379).

Ultimately, religion makes us act and helps us live—it enables us to be capable of more: the believer “feels more strength to endure the trials of existence or to overcome them ... he believes he is delivered from evil—whatever the form in which he conceives of evil” (Durkheim 419). Good and evil are terms defined by more mature religions via doctrine, and the next level up in the model.

Key Doctrine

Once the foundation is established, the development of these precepts into a religion revolves around the development of religious doctrine—or “espoused values.” Once a religion has matured to a sufficient point, the conduct becomes less instinctual and more rationalized.⁶¹ The principles, code of conduct, myths, traditions, and rites become more formalized, usually in written, sacred texts. This doctrine then becomes the source of longevity of the belief system, and encourages intellectualism and debate among learned scholars and the laity. Weber weaves several doctrinal threads throughout The Sociology of Religion, and for my purposes, I will focus on three of them: soteriology, mystery, and theodicy.

⁵⁹ Durkheim notes that this can be physical or mental discomfort (320).

⁶⁰ Meaning, beliefs. Durkheim tended to use the terms interchangeably.

⁶¹ Weber discusses the rationalization of religious concepts as a theme through his text.

Soteriology is the theory and ideas concerning salvation, both in the here and now and also often in the next life or lives to come. “The first article of any faith is belief in salvation by faith” (Durkheim 419). Weber discusses the need for salvation as a key individual characteristic associated with the desire for personal legitimation (xlix). Tying soteriology in with religious ethic (the positive and negative cults), Weber defines “piety” as behavior acceptable to god, the goal of which is to bring the individual salvation, in particular the liberation from concrete ills (44). “One path to salvation leads through the purely ritual activities and ceremonies of cults, both within religious worship and in every day behavior” (M. Weber 151). Of course, the religious ethic conducive to a particular salvation may vary widely between religions. While some gods may favor pacifists or peacemakers, the gods of war may welcome into their paradise only those who have fallen in battle, or at least show preference to warriors (M. Weber 154). In any event, salvation in the present tense is very important to a military organization, which is facing tangible threats from the opposing forces.

Mystery⁶² is another constant theme throughout Weber’s analysis of religion. The mysteries of the faith, the unknown and unknowable, are one of the foundational elements of religious doctrine. Part of the concept of the doctrine of mystery is that few individuals will ever understand the intricacies of the religion, partly due to a need for divine revelation but also partly due to restrictions on sharing the key tenets of faith. Nearly all military success is shrouded in mystery, with the focus of most military texts on strategies to victory in an uncertain environment. It is perhaps a truism that there is no sure path to victory, but in a military situation failure is usually not an option—which drives the constant search for the mystery of success. In addition, one has to be indoctrinated and initiated properly into the religion in order to be trusted with or gain additional access to ever-more sacred information.⁶³ This concept of initiation rites, or rebirth, into the organization will be discussed further later in this chapter.

The final key doctrine is theodicy, the explanation of the rationale of good and evil, and an understanding of its relevance in and to one’s life. Theodicy is how one reconciles the idea of providence, which is often inconsonant with the injustice and imperfection of the existing social order (M. Weber 139). When properly developed, a viable theodicy allows for the legitimation of daily life and

⁶² There is a distinction between his discussion of “mystery religions” and “mystery” in general. The former revolves around those religions with little doctrine or orthodoxy, and which functioned in secret. The latter term is more about seeing “through a glass darkly,” that is, lacking full understanding of transcendental concepts (King James Bible 1 Corinthians 13:12)—and this is my intended meaning of this term.

⁶³ Note that the mysteries of classified information are also part of the sacred/profane divide (Gusterson 90). Also, see Nuclear Rites (Gusterson) for a study of life at a nuclear research facility, and the religious overtones associated with such work. It would be interesting to discover whether these religious overtones were generated by the nature of the work, or the close association with the military, or other causes or combinations thereof.

the events which occur. “Our everyday experience proves that there exists just such a psychological need for reassurance as to the legitimacy or deservedness of one’s happiness” (M. Weber 107). Weber touched on the particular problems of a military with believing in an impartial, wise, and kindly providence, highlighting a predisposition to predestinarianism (36). Theodicy becomes critically important for those engaged in combat, in order to justify and legitimate one’s actions (Aho 149). In modern times, most Western militaries have felt they were righting wrongs or defending their nation, and usually that “good” and “right” was on their side. This manifestation of theodicy, expected in Aho’s transcendent-historical war myth, enables the rationalization of civilian deaths, collateral damage, and other justifications for proportionality (or lack thereof).⁶⁴

Organizational Roles

These key doctrines, built upon the underlying precepts, then provide the framework for defining the organizational roles within the unique culture.⁶⁵ A set of standardized, recognized roles is characteristic of nearly all human societies, and establish boundaries between expected behaviors. The standard organizational roles for most Western religions, and for the model of a military religion, include priests, prophets, and laity. Here, I rely heavily on Weber’s descriptions of these roles, and use his taxonomy for to my military religion model.

Weber describes priests as those who oversee an organized, permanent, and stable cult,⁶⁶ are concerned with influencing the gods, and are responsible for the maintenance of order and the interpretation of doctrine, by which they develop a systematic and distinctively religious ethic (28-29). Within stable religious cults, congregations develop for which the priests are the central controlling figure. While the position of the priest becomes increasingly powerful as the congregation is enlarged, additional concerns about the laity also need to be addressed. One of the functions of a priesthood is to systematize the content of prophecy and sacred traditions by supplying the rationalistic framework of analysis and adapting them to the existing cultural framework of their laity (M. Weber 67).

While priests may engage in organizational change, they do so from an evolutionary standpoint—small, incremental changes, rather than sweeping, grandiose change. Priests represent and enforce the sacred norms, striving for consistent regulation and control of life, and generally have

⁶⁴ Proportionality is the concept of a relatively-equal response in kind. For instance, two individuals engaged in a sword fight both armed with swords is proportional; if one of those individuals pulled out a Bazooka, that would be a disproportional response.

⁶⁵ Organizational roles are an important part of a religious culture, but were not specifically identified as part of a generic culture in the earlier section.

⁶⁶ Weber defines “cult” as “the relationships of men to supernatural forces which take the forms of prayer, sacrifice and worship” (28). In this context, it is unassociated with “rites.”

rational training and discipline but not necessarily charisma, which instead tends to be a hallmark of prophets (M. Weber 22, 29). The tension—power struggle—between the priests and the prophets (who most often arise from within the laity) usually results in either the prophets achieving their mission or becoming martyrs (M. Weber 66).

A prophet is “above all the agent of the process of breakthrough to a higher, in the sense of more rationalized and systematized, cultural order.” The role of the prophet is “charismatic leadership...[of an] *individual* person who takes the responsibility for announcing a *break* in the established normative order and declaring this break to be morally *legitimate*, thereby setting himself in significant respects in explicit opposition to the established order” [emphasis in original] (M. Weber xxxiii-xxxiv). It is interesting to note that followers may be attracted to the person of the prophet, or to his (or her) doctrine; of greatest importance, however, is the prophet’s “personal call” to service, given that few prophets have emerged from the priestly class (M. Weber 46).

Prophets do not receive their mission from human agency or established structure, but rather seize their mission and then struggle against the bureaucracy (M. Weber 51). A key requirement for establishing authority for prophets is charismatic authentication, in order to validate their new doctrine and legitimate the challenge to established authority, especially important given that prophetic changes are usually revolutionary in nature.⁶⁷ The use of personal gifts, along with vital emotional preaching,⁶⁸ is necessary as the prophet seldom has any organizational power or authority within the existing order (M. Weber 47, 53). Finally, Weber postulates two primary kinds of true prophets: the ethical prophet, who is an instrument for the proclamation of a god and his will and demands obedience as an ethical duty; and the exemplar prophet, who by personal example demonstrates the path to salvation (55).

The laity, also referred to as the congregation, refers to those individuals who provide the supporting structure for the priests and prophets, and whose adherence to the doctrines gives the religion power. The three primary forces operating within the laity are prophecy, traditionalism, and lay intellectualism (M. Weber 65). From within the laity, as already mentioned, arise nearly all prophets, and so the seeds of prophecy and change are in the laity, not the priesthood. Regarding traditionalism, Weber felt that the laity resisted change and tended to prefer things remain as they had always been

⁶⁷ In organizational behavior parlance, prophets exercise primarily personal power, rather than structural or technical power.

⁶⁸ Fervor surely must be a requirement for successful prophecy—after all, one must believe in what one is selling to convince others.

(ch. 5).⁶⁹ In emphasizing the importance of the laity, Weber notes that “...lay intellectualism is involved in every complex soteriology which develops abstractions and opens up cosmic perspectives...” (129). So while the priests and prophets tend to be “great men” and are usually celebrated as individuals, the faceless, nameless laity legitimate and support the group artifacts which drive the resultant cultural practices.

Cultural Manifestations

The final component of the military religion model involves cultural manifestations based on the precepts, doctrines, and roles previously discussed—and are similar to the cultural “artifacts” described earlier. The foundational components culminate into a unique culture bearing the particular hallmarks of, in my case, the military, but with an “aura of sanctity” (Gentile xiii).

First, consider how Weber distinguishes between the religious community and the “sacralized polity”—the society in which the religious and secular aspects of the organization are not differentiated at the higher collective levels, resulting in no separation between church and state (xxxvii). Gentile also discussed this concept in detail; his entire book revolves around the idea of the sacralization of politics.⁷⁰ When a military is acting as a religion, there exists no separation between a “secular” and a “religious” sphere of influence, and the sacralized polity is fully realized. This translates to difficulty in separating the religious edicts from the “secular” political objectives—thus, to disagree with a high priest is to commit heresy, and to voice opposition is to not engage in debate, but rather question the meaning of the religion itself.

Interestingly enough, there is also a certain moral complexity associated with the military due to the nature of its express purpose: physical violence against other human beings. In particular, the issues of *rights* (to authorize collective violence) and *legitimation* (justification of the use of such power) become particularly important (M. Weber xxxix-xi). Aho narrows the concept of a military ethic down to three elements: acceptable motives for going to war, preferred attitude toward war, and approved ways of fighting (9). Between the moral complexity required by the society for the use of force and the military ethic governing its warriors, discipline and organizational ethics become critical to a military religion. Given that the U.S. military tends to the transcendent-historical war myth, which involves holy

⁶⁹ He never seemed to quite reconcile this with the notion of the prophets arising from the laity, however. Perhaps this desire for the status quo, coupled with indignities requiring change, creates a natural tension within the laity which does not exist in the priesthood. After all, the priesthood’s power comes from the status quo, while the laity’s power does not—thus the priesthood would not be as interested in change which might alter their power.

⁷⁰ Gentile notes how in many ways fascist and communist states originated the notion of political religion (xvii-xxiii). The military, in many ways, has elements of fascism/communism.

wars of God's wrath to provide justice in a conflict between good and evil⁷¹ (Aho 145-148), formalization of organizational ethics are especially critical for a military.

Weber characterizes groups which are very traditionalistic and those most heavily involved in secular responsibility are also the least likely to be swayed by prophecy.⁷² This group includes military-related institutions, and also bureaucracies, because these groups have a strong vested interest in maintaining the established order (M. Weber xxxix). As mentioned, the laity and the priesthood both tend to be resistant to change, and this characteristic is further exacerbated within a military religion—in part because the group's members have their personal self-respect tied in with their identification with the organization.

An individual's identification with the organization is an important attribute of a military, and particularly when viewed as a religious enterprise. From distinctive tattoo markings—a holdover from ancient clans demonstrating religious membership (M. Weber 71)—to velcroed patches, obvious rank insignia, and special badges, the warrior's congregation and their place within it is always visible⁷³ to fellow military members and outsiders as well. Hinde notes that "religious belief has nearly always been coupled with a degree of material sacrifice" (2) and the military religion is no different, with the rigorous training, personal discipline, and often low pay, and so the identification with the military religion sustains members during periods of sacrifice required by the organization.

The concept of heroism resonates throughout a military culture, and that same theme is yet another parallel with religious cultures. Weber discusses the notion of heroes throughout his text, often in a militaristic context, such as the following passage:

...heroism rests on a charisma which must be aroused, tested, and controlled in the hero by magical manipulations. In this way, therefore, the warrior is reborn into heroism. Charismatic education in this sense, with its novitiates, trials of strength, tortures, graduations of holiness and honor, initiation of youths, and preparation for battle is an almost universal institution of all societies which have experienced warfare. (68)

Heroic stories get their potency as a symbolic narrative, resonating with the fundamental myths of Western culture (Stahl, Campbell and Petry 56-57).⁷⁴ Many of these heroes arise from anonymity, and they often bring salvation to fellow Airmen, family members, and the nation at large. Frequently, this

⁷¹ And hence the concept of theodicy.

⁷² In my context, "prophecy" refers to challenges against the established doctrines; so, more or less, change.

⁷³ Some tattoos, such as the Jolly Green Giant tattoos of the Rescue helicopter pilots, are located on the buttocks so not usually visible, although readily demonstrated upon request.

⁷⁴ The hero myth consists of five central tropes and four required personal characteristics (Stahl, Campbell and Petry 56-59).

salvation comes at dear personal cost, resulting in enduring legends. Heroism is important because it not only provides a myth⁷⁵ to emulate for all members of the group, but it also promotes what is essentially a positive cult—the preparedness of an individual to engage in Herculean efforts for the good of the community. The myth of heroism tends to be shrouded in salvation stories as well, in describing a hero arising in times of oppression to give justice to his followers (M. Weber 139).

The vision of a hero arising from anonymity (and, like prophets, usually from among the laity) invokes the theme of rebirth. In describing initiation rites, Durkheim states “so complete is the metamorphosis that it is often portrayed as a second birth” (315). Weber shares this sentiment: “thus, only by acquiring a new soul through rebirth can the warrior achieve superhuman deeds of heroism” (155). This theme of rebirth, which is clearly part of the doctrine of mystery, is part and parcel of what it means to be a hero. It is also tightly coupled to military themes, and the “tear them down and build them up” approach at military basic training (initiation) schools. Educational institutions controlled by the religious leaders, in order to properly indoctrinate neophytes or to reinforce dogma to the laity at large, are a key part of the modern professional military. “A ritualistic religion may exert an ethical effect in another and indirect way, by requiring that participants be specially schooled” (M. Weber 154).

“Wherever an ascetic training of warriors involving the rebirth of a hero is or has been dominant, woman is regarded as lacking a higher heroic soul and is consequently assigned a secondary religious status. This obtains in most aristocratic or distinctive militaristic cultic communities” (M. Weber 105). A final cultural practice for consideration is that of gender issues—the military’s approach to women mirrors, in a broad sense, that of Western religion’s normative second-class status for “the weaker sex.” Women have almost always held secondary statuses in Western religion, and this is true for the U.S. military for most of its history as well. Interestingly, the approach to females in the military also translates to what it means to be a male in the military, so that the gender issues aren’t all about women but also about the men. One reason gender issues are important to the Air Force is to discover the assumptions which shape its inferences, in an effort to find and develop new ideas, both technologically- and process-oriented (Longino 225).

Summary: The Military Religion Model

Gentile notes that modern warfare can be “perceived as a violent experience of the sacred” which can then generate new religious beliefs toward secular objects (10). The military religion model builds on the notion of the sacred, and works upward through doctrine and organizational roles to,

⁷⁵ Myths are those stories and legends that, as Singer aptly put it, “if they aren’t true, they ought to be” (36).

finally, the manifestation of cultural practices. Figure 5 captures the model in a pyramidal building block format, to underscore how the components fit together and build on each other. Note how important the foundation is in developing and supporting the ultimate cultural manifestation—thus, the actions and motivations of individuals in the military religion originate at this level.

It is also significant that some components may be primarily “individual” functions, while others may be primarily “group” functions. So while an individual may experience effervescence as part of a group, those feelings are something internal to that individual and may not be commensurate to the effervescence of someone else (if indeed that other person shared in the experience).

Figure 6 attempts to capture my concept of how the various elements of the military religion model

map between the group and individual, relative to the venue (where or how the activities occur) and the resultant primary benefit. For example, plot #4 is soteriology, which primarily benefits the individual (because he or she will believe in a path to salvation and that will provide individual comfort or encouragement), and the venue is primarily individual as well, as whether one truly believes in the soteriology of a particular religion is an individual decision. Heroes, plot #12, are usually a benefit to the group, but that role is usually accomplished by an individual.⁷⁶

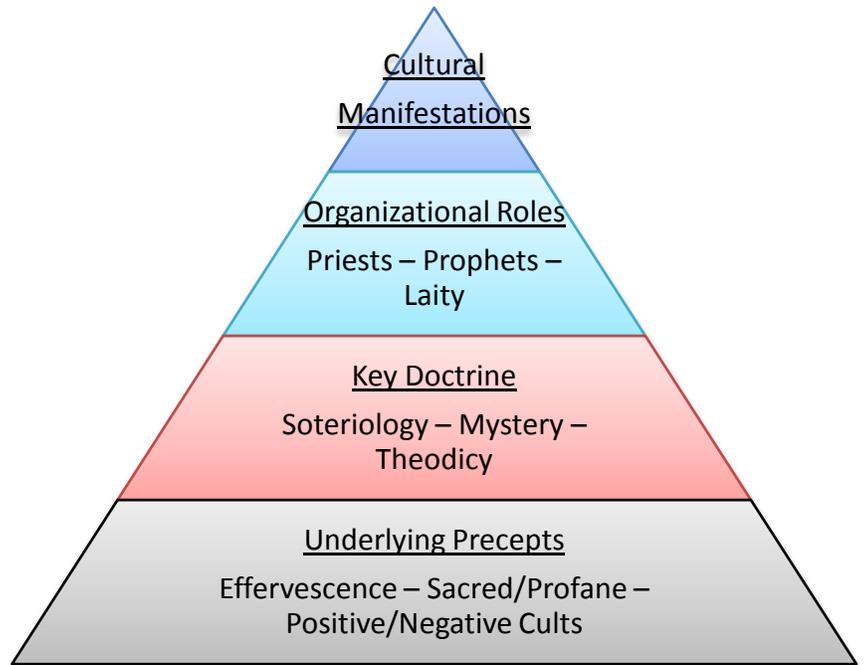


Figure 5 - Military Religion Model

⁷⁶ Using specifics, Medals of Honor are most often awarded posthumously and usually for heroic actions which saved the lives of a crew or other group.

Elements of Military Religion: Group vice Individual

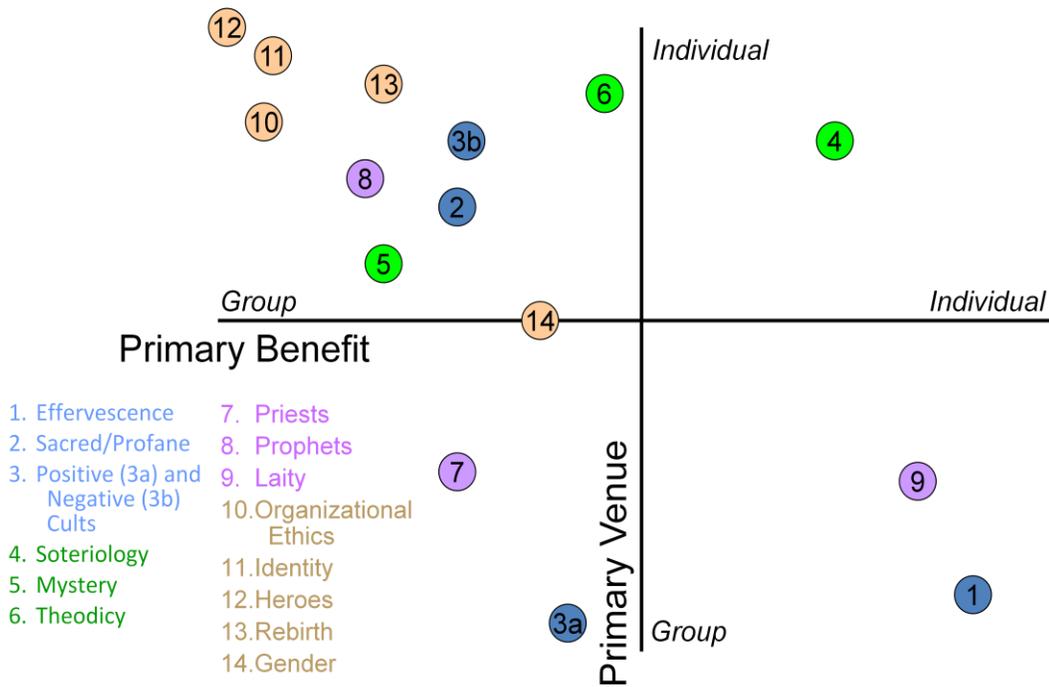


Figure 6 - Military Religion Model: Group vice Individual

While the mapping lacks objective rigor, the exercise of plotting the elements on this grid may be a worthy endeavor; it indicates that, for a military religion, it is primarily the individual actions which benefit the group. This kind of information may help senior Air Force leaders

determine the best way to encourage individual behavior that will benefit the group by leveraging the underlying AF religion to shape organizational expectations and goals.

A final note is that while some of these religious elements are present in other organizations and activities, the military is uniquely similar to religion in the key doctrinal concepts—and the member’s belief in the organization’s ability to provide salvation and resolve questions of theodicy. In particular, in time of war, it is a singularly unique characteristic of a military religion to offer the promise of salvation, in the present and possibly for the life or lives to come.

The Military Religion Model Applied to the U.S. Air Force

As Gentile describes civil and political religions, it must have a system of beliefs, values, myths, rituals, and symbols, along with “holy scriptures,” martyrs, temples, sermons, commemorative holidays, and even sacred history (xiii-xiv). In particular, a political religion subordinates the destiny of individuals and the collective to a supreme entity (Gentile xiv). The preceding section established the military religion model, and now I will demonstrate how the Air Force maps onto the model. The obvious place to start is at the beginning, so I begin by correlating the underlying precepts—effervescence, the sacred/profane dichotomy, and positive and negative cults—to the Air Force.

The Air Force and Underlying Precepts

“There can be no society that does not experience the need at regular intervals to maintain and strengthen the collective feelings and ideas that provide its coherence and its distinct individuality” (Durkheim 429). Within the Air Force, there are many activities intended to impart a sense of effervescence. Retreat, the lowering of the flag at the end of the day while playing the national anthem, is an important part of basic training. There are rules on which way to face, when to salute, and even rules concerning the duties of retreat (the actual lowering of the flag)—officers do not perform this duty, but rather it is the domain of non-commissioned personnel. Retreat marks the end of phases of training, and can be an emotional experience especially when coupled with a flyover by the holy totems (military aircraft). Even a casual reading of Magee’s “High Flight” poem leaves the reader with sense of the effervescence of flight—dancing, laughter, and tumbling mirth.

The notion of “devotion to duty” is a central tenet in the Air Force, exemplified in the core value of “Service before Self” as promulgated by the most high priests of the Air Force for years (e.g., Secretaries of the Air Force (Wynne)). In addition, most award citations, especially the higher, more restricted ones, list “devotion to duty” as a substantiating rationale for award approval. Durkheim understood this notion decades ago, writing that “there is virtually no instant of our lives in which a *certain rush of energy* fails to come to us from outside ourselves. In all kinds of acts that express the understanding, esteem, and affection of his neighbor, there is a lift that the man who *does his duty* feels, usually without being aware of it” [emphasis added] (213).

In the realm of sacred and profane, the Air Force clearly understands and implements this concept throughout the organizational culture. Aircraft are most sacred things and kept apart by security cordons and restricted area designation, with armed security forces to preserve their sacredness, while special access badges allow entry to holy individuals and vehicles. While some

military academies, such as the Army's West Point, put busts of famous military leaders at the central area of the campus, at the Air Force Academy the central area consists of static displays of aircraft (J. M. Smith 13). A limited number of highly coveted incentive flights are awarded to outstanding performers from across an Air Force base, an opportunity to participate in transcendent flight—to reach out a hand, and touch the face of God (Magee)⁷⁷ by virtue of the sacred aircraft.

Even toolboxes in avionics maintenance shops have a degree of sacredness. In order to ensure accountability for the tools,⁷⁸ foam sheets are cut out in the shape of each tool, so that a quick inventory will assure a complete set. There are distinct rituals associated with signing out and accounting for tools, with a check and counter-check procedure often used. This is an example of a sacred object of lesser degree being segregated and monitored when in close quarters with a higher degree sacred object.

Objects are not the only sacred items—high ranking officers assume a degree of sacredness as well. The base commander is a high priest, and given deferential priority and precedence over nearly every aspect of the organization. Low ranking members will literally jump out of his or her way, and when the commander enters a room, it is called to attention.⁷⁹ General officers usually have a coterie that follows them around, limiting access and filtering information, providing an aura of supreme importance and invincible authority.

In relation to the positive and negative cults, or rites, the Air Force is rife with examples. Positive cults, such as formal dining outs and ins⁸⁰ (and informal “combat” dining ins⁸¹), ceremonies ranging from change of command to base activations, family day celebrations,⁸² and other activities. There are a host representative rites, such as commemorating the flight of the Kitty Hawk, the “Heritage to Horizons” program by the Chief of Staff of the Air Force (CSAF),⁸³ and by the ritual of the prisoner of war/missing in action (POW/MIA) table which is always set at all dining events, formal and informal. The

⁷⁷ From the poem “High Flight,” by John Magee, Jr. It is the unofficial poem of the U.S. Air Force, is considered the pilot's creed, and first-year cadets at the U.S. Air Force Academy are required to recite it from memory.

⁷⁸ To prevent accidentally leaving a socket or wrench in an aircraft engine or compartment.

⁷⁹ There are exceptions, such as in workplaces where delicate electronics are repaired.

⁸⁰ A dining “in” means military members only. A dining “out” means civilian members may attend.

⁸¹ A combat dining in is usually set in a hangar and very informal. Duty uniforms (battle dress uniforms) are worn, water guns encouraged, and dinner rolls almost always served although seldom consumed (they make excellent “grenades” when soaked with water). Water balloons are common as well, and sometimes civil engineering units will bring a fire truck and slip the hose into the hangar for unstoppable “fire”-power. Note that the POW/MIA table is either protected by a tarp before engagement, is moved out of the combat zone, or is appropriately respected by combatants.

⁸² Usually, once a year the base is opened to family members, and a mini-air show and open house occurs.

⁸³ The program actively solicits retired senior enlisted and officer viewpoints and perspective (Weckerlein).

table is set at a place of honor at the front of the room, and a solemn ceremony acknowledges each Service's POW/MIAs. The wineglasses are filled with water, the plates usually remain empty (sometimes a piece of bread is left), and even during the water gun fights and food throwing of a combat dining in, the table remains untouched and sacred.

Negative cults are also ubiquitous throughout the Air Force culture. Broad but (hopefully) clear guidelines are often issued to members in printed form and shared by senior leaders in briefings and other venues. Deviations from established norms and standards, such as travel voucher fraud and theft, are usually dealt with quickly and publicly, reinforcing the notion that certain forms of behavior are not acceptable and will not be tolerated. Part of the responsibilities of senior non-commissioned officers (NCOs) is to enforce the respect for "customs and courtesies" among the junior enlisted ranks. For example, it is not "illegal"⁸⁴ for an Airman Basic⁸⁵ to fail to render a salute to an officer, but even if the officer does not take issue, any senior NCO observing such a breach will likely discuss the situation with the Airman.

The primary prohibition of contact is exemplified in multiple instances throughout the U.S. Air Force. As mentioned previously, the most sacred totems—the aircraft—are protected from the profane by a restricted area. Flight mission planning areas are also restricted, as are command posts and avionics maintenance areas, to protect the mysteries of classified information. In the old-school airdrop community,⁸⁶ the use of the word "green" is usually verboten when discussing flight planning. The navigator calls "green light" over the interplane communication system to direct the releasing of the load in-flight over the dropzone; therefore, to reduce inadvertent off-target drops, "emerald" or other euphemisms for "green" are often used while mission planning or during flight.

The Air Force and Key Doctrine

The Air Force is a doctrine-based organization, and goes to great lengths to develop and disseminate doctrine on the precepts and execution of air power. A search for "AFDD"⁸⁷ on the Air

⁸⁴ Here, meaning against the Uniform Code of Military Justice (UCMJ), the "law" for military members—or, more apropos, the Ten Commandments of the military. It goes beyond civilian law in requiring certain behaviors, and punishing infractions. For example, "Conduct Unbecoming an Officer" is Article 133, and concerns performing, or failing to perform, certain acts which constituted conduct unbecoming an officer and a gentleman.

⁸⁵ The lowest enlisted rank (E-1).

⁸⁶ The airdrop community would include C-130s, C-141s, C-17s, and other aircraft which can drop people or objects mid-flight. "Old-school" refers to the fact that with the elimination of the navigator from many cockpits, the culture is changing as pilots are executing many of those duties.

⁸⁷ "Air Force Doctrine Document" – the standard abbreviation for these documents.

Force's ePublishing website produces 34 hits, of which the first is "AFDD1 – Air Force Basic Doctrine."⁸⁸ The Air Force relies on a certain level of personal initiative in order to execute its doctrine of "centralized control, decentralized execution," one of the key 18 core doctrine statements of the United States Air Force (DAF, AFDD-1 ix-x). The latitude allowed for personal initiative does not undermine discipline; rather there are usually channels and processes in place for coordinating and implementing initiative, and often this concept is built into the governing regulations, such as those paragraphs which clearly give aircraft commanders the authority to make independent decisions in particular circumstances (e.g., safety of flight judgment calls).⁸⁹

This notion of being able to save oneself, or the crew or team, is systemic to the U.S. Air Force. It is reinforced with the rank structure, and in the belief that the general officers, as the masters of strategic and operational art, will save not just the personnel engaged in direct combat but also the nation. The United States has never "lost"⁹⁰ a real war, and the esteem for the general officer corps is partly legitimated by this fact. Thus, the Airmen⁹¹ who exhibit the proper piety will find favor in the sight of the generals, who will provide salvation—in this case, from the threat of death or total defeat, rather than in the life to come.⁹²

The concept of "mystery" is embedded in the Air Force culture, starting with the very mysteries of aviation (how many people *really* know how an airfoil works?) and by extension the power of the totemic aircraft. Even the language of aviation is a mystery—consider the popularity of allowing passengers to listen in on air traffic control frequencies while flying on commercial aircraft. The mysteries of "high tech" explains the popularity of airshows, the spectacle of flight, and the general awe of the populace in response to the fastest, "smartest," and most capable aircraft. However, one of the very key mysteries of the military religion is classified information.

Classified information is carefully controlled, both the physical access and the "need to know" requirement for allowing others to access the information. Security clearance investigations, levels of classification, compartmentalization of different types of information, all combine to make the source, relative value, and applicability of the information a convoluted mystery known only to the specialized

⁸⁸ The other 33 doctrine documents build upon this one.

⁸⁹ Note that the Air Force's culture of discipline tends to be different from that of other Services such as the Army (Builder, *Masks of War*).

⁹⁰ In the context of having the homeland permanently occupied by a foreign power. Note that Tilford argues that the Air Force lost Vietnam (183).

⁹¹ The term "Airmen" is used for Air Force members the same way "Marines" is used for Marine Corps members.

⁹² However, note that for some individuals who equate military success with performing God's will (in a Western theological sense), success on the battlefield may be directly tied to attaining the next life. Certainly, the Islamic martyr tradition ties these concepts closely together.

intelligence guilds. Even the inner sanctums of highly classified information, Sensitive Compartmentalized Information Facilities (SCIFs—pronounced “skiffs”), have special rules for how they are constructed, who may enter, and how the sacred information is handled.

Finally, the remaining key doctrinal element of a military religion involves theodicy. It is almost universal that, in the modern military and the U.S. Air Force in particular, individual members feel they are “doing the right thing.” A prime distinction between an infantryman and an aviator is that the infantryman often has an opportunity to physically see his target, whereas the aviator may be dropping a bomb or releasing a cruise missile and need to trust the mysteries of classified information and the orders from on high and hope he or she is doing the right thing. Therefore, Air Force members reconcile the potential implications of bombs landing in unintended locations and the imperfection of the system by placing their faith in higher headquarters and their hope in God. Even when the premise of an entire war is questioned, the members tend to do their personal best to do the right thing and hope the top generals will be able to save the situation in the long run.

The Air Force and Organizational Roles

All of this doctrine presages the establishment of the organizational roles clearly visible throughout the Air Force. The priests include the senior NCOs and officers, but of particular significance are the general officers as the high priests. Just as low-level Catholic priests are usually only known and recognized locally, while the high priests and Popes are well known universally, so too with the military religion’s highest priestly caste. The Air Force “Popes”—the Chiefs of Staff of the Air Force (CSAF), the highest ranking Airman—and other four-star general officers provide the “great man” concept similar to the highest ranks in a Church. Members of other military Services, and sometimes civilians off the street, will know the names of famed Airmen who either have or are serving in the Air Force.

It is also true that the senior NCOs and officer corps enforce the “what is,” maintaining the existing order and interpretations of doctrine. The officers are the central controlling figures, and as the number of “followers” increases, so does the priestly power. Priests enjoy the advantage of deflecting blame for failures away from themselves and either onto their god, or upon the god’s worshippers (M. Weber 32-33). “Empire building”—the practice of consolidating functions and personnel under a particular senior officer—is a common theme within the Air Force, and the purpose of many power plays. When prophecy (change) is embraced by the laity it is the senior NCOs and officers (priests) who eventually rationalize the content into the cultural framework of the Air Force.

On the other hand, the prophets—usually equal in fame to the priests, if successful in their mission—pave the way for organizational change via an “irrepressible need” to spread the new vision

(Durkheim 427). Through charismatic leadership and religious fervor, individuals fulfilling this organizational role change the normative order—or die trying, sometimes literally but mostly figuratively. The Air Force is full of stories and legends about the maverick “great man” that brought about massive change⁹³ to the organization. Successful prophecy results in the winning of permanent helpers to the cause of the prophet, and these individuals are personal devotees of the prophet, whether they are disciples, followers, or comrades (M. Weber 60). Billy Mitchell is probably the earliest and most famous airpower prophet; General Carl Spaatz wrote a 1947 article pressing for the creation of an air force “second to none,” and spoke of Mitchell’s “prophecy” and how World War II proved “air power has evolved... [and is] worthy of the faith of its prophets” (12, 15).

The laity, or the Air Force rank and file Airmen, makes up the bulk of the institution. They provide the reinforcement of the traditional organizational structure and the legitimation of cultural norms, while also providing the seeds of prophecy and the source of prophets. In general, the average Airman is a well-educated lay intellectual, with a thorough knowledge of not just in the Air Force culture, doctrine and precepts, but also advanced formal education. The Air Force has more than 50% of all officers with advanced degrees, and nearly 75% of the enlisted force has at least some semester hours toward a college degree (Service Demographics).⁹⁴

The Air Force’s Cultural Manifestations

All of the above components build upon each other and manifests in the cultural practices of the Air Force—based on flying, which is “equated with the ultimate service to God” (Harrington 137). The Air Force tends to have strong organizational discipline, which is part of the organizational ethics discussed in the model. The single-seat fighter jet, in which one person’s actions may have tactical, operational and strategic application, demonstrates how and why discipline is required. A C-130 crew off across the world on their own also has to demonstrate a collective self-discipline when “mother” isn’t around to ensure regulatory compliance. Aircraft maintenance personnel take pride in performing their functions in a can’t-fail environment, and often go above and beyond in taking care of “their” jet, identifying closely with the sacred technology. The separation from friends and families from long deployments, the permanent change of station (PCS) moves required every 2-3 years, and even the low

⁹³Normally this change is assumed to be for the overall betterment of the organization, regardless of the actual circumstances.

⁹⁴For those wishing to do some serious demographic research on the Air Force, try the Air Force Personnel Center “IDEAS” web-based tool at <http://www.afpc.randolph.af.mil/demographics/>.

pay (for lower-ranking enlisted members) are all part of the material sacrifice required of the Air Force religion.

Shiner, in describing the 1934 birth of the Army's General Headquarters Air Force,⁹⁵ noted that resistance to change was one of the endemic problems in developing an independent air force for the United States (114-115). Even after its 1947 birth, the Air Force has roots deeply tied to resistance to change. The slow pace of change is documented via multiple sources such as Drew's "U.S. Airpower Theory and the Insurgent Challenge: A Short Journey to Confusion" (825), essays on the Air Force in America's Defense (Mandelbaum), books about the inclusion of female cadets at the Air Force Academy (Stiehm), even descriptions of Air Force cultural aversion to cross-specialty training (Lambeth, Pitfalls). Not only are bureaucracies famous for their reluctance to accept change, but the military adds significant inertia to the mix.⁹⁶

Airmen identify closely with their Service, as evidenced by the very limited success of the "Blue to Green" program. This program, designed to convince Airman to transfer into the Army, over the course of three years only managed to get 1,000 converts (Quigley).⁹⁷ The well-known inter-Service rivalry, coupled with a volunteer military, may also account for the strong identification of Airmen with the Air Force. Internally, the U.S. Air Force is usually considered to be the least cohesive of the Services (Builder, *Masks of War*; J. M. Smith; English), due to unique technologies, non-overlapping subcultures, and relative isolation/independence of the Wings. Smith alludes to the underlying problem with cohesion as being technology, and suggests the U.S. Air Force might need to "look outside the military into other complex government agencies and civilian organizations for models" concerning change and technology (J. M. Smith 52-53).⁹⁸

However, while cohesion within the Service may be subject to fluctuation, cohesion with one's fellow Airman tends to be quite strong as evidenced by the myriad of heroes from all ranks and specialties. The Air Force Memorial Foundation has established an Air Force Heroes page,⁹⁹ which allows anyone to post a tribute to his or her personal Air Force hero. The page's introductory language

⁹⁵ Aviation within the Army went through many organizational changes before finally, in 1947, being spun off as the United States Air Force (a separate Service). GHQ AF was the last Army organization prior to the stand up of the separate Service.

⁹⁶ All this, of course, making the prophet's job that much more difficult, and less likely to succeed.

⁹⁷ Given that the Air Force has roughly 325,000 members on active duty (close to 500,000 if the Guard and Reserve is included), the number of converts is trivial.

⁹⁸ Or, as this chapter seems to suggest, religious organizations.

⁹⁹ <http://www.airforcememorial.org/heroes/index.asp>.

contains the lexicon of heroic religious figures, sacrificing for the values, freedom, and the greater good.¹⁰⁰

[Americans currently serving in the United States Air Force] personify ingenuity, innovation, courage and sacrifice in the work they do to maintain the proud heritage of the Air Force. Through their deeds, in combat as well as everyday life, the heroes of yesterday and today shape our finest aspirations. Young men and women serve throughout the Air Force on the ground and in the air... In their service to their country, today's airmen can look to the courage and sacrifice of Air Force heroes, and strive to uphold those same values for the airmen of tomorrow.

Air Force heroes are also found in the homes of Air Force families. They are the sons and daughters, husbands and wives, and mothers and fathers who support and make possible the service of their family members. This is never so true as when airmen are called upon to go in harm's way for the greater cause of defending freedom. These individuals represent the very best of America and its values.

More than 54,000 American airmen have been killed in combat. They are among our finest Air Force Heroes, and we owe them a debt of gratitude for their sacrifices and for safeguarding American freedom. (Air Force Heroes)

Airmen have usually been called heroes, from the lone knights in their single-seat fighters to the unsung airplane mechanics—which Arnold and Eaker single out in their book Winged Warfare. The mechanics—with their lack of human weaknesses, courage, reliability, trustworthiness, self-sacrifice, and dedication—are called “the real Air heroes” (Arnold and Eaker 50-51).

The theme of rebirth also runs throughout the Air Force (much like most modern militaries). Who and what an individual was prior to enlistment often doesn't matter a great deal at basic training. Enlistees are shorn of hair, personal adornments, and unique clothes, and are mentally and physically broken down and remolded into Airmen. The wearing of “blues”¹⁰¹ is a privilege, something earned after the initiation rites, trials of strength and courage, and advancement to a new level within the congregation. The heroic legends are taught as part of the initiation into the military religion, with trainees required to memorize and recite official stories of Medal of Honor recipients. However, none

¹⁰⁰ This analysis not intended to denigrate the contributions of individuals or comment on their individual heroism, but to consider the concept in light of a “military religion” model.

¹⁰¹ The uniform consisting of light blue shirt and dark blue pants, the “business-casual” dress of the Air Force. (“Service dress” is the blues with the Service coat (“sport jacket”) worn as well).

of the 59 Medal of Honor awardees claimed by the Air Force are women (Air Force Historical Studies Office [AFHSO]).¹⁰²

The Air Force reflects a white-collar, technological bias and this inclination toward “professionals” may explain why it has the highest percentage of female personnel—20% (Service Demographics)—of the U.S. military Services, with 99.7% of the career fields open to women (English 116). Nonetheless, organizationally the Air Force has been slow to fully embrace women, with the prohibition on women in fighter jets not lifted until July 1993. Kathleen Harrington, a graduate of the Air Force Academy, describes the Air Force norm for officers as being white, athletic, heterosexual, Christian, and male (48). She argues that this norm is also reflective of society at large—that because the military is a microcosm of society, and because it is common for Air Force officers to retire in their mid-40s and then pursue civilian careers, this subtext permeates not just the Air Force but America (2), and resonates with the Christian culture and its institutional reluctance toward women in positions of power.¹⁰³

Summary: The Air Force and the Air Force Religion

Religious narrative permeates the Air Force. Writings from Air Force members, scholars of Air Force history, and even media sources resonate with the message. While most references are simply allusions in passing, some authors take it to further extremes. These meta-messages are in reality a reflection of what really *is* a religion, rather than just a minor theme or turn of phrase.

Meilinger, in his paper “U.S. Air Force Leaders: A Biographical Tour” reviews the literature on nearly two dozen key figures in Air Force history, and refers to a religious lexicon to communicate the trials and tribulations of these priests and prophets. “Gospel of airpower,” “crusader,” “prophet,” “martyr,” “trial of faith,” charisma,” “destined,” “glorified,” “self-sacrifice,” “doctrine and dogma,” and “disciple” are used throughout—all of which are strongly associated with the lexicon of Western religions. Perhaps, then, it makes sense that some of these early Air Force leaders, such as “Hap” Arnold and White, originally intended to become ministers of the gospel or were sons of clergymen (Puryear 3, 165), and translated their personal convictions into institutional ones.

Carl Builder wrote extensively on military culture that tended to associate religious tenets with the Air Force. He coined the concept of the Air Force worshipping at the “altar of technology” (Builder,

¹⁰² Technically, only 17 are official U.S. Air Force recipients. However, those recipients who were part of U.S. Army aviation prior to the formation of the separate U.S. Air Force increase the number to 59.

¹⁰³ Retiring military officers often take follow-on positions of prominence with civilian companies, enabling them to inject their biases into the civilian organizations.

Masks of War 150), and used religious lexicon extensively in writing of the Air Force crisis of identity of the late 1990s (Builder, Icarus Syndrome). The shortcoming of Builder's efforts is in making the leap from whimsical analogies to useful construct—his conclusions in The Icarus Syndrome do not leverage any value from those religious metaphors. Throughout his text, chapters and sections are titled “creation,” “the prophets,” “founding of the church,” “test of fire,” and so on, and he sprinkles religious metaphor within the book, especially in the historical review of Air Force doctrine. However, his conclusion—that the Air Force needs an integrative, basic mission statement of air power theory—is devoid of religious elements. The Air Force culture and history is inextricably linked to religious themes and those themes can aid in development of a useful prescription for a successful air power theory—“what defines the sacred is that the sacred is added to the real” (Durkheim 424), highlighting the tangible power of collective belief.

These collective beliefs of the Air Force, as related to Burk's four characteristics of a military culture, are all religious in nature. The Air Force's discipline, professional ethos, ceremonial displays and rituals, and cohesion/esprit de corps are all founded in religious observances, and these religious characteristics create the Air Force culture. With this perspective, technology then becomes part of the religion, especially when it enables the religion—and the worship of technology, then, becomes a religiously inspired veneration.

Regarding technology in particular, the Air Force is conjoined with religion—the weapons and tactics of war are “manifestations of God's awesome historical justice in a fallen world” (Aho 156), and this paradigm of tying war power to manifestations of godlike power (omniscience, omnipresence, and omnipotence) is naturally appealing to the Air Force. However, each new technological wonder that increases the destructive power at humankind's disposal also exacts a price when a concomitant development in ethics is missing (Aho 221). This is one of the dangers of a military religion that worships too blindly at the “altar of technology” (Builder, Masks of War 19), and is too ready to adopt emerging technologies—a description of the Air Force (Matthews 14).

Along this vein, as technology changes and the mission(s) of the Air Force change, the organizational culture must adapt as well. Incremental changes in technology and other external circumstances without an effective cultural adaptation could seriously impact the Air Force warrior culture—and that culture is critical to the effective employment of air power regardless of the means used (Matthews ix).

The Air Force *and* Religion

“Hap” Arnold and Ira Eaker link the spreading of Christianity with the spread of air power strategy in their seminal 1941 book (160), establishing yet another early connection between the as-yet-unborn Air Force and Christianity—the dominant religion of the United States.¹⁰⁴ The Air Force itself is a very religious institution, meaning that beyond a dedication to the Air Force religion, members are also devout in a more conventional sense as well. This tends to reflect the American truism that “there are no atheists in a foxhole” as well as provide a convenient parallel between personal faith and organizational faith. A society’s military ethic is usually “interrelated with its prevailing religious mythology” and this mythology legitimizes an ideal of military practice (Aho 3)—the Air Force religion aligns quite neatly with Christianity, so there is little discomfort about serving god and mammon (King James Bible Matthew 6:24).¹⁰⁵

Kathleen Harrington discusses life at the ultimate seminary and the wellspring of many of the Air Force future leaders: the Air Force Academy.¹⁰⁶ She notes how taking personal time off is frowned upon, but “worship is viewed as a legitimate use of cadet time” (146). The Chapel is at the center of the campus, and is a central venue for activities of cadets, staff, and tourists. The founding fathers are worshipped, along with Christ-like saints (in visage as well as saintliness) such as Lance P. Sijan—“the center of an active religious faith” (Harrington 152-154). Given the importance of religion in battle long acknowledged by scholars and generals alike (Aho), the Air Force is providing neophytes a sound indoctrination in both a personal religion and a military religion via its Academy.

Harrington cites the religious makeup of Air Force Academy cadets in 1997 as being “75% Protestant, 24% Catholic, and 1% Other (Muslim, Jewish, Buddhist, Pantheist)” (146). After further research, she ascertained that the Academy at the time did not acknowledge “no religious preference,” instead lumping those cadets—estimated at 15% of the population (146)—in with the Protestants. Additionally, she argues that not only is religion unofficially promoted at the Academy, but military aviation adopts religious metaphors to justify military missions (145).¹⁰⁷

¹⁰⁴ The link between the Air Force and Christianity is only touched upon here, but is another promising area for additional research.

¹⁰⁵ Adam Goldberg cites a study indicating Protestant affiliation as a key to promotion in the military (50)—so perhaps Christianity and the Air Force religion are more than just compatible.

¹⁰⁶ The Air Force Academy is particularly relevant as an institution, as it serves as one of the (if not *the*) primary source of Air Force culture and senior leaders. Additionally, Millonig notes that as the military draws down, the percentage of officers from service academies goes up (10).

¹⁰⁷ See “The Impact of Religious and Political Affiliation on Strategic Military Decisions and Policy Recommendations” for an interesting assessment of religion (and particularly, fundamentalism) in the U.S. military (Millonig).

Harrington’s research occurred before some of the allegations and issues concerning the religious climate at the Academy;¹⁰⁸ however, the current reported makeup of cadets is still more religious than America at large or the Air Force as a whole. The 2005 HQ USAF report on the Academy religious climate shows that 85% of cadets (and 78% of the faculty and staff) are Christians (DAF, Religious Climate Report 5), while a 2008 Pew Forum report shows 78% of Americans are of Christian—including Protestant and Catholic—faiths (Pew Research Center 5). Additionally, the religious makeup of the Air Force—officer and enlisted—is 80% Christian and only 18.6% “other”¹⁰⁹ as compared to America’s 20.5% “other,” so the Air Force as a whole is more Christian—and more religious—than America is at large (Goldberg 102). The following table is from Goldberg’s 2005 Service demographic analysis (99-103):

	America	Air Force	Army	Marine Corps	Navy ¹¹⁰
Christianity	77%	80%	72%	74%	68%
“Other”	21%	19%	27%	25%	31%

Table 1 - Religious Demographics

Providing tangible examples of the harmony between the Air Force religion and Christianity, Harrington cites Scott O’Grady’s book Return with Honor¹¹¹ as evidence of the tight linkage between Christianity and the Air Force. She includes numerous excerpts from the book that allude to Christian themes and Biblical passages; two passages include O’Grady being “reborn” in air and then later in the tale experiencing effervescence: “the brightest, most joyous feeling ... warmed by an everlasting flame ... I’d been on a spiritual high” (qtd. in Harrington 157-158).

Both God and the Air Force promote and protect aviators, and the artifacts of the Academy and life in the Air Force reinforce this duality. The Air Force Hymn asks the Lord to “guard and guide the men who fly;” pilots reach into the sanctity of space and touch the face of God in “High Flight,” the unofficial poem of the Air Force; Coffee’s toast to fallen pilots commemorates their state of grace as

¹⁰⁸ The reports released in 2005 “tend to confirm the press accounts that the Academy community is not as sensitive and accommodating to minority religious beliefs as we would like to hope” (HoR, The Religious Climate at the U.S. Air Force Academy 6).

¹⁰⁹ Consisting of the following categories: non-religious, atheist, agnostic, other religions, or refused to answer/unknown.

¹¹⁰ Note that since the Navy does not track religious preference of officers (only enlisted), these numbers are extrapolated (Goldberg 101).

¹¹¹ O’Grady was an Air Force aviator who ejected over Kosovo and was the successful objective of an intensive search and rescue effort. A few years after the incident, he left the Air Force and obtained a master’s degree at Dallas Theological Seminary.

evidenced by succor from “God’s own hands” (qtd. in Harrington 149); and of course the Air Force Song appeals specifically to God.

The Air Force has adopted characteristics of the Judeo-Christian culture from which it sprang; for example, the holy trinity is the Air Force’s lucky number. There are three core values—integrity first, service before self, excellence in all we do—and Colonel Mike Worden identified “endless” capabilities of the “enduring doctrinal trinity” apparent at the institution’s birth: globalism, indivisibility, and decisiveness (33). The functional Wing structure is based on three Groups (Operations, Maintenance, and Logistics) supporting the core mission.¹¹² Even the Air Force Memorial, within eyesight of the Pentagon and the National Mall, consists of three stainless-steel technological spires arching 270 feet into the sky, and the number three was deliberately chosen for its symbolism to the Air Force (Freed). Poignantly, the “missing man” formation, a flyover tribute to a fallen comrade, normally consists of three aircraft with the fourth aircraft “missing” out of the four-ship formation.

Even in the mundane, Christianity is everywhere. The 2007 “Catalog of Caring” for the Combined Federal Campaign (CFC)¹¹³ of the National Capital Region broke up the various charitable organizations by category for ease of access. The “Christian Charities USA Federation and Member Organizations” and “Christian Service Charities Federation and Member Organizations” categories were both in the top five for number of affiliated organizations, and combined the count was second only to the catch-all “National/International Independent Organizations” category.¹¹⁴

It is the conflating of cognitive claims of reality and warfare expressed in religious terms with the military ethic that legitimates war, and justifies individual and group behaviors during war (Aho 8-9). Durkheim contends that “religious forces are in fact only transfigured collective forces ... they are made of ideas and feelings that the spectacle of society awakens in us” (327). Religion helps set aside danger, and encourages and reassures (Durkheim 411). The linking of both the Air Force religion with the underlying Christian religion of its members provides a great confidence during times of crisis. With both God and the Air Force—and by extension, the nation—backing the Airmen, succor is assured, whether in this life or the life to come.

¹¹² Recall from chapter two that Wings, or essentially an Air Force Base, may also have a Medical Group, but medical officers are not “line” officers so are not able to command the Wing, and the Medical Group is usually not a core part of the Wing mission.

¹¹³ Annually, the Department of Defense consolidates charitable giving via the CFC and streamlines the process for its employees.

¹¹⁴ Note that many Christian organizations were also listed across the other categories as well.

Conclusion: For God is With Us¹¹⁵

Culture is a slippery term, but is the defining element of organizations and has great explanatory power. Especially when a culture is imbued with religion, or when the culture *is* religion, the underlying metaphor is worthy of study in order to understand the organizational culture and its meaning to the people associated with the organization. When a culture is affiliated with war—timeless death-matches of human against human—the ties that bind are most often those of a religious nature. Who believes war is as much “a philosophical, or better a spiritual problem, as it is a problem of technology and political economy” (xiii). The goal of this chapter was to describe the United States Air Force as a religion, complete with all the key components of a traditional Western religion, to set the stage for a discussion of technology by first understanding the core meaning and culture of the organization. The Air Force maps convincingly to my fourteen characteristics of a military religion—from underlying sacred and profane objects, soteriology and theodicy, priests and prophets, to stories of heroes and rebirth.

Belief systems are important to many people, and often provide a great deal of comfort especially when the religious system is intimately intertwined with group ideology and the social structure (Hinde 4). While Harrington believes the “strong religious underside” of the Air Force trumps its “religiously neutral exterior” (136), it’s really a case of the organization *being* religious the entire time, because it *is* a religion. The Air Force allows other gods, but only because the Air Force and Christianity are harmonized together in the culture.

Viewing the Air Force in this manner should help shed light on the motives and beliefs of the individuals in the organization, and enable an understanding of the sublimity of the Air Force and what it means to be an Airman. With this cultural perspective in mind, it will then be possible to review the role of technology within the Air Force. In this case, it is less about a soft underbelly or an exterior mask, but rather the reality of an Air Force that “worships at the altar of technology” (Builder, *Masks of War* 19).

¹¹⁵ “Devise your strategy, but it will be thwarted; propose your plan, but it will not stand, for God is with us” (King James Bible Isaiah 8:10).

Chapter 4

STS and “High Flight”: Technological Change and the U.S. Air Force

The Air Force has long worshipped at the altar of technology.

*-Carl H. Builder
(Icarus Syndrome 155)*

The epigraph is part of a theme regarding the Air Force—the permeating religious metaphor enshrouding the organization. As presented in the previous chapter, the Air Force religion is built around a Christian ethic with technology as the sacred totems. The co-construction of the Air Force and technology, then, is not a simple, straightforward affair, but rather has a unique flavor that reflects these underlying beliefs. As the users construct the meaning of the technology, the technology is also constructing what it means to be a user—the ways in which one knows and represents technology is inseparable from the ways one chooses to use it.¹¹⁶ Users and technology are “two sides of the same problem” (Oudshoorn and Pinch 3) and the connections between them have explanatory power in understanding the relationship between culture and technology as being produced together.

The purpose of this chapter is to describe the science and technology studies (STS) concepts used to analyze the Air Force. The overall goal is to examine how the large, technically-oriented United

¹¹⁶ Related to the concept of “co-production” and this definition paraphrased from Jasanoff (2).

States Air Force approaches the development and innovation of technology, and in particular, technological change using STS methodologies. The primary focus is not on large-scale acquisition strategies for major weapon systems (such as aircraft), but rather on the small-scale innovation and invention processes that provides added capability to those major weapon systems. A plethora of academic texts and Air Force regulations exist that discuss major systems acquisition and the rules, policies, and case studies for major systems, but there is little insight on smaller scale evolutionary adaptations to those major weapon systems.

The purpose of the STS methodologies is, borrowing from Wiebe Bijker, to provide an integration of the case studies, the theoretical generalizations, and sociopolitical analyses in order to understand the relations between technology and society so that one can act on the issues of technological change (Bijker, *Of Bicycles* 6). My analytic approach requires a foundation in science and technology studies, discourse and metaphor, social construction of technology, philosophy of technology, and knowledge management as applicable to the Air Force.

STS Underpinnings

Scholars such as Pitt, Mitcham, and others have made a convincing case for “technology” as encompassing more than just physical objects, but also the human processes surrounding the accomplishment of goals. Pitt’s short and succinct “humanity at work,” while possibly overly broad, nonetheless captures the intended use of the term in this chapter.¹¹⁷ This meaning of technology is particularly important for a large organization like the U.S. Air Force that tends to overlook the idea that processes must be as carefully engineered (or designed) as the technological objects—that a balance is required between the objects and the people that create them.

H. Bruce Franklin’s War Stars reviews the history of Cold War culture, based on the premise that:

American weapons and American culture cannot be understood in isolation from each other.

Just as the weapons have emerged from the culture, so too have the weapons caused profound metamorphoses in the culture. Comprehending this process may show us how we got into our current predicament. It might even help us find our way out. (7)

While published in 1988 prior to the end of the Cold War, nonetheless Franklin does a good job in presenting the co-constructed nature of that era and the lingering issues of potent weapons. The text is not Air Force centric, but does have an entire chapter on the patron saint of air power theory, Billy Mitchell, in which Franklin describes Mitchell’s main role as within American culture itself (91). A “visionary apostle,” Billy Mitchell “turned the affair with superweapons into an American romance,” and enabled the religion of the superweapon to establish rituals via the airplane (Franklin 91). In all, Franklin’s STS perspective on the Cold War and the social processes and political decisions that shape technology also highlights how that technology shapes the sociopolitical as well.

Another Cold War text based on STS principles is MacKenzie’s Inventing Accuracy. He states his goal is to examine the “complex, conflictual interaction of different social groups—technological, military, and political ... [and see] how boundaries are created around projects, resources channeled into them, and a gradual and cumulative process of technological change institutionalized” (MacKenzie 5). He structures the book around his argument that “technological change is simultaneously economic, political, organizational, cultural, and legal change, to enumerate just some of the aspects of ‘the social’” (MacKenzie 9). This premise—that technological change is inextricably linked to the social—is a part and parcel of the STS creed.

¹¹⁷ Other definitions include “practical implementations of intelligence” (Ferre 26), and “the making and using of artifacts” (Mitcham 1). The point is that a term this ambiguous should be approached with caution.

Paul Edwards developed an excellent STS text, The Closed World, around this very concept. His convincing analysis of the relationship between discourse and computers during the Cold War highlights the over-emphasis on computers and cyborg mentality that led to confusion over values and identity (363-365). Edwards notes that technological change is a matter of politically significant choices, and technology itself is a fundamental element of culture and politics (xiv). While Edwards also does not focus solely on the Air Force, a significant portion of his book revolves around the Air Force and its hyper-focus on technology, to the point that pilots risk becoming little more than part of the automation associated with technology. Only by achieving the “Holy Grail” of military technologists—the creation of cyborg human-machine interfaces to eliminate the error associated with humans—can perfection be realized (Edwards 206-207).

The Strategic Air Command, or SAC, led by General Curtis E. LeMay, was built on the need to eliminate human error via heavy reliance on human-machine interfaces. Kaplan’s The Wizards of Armageddon describes the social interactions of the chief American architects of the Cold War, and quotes LeMay as often saying, “on some Mondays I don’t even trust myself” (104), an indication of the higher trust placed in machines over humans. Part of Kaplan’s conclusions are that World War II was the first time in history that systematic calculation by operations research analysts using scientific methods of investigation produced military tactics in wartime (53). This then enabled the transition during Vietnam and the Cold War to war managers rather than warriors, resulting in those who “foolishly thought that all problems could be solved by hardware” (Kaplan 76).

Robert Thomas notes that technology is often considered to be all about indisputable facts and observable, objective relationships while politics, being about interest groups and worldviews, often throws things into disarray, resulting in two regimes at odds with each other (246-247). Essentially then technology is about “control” while politics is about “chaos,”¹¹⁸ but an over-reliance on technology in isolation from the people usually comes at a very high cost, while holistic innovation generally yields better results (Thomas 246-247).

In Walter Vincenti’s What Engineers Know and How They Know It he limits attention to “normal design” and “normal technology” which he considers an evolutionary improvement rather than a radical “revolutionary” change (7-8). These normal evolutions of technology are often found at what Thomas Hughes refers to as “reverse salients” or “lagging components” in developing systems (xvii, 71-74). In military parlance, a reverse salient is a section of a front (advancing force) that falls behind, slowing the movement of the entire force. The utility of this metaphor is that in large organizations engaged in

¹¹⁸ The old control-vs.-chaos dichotomy—with a tip of the hat to Maxwell Smart.

technological change, reverse salients are typically the areas of controversy within the organization and, usually metaphorically, often the site of intense fighting between the relevant social groups.

Technological momentum, another STS concept, postulates that generally organizations tend to perfect and maintain their familiar systems; as projects evolve, the technology becomes more rigid as potential options are closed off with each decision (Staudenmaier 150-151). Staudenmaier argues that the momentum model weds the technical and cultural elements together into a “moving body” (152). Hughes refers to momentum as well, agreeing that it can work against innovation when organizations are “resolutely committed” to their existing technology (xviii-xix). Note that the momentum model does not imply technological determinism; rather, it accounts for the tendency of the cultural elements (humanities philosophy of technology) to drive the existing technical elements (engineering philosophy of technology¹¹⁹) toward evolutionary change. In this way, Carl Mitcham’s perspectives assist in assessing technological change, and understanding how a balance is important in both directions to achieve solutions.

Other STS concepts touched on in this dissertation include gender and identity issues, which are part of the cultural manifestations of the Air Force religion. A number of authors have explored the Air Force’s affinity for masculinity—from language artifacts such as “cockpit” and the “penis pocket” on flight suits to the manufacture of gender in cockpit design (Kenagy; R. N. Weber; Segal and Segal). Failing to realize that gender and technology are mutually constructed and, where feasible, accommodating physical differences results in barriers to career advancement and a stigma of abnormality (R. N. Weber 249). In particular, “contradictory gender identities and power relationships” are woven around technologies, driving a rich and diverse field of study emphasizing a change from passive to active participation (Oudshoorn and Pinch 4-7). The point of exploring gender from an STS perspective is to produce a stronger objectivity consisting of less partial and less distorted beliefs; that is, to see the social from the eyes of “valuable strangers” (Harding 138, 149-150).

Genderization also applies in broad terms to the subcultures of the Air Force: the Combat Air Forces (CAF), the Mobility Air Forces (MAF), and the support functions such as security forces, intelligence, space, and so on. The relative value of each subcommunity stems from gender-related issues, and the difference between “virtuosity values” associated with masculine warriors and the feminine “user or need values” associated with support roles (Pacey 102). A potential problem with genderization of subcultures is the same with physical gender issues: a lack of equality and parity often

¹¹⁹ Both the humanities philosophy of technology (HPT) and the engineering philosophy of technology (EPT) perspectives are discussed in detail later in this chapter.

drives disparate treatment, resulting in a lack of cohesion and morale for the second- or third-class citizens as well as a potential loss of innovative ideas and possibilities.¹²⁰ Since its inception, the Air Force has been dominated by the “masculine” CAF subculture, while the “feminine” MAF and support subcultures have been relegated less-important statuses.

The goal of this section is a broad overview of some of the STS concepts relevant to this dissertation, with the preceding material intended to cover a range of authors in the STS field and underscore some of their contributions which are applicable to the Air Force. Next will be the detailed review of discourse and metaphor, social construction of technology, philosophy of technology, and knowledge management ideas, followed by some brief thoughts about the Air Force and these concepts.

Discourse and Metaphor

Edwards defines discourse as “a way of knowledge, a background of assumptions and agreements about how reality is to be interpreted and expressed,” and “a self-elaborating ‘heterogeneous ensemble’ that combines techniques and technologies, metaphors, language, practices, and fragments of other discourses around a support or supports” (34, 40). Leveraging Edwards’ template, I define the elements of Air Force discourse as consisting of technique, technologies, experiences, and language (15), separating out metaphor for individual analysis under the rubric of the military religion model.

Air Force discourse delineates a worldview—a “paradigm” in Kuhn’s terminology (ch. 3)—a set of heterogeneous but related practices and methods of social engagement:

- *Techniques* consist of those activities and methods used to implement change or move a controversy toward closure. Techniques are seldom formalized doctrine, but rather consist of the principles and practices widely accepted as useful ways of accomplishing an objective. A technique to reduce controversy over a new artifact might be to inculcate the new artifact firmly within the organization, so that the organization is reliant (or believes it is reliant) on the new artifact.
- *Technologies* are those processes, and sometimes objects, that enable the political/social choices regarding a particular artifact. A chief difference between techniques and technologies is that techniques are seldom codified, while technologies (especially processes) usually are. For example, within the Headquarters U.S. Air Force (HQ USAF) there are existing written staffing and policy processes (technologies) that govern hierarchical decision-making.

¹²⁰ See “The Matthew Effect in Science” (Merton) and “The Matthew Matilda Effect in Science” (Rossiter) for historical perspective on exclusionary practices.

- *Experiences* refer to the lessons learned by either individuals or particular social groups that drive their resultant behavior. Past experiences shape and condition responses to new situations, and establish habit patterns and frameworks that guide those individuals and groups. Experiences are usually specific to individuals or groups within the broader organization, such as the tacit knowledge of a social group in learning how to identify and capitalize upon a reverse salient.
- *Language* consists of the verbal and written communication and information shared between individuals and groups associated with technological change. Examples are the written Air Force publications, guidelines, Letters to Airmen from the Secretary of the Air Force, speeches by senior leaders, use of phrases or semiotics during meetings, and so on.

Together, these four elements comprise the Air Force discourse, with the seamless web of the Air Force religion metaphor providing the overarching support for the worldview.

Metaphor allows the translation of uncertain or obscure areas of experience into terms of the familiar, restructuring one's thinking and setting conditions for the literal interpretation of the metaphor (Edge). Understanding that "metaphors can kill" underscores the critical nature of these abstractions (Lakoff, *Metaphor and War*; Lakoff, *Metaphor and War, Again*). Metaphors require a search for meaning on the part of the listener, and the mapping of the content between domains in order to create information transfer, which often guides thinking and action (Burke 4-15). When consciously leveraging metaphoric abstractions, "choosing, applying, and thinking through metaphor should not be casual, should be related to experience, and should not be simplistic" (Burke 19).

This construct provides a methodology analyzing the Air Force worldview from the perspective of a military religion, as discussed in the previous chapter. The religious metaphor organizes analysis of the Air Force into the underlying precepts, key doctrines, organizational roles, and cultural manifestations, providing a lens through which to view the relationship between the relevant social groups, their problems and implied solutions, and to understand how closure is achieved in controversy.

Social Construction of Technology

The sociological approach to technology often focuses on looking inside the "black box"—not just considering the inputs and outputs of technological artifacts but trying to examine the sociological components buried within the very contents and meaning of those artifacts. The social approach as described here is what David Hess calls "heterogeneous constructivism," which considers how "technoscientific changes and networks shape and constitute new forms of social relationships" (83).

This approach is often associated with the social construction of technology (SCOT) analysis methodology, which Pinch describes as a “seamless web” of society, politics, and economics (5). SCOT attempts to delineate networked interactions, but disregards technological agency—thereby placing the focus fully on the human and explicitly rejecting technological determinism (Pinch and Bijker), which keeps attention on the humanities philosophy of technology side of the equation. Trevor Pinch, Wiebe Bijker, and Ronald Kline have all written on SCOT, as have numerous others in expanding and defining the concept; however, the anthology edited by Bijker, Hughes, and Pinch remains the seminal text. SCOT will be the primary analytic framework used in this dissertation.¹²¹

Actor network theory (ANT) and Hughes’ systems model are other sociological constructs examining the role of technology and technological change, but neither is as appropriate for this study of the Air Force as is the SCOT model. ANT relies on technological determinism while Hughes’ model places everything within the context of a large-scale systems framework. Technological determinism denies the human element and risks fostering the existing technological focus—“worship”—within the Air Force, while the systems model is more appropriate for major weapon systems acquisition rather than the smaller scale innovation intended to be the subject of review here.

A key goal of SCOT is to identify different social groups and their problems and then analyze how those groups and problems interact with artifacts, and how solutions are employed to meet the needs of social groups (Pinch).¹²² Within SCOT, the first goal is the interpretative flexibility or the description of “technological artifacts by focusing on the meanings given to them by relevant social groups” (Pinch and Bijker 46). Closure and stabilization of the artifact—meaning the cessation of controversy when the relevant social groups largely believe the problem is resolved—is the next stage of SCOT, and there are two predominant mechanisms for closure: rhetorical and redefinition. Rhetorical closure is the stabilization of the artifact and the “disappearance” of the problems that drove the controversy via the shaping of the meaning of the debate, while redefinition of the problem provides closure due to a translation of meaning (Pinch and Bijker 44-46). Eventually, the interpretative flexibility

¹²¹ Note that critics of the SCOT approach have raised concerns over the model, an influential example being “Upon Opening the Black Box and Finding it Empty: Social Constructivism and the Philosophy of Technology” (Winner). Within the case studies, I have attempted to mitigate the criticisms of SCOT; for example, Winner’s concern over consequences (368-369) is addressed in every case study by consideration of the outcome(s) associated with a technology. Additionally, there is a precedent for the useful treatment of military technology via SCOT (MacKenzie; Edwards; R. N. Weber).

¹²² As Pinch describes it, the radical version shows how social processes influence the very content of technology, even for what it means for a technology to “work” (3).

“vanishes” and a predominant meaning and use of the technological change emerges (Oudshoorn and Pinch 3).

The third and final stage involves relating the content of a technological artifact to the wider social-political milieu, an attempt to interpolate between a social group’s norms and values and the meaning of the technology (Pinch and Bijker 46). In this dissertation, the wider socio-political milieu is captured via sections on the overarching American culture, and the relationship between the Air Force and its sister Services and the Department of Defense. Nonetheless, it is still difficult to encapsulate the entire socio-political milieu via a few paragraphs of text; the best to hope for is an approximation of the overarching environment in which the technological change is occurring.

The most intriguing element of SCOT is the diagramming or modeling of the interpretative flexibility of a particular technological artifact.¹²³ It provides a visual depiction of the way in which different social groups may have radically different interpretations of the same technological artifact, and equally important it shows the “flexibility in how artifacts are *designed*” [emphasis in original] (Pinch and Bijker 40-41). I will endeavor to re-create some of Pinch and Bijker’s diagrams, with the intent of using this template while discussing the following case studies.

Klein and Kleinman extended the SCOT model by including “power asymmetry” and structural considerations into their modified construct. These concepts help define the relative organizational or other comparative positional relationships between the relevant social groups, both in the textual descriptions and in the SCOT figures. Not only does the spatial location of the social groups have meaning, but also the relative position of the social groups in relation to the technological artifact. In my case, I will endeavor to take great care to position the relevant social groups both in appropriate locations relative to each other and also to the technological artifact, based on my subjective assessment of the situation.

In my extended use of the model, each object’s relative location and spacing to other objects will help provide some sense of the relative “closeness” of the objects. For like objects, the term “closeness” indicates a relative degree of compatibility; for example, social groups mostly in alignment would be spatially closer to each other, while problems and solutions that are complementary or similar in nature would be closer to each other. For unlike objects, the “closeness” indicates a relative degree of interest or ease of implementation. Therefore, a social group strongly interested in an artifact or tightly tied to a particular solution would be spatially closer to that unlike object.

¹²³ Pinch and Bijker note that there are other possible methods (41). However, using this graphical method also ties into Davis Baird’s convincing argument that there a unique *thing-y-ness* about non-textual depictions and models.

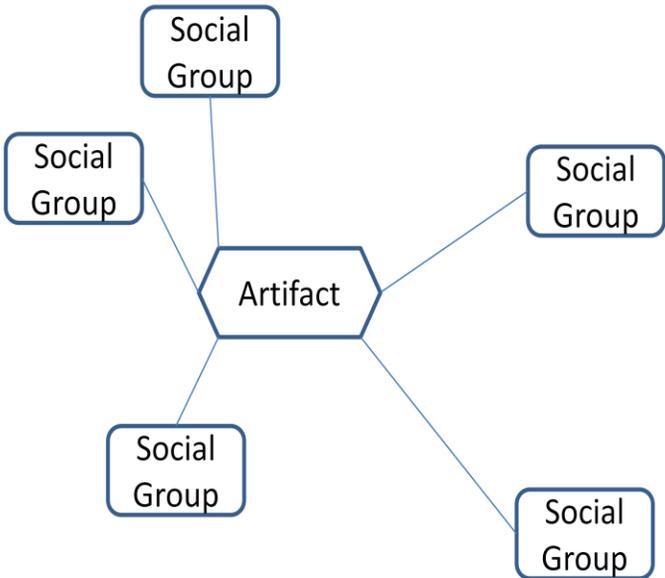


Figure 7 - SCOT: Artifact and Social Groups

Figure 8 depicts the relationship between one particular social group and the perceived problem(s) that the social group is trying to solve. In building this diagram, each social group from the prior diagram is broken out to reveal the particular issues of that unique social group.

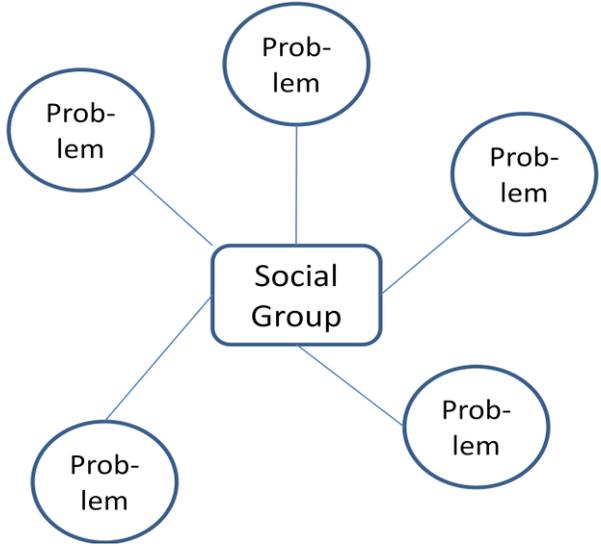


Figure 8 - SCOT: Social Group and Problems

Figure 9, the final decomposition figure, shows the relationship between one particular problem and its

possible solution(s), and this then is the

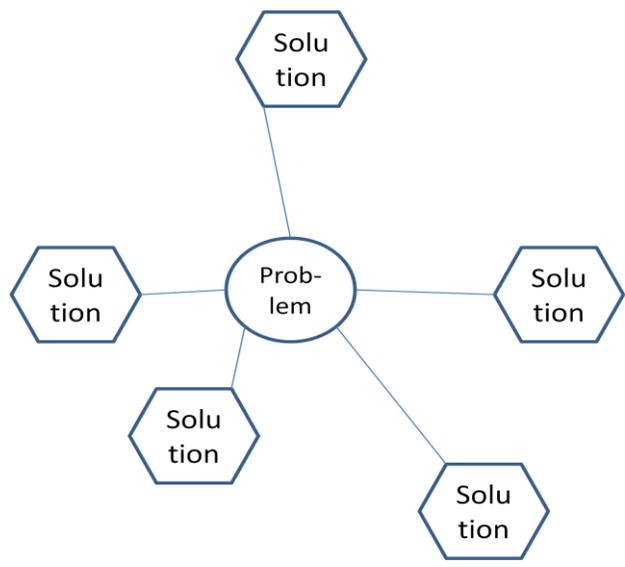


Figure 9 - SCOT: Problem and Solutions

final level of analysis in building a social construction of a technology model. The entire model, with all three types of diagrams, represents the essential social elements in the design of an artifact. By using this process, Pinch and Bijker create a detailed model of the developmental process of the Penny Farthing bicycle,¹²⁴ which is a seminal model for SCOT analyses (37).

The point of this brief overview of SCOT is to

¹²⁴ As an aside, the Wright Brothers were bicycle repairmen prior to their ascent into history. Could there be a fundamental connection between bicycles and social and technological change?

introduce the concepts and demonstrate how the methodology is used in this dissertation to provide a template for deconstructing an organization’s processes, which are then used in understanding the co-construction of technology. My goal is to use this holistic approach—the HPT/EPT perspectives, the knowledge management models, and the social construction of technology—explicitly to provide a unique depiction of the Air Force approach to technology development.

The Philosophies of Technology

Mitcham’s influential text, Thinking Through Technology, underscores two approaches to the philosophy of technology: the engineering philosophy of technology (EPT), and the humanities philosophy of technology (HPT). He defines EPT as “analyses of technology from within, and oriented toward an understanding of the technological way of being-in-the-world as paradigmatic for other kinds of thought and action,” while HPT is defined as “the attempt of religion, poetry, and philosophy to bring non- or transtechnological perspectives to bear on interpreting the meaning of technology” (39).

Mitcham’s chapter 1 summarizes the history of the EPT tradition, from its early roots in mechanical philosophy and Ernst Kapp’s “organ projection,” through Engelmeier’s “spring in the great world clock” and Dessauer’s technology creation as religious experience, to Bunge’s logical empiricist-influenced “technophilosophy” (19-38). This engineering approach focuses on the objects, their capabilities, and promises of human benefit, usually with an optimistic air and positive outlook. There is also a tendency when using the EPT viewpoint to understand technology as simply artifacts and things, rather than the processes and social constructs that are also part and parcel of “humanity at work.”

In chapter 2, Mitcham parallels the historical summary of the EPT tradition with the HPT tradition. In this case, Mitcham starts with Rousseau’s criticism of the Enlightenment idea that technological progress advances society, and touches on Mumford’s “myth of the machines,” Ortega’s “I am I plus my circumstances,” Heidegger’s questions on the meaning of technology, and concludes with Ellul’s technological determinism concepts (39-61). Mitcham argues that HPT is a series of “rear-guard attempts to defend the fundamental idea of the primacy of the non-technical” (39) and this theme runs throughout his text. Essentially, the questions revolve around the place of technology within the social realm and the balance of the human and the technological—essentially, an exploration of the co-construction of these two domains.

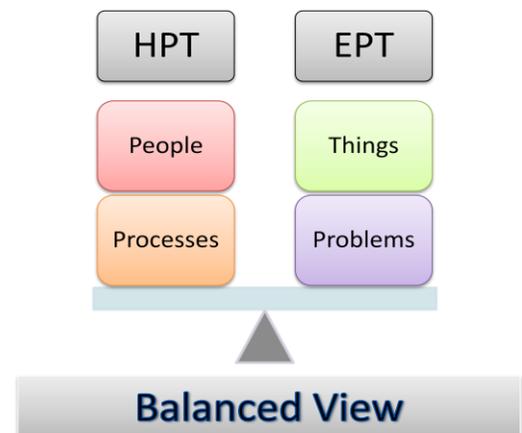


Figure 10 - HPT and EPT in Balance

In his text, Mitcham describes HPT as being a poor term for “nonengineering philosophy of technology” but nonetheless seems unable to find a better term which encapsulates the humanities, humanization, and humanists (63-64). He notes that EPT does not quite suffer from this ambiguity, given the technological Esperanto resulting from the apparent aspirations of all peoples for technoculture (64). However, the underlying point of Mitcham’s HPT/EPT perspective is that robust philosophy of technology must include a balance of both approaches (137). I will use the HPT/EPT distinction to highlight the difference between a focus on the technological artifact—the *thing*—as compared to the people-oriented possibilities associated with an equal focus on the processes and the social side of the equation.¹²⁵ The goal of using this set of perspectives is to provide an analytic structure from which to examine the case studies.¹²⁶

By describing the interactions of the relevant social groups with technology, I will be able to deconstruct the meanings associated with their reactions to the technology and technological change, and discover the shifting boundaries between the two perspectives in relation to the artifact.

The dichotomy of HPT and EPT is evident in applied form in the knowledge management field, with the descriptions of organizational dynamics and structures, and their effect on sharing of knowledge. This is relevant to the Air Force due to its large size, and the differences between how the organizations in the field share knowledge as compared to how the organizations at the headquarters level share knowledge.

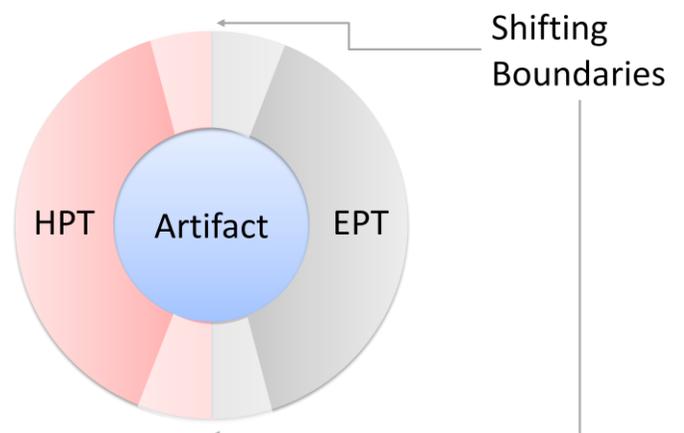


Figure 11 - HPT/EPT Shifting Boundaries

Knowledge Management

While not strictly speaking a core part of the STS epistemology, knowledge management is relevant to my arguments and often implicitly or explicitly used in STS projects. The field of knowledge management has blossomed in recent years, particularly with the expansion of information technology (IT) systems intended to help capture and integrate knowledge within organizations. Michael Polanyi developed some of the original thinking on knowledge as described in The Tacit Dimension, in which he outlines the differences between explicit and tacit knowledge. Polanyi describes tacit knowing as based

¹²⁵ This concept is similar to Sorensen and Levold’s heterogeneous technological problem-solving process (18).

¹²⁶ Similar to Scott Sagan’s “normal accidents theory” and “high reliability theory” approach in The Limits of Safety except I will use EPT and HPT perspectives.

on the premise that “we know more than we can tell” (4), and when coupled with hierarchical organizations, it becomes increasingly difficult to share knowledge across the breadth and depth of the organization. Davis Baird notes that *how* a particular community conceptualizes knowledge affects how knowledge is developed and shared in that community (115), a concept further detailed by Peter Galison in Image and Logic.

Vincenti identifies design as being both multilevel and hierarchical (9), a concept that drives the contextual relevance of the organizational constructs which enable the invention and innovation to occur (or not). He notes that the upper levels of hierarchy generally have the greatest influence over the “ambience” or contextual factors, such as economic, military, social, etc (11). This concept ties in

with ongoing discourse in the knowledge management field that describes the organizational structures of the Air Force.

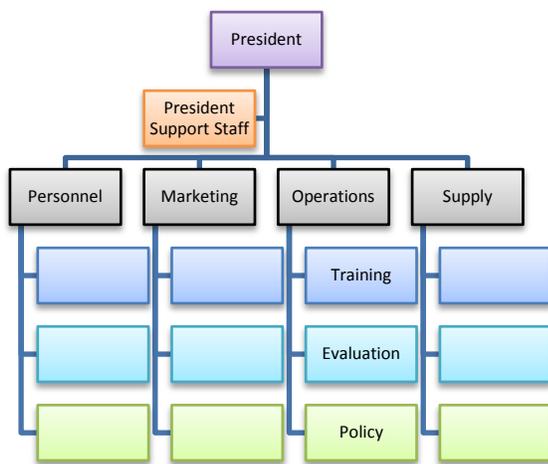


Figure 12 - Cognitive Model

The principle construct of interest regarding knowledge management for innovation consists of two primary models: the cognitive model and the community model as described by Swan et al.¹²⁷ The cognitive model “emphasizes linear information flows” while the community model highlights “dialogue and sense-making through active networking” (Swan,

Newell and Scarbrough 264). In essence, the cognitive model tends to be more hierarchical and “supply driven”¹²⁸ while the community model tends to be a flatter, more integrated approach which is “demand driven”¹²⁹ (Swan, Newell and Scarbrough 264, 271). Baird’s description of gift economies and commodity economies (222-225) parallels these cognitive and community models. For example, gift economies bind people together, and create and maintain social groups, with prestige and status tied to one’s contribution, rather than one’s hierarchical position—and gift economies are necessary for knowledge creation, production, and dissemination (Baird 223). Conversely, commodity economies work against bonding, and their structures “define and delimit mutual responsibility” between the

¹²⁷ Interestingly, see Spender’s discussion of different types of organizational knowledge, his Figure 1 on page 52. There are certain parallels exhibited between his “individual” and Swan et al’s “cognitive,” and his “social” and Swan et al’s “community” models.

¹²⁸ “Supply-driven” is the philosophy that if information is widely available it will be applied in new ways to engender innovation (Swan, Newell and Scarbrough 270).

¹²⁹ “Demand-driven” refers to initiatives more concerned with the creation of new knowledge in innovation projects because it is required for the project (Swan, Newell and Scarbrough 272).

parties—essentially they exist “to establish a mutually beneficial conclusion of interactions” (Baird 223-224).

The relationship of this knowledge management model to the philosophies of technology described above is that the EPT perspective is most noted in the cognitive model. Conversely, the HPT perspective tends to be more in evidence with the community model—for instance, the primary feature of gift economies is the creation of

community (Baird 237)—but often fall short when looked at from the EPT aspect. The shift from warriors to “war managers” discussed in chapter two is an example of a hierarchical organization over-focusing on body counts and munitions delivered rather than winning the war. Conversely, front-line units wanting a new technological artifact right away may overlook the need for logistics trails, long-term parts contracts, and other EPT issues a methodical, disciplined, and hierarchical approach may properly capture.¹³⁰

Sorensen and Snis use and extend this construct in describing how organizations can use these models either consciously or unconsciously, with varying degrees of success depending on application. Again, they emphasize the “highly distributed” nature of the organization’s knowledge as a prerequisite for employment of these concepts, and describe the distinctions among tacit/explicit and individual/collective knowledge as being important for the organization’s ability to innovate and share knowledge (Sorensen and Snis 84-85). Sorensen and Snis focus on the use of information technology (IT) to enable knowledge sharing, and in so doing demonstrate that both models have their place within large organizations. For example, the cognitive model can assist an organization with knowledge exploitation processes, and also in developing certain types of products, while the community model is better for collaborative processes and products (Sorensen and Snis 94).

One of Swan et al’s observations is that opportunities for innovation are lost when organizations are spread out over time and space, and the “casual sharing of knowledge and learning induced by physical proximity” is lost (Swan, Newell and Scarbrough 265). In a case study on the cognitive model, they highlighted that the organization’s new initiative failed because the focus was on the technology

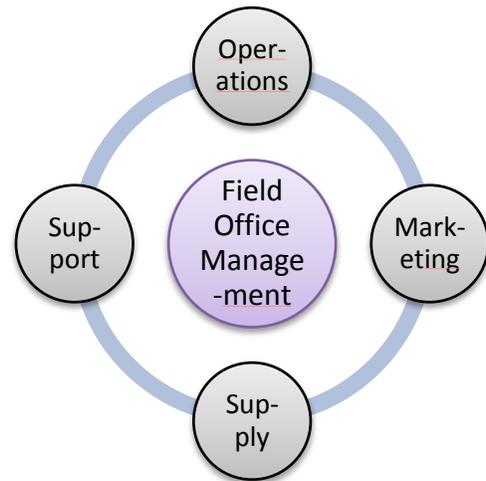


Figure 13 - Community Model

¹³⁰ The Air Force may never be able to fully embrace an “information age” type organizational structure (“flatness, interdisciplinary, heterogeneity, distributed control, meritocracy, and nimble flexibility” are some of the characteristics of such (T. P. Hughes xxii)). This inability is partly due to the nature of the military and the size and unique requirements of the organization. However, the use of “trading zones,” “translators,” and other mediating organizations/networks may provide some of the advantages desired while in large part maintaining the current organizational structure.

rather than the people, and the tendency of experts to dwell within their own particular culture, a not uncommon situation where functional and departmental boundaries are strong (Swan, Newell and Scarbrough 267). In their case, the failure to properly design a new technological system is readily discovered when analyzed from the EPT perspective.

Conversely, in a different case study for the community model, Swan et al demonstrated that it can be effective for organizations, including those widely dispersed, and highlighted its successes in enabling innovation when properly applied to an organization (Swan, Newell and Scarbrough 268-270). In this case, the success in designing the new technological system is quickly realized when viewed from the HPT perspective. This is not necessarily to cast the cognitive model in a disparaging light, but rather to underscore a pitfall of relying too heavily on one particular model or philosophy, especially in a large organization with multiple sub-communities such as the Air Force—which has a pre-existing tendency toward behavior too focused on technological artifacts.

The metaphor of the Air Force religion factors into this discussion. The previous chapter described the three primary organizational roles: priests, prophets, and laity. The priests tend to reinforce the existing structure and hierarchy, and control the organization—the parallel is the headquarters function (the major commands and Air Staff) for the Air Force. Meanwhile, the prophets, who are those inspired by visions for change, originate primarily from the laity—the field organizations such as Wings and squadrons in the Air Force. The point is that if the Air Force wants to generate innovative ideas and stimulate visionary change, it must consciously adopt the best model for the particular circumstances and build bridges between them.

Analogously, Ackoff discusses the migration from mechanistic systems of organization (hierarchical in nature) to more organic or “social” systems of organization (more community-oriented) among agile¹³¹ organizations. The mechanistic system, which relied on unskilled/uneducated workers acting as cogs of an overall machine, started with the industrial age and ended more or less around World War I. The organic system began to see skilled/educated workers as more important to performing processes—rather than functions—for the organization, and existed from World War I until somewhat after World War II, at the start of the information age when the present social system phased in. In Ackoff’s view, this social system is a new kind of structure in which the highly skilled/educated individuals comprising an organization have more personal flexibility, creativity, and expression in their dealings with their environment as they work toward their personal goals and the goals of the organization. Thomas Hughes lists the characteristics of “information age management” as: “flatness,

¹³¹ By “agile” Ackoff means competitive or leading.

interdisciplinary, heterogeneity, distributed control, meritocracy, and nimble flexibility” (xxii)—paralleling Ackoff’s “social” system. However, a limitation of the Air Force is that it is mired in a transition from the Cold War “mechanistic” system to the “organic” system of the modern Air Force—yet it wants the benefits of the “social”/information age system.

A limitation of an “organic” and highly religious organization is that many subjects or topics are “taboo” or otherwise off-limits to discussion. The fear of the heretic label affects the discourse, and the willingness of the members of the community to challenge existing norms. In the context of the Air Force religion, this reluctance to challenge existing dogma has plagued the organization throughout its history resulting in lessons being learned the hard way if at all. In large organizations with complex technological artifacts, design and innovation processes are clearly a community activity (Vincenti 52), and should be so for the Air Force.

The Air Force Organizational Approach to Technology Development

Within the Air Force, it is axiomatic that technology has preeminence, given that technology is the underlying enabler of the Air Force's very existence. As such, perhaps it is natural that an EPT/HPT analysis of the Air Force reveals a near-fanatical obsession on the aircraft and weapons, usually at the expense of the people and processes. This imbalance is most pronounced within the Air Force, but is prevalent throughout the Department of Defense. Some authors, such as Hammes, have entire chapters on decrying technology as a panacea (ch. 13) while trying to communicate "the danger inherent in the Department of Defense's reliance on the technological aspects of war rather than its human aspects" (189).

In another example, Stephen Biddle, a professor at the U.S. Army War College, argues convincingly that the Department of Defense has spent more than thirty years developing a better understanding of the technical performance of weapons, but very little time or effort spent understanding the skills of the operators (178-179). Another example involves the 2006 decision by the Secretary of the Air Force and the Chief of Staff of the Air Force (CSAF) to essentially "trade in" 40,000 Airmen in order to purchase more F-22s (Erwin). At least the Air Force senior leadership had the honesty to admit that the sweeping reduction in force was not working as planned; in October 2007 the Secretary of the Air Force told *Air Force Times* that the downsizing "isn't working. It is not working" (E. Holmes).

The Headquarters and Field Organizations of the Air Force

Within the Air Force, at the major command (MAJCOM) or Air Staff (Headquarters United States Air Force (HQ USAF)) level, the cognitive model comes to the fore. Creation of knowledge occurs in a more "sterile" environment, in which staff packages (documents assembled in a package), antiseptic emails, and regulations become increasingly dominant. This occurs in part because of the different focus of the headquarters—the need to establish multi-year programs and funding cycles, budgeting constraints, detailed coordination across multiple communities, the process of policy development and production, and so on. In addition, the headquarters usually does not have a single overarching mission or set of priorities; instead, there is a great deal of competition between the functional groups and directorates.

The cognitive model also applies due to the manner of personnel assignment—usually 2-3 year tours before heading back to a field unit or retirement—but in any event the social interaction is more difficult and seldom are there deliberate attempts to engage in community learning processes.

Naturally, the priestly class, from the junior acolytes to the most high priests, primarily staffs the headquarters. The prevalence of the cognitive model is not necessarily a “bad” thing—in fact, the headquarters structure may well depend on the bureaucratic inertia in order to absorb the staff turnover coupled with limited resources and competing requirements.

Out in the field, the Wings—usually synonymous with a base—have an Operations Group that includes the aviators and direct support personnel for the training and management of the crew and missions. While there are some differences between fighter and mobility cultures,¹³² the basic structure is the same, and field units usually have one overarching mission and set of priorities. Tactics shops organize training events to share information, flight profiles are briefed prior to “stepping” to the aircraft, and there is always a post-flight debrief in which individuals critique the performance of others. During the flight and debrief, rank is dispensed with in place of call sign (fighters) or crew position (mobility).¹³³ There will be meetings for “cross-tel” (cross-flow of information) after one or more members of the unit return from a conference or special training, annual refresher classes taught seminar style, and so on, all usually very interactive forums.

Certainly, a lot of policy is in the form of regulations setting out strict guidelines on everything from the wear of the uniform to the conduct of flying operations, but even so small groups spontaneously form to figure out how to maximize any latitude in the regulations. The field organizations have the bulk of the Air Force population, including the junior members, and so comprises the laity of the Air Force religion. In all, at the field level knowledge is shared and managed as a community, and formalized effort converts individual tacit knowledge into shared tacit (or even explicit) knowledge.¹³⁴ The theme of shifting boundaries comes into play in the interaction between the cognitive and community models of knowledge management.

Connecting the Air Force to the Models

Keeping in mind the preceding description of the Air Force HQ and field units, I will now tie those organizational types into the STS constructs described earlier in this chapter. The first step is in evaluating the philosophical approach to technology: does the Air Force strike a balance between the HPT and EPT perspectives, or is there an imbalance between the views? In the discussions above and in

¹³² One major difference being the presence of fully-stocked bars in fighter units and the lack thereof in mobility units.

¹³³ For example, “Viper04” is a callsign and indicates a single aircraft; “Navigator” is a crew position and indicates an individual.

¹³⁴ See Spender for a breakdown of knowledge categories. One example of a formal effort to convert knowledge from individual to social knowledge is the interactive aircrew refresher courses.

chapter two, it should have become apparent that Air Force organizations at all levels worship the artifacts (the totems) over the people, resulting in the imbalance shown below:

Modifying the diagrams from the earlier section provides the following as representational of the differences between the Air Force headquarters organization, which is of the cognitive structure, and the field units, which are of the community structure:

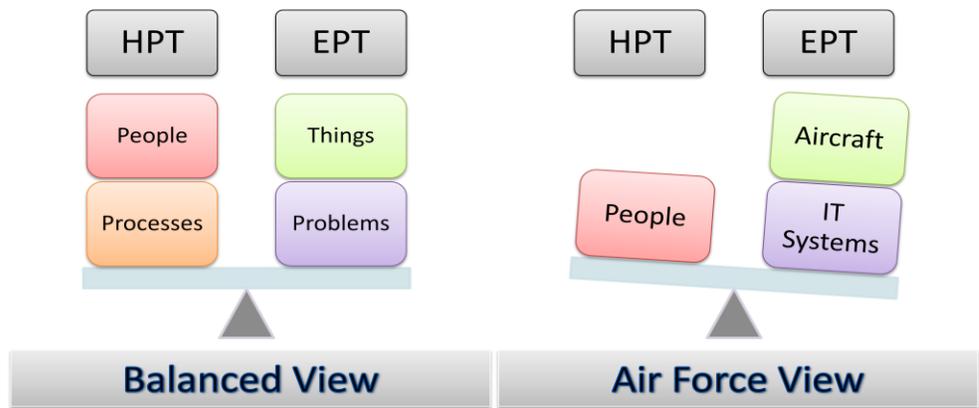


Figure 14 – HPT/EPT and the Air Force

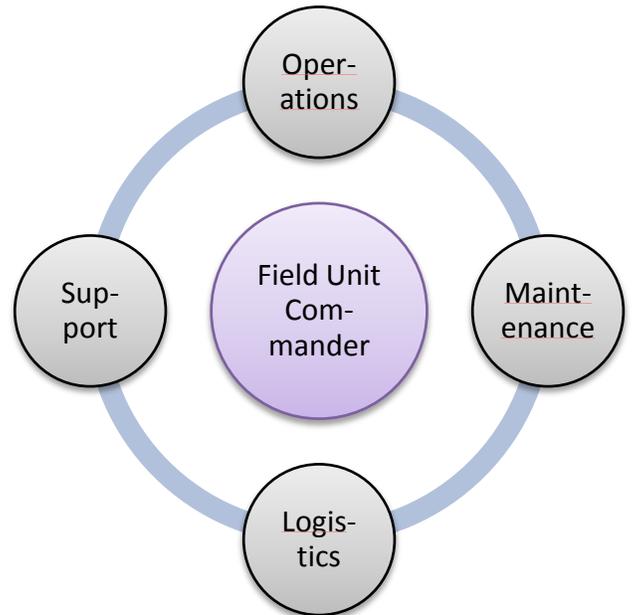
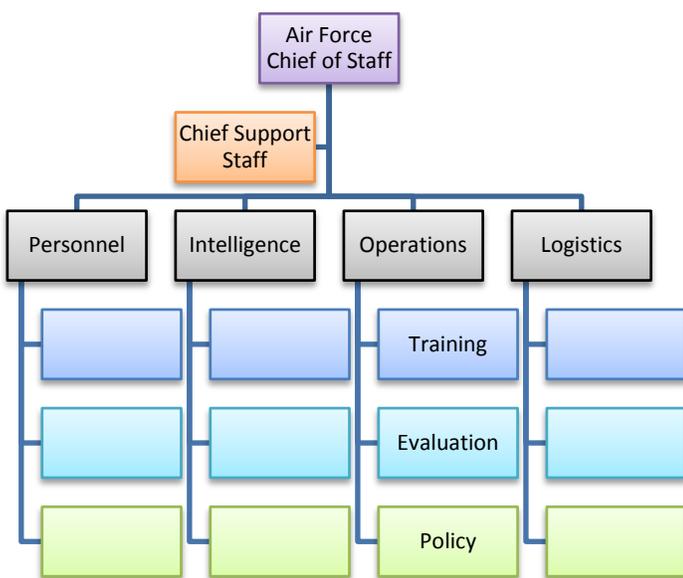


Figure 15 - Air Force HQ and Field Organizational Structures

Note that both the cognitive and community models are used within the headquarters and field for knowledge sharing, just with different overall ratios. At the tactical unit level, the personnel are highly reliant on the community model, whereas at the strategic headquarters level the cognitive model is clearly predominant. While there is still a hierarchy within the field units (it is a military organization, after all), the overall behavior of the organization is less structured and more team-oriented, and as

Vincenti underscores, much of the time solutions to problems comes from the “people in the trenches” with high, self-generated productivity (91). Using Vincenti’s “historian’s approach” and via inductive case studies and presentation of concepts, generalizations can then be made which are applicable to other projects of a similar scope (10).

Process Design Strategies for the Air Force

While the cognitive model of knowledge management has its utility within the Air Force, it is often difficult to take into account the divergent goals and objectives of the subcommunities (Swan, Newell and Scarbrough 273). Likewise, the community model lacks effectiveness at the headquarters level due to the unique needs of the headquarters to have very linear information flow to ensure synchronization of very complex, long-term efforts via bureaucratic process.¹³⁵ Some authors argue that the complexity of military technology drives increasing bureaucracy to handle the associated risk and decision-making factors, creating impediments to organizational change (Segal and Segal; McNaugher).

Perhaps one of the biggest challenges for the Air Force is the recognition that, for a large, geographically dispersed organization, it is extremely difficult to share knowledge when the groups are heterogeneous and the innovation requires interaction (Swan, Newell and Scarbrough 273). However, it is precisely the “sharing of knowledge across organizational boundaries, through using cross-functional and inter-organizational teams, that is seen as the key to effective use of knowledge for innovation” (Swan, Newell and Scarbrough 273).

Vincenti sums up the enabling conditions for innovation as a “fruitful melding” of personal and group ambition, when “talented technical people join in what they see as a demanding and worthwhile task” because the whole can be more than the sum of its parts (91). His figure 7-1 (226) depicts knowledge and generating activities and is very similar to the concepts I have outlined, except in my case “field” and “headquarters” replaces his “scientific” and “engineering” terms. He has the scientific community on one end of the spectrum and the engineering community on the other end, with “combined or interpenetrating activities”¹³⁶ in the middle that overlap and intersect at multiple points

¹³⁵ English cites one author who believes the development of a functioning bureaucracy as the most important military innovation in the sixteenth century, and likewise the greatest military innovation of the nineteenth century was not technological (in the restricted sense) but organizational represented by the general staff concept (134). Drucker, too, believed that an enterprise needs first and foremost a “human organization designed for joint performance,” an effective human organization wherein the individuals work together for a common result (156). The bottom line is that the human element should be at least as important as the technology, and the organizational focus should strive to ensure balance despite the inherent difficulties in the “soft” art of human management.

¹³⁶ The trading zone in Galison’s terminology.

between the communities (Vincenti 226). An unambiguous linking of the groups is required in order to ensure the subcommunities are able to meet within a “trading zone” or sociopolitical location in which those communities can gather to share information (Galison).

In his discussion of these combined or interpenetrating activities, Vincenti identified four subcommunities required to ascertain flying quality specifications,¹³⁷ and noted that successful interaction between the groups required more than just simple cooperation, but rather a dynamic, intertwined group that transcended the subcommunities (76). In a foreshadowing of Galison’s concept of “creole/pidgin languages,”¹³⁸ Vincenti highlights the value of having a “‘translator’ between social systems (or communities)” in order to cross boundaries (84). This concept is reinforced by Swan et al and the need for disparate social communities to have a shared system of meaning so that interactive innovation can take place (Swan, Newell and Scarbrough 270).

A primary consideration is that military bureaucracies consolidate power and authority into the hands of those at the top of the hierarchy, and usually knowledge is considered to be consolidated along with the authority (Spender). However, this is not necessarily the case given that general officers are usually years “out of the cockpit”¹³⁹ and so are frequently out of touch with the current issues affecting the warfighters. One of the arguments of this dissertation is that, if anything, it is an inverse relationship between authority and operational knowledge because of this distance.¹⁴⁰ This relationship is why the difference between community and cognitive knowledge management models is so important to the Air Force, and why methods of crossing boundaries are valuable to the organization.

¹³⁷ Those subcommunities were design, engineering research, instrument development, and test flying (Vincenti 52).

¹³⁸ A “common language” which allows the disparate groups to communicate across their cultural boundaries.

¹³⁹ As the vast majority of general officers in the Air Force are aviators, and the most senior generals are mostly fighter pilots, this turn of phrase is appropriate for describing the separation from a truly operational mindset.

¹⁴⁰ Of course, general officers have a great deal of experiences and expertise, just not necessarily current knowledge of operational systems and requirements that those with daily hands-on experience have.

Conclusion: The Seamless Web

“Technology” is not just artifacts and devices, but is “humanity at work” and all that entails. As such, the social is as important as the technology, and the two co-construct each other. There has been a tendency for the Air Force to focus on the human-machine interface—with preeminence given to the machine—and a number of STS treatments of Vietnam, the Cold War, and even more recent times have highlighted the Air Force’s overemphasis on artifacts at the expense of human processes.

The Air Force must deliberately design its organizational processes for innovation and invention—technological change is not so much about momentum, or deterministic helplessness, as it is about social choices and processes. In order to understand those choices, tools from the STS disciplines provide frameworks for analyzing and assessing the Air Force’s social choices and processes, particularly when leveraging the religious model described in the previous chapter.

Discourse and metaphor are the overarching constructs that produce both “power and knowledge: individual and institutional behavior, facts, logic, and the authority that reinforces it” (Edwards 40). SCOT provides a methodological construct for deconstructing the relevant social groups and their problems and possible solutions, along with a means for discovering closure. The boundaries and balance revealed via HPT and EPT analysis represent the concept of the co-construction of the users and technology, between the “external relations and the meaning of technology” and the “internal structure or nature of technology,” respectively (Mitcham ix). This set of perspectives enables the ontological exploration of the co-construction, while knowledge management concepts provide a model of two types of organizational constructs for innovation and the creation of knowledge as useful to the Air Force.

With these STS concepts and methodologies in mind, I will turn to the case studies and explore the co-construction of the Air Force religion and technology. The case studies are in some respects somewhat detailed; however, “it is only by going down to the ‘nuts and bolts’ level of analysis that we gain insight in the *design* development of technology” [emphasis in original] (Bijker, *Of Bicycles* 10). It is only through conscious design of both the *technology-as-process* and the *technology-as-thing* that the Air Force can effectively maximize and balance both aspects, and come closest to designing the high flight in which a human—not an artifact—can “reach out my hand, and touch the face of God” (Magee).

Chapter 5

Age of the Patriarchs: The Generals and the Gatling

History has shown that it is not technology itself, but how technology has been perceived and used, as guided by doctrine, that has spelled success or failure for armed forces in the past...[and] for doctrine to be useful it must reside in a military culture that can cope with change effectively.

*-Allan English
(157)*

The Gatling gun was the first functional machine gun,¹⁴¹ able to reliably spew hundreds of rounds per minute with the cranking of a handle. Although early models were heavy and cumbersome, requiring a horse- or mule-drawn carriage and a team of soldiers for optimum firepower, from this vantage point in history the Gatling, and follow-on machine guns, offered a clear military advantage. Given that its development occurred in the early days of the Civil War, when the infantry charge was

¹⁴¹ While other machine gun prototypes were developed prior to the Gatling gun (such as the Ager “coffee mill” and Ripley guns), the Gatling gun eliminated most of their shortcomings while maximizing the utility of such a weapon, and is thus generally considered the first true machine gun (Chinn 48). Note that the Gatling was not an “automatic” machine gun as continual manual effort (the cranking of the handle) was involved. Maxim later invented the first automatic machine gun, which reloaded the chamber using the gas pressure from the round just fired, enabling continuous fire by simply holding down the trigger.

often the decisive factor, why did the United States Army¹⁴² not seize upon the Gatling as a way to change *how* to maximize an advantage in war?

The vast majority of widely-adopted machine guns—the Gatling, Maxim, Browning, and Colt—were designed by Americans, but it was not just the United States’ militaries which failed to fully capitalize upon the Gatling and its subsequent competitors, but also other world powers such as Britain and France. Despite skirmishes in African countries by the British (late 1800s), the Franco-Prussian War (1870-71), and even the Spanish-American War (1898-1899), the U.S. Army leadership by and large still did not comprehend the change in warfare brought about by the machine gun until World War I. Even then, it took tens of thousands of casualties before the various generals decided machine guns had changed the established patterns of warfare. The Battle of the Somme alone resulted in over 50,000 British casualties in the first 24 hours due to the German machine gun defensive positions and inability of French and British leadership to react to the new paradigm.¹⁴³

This chapter will review the period from 1862-1918 from the vantage point of the United States Army and its approach to the Gatling gun, with the intent of exploring the cultural perspective of the organization that gave birth to the U.S. Air Force. Starting with its forebear is a worthwhile endeavor for a historical understanding the Air Force’s approach to technology: the sins of the fathers are visited upon the children (King James Bible Exodus 20:5).

¹⁴² The Gatling was predominantly marketed to the North. There is no evidence to suggest that Gatling, or someone pushing an inferior machine gun, sold or tried to sell to the South. Even after the Civil War, the generals did not realize the fundamental change in warfare made possible by the Gatling.

¹⁴³ Over 50,000 casualties are equivalent to “men passing a fixed point in eight hours if marching four abreast in an unbroken column” (A. Smith 208). Note that estimates vary; Crutchley cites the figure as 60,000 (40), while Armstrong and Smith both put it at 57,470 (xi; 208). Also, Smith notes that of those casualties 19,240 were killed (208).

State of War-making in the Late 19th Century

In The Pursuit of Power William H. McNeill discusses the changes in warfare and the tremendous revolution in military technology and tactics that started in the late 1800s. These changes included the Minie bullet, Gatling gun, coincident improvement in national industrial bases, and even changes in the required qualities for soldiers. As the rate of manufacture increased to the point at which “an entire army could be re-equipped about as quickly as soldiers could be familiarized with the new weapon,” the need for smarter soldiers better able to handle the technological changes became more pressing (McNeill 235, 232).

McNeill argues that the U.S. Civil War was the first full-fledged example of an industrialized war, citing the important role of the railroads in supporting the war effort (242). The new railway system coupled with increasing demand for supplies for troops and equipment continued to drive the improvement of the newborn industrial capability of both the North and South. This new capability meant that mobilization was no longer the limiting factor for the conduct of war, but rather the employment of weapons and personnel on the battlefield—that is, tactics.

Despite the large time span covered by his book, van Creveld’s Technology and War substantiates that war-making was fairly static until the 1800s, when technological change began altering the conduct of war. He takes care to provide the reader with a convincing argument, such as when describing the density of combatants on the battlefield (173), or the problems of ammunition supply chains with the rapid firepower of the Gatling gun (175). Van Creveld provides a deliberate look at technology and how it impacted war making, which he sums up as

Technology does not just represent an assemblage of hardware but a philosophical system. As such, technology affects not only the way war is conducted and victory is sought, but the very framework that we use for thinking about it. (van Creveld 232)

It is in the way one thinks about war-making technology and how best to employ it that tactics are developed. As Perry Jamieson notes, the Gatling is an excellent example of “technology outrunning tactical theory” as the Army was uncertain how to employ the new weapon, or how to fit it in with current tactics and doctrine (79). Throughout his book, he asks many questions that seemed unanswered by the U.S. Army prior to World War I: is the Gatling gun artillery or ordnance? How/where do they fit into the Army? What about tactics? What new logistical issues should be addressed organizationally?

The Civil War

Dr. Richard Gatling developed his namesake gun when he observed the many wounded returning from Civil War engagements. His comment—one hopes made without cynicism—was that the possession of a gun capable of continuously firing hundreds of rounds per minute would reduce the number of men required to fight and exposure to disease due to the killing power (qtd. in Wahl and Toppel 12). A clever inventor—he made his original fortune with the development of the seed drill, and registered numerous patents—he set to work and by November 4, 1862 had a patent and working model of the first reliable, functioning machine gun. The crank handle rotated the firing action around six fixed barrels, and a hopper on top of the weapon kept it fed with fresh cartridges. It was easy enough to use that a well-dressed individual in coat and top hat could operate it, although on the battlefield the Gatling gun generally required a team to move, aim, reload, and fire. In 1862, Gatling sent a letter to the Army Ordnance Department in hopes of encouraging tests of his gun and eventual adoption by the Union.

Brigadier General James Wolfe Ripley, the Army Chief of Ordnance (1861-1863), was by all accounts a careful and methodical career soldier—a priest, in other words, and as Chief of Ordnance a high priest. By 1861, he had nearly a half-century of experience as an ordnance officer, much of it based on dealing with tight budgets and expansive regulatory guidance. During this period, inventors were expected to petition directly to the military for test and evaluation of their inventions, and most of these solicitations were to the Ordnance Department.

Apparently due to his small staff, coupled with the high-volume of snake oil salesmen mixed in with the well-meaning inventors, General Ripley's written intent was to ignore correspondence and instead focus on maintaining the procurement and fielding of weapons already in the system (United States War Department [USWD] Ripley to Secretary of War Cameron, June 11, 1861, Series 3, Volume I, 264-65 and 292). While reducing workload and preventing a plethora of mismatched weaponry, it also resulted in very few opportunities to capitalize on new technological developments. General Ripley's office did respond to Dr. Gatling's solicitation, but simply to point out that the Ordnance Department had no direct knowledge of the weapon and therefore was unable to express an opinion relating to its value (U.S. National Archives [NA] Letters Endorsements and Reports to the Secretary of War 1812-89, Vol 14, 31). A subsequent meeting between Gatling's representative and Ripley produced a "point blank" refusal by Ripley to evaluate the Gatling gun (Chinn 50).

In addition to efforts to stir interest from the U.S. Army, Dr. Gatling tried some novel approaches such as putting on a demonstration for the town of Indianapolis, and amazed thousands along with the

governor of Indiana with the weapon's ability to expend munitions. However, the limited reach of the governor afforded no help to Gatling in obtaining official interest in the weapon.¹⁴⁴ The only real success (and limited at that) was General Benjamin F. "Beast" Butler of the Army of the James. In 1863, he bypassed the Army Ordnance office and bought 12 Gatlings on his own along with 12,000 rounds of ammunition (A. Smith 12). While used during the siege of Petersburg, they were less than fully effective due to a lack of tactics and training, and the Army Ordnance Department refused to purchase any additional ammunition for the weapons, rendering them useless once the initial quantities were expended (A Chat with Dr. Gatling).

After the retirement of Ripley, in early 1864 Gatling wrote President Lincoln and requested an opportunity to demonstrate the Gatling gun—the invention of which Dr. Gatling referred to as "providential" for quickly "crushing the rebellion" (qtd. in Chinn 52-53). However, with the stresses of the war and a re-election, it appears Lincoln took no direct action on the request. Gatling remained determined but at this point unsuccessful in finding a patron for the Gatling gun; by the end of the Civil War, only a few Gatlings had been purchased and no priest or prophets had yet embraced this harbinger of change.

Why the lackluster response to a potentially decisive weapon? Regarding Gatling, there were rumors about his membership in the Order of American Knights, a group of Southern sympathizers, although the references are only in passing and no substantiation has surfaced (USWD Series 2, Volume 7, 298 and 342).¹⁴⁵ Further, Gatling was a novice in the machinations of Federal bureaucracy, and the lack of modern lobbyists was no doubt a serious hindrance to obtaining even a chance to prove the weapon's worth.

The Army itself was already in a state of disarray, with multiple calibers, types of weapons, and dissimilar equipment to the point where it was very difficult to equip units uniformly. The budget crunch was also a sore spot, with the huge expenses of fighting a war, and then the costs of Reconstruction immediately following the cessation of hostilities—and who wants to pay for new Army equipment with an expensive war just won? This prevalent mindset explains much of the period between the end of the Civil War and the Spanish-American War (1865-1898).

¹⁴⁴ The governor wrote a letter to Mr. Watson, then the Assistant Secretary of War, but no apparent response was forthcoming (Chinn 48).

¹⁴⁵ After all, if he were really that much of a Southern sympathizer, why weren't any Gatlings sold (or attempted to be sold) to the South? Instead, Gatling expended much effort to sell his weapon to the North.

Reconstruction

With the arrival of a new Chief of Army Ordnance, General Alexander B. Dyer,¹⁴⁶ Gatling finally got approval for formal testing of his invention, and by January 1865 the latest model of the Gatling gun was tested at the Washington Arsenal. With four barrels this .58 caliber Gatling weighed 224 pounds, the carriage another 202 pounds and the limber yet another 200 pounds.¹⁴⁷ The overall test went very well, with some 300 rounds fired and very good accuracy noted out to 500 yards. Lieutenant Maclay, in charge of the testing, was overall impressed with the weapon although noted several areas for improvement in order for the weapon to have maximum battle effectiveness¹⁴⁸ (NA Reports of Experiments 1826-71, Vol 98, Entry 70).

Several weeks later, after an official demonstration attended by Generals Hancock¹⁴⁹ and Dyer, an order for twelve Gatlings was made by the Ordnance Department for the First Corps, along with two experimental one-inch Gatlings for flank defense (NA Letters, Endorsements and Reports to the Secretary of War 1812-89, Vol 15, 268). Flank defense is the protection of forts from ground assault, a new potential role for the Gatling advocated by General Dyer after seeing the demonstrations.

In the summer of 1866, additional tests of the Gatlings were ordered. Captain Baylor was placed in charge, and tasked with comparing a rifled one-inch Gatling against a smooth-bore 24-pound howitzer. Baylor went above and beyond the testing regimen, conducting tests on the durability of the Gatling by removing all oil and leaving it out in the rain for two days before taking directly to the range and firing. He also gave some minor consideration to machine gun tactics, noting the continuous barrage nature allowed no time for the enemy to advance between discharges (NA Reports of Experiments 1826-71, Vol 98, Entry 78).

The Ordnance Department—despite the abrupt and continuing reduction in funding—ordered 100 Gatlings in two models based in part upon Baylor's tests. This was a bold move considering the rapidly diminishing budget of the Ordnance Department—its 1865 \$43.1 million budget was slashed to \$16.5 million in 1866 and by 1870 the budget was down to \$2.4 million, or roughly five percent of the war-time amount (Armstrong 43).

¹⁴⁶ Dyer was Ordnance Chief from 1864-74.

¹⁴⁷ "Limber" is "a two-wheeled vehicle to which a gun or caisson may be attached" (Webster's). The Gatling was fitted to its carriage, which allowed vertical and horizontal movement of the weapon, and the carriage then set into the limber. The limber also carried, depending on model, about 10,000 rounds of ammunition.

¹⁴⁸ Suggestions included adjustments to the rifling twists, better rear sight, improvements in weight distribution (NA Reports of Experiments 1826-71, Vol 98, Entry 70).

¹⁴⁹ General Hancock was building the First Army Corps of Veteran Volunteers and was very influential.

In the 1870s, the downsized and fiscally constrained U.S. Army still had not found a home or a battlefield role for Gatlings. As David Armstrong puts it, there was “an absence of an intellectual and bureaucratic apparatus within the military that could make an *organized response to change*” [emphasis added] (51), and George Chinn argues that “old-line military men were still not inclined to accept anything as revolutionary as the Gatling” (58). This complacency explains the lack of tactical employment doctrine for the Gatlings—during this period, there were no credible tactics schools or other formal organizations composed of operational thinkers integrating divergent weaponry into a cohesive synergistic effort. Reviews of available documentation, writings in military journals, and other sources provide scant information on employment methodologies for the Gatling.

There were little new tactics developed for the Gatling or other machine guns throughout the remainder of the century. Aside from an occasional reference, such as the U.S. Army 1874 artillery manual which included some Gatling gun defensive drills, there was little organizational recognition of the Gatling or its capabilities; however, the manual lumped the Gatling in with other artillery pieces and limited its role to defensive emplacements. Custer refused to take Gatlings as they might’ve slowed the horses down (A. Smith 74),¹⁵⁰ the machine gun massacres of African natives weren’t considered ‘real’ warfare,¹⁵¹ and the fantastic French failure with the *mitrailleuses*¹⁵² (Armstrong 60-61) all underscore an almost worldwide blind spot regarding machine guns.

There were advances in the hardware itself, such as Hiram Maxim’s truly automatic machine gun, which in 1884 he designed in England.¹⁵³ Continuing improvements to the reliability, mobility, and design of the Gatling resulted in an excellent weapon and it remained the U.S. Army’s primary machine gun until 1903.¹⁵⁴ Other machine guns were developed and fielded sporadically by the U.S. Army, although the Gatling remained the standard to which all others were compared.¹⁵⁵

¹⁵⁰ Note that historians and tacticians are uncertain whether Gatlings would’ve made a difference at the Last Stand, due to the undisciplined manner in which the Indians fought (i.e., no infantry charge but rather guerilla-style tactics).

¹⁵¹ Rather than learning from these engagements and developing tactics for future warfighting, the British (and other imperial nations) simply ignored the lessons. The Brits did have a little cadence about it though: “Thank God that we have got, the Maxim gun and they have not” (qtd. in Ellis 18).

¹⁵² Ramping up to the Franco-Prussian War, the new French machine gun was kept in such utter secrecy that the troops generally had no training, and therefore no tactics were developed. It resulted in the war-winning secret weapon being a hideous failure and readily relegated to “bad idea” status—but due to decisions by the generals, not because of the weapon’s failure.

¹⁵³ Note that Maxim was an American residing in England. In *The Social History of the Machine Gun*, John Ellis posits some explanations for why Americans were so successful at developing these weapons (ch. 2).

¹⁵⁴ The Gatling was officially retired from U.S. Army service in 1911.

¹⁵⁵ In September 1881, Gatling published a challenge in an English periodical (*Army & Navy Journal*) proposing wagers against all comers as to the firing rate and accuracy of the Gatling gun (Chinn 58).

The Spanish-American War

In 1898 the Spanish-American War broke out, and ambitious Army Lieutenant John Henry Parker became the leading prophet¹⁵⁶ of machine guns in general and Gatlings in particular. While the U.S. Army at large still disregarded Gatlings as a viable infantry weapon or artillery, Parker went to great lengths during the Santiago campaign to demonstrate their value. He had exceeding difficulties in convincing the commanding generals to authorize his experimental Gatling Gun Detachment, and in obtaining the logistics and support required to employ the Gatling in combat.

John Henry Parker was one of the very first believers in the capability of the Gatling, and is credited with being the first to develop tactics specifically for the Gatling and devise methods of employment on the battlefield.¹⁵⁷ In his book The Gatlings at Santiago (With a Few Unvarnished Truths about that Expedition) he discusses his methodical use of the Gatlings on the battlefield and their successes. The text starts with a rousing tribute by Theodore Roosevelt of the Rough Riders, describing the clear advantage the Gatlings provided to the front lines of battle. This battle-forged friendship of Lieutenant Parker with the soon-to-be President enabled Parker to push machine gun tactics further than he may have otherwise been able, although he was still limited in his ability to effect change.

There also appears to be a bit of careerism involved in his crusade, as he continuously pushed for a separate machine gun arm within the Army, commanded by someone with vision, foresight, and the courage to get the job done.¹⁵⁸ Many of his ideas were ahead of their time; for example, his underlying tactical strategy for the employment of the Gatling was independent rapid mobility—a concept the present-day U.S. Army is trying to embrace. Parker did manage to get a small (28-man) detachment authorized, along with four Gatlings, mules, and ammunition.¹⁵⁹ Parker had to go through or around General Wade, General Lee, General Sumner, and General Chaffee in order to prove the value of the Gatling (Parker, Gatlings).¹⁶⁰ General Shafter was one of the few high priests that supported the experiment, and in one case had to be physically present so Parker could requisition the mules and equipment.

¹⁵⁶ Parker was not a prophet-priest, as his status as a lieutenant made him an acolyte in training, rather than a full member of the priesthood. In many ways, this likely contributed to his ability to accept the prophetic vision; usually, prophets spring from the laity, and as a very junior officer, Parker was likely not fully assimilated into the priesthood. He is clearly a prophet; to quote Theodore Roosevelt, “[Parker] had the rare good judgment and foresight to see the possibilities of the machine guns” (166).

¹⁵⁷ For example, designing methods of linking up dynamite guns with the Gatlings for better effect.

¹⁵⁸ The additional requirement of having the initials “JHP” was barely left as an exercise for the reader.

¹⁵⁹ Major General Shafter, 5th Corps Commander, authorized the establishment of the Gatling Gun Detachment. Lieutenant Parker reported directly to General Shafter.

¹⁶⁰ This list only includes general officers. The list of lesser officers would consume too much space.

The Gatling Gun Detachment as reported by Parker and others contributed substantially to the Santiago campaign and to the body of knowledge on machine gun tactics.¹⁶¹ Additionally, Parker's success resulted in the Army finally taking some interest in Gatling guns and their possible contribution on the battlefield, some 36 years after General Butler used them at Petersburg (Chinn 59). Still, between the end of the Spanish-American War and the start of the Great War, Army leadership—the priesthood—marginalized the Gatling.

World War I

The Great War saw a number of “firsts” such as the use of chemical weapons on a battlefield, the invention of tanks,¹⁶² and defensive lines created by machine guns resulting in trench warfare with nearly 9,000,000 soldiers killed. Some of the excessive casualties were caused by the use of “Civil War style” rank and file charges straight into machine gun emplacements, resulting in heavy losses—as late in the war as June 6, 1918 the U.S. Army's 4th Marine Brigade lost 1,087 officers and men due to such foolhardy tactics (Eisenhower 142-144).

Germany was better prepared for trench warfare and quicker at deploying and using machine guns as an infantry weapon, having capitalized on lessons learned at the turn of the century (Chinn 146-149).¹⁶³ The German's ability to embrace the machine gun and develop useful tactics for it stemmed from a lack of organizational resistance and prejudice toward the new weapon, in part due to the rapid expansion of the German army in the early 1900s (Armstrong 173-175). As one benchmark, in 1908 the U.S. Army's American *Field Service Regulations* made no mention of machine guns, while the 1908 equivalent German manual, *Felddienst Ordnung*, had an entirely new organizational construct meant to maximize the weapon (Armstrong 174).

Due to limited U.S. participation in the Great War, American data on machine gun manufacture and use is lacking.¹⁶⁴ However, the British machine gun manufacturer production numbers are as follows (A. Smith 196):

¹⁶¹ Parker also managed to impress Teddy Roosevelt of the Rough Riders, and John T. Thompson an ordnance officer and later the inventor of the Thompson submachine gun known as the Tommy gun.

¹⁶² Tanks were developed late in the war, primarily as a response to the trench warfare stalemate brought about by the machine gun (Ellis 168).

¹⁶³ Additionally, LtCol George Chinn, USMC, stated that “true to the German military tradition, they sought to build tomorrow's weapons today. In contrast, it has always been our custom to build yesterday's weapons soon” (149).

¹⁶⁴ U.S. Congress declared war in 1917, the war ended in 1918.

	1914	1915	1916	1917	1918
Vickers	266	2,405	7,429	21,782	39,473
Lewis	8	3,650	21,615	45,528	62,303
Hotchkiss		9	4,156	12,128	19,088
TOTAL	274	6,064	33,200	79,438	120,864

Table 2 - British Machine Gun Production 1914-1918

Clearly, it did not take long into the war for the British generals to figure out that machine guns had changed *how* wars were fought, and to frantically ramp up production to meet the need.¹⁶⁵

Crutchley called the machine gun “the most deadly of weapons” during World War I (15), and machine guns caused an incredible number of casualties—Lloyd George, the British War Secretary during WWI, estimated that during the war almost 80% of their casualties were caused by machine guns (Ellis 142). The U.S. Army’s Major General Robert Lee Bullard, commander of IV Corps in 1918, recognized the power of the machine gun: “artillery fire is not what kills men; it is the machine guns” (qtd. in Eisenhower 168). Finally, after decades and tens of thousands dead, the high priests recognized the revolution in warfare brought about by the Gatling.

¹⁶⁵ Note that in 1918 more machine guns were produced than in all the previous years combined.

The Gatling and STS

As outlined in chapter 4, I will use analytic tools from the science and technology studies (STS) discipline to explore the co-construction between the people and the technological artifact, in this case the social groups involved with the Gatling gun and the problems and issues the weapon was touted as solving. Additionally, the difference in attitude between the cavalry commander, interested in performance and employment out in the field, and the headquarters staff, concerned about durability of equipment, service life, and logistical support, highlight the divergence in goals and requirements between organizations within the U.S. Army (Armstrong 55, 73-74, 211)—a divergence which continues today in the Air Force.

The Gatling and the Humanities Philosophy of Technology

Recalling that the humanities philosophy of technology (HPT) perspective focuses on “the attempt of religion, poetry, and philosophy to bring non- or transtechnological perspectives to bear on interpreting the meaning of technology” (Mitcham 39), in this section I will focus on the social interactions and wider context surrounding the Gatling gun. A focus on the actual characteristics and issues surrounding the weapon itself will be covered in the section on the engineering philosophy of technology (EPT) perspective.

Armstrong posits the reason so few military leaders recognized the potential of the machine gun prior to 1900—despite their successes against primitive peoples—was due to the conclusion from the Franco-Prussian War: machine guns were not practical as an offensive weapon except when enemy artillery was inferior (65 and Note 44). This erroneous conclusion did not properly analyze the shortcomings of the French *mitrailleuses* and the underlying reasons for that debacle. In addition, machine guns were not considered to be proper civilized arms in the day of cavalry charges and the heroism of the infantry soldier (A. Smith 113-114).¹⁶⁶ In 1863, a correspondent during the height of the Civil War commented on the soldier’s approach to machine guns:

But soldiers do not fancy it. Even if it were not liable to derangement, it is so foreign to the old, familiar action of battle—that sitting behind a steel blinder and turning a crank—that enthusiasm dies out; there is no play to the pulses; it does not seem like soldier’s work. (qtd. in Wahl and Toppel 10)

The British Cavalry Training Manual of 1907 stated: “it must be accepted as a principle that the rifle, as effective as it is, cannot replace the effect produced by the speed of the horse, the magnetism of the

¹⁶⁶ Additionally, Smith notes that the invention of the submarine was met with similar attitudes (169).

charge, and the terror of cold steel” (qtd. in Ellis 55). Even by the Battle of the Somme in July 1916—two years after the war started—the generals had still not learned that machine guns had changed the nature of war, and hence sent waves of troops across the deadly ground toward the German machine gun emplacements.

Discourse & Metaphor of the Gatling from the HPT Perspective

The themes of technique, technology, experience, language, and metaphor as described in chapter 4 are the analytic tools for reviewing this case study, first from the HPT perspective, and later from the EPT perspective. Techniques are those activities and methods used to implement change or move a controversy toward closure—the principles and practices used by social groups to accomplish an objective. In the case of the Gatling gun, its inventor used the technique of multiple approaches and a salesman attitude to press for adoption of his firearm with a prophetic zeal.¹⁶⁷ When the Army Chief of Ordnance rebuffed his direct approach, Gatling tried other avenues such as writing to President Lincoln and selling Gatling guns to “Beast” Butler on the side. Gatling was apparently an earnest and convincing individual, a New York Times interviewer said that “the irresistibility of its inventor” caused one to acquire an “inclination to draw his wallet and buy as many of the Gatling guns as he can pay for” (A Chat with Dr. Gatling). Other examples of work-arounds include an anonymous letter to the editor suggesting possible uses for the Gatling guns—it is suspected that Gatling penned the missive (Wahl and Toppel 21). Likewise, the Army prophet John Henry Parker pressed hard for adoption of the Gatling as a new weapon of choice, using multiple approaches and demonstrating exceptional persistence in getting the Gatling Gun Detachment out in combat.

The priests, on the other hand, used technologies—in this case, processes—to undermine the possibilities of the Gatling. Ripley used the military bureaucracy¹⁶⁸ to sideline the Gatling and prevent any testing or evaluation of the weapon—his “response to procurement problems was to solve them following precedents, regulations, and laws of the prewar Ordnance Department” (Armstrong 11). The Ordnance Department’s correspondence to Gatling denying any knowledge of the weapon and therefore being unable to evaluate its utility was specious; since the Army Ordnance office had to test and evaluate all proposed new weapons, how would the Army *or* the Ordnance office have knowledge of the weapon unless they were to test it? The result was a chicken-egg conundrum which effectively

¹⁶⁷ While Gatling was not an official member of the Army, the military religion model applies due to his strong influence on the organization. Therefore, his tenacity, fervor, and belief in his revolutionary weapon align him with the organizational role of prophet.

¹⁶⁸ A “process” form of technology.

slow-rolled adoption of the Gatling—apparently Ripley’s goal all along. In an 1891 interview, Gatling called Ripley the “most perfect old fogey that ever lived” and recalled Ripley as categorically against “any new-fangled guns”¹⁶⁹ (A Chat with Dr. Gatling).

By and large in the U.S. Army of the late 19th century, high priests were allowed free rein in their departments, and Ripley was responsible for a three year delay in the adoption of machine guns (and the Gatling in particular) into the U.S. Army. Even into the Reconstruction period, dwindling funding levels and a lack of Gatling guns and ammunition for practice resulted in poorly trained troops and a lack of tactics (NA Document #3397, Major H. C. Cook to Assistant Adjutant General, Department of the Missouri, November 13, 1889). During the Spanish-American War, Parker lists many of his difficulties in cutting through red tape to get the Gatling Gun Detachment the equipment and supplies necessary.

Clearly, the experiences—the lessons learned by individuals or social groups that shape their resultant behavior and beliefs—of Gatling and Parker in pursuit of the Gatling shaped their subsequent actions. Persistence and patience seemed to be the chief lessons of both these individuals; in Gatling’s case waiting for the retirement of a roadblock (Ripley—who was “trained by all of his experience to resist change” (Armstrong 26)) resulted in Dyer, a more “wideawake” replacement, as the Chief of the Ordnance Department (A Chat with Dr. Gatling). For Parker, constant repetition of the vision for the Gatling Gun Detachment at long last resulted in success for his mission.

Language conveyed an understanding of the Gatling and its possibilities—Major Bosbyshell, in his narrative on the 48th Regiment, poignantly described a determined Unionist woman “with all the ferocity of a Gatling” heaping scorn upon a clergyman with “Rebellionitis” in 1863 (Bosbyshell 134). John Davis Billings described muledrivers around 1864 unleashing a “Gatling gun of curses” coupled with the “Black Snake” (whip) to encourage the best performance from the cantankerous mules (Billings 286). Another instance of language is when Ripley called the “vast variety of new inventions” a “great evil”—firmly establishing his view of new weapons via a religious connotation (qtd. in Armstrong 13). In other uses of language, Gatling recalls Ripley as saying “there’s nothing like handling a ramrod in the face of the enemy to give men courage and nerve” (A Chat with Dr. Gatling), and the concept of heroic measures and character under fire is reflected in many of this era’s letters and documents.

Metaphor in the form of the military religion model was a key part of the issues and controversy over the utility of the Gatling gun. U.S. Army generals—and others worldwide—clearly failed to

¹⁶⁹ As Bernard Brodie quipped, there is a “traditional reluctance of the military professions to be killed by anything but traditional weapons” (108).

comprehend the dramatic change in warfare marked by the arrival of the Gatling gun, and the priest class did what priests do best: enforce the existing structure and doctrine. While some generals, such as “Beast” Butler and Dyer,¹⁷⁰ seemed to recognize something different about the Gatling, they mostly tried to incorporate it within the existing doctrine and framework as priests are wont to do. While occasionally a prophet—such as John Henry Parker—tried to present a new revealed truth, the high priests (and hence the higher headquarters) either never heard or disregarded the message.¹⁷¹ The laity largely ignored the Gatling instead keeping to traditional methods of warfighting and resisting non-prophetic change—and too few prophets arose with good tidings. Beyond organizational roles, the Gatling (and other machine guns) were viewed as a somewhat profane, rather than a sacred, object—occasionally resulting in negative rites being established. The new weapon was “merely killing for the sake of killing. Where was the luster in merely mowing down an enemy? ...it could kill, but was not a proper instrument of war” (A. Smith 169). Anthony Smith even quotes some officers during pre-1914 maneuvers as telling the troops “put that thing to one side, lose it somewhere; do anything with it save involve it in the action” (169). The military religion’s organizational ethics—in particular the preferred attitude toward war and the approved ways of fighting—did not recognize the machine gun as an ethical way of warfighting, and the strong identity of the infantry and cavalry men (and it was men) with their respective organizations also caused resistance to the new weapon.

The machine gun demanded a rethinking of old orthodoxies about the primacy of the final infantry charge (Ellis 17)—a most sacred act—and many priests either did not recognize the significance of the new weapon or tried to ignore it, instead clinging to their identity with the old Army and the mystery and purity of heroism and charges and rebirth in the fires of war.

Outcomes of Discourse & Metaphor from the HPT Perspective

The stalling of the adoption of a significant technology was the net result of the discourse and metaphor from the HPT perspective. While the proponents of the Gatling gun worked hard to press their vision, the entrenched and powerful priesthood actively used elements of discourse to their advantage to derail the heretical message. Even with the support of the occasional high priest—such as Dyer and Shafter—the laity continued to support the majority of the high priests and resist the new beliefs. An entrenched mindset, reinforced by existing dogma and doctrine, implied that salvation was

¹⁷⁰ Perry Jamieson notes only four generals (all Union) as showing any interest in machine guns during the Civil War: Porter, Hancock, Butler, and Geary (15).

¹⁷¹ Parker continued to preach his message throughout his career, eventually rising to the rank of Colonel, and receiving the Distinguished Service Cross with three oak leaf clusters for heroism in the Great War. He apparently earned nothing for his efforts in Cuba or with the machine gun (A. Smith 161).

possible using the existing, time-tested methods thus causing the rejection of new possibilities because they did not align to the expectations of the Church. In the words of Army officers after the Civil War, the “old prejudiced fogies” seemed to want to “preserve the difficulties of the profession” with the resistance coming from “the bulk of the old officers aware of having to learn new things” (qtd. in Jamieson 18).

The Gatling and the Engineering Philosophy of Technology

Mitcham defines EPT as “analyses of technology from within, and oriented toward an understanding of the technological way of being-in-the-world as paradigmatic for other kinds of thought and action” (39) and in this section I will turn attention toward the characteristics and issues of the technological artifact—the Gatling gun—itsself. The Gatling gun was actually an excellent performer—when given the opportunity to compete in a fair contest, it was clearly superior to howitzers, the Coffee Mill gun, and other possible contenders. However, it took years for the U.S. Army to finally adopt it, additional years for rudimentary tactics to be developed, and the value of the machine gun was still underestimated going into the Great War.

Discourse & Metaphor of the Gatling from the EPT Perspective

One of the ways in which techniques shaped the EPT discourse was in the testing of the Gatling gun. As its inventor recalls, in the 1866 testing the Army officers—the priests—had planned to demonstrate the greater effectiveness of their preferred weapon (the howitzer) against the Gatling gun. Gatling recalled that while they had experienced, hand-picked men on the howitzers, they had assigned “plantation darkies, raw recruits just in from the farm” to run the Gatling gun (A Chat with Dr. Gatling). After spending an hour training his novice gunnery crew, “those fellows worked like heroes. I beat the howitzers four to one” resulting in an order for 100 Gatlings—the first real order from the U.S. Army (A Chat with Dr. Gatling). The Army priest’s technique clearly backfired, proving the utility and ease of use of the Gatling rather than resulting in its relegation to the dustbin of history.

Technologies shaped the discourse in several ways, but the primary one I will highlight is the multiple calibers of the Gatling gun. Gatling in the 1891 New York Times interview admitted that the constant changes in calibers caused difficulty in turning a profit on his weapon, due to the endless re-patterning and retooling of machinery to deliver a Gatling gun in the caliber desired (A Chat with Dr. Gatling). The variety of calibers also made logistics more difficult for the U.S. Army in supplying the Gatlings it did acquire. The initial order for 100 Gatlings was for half at .50 caliber and half at one-inch

caliber, resulting in a lack of interchangeability and underscoring the lack of doctrine on how the new weapons were intended to be employed.

The 1866 Gatling would have been a much better weapon if Lieutenant Maclay used his experience and expertise to aid in the gun's design and manufacture from the beginning, rather than listing caveats to the utility of the final product discovered during testing. When requirements work in close concert with development, and the processes for adoption and integration of new technology are firmly established, there is much greater opportunity for a successful development and fielding—and with appropriate tactics and training. The Gatling gun demonstrates the shortcomings when experiences of appropriate individuals or social groups are not fully employed during the design and engineering of an artifact, but shoehorned in after the fact. Additionally, a complaint about machine guns, to include the early models of the Gatling, was that they were prone to jamming and otherwise unreliable. Interestingly enough, no such complaint was recorded from the public spectacle at Indianapolis or the Coffee Mill Gun demonstration for President Lincoln, or various other machine gun tests. The lack of experience and expertise—i.e., training—on the part of the line soldiers contributed to ineffective use of the weapon and this shortcoming should be attributed to the Army leadership for lack of such training,¹⁷² rather than flaws in the technological artifact itself. As late as 1898 and the Spanish-American War, Parker still had to “instruct men in the art of feeding the guns” while moving to engage the enemy, due to lack of prior training or experience (Parker, *Tactical* 40-41).

Unfortunately, confusing language over whether the Gatling was for point defense, an artillery piece, or an infantry weapon contributed to its lack of acceptance; for instance, while an 1874 artillery manual included Gatling gun drills, there was disagreement over their battlefield utility (Jamieson 16). With every branch of the Army uncertain how to adjust tactics based on new weapons, the machine gun had trouble finding its place; as the 1896 tactics manual said “the role of the machine gun on the battlefield is not yet determined,” a repeat of the 1891 language (Jamieson 16, 81). All this confusion despite the report language from the May 1868 tests of the .50 and one-inch caliber Gatlings; the testing Board stated that the gun tested by them “had no superior” (qtd. in Chinn 55).

The military religion model played a pivotal role in the EPT discourse of the Gatling gun. While the Gatling was fine for mowing down hundreds of primitives with spears and facepaint, the disdain of the high priests ensured a lack of enthusiasm from the laity despite the positive results from a number of tests. The high priests were able to use their position within the organization to prevent adoption of

¹⁷² As late as the 1870s, the local commander decided the instruction, training, organization, and equipping issues for the Gatlings (Parker, *Tactical* 50-51).

the “new-fangled gun” while the laity, in part due to a lack of doctrinal development,¹⁷³ seemed to go along with the majority of the priests. The power of the Gatlings was not salvation; rather, they were perceived as a profane object not suited to civilized combat without any priestly acceptance of evidence to the contrary. Even the occasional prophetic vision, such as the one on San Juan Hill during the Spanish-American War, was not sufficient to bring about lasting change to the Army religion.

Heroism, a cultural manifestation of the military religion model, was dying as well on the battlefields. Ellis characterizes World War I as “a war in which heroism was in fact irrelevant” (142), highlighting the mechanistic and impersonal death caused by the machine guns. The decades-long reluctance of the U.S. military forces to adopt the machine gun is also tied to another cultural manifestation, that of gender roles. As Pacey defines virtuosity and need values, the former is about warriors while the latter about support—the Gatling gun can be seen as falling into the support or feminine roles because it was considered an oddball artillery or point defense weapon rather than part of the mainstream cavalry or infantry. The result of this cultural gender assignment was extraordinary difficulty for the organization in recognizing the potential of the Gatling.

Outcomes of Discourse & Metaphor from the EPT Perspective

Despite successful testing of the Gatling gun on a number of occasions, the U.S. Army was still reluctant to fully embrace the new weapon, or to develop doctrine and tactics for its employment on the battlefield. Although in 1866 the Army purchased 100 Gatlings, over three decades later during the Spanish-American War they were still not integrated into the warfight, nor into the Army’s doctrine and holy scriptures—even the ammunition necessary to use the weapon was in short supply, another indicator of the profane status of the Gatling.

George Chinn states that there was no military demand for the weapon, as the Army leadership “condemned” machine guns as requiring too much ammunition for practical use (39)—clearly, the high priests were creating negative cults associated with the weapon. Even those who seemed to be favorably impressed by the new weapons tended to limit the possible roles; either the Gatlings were artillery support, or “special objectives”,¹⁷⁴ but the real utility of the Gatling gun—as an infantry weapon—failed to be recognized (Chinn 54). Outside pressure or events are usually necessary to change the position of the Church by shaking up the priesthood enough to accept a new revealed truth. As Armstrong summed up the situation: “the army lacked the bureaucratic, fiscal, and above all the

¹⁷³ Recollect from chapter 3 that lay intellectualism requires established doctrine. Mundane military doctrine—such as battlefield employment of weaponry—was not well developed at the time of the Civil War.

¹⁷⁴ E.g., bridge defense.

intellectual capacity needed to recognize, explore, and exploit the potential of novel weapons” (ix). With an insufficient number of prophets to spread the message, the Gatlings languished until the cataclysmic events of the Great War.

The Gatling Gun and the Social Construction of Technology

Identification of the relevant social groups underpins the social construction of technology (SCOT) analytic methodology (as described in chapter four)—these social groups are those in which “all members... share the same set of meanings, attached to a specific artifact” (Pinch and Bijker, Social 30). As Ellis puts it, “the general aspirations and prejudices of particular social groups are just as important for the history of military technology as are straightforward problems of technical efficiency” (9). The matrix below captures the primary social groups, and their goals, key problems, and associated artifacts.

Social Group	Goals	Key Problems	Artifacts ¹⁷⁵
Prophets (Dr. Gatling, Parker)	Embed Gatling gun technology within the U.S. Army’s processes, tactics, and doctrine	Bureaucratic inertia, oppositional groups, funding issues, lack of high priest support	Gatling gun
Priests (Opposing) (Ripley, Sumner, Chaffee)	Maintain existing structure, reduce churn and turmoil for troops, preserve mystery and purity of warfighting	Constant clamor for attention by inventors, funding issues	Bureaucratic processes
Priests (Supporting) (Dyer, Shafter)	Find best solutions for modern Army, weed out poor solutions, support ideas or subordinates	Funding issues, desire for good weapons	Gatling gun, bureaucratic processes
Laity	Support existing doctrine and organizational structure/stability, continue traditionalism, support the priests	Salvation on the battlefield, success in war	Bureaucratic processes

Closure in the case of the Gatling gun was primarily achieved via redefinition. The very nature of war changed dramatically, proving out the prophetic visions of Gatling and Parker, and firmly eliminating any controversy over the place of machine guns in warfare.¹⁷⁶ The diagram that follows translates the matrix into the typical SCOT format, with the relative positions and organization linkages containing meaning for the groups, their problems, and their solution(s) to those problems along with their relative power asymmetric and structural position.

¹⁷⁵ The artifacts indicate a process and/or physical object.

¹⁷⁶ Along with eliminating thousands and thousands of combatants.

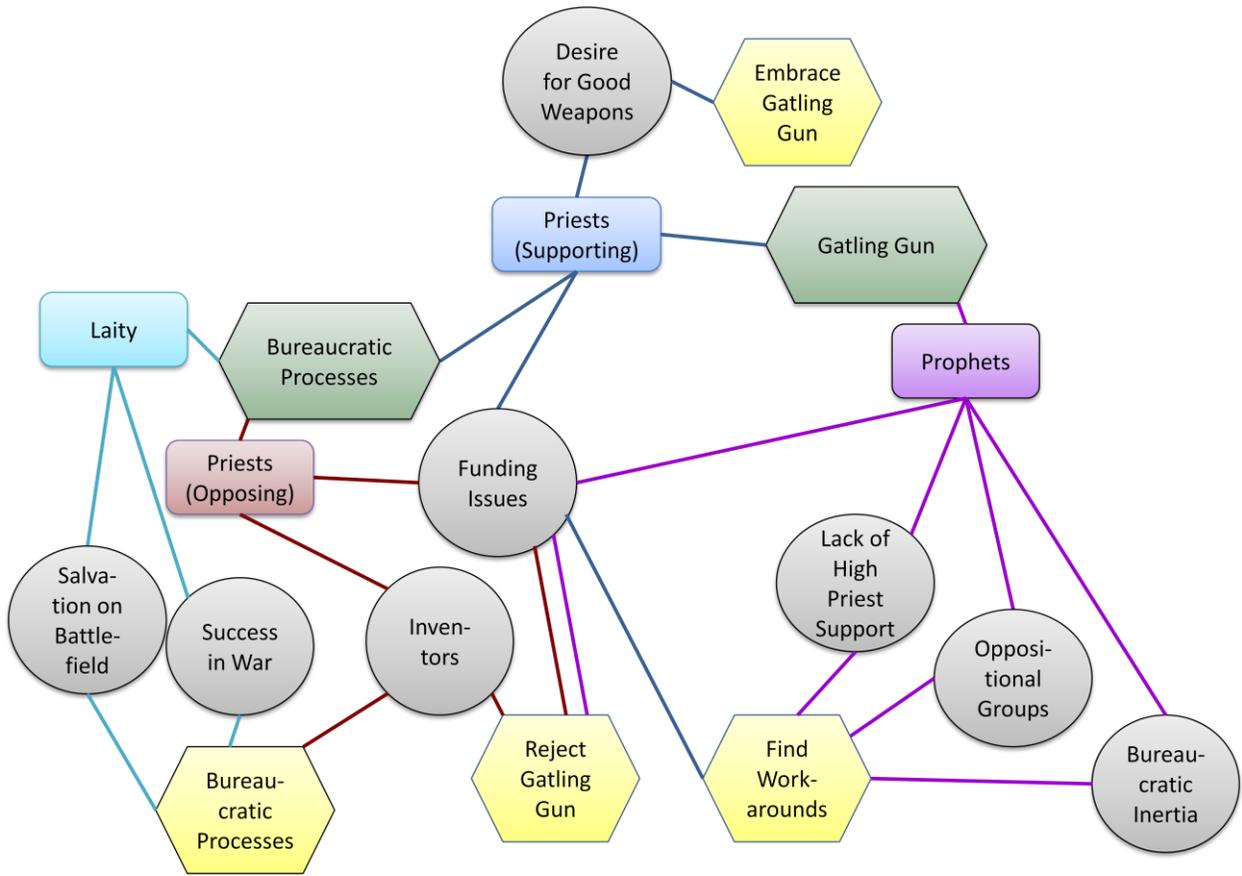


Figure 16 - SCOT Diagram of Gatling Gun

Conclusion: A Few Unvarnished Truths

While it's an old cliché, history continues to underscore its validity: militaries prepare to win the last big engagement, not the engagement about to come. The Civil War did not prepare the U.S. Army for the Spanish-American War, the Spanish-American War did not prepare the U.S. for World War I, and engagements by foreign militaries did not provide lessons learned for the U.S. Army. In the case of the Gatling gun, part of the reason for the failure to prepare stems from the Army imbalance between the HPT and EPT perspectives concerning the Gatling gun—the technical realities of the new weapon were seemingly ignored in favor of preserving the social meaning and conduct of war. This imbalance resulted in devastating trench warfare in the Great War for Americans as late as 1918—nearly two years after the Battle of the Somme.

The controversy surrounding the Gatling gun—an invention “born too soon” (Wahl and Toppel 26)—was ultimately settled as war itself was redefined, and the use of machine guns embraced—the EPT considerations won out because the Gatling was a superior weapon which changed the face of war. However, for decades prior to WWI the dominant social context prevailed, and the HPT perspectives suppressed the weapon. Perhaps the failure of the Army in the case of the Gatling gun is that, unlike the U.S. Air Force, the Army does *not* worship at the altar of technology. Custer left the Gatlings behind that fateful day—would an Air Force unit have left behind holy totems?

Ultimately, it is not just about the technology itself, but the tactics and techniques for fully maximizing the capability of the technology. So it was not just a matter of finally accepting the Gatling into the Army and properly equipping the units, but also a matter of learning how best to use them. If the Army had focused on a better balance between the HPT and EPT discourses earlier, it may've established doctrine, assigned a level of sacredness to the Gatling, and better prepared for the Great War. The purpose of this case study is to establish some of the organizational behaviors of the U.S. Army, as many of these behaviors influenced the formation of the nascent U.S. Air Force. The Air Force has moved too far the other direction from the Army, resulting in overly sacred technology and profane people.

Chapter 6

ACTS of the Apostles: The Air Corps Tactical School

*Proficimus More Irretenti*¹⁷⁷

-Motto of the ACTS
(Boyne, Tac School)

The lessons of World War I convinced the United States Army to establish a school dedicated to developing strategic and tactical warfighting capabilities for the new technology of airplanes. In the mid-1920s, this school took its final form as the Air Corps Tactical School (ACTS), located at Maxwell Field, Alabama. The ACTS was guided by the messianic mission of developing not just the tactics, techniques, and procedures to fight and win, but also the military broadening of the airpower strategists. The culmination of their efforts was World War II's air war fought by the strategists who honed their skills and concepts at the ACTS.

The legacy of the Tactical School endures to the modern age of the U.S. Air Force, and even with significant changes in aviation technology, many of the core tenets of the Tactical School remain part of the Air Force's Church doctrine. The original Desert Storm model for victory was based on Colonel John Warden's theories—which are reminiscent of the theories developed by the original thinkers of the

¹⁷⁷ "We Make Progress Unhindered by Custom"—motto adopted by the ACTS in 1929 (Finney v).

ACTS. In many ways, the Tactical School was a “skunk works”¹⁷⁸ concept, a hothouse of creativity to take advantage of the new warfighting technology—in this case, the airplane—and its potential as a weapon of war.

The pace of technological change during the interwar period was non-stop to those experiencing it firsthand—as Clayton Bissell, an early member of the ACTS, aptly put it “technically, aircraft were developing very rapidly” (85)—but beyond the aircraft, the organization itself was changing rapidly as well. The Army Air Corps continued to make strides toward independence, and the ACTS was a seminal institution creating the enduring Air Force religion out of the Army’s experiences. The development of the Air Force religion’s underlying precepts, key doctrine, organizational roles, and cultural manifestations occurred during the interwar period and were subsequently crystallized in the fires of World War II.

The first part of this chapter delves into the history of the school—its origins, personnel, and curriculum. The second part discusses the output of the school—the doctrine and concepts produced by the students and faculty. Finally, the chapter concludes with an STS analysis of the acts of these early airpower apostles.

¹⁷⁸ Referring to Lockheed’s Skunk Works, a top-secret isolated facility which produced many advances in aviation technology, such as the F-117 stealth fighter.

History and Issues of the Air Corps Tactical School

One of the very best texts on the ACTS is History of the Air Corps Tactical School, 1920-1940 written by Robert T. Finney of the United States Air Force (USAF) Historical Division, Research Studies Institute, Maxwell Air Force Base, AL. Originally published in 1955, it provides a chronological “insiders” overview of the Tactical School and presents a more-or-less official account of the establishment of the school after World War I, the proceedings during the interwar period, and the eventual suspension of activities in 1941. It includes a full set of appendices with an organizational diagram, lists of staff and faculty, and graduates of the school by year and class. The original 1955 content was brushed up slightly and reprinted in 1992 and again in 1998, and includes some original black-and-white photographs. Overall, the text minimalizes the controversy and tension between the school and higher headquarters.

Another USAF Historical Division study is Thomas H. Greer’s The Development of Air Doctrine in the Army Air Arm, 1917-1941 published in 1953. While not as specifically focused on the Tactical School, the book covers the doctrinal contribution of airpower theorists¹⁷⁹ in good detail as it describes the interwar period, and provides a chronological account of the development of doctrine up to the start of World War II. Greer implicitly recognizes the seeds of the Air Force religion and makes specific mention of elements in the military religion model. For example, in the introduction Greer identifies the sacredness of the ACTS creed: “that the doctrine was sound is affirmed by the results of America’s air war [in World War II]” (vii), while elsewhere he refers to airmen as “air prophets” (14), spreading the “gospel of airpower far and wide” (16) and one chapter title is “The Heroic Age of Doctrinal Development” (ch. 2).

His unwavering belief in the supremacy of airmen does not fully consider missteps such as the marginalizing of pursuit,¹⁸⁰ overemphasis on the supremacy of bombardment, and unrealistic expectations of the “precision”¹⁸¹ bombing concept. Aside from these issues, Greer does a remarkable job of delving into the politics and personalities of the fledging Air Corps, bringing out the tension and conflict of the period.

¹⁷⁹ Most of who attended and/or taught at the ACTS.

¹⁸⁰ One of the creators of AWPD-1 later called the omission of fighters one of its greatest faults (McFarland and Newton, *American Offensive* 184). Even “Hap” Arnold and Ira Eaker, in their 1941 Winged Warfare, acknowledged the great fighter/bomber debate and noted that events in Europe over the last year had settled the controversy—that fighters were indeed a necessary component of an air force (7-8). They went so far as to remark “the air fighter we know to be the stout shield which turns the bomber spear from the heart of mankind” (Arnold and Eaker 3).

¹⁸¹ From tests in 1933, the probability of hitting a small factory was 64% from 3,000’ and 19% from 10,000’ (Overy 51). While very good for that era (especially compared to other nations such as Britain), this level of “precision” is not terribly accurate by today’s “which window of the factory” standards.

Clayton L. Bissell's A Brief History of the Air Corps, written in 1927 is an excellent primary source of Army air arm history. It covers a wealth of information including organization, implementation, and struggles of the nascent air force, and includes some information on the Tactical School. No history of the early air arm would be complete without reference to Bissell's pro-airpower work, and unsurprisingly he was a graduate of the first class of the Tactical School.

The legacy of the ACTS rests primarily on its enduring contribution to airpower doctrine. At the beginning of the 20th century, airplanes were still a novelty for the military, and yet most modern writers on strategic air power at least tip their hat to the Tactical School, if not dwell on its concepts at length. For example, Case Studies in Strategic Bombardment is a compilation edited by R. Cargill Hall and published in 1998; and Scott D. West's 1999 paper "Warden and the Air Corps Tactical School: Déjà vu?" was written for the United States Air Force School of Advanced Airpower Studies, the modern-day Tactical School.

Origins through World War I

The U.S. military has long supported the concept of formal military education to increase the effectiveness of its fighting forces. George Washington, in a 1799 letter to Major General Alexander Hamilton, urged the "Establishment of an Institution" for the training of future soldiers (Finney 1), and in 1802 West Point opened. Other military academies successfully followed, and then came the specialized schools such as the Artillery School of Practice (1824), Infantry and Cavalry School (1881), Light Artillery School (1887), and more. This makes it unsurprising that by 1911, just three years after acquiring its first airplane, the Army had established a flying school, and two years later the school moved to San Diego and expanded its educational program to include not just basic pilot training but mapping, navigation, meteorology, and more. Finney points out that due to the very newness of the airplane the curriculum did not include tactics, techniques, and employment but rather focused on the basic mechanics of aviation (2).

Bissell caustically notes that in 1916, midway through the War in Europe, the Army's aerial organization had a "diminutive military flying school at San Diego," was "inadequately staffed and hampered by inferior equipment," and "the flying equipment is better classified as experimental aircraft...their uselessness in military operations was emphatically demonstrated during the [Punitive Expedition across the Mexican Border]" (15). Greer highlights the infancy of the Army air arm, quoting General Henry "Hap" Arnold that, in 1917, they "had no theories of aerial combat, or of any air operations except armed reconnaissance...[and] hadn't a single bomber." Arnold further noted that the

first task of air power was to provide aerial reconnaissance to the ground forces (Greer 4), an impression which continued to prevent higher headquarters staff from grasping the full potential of the airplane.

The technology of flight was clearly in its infancy. The first airplane purchased by the Army was from the Wright Brothers and was delivered in 1908, with the first solo flight by a military member occurring in 1909. It was a propeller-driven biplane weighing approximately 800 pounds, launched from a monorail and powered by a four-cylinder engine developing 25 horsepower (Bissell 8-9). In the fall of 1912, new Wright and Curtiss airplanes were delivered; they were propeller driven as well with the Wright having a six-cylinder 50 horsepower engine while the Curtiss eight-cylinder developed 80 horsepower (Bissell 11). By 1923, the great Barling bomber was the world's largest airplane, powered with six 400-horsepower engines and able to remain aloft for 13 hours with a crew of 11, with a maximum cargo load of over three tons (Bissell 97). Even as newer, faster, and more capable airplanes came into the inventory during the Great War, Bissell notes difficulties with the new technology: "these engines left much to be desired... [proving] practically impossible to keep more than 60 per cent of the aircraft in service... However, the performance of the Spad when the engine functioned satisfactorily was superior" (65). As seems to be the case, technology in its infancy tends to promise more than it is able to consistently and reliably deliver—yet often in the military the edge provided by such technology is believed to be decisive.

The primary airpower lessons learned by aviators during World War I were 1) aerial superiority is a prerequisite to successful air operations; 2) the only truly effective means of establishing and maintaining control of the air is through a determined offensive against the hostile air force; 3) when air attacks are carried out in depth, enemy reconnaissance and pursuit action against friendly front lines decreased; 4) limiting the air services to reconnaissance and observation failed to utilize to full advantage military aircraft which could take the war to the enemy by bombing and strafing; and 5) in battle the air arm is more effective if concentrated under a single command (Finney 2-3).¹⁸² Early aviators, such as Billy Mitchell,¹⁸³ learned these lessons, and carried them back after the war and formalized them through the ACTS.

Establishment of the ACTS

Finney notes that the use of the air arm during World War I was primarily tactical, with little thought to the strategic applications of the airplane. While observation and infantry support were the

¹⁸² These lessons are instructive for their endurance over time as core tenets of airpower.

¹⁸³ Later in his distinguished career a key proponent of a separate Air Force; see chapter two.

main purposes of Great War airpower, the lessons learned provided a great deal of momentum¹⁸⁴ to the concept of a separate Air Force with independent objectives and strategic capabilities vis-à-vis the Army (Finney 4).

After the Air Service was formally created by the Army, in 1920 the War Department authorized the establishment of a number of special Air Service schools, including the Air Service Field Officers' School at Langley Field, Virginia. This school, a forerunner of the ACTS, was intended to develop and standardize the instruction and training of senior officers in the duties and mission of the Air Service. Half the nine-month academic schedule was dedicated to the Department of Military Art (Tactical) with the other half split between the Department of Aeronautical Engineering (Technical) and the Department of Administration (Administrative). Despite insufficient lead time and limited instructional material and doctrine, the school formally opened on November 1, 1920 (Finney 5-6).

In 1922, the name of the school was changed to the Air Service Tactical School (ASTS) and the curriculum changed as well, putting an increased emphasis on air tactics and techniques, and then in 1923 a course in "practical flying" was added to ensure the students were proficient pilots. Finney further notes that many of the school's problems were solved in the air, underscoring the value of hands-on practicum as relevant then as it is today (7). In 1926, when the Army changed the Air Service to the Air Corps the school took its final form as the Air Corps Tactical School (ACTS).

After much wrangling with a tight-fisted post-war Congress, the Tactical School was finally able to move to new facilities at Maxwell Field, Alabama in the summer of 1931. The planning for the move included anticipation of three times as many students (75 per year instead of 25 per year), although the plans also included increases to the staff and faculty (Finney 14-15). Greer underscores that the function of the school coalesced around developing new ideas and, more importantly, producing a unified and consistent body of doctrine (47).

As it settled into Maxwell Field, things began to change for the better; for instance, a 1934 study by the Baker Board¹⁸⁵ recommended the Air Corps Board be permanently staffed and tasked to standardize tactical doctrine for the entire Air Corps. This led to the resurrection of the Air Corps Board, this time as an agency of the Air Corps and working side-by-side with the ACTS. As the members of the Air Corps Board were, generally, former members of the Tactical School, the two organizations tended to integrate together easily (Finney 16-18).

¹⁸⁴ Unfortunately, the bulk of the momentum was at the company-grade (e.g., Captain and below) level, and not at the field grade or general officer level where the momentum could become institutionalized.

¹⁸⁵ A board established by President Franklin D. Roosevelt to review all phases of Air Corps activities, referred to as the Baker Board in honor of its chairman, former Secretary of War Newton Baker (Finney 17).

This arrangement worked well, as the Board would upchannel projects to the Chief of the Air Corps for consideration—review of tactical doctrine, tests of various weapons or equipment—and with the assistance of the Tactical School the projects would be completed and the results disseminated throughout the Air Corps. The Board worked on 77 projects between 1935 and the Board deactivation in 1942 (Finney 18), although it is worth noting that the lack of organic air assets hampered the ability to take on and complete projects.

The General Headquarters Air Force (GHQ Air Force) was created in 1935, and finally in 1939 the GHQ Air Force agreed to establish the 23d Composite Group, consisting of three flying squadrons, at Maxwell Field. Its purpose was to be an experimental unit operating in conjunction with tactical projects of the Tactical School and Air Corps Board. While it was a real coup to obtain dedicated aviation resources for the development and testing of tactics and techniques, the ACTS suspended classes in mid-1940 to gear up for the war so there ended up being little integration between the two organizations (Finney 19).

Staff, Faculty, and Students

In the first few years, the staff and faculty were plagued by the usual issues of startup organizations: temporary buildings and facilities, lack of adequate funds, burdens of extra-curricular¹⁸⁶ demands from around the post, insufficient personnel, and turnover of qualified instructors (Finney 9-10). In the summer of 1924, the Chief of the Air Service approved most of the recommendations of the school staff pertaining to personnel issues, mitigating some of the issues but still leaving the school seriously undermanned.

Despite the hope that the move to Maxwell Field would entail a remedy to the manpower shortages, during the first year at Maxwell its faculty was 16 officers, two *less* than had been assigned to the school at Langley. Eventually by 1935 six more officers had been added, and while still substantially less than optimal, the staffing problems appear to have become manageable. An additional bonus was the increase in assignment duration to four years, which greatly improved stability and consistency over the original one-year terms (Finney 22-23).

The school's organizational problems were reflected in the student throughput, with only seven students graduating the first year.¹⁸⁷ By the middle of the 1920s, the annual number of students had increased to the mid-teens, and after the 1926 conversion to the Air Corps the student load increased to

¹⁸⁶ Modern term is "additional duties."

¹⁸⁷ Four of the school's instructors were also considered students, bringing the official total to 11 graduates for the first year.

the mid-20s, although the size of the faculty did not appreciably increase (Finney 11).¹⁸⁸ In all, 217 graduates completed the course at Langley Field.¹⁸⁹

The move to Maxwell Field provided expanded facilities, and the increasing size of the Air Corps coupled with the gradual increase in faculty manpower resulted in larger classes. From 1931 to 1940, the school matriculated 470 officers from its standard nine-month program (Finney 24). Comparatively speaking, in its first 11 years there were 221 graduates, and in its final nine years, there were 470 graduates of the core program, all accomplished with essentially the same faculty and staff manpower levels. These Air Corps Tactical School students were the leaders, planners and commanders during World War II, and all three of the air arm's four-star generals, and 11 of the 13 three-star generals, were graduates of the school (Finney 24-25), including most of the seminal leaders of the Air Force, such as Spaatz, Twining, and Vandenberg (Puryear).

Curriculum

Finney reports that limited airpower doctrine and tactics resulted in a strong emphasis on the ground campaign, and a prevalent belief that airpower simply enabled the Army war efforts (12). However, with the assignment of Capt Naiden as the director of instruction in 1923, changes began that allocated time for students to better explore the tactics and techniques of aviation, while another example of the evolution of course content occurred with the 1928 class, when instead of lectures simply presenting the operational record of World War I campaigns, the lectures started to “stress the use to which an air force *might* have been put” [emphasis in original] (Finney 12-13). Greer supports this, relating that the first half of the 1920s the school basically taught lessons learned from World War I, and its corresponding lessons in supporting the surface war. It wasn't until the last half of the 1920s, and the advent of a new generation of faster, more capable aircraft, that the evolution of airpower doctrine began to take shape; nonetheless, the limitations of low staffing levels and lack of organic aircraft support continued to hobble efforts (30).

The school also accentuated the importance of exercises, maneuvers, and demonstrations, and ensured a close working relationship with the Army War College and the Fort Eustis infantry for experimentation with concepts and tactics (Finney 13). As Greer characterizes the school, it was the center of the revolution in doctrine relevant to pursuit and bombardment, and of the overall development of air theory after 1926 (44). Interestingly enough, Finney reports that relations with the

¹⁸⁸ To provide perspective, the total number of officers in the Army Air Service in 1926 was 919 including 33 non-flyers (Bissell 107).

¹⁸⁹ If counting instructors given credit for completion (see above footnote), the total would be 221.

Army War College became strained over time, due to a disagreement over the proper use of air power. As their doctrine evolved, the Tactical School staff felt they were not given enough latitude to properly contribute to the annual maneuver exercise, leaving future strategic leaders with an incorrect view of the capabilities of airpower. Finally in 1931, the Tactical School decided the expense and effort of participating in the War College maneuver was incommensurate with the value derived and threatened to withdraw (Finney 13-14). Apparently the tactic worked; by 1933 (the last year the exercise occurred due to budget cuts) “the maneuver was more satisfactory from the air point of view than in any previous year” (Finney 19).

After the move to Maxwell Field, the new facilities, somewhat expanded staff, and the growing canon of aviation doctrine allowed the expansion of courses in the employment of airpower. By the mid-1930s, more than 50 percent of the school year involved air subjects, up significantly from the 1930-31 school year as noted in the following chart (Finney 20):

	1930-31	1931-32	1932-33	1933-34	1934-35
Air Subjects	43.6	48.8	46.3	50.9	52.9
Ground Subjects	29.8	33.6	31.9	26.6	25.4
General Subjects	26.5	17.6	21.8	22.5	21.7

Table 3 - ACTS Curriculum Content by Year

The academic division underwent frequent reorganization in order to more fully meet the mission of the Tactical School, finally stabilizing in 1935 in a form that would remain mostly unchanged throughout the remainder of the ACTS' existence. Instead of the three original departments (Military Art, Aeronautical Engineering, and Administration), the school now had four departments: Air Tactics and Strategy; Command, Staff and Logistics; Ground Tactics; and Flying Instruction. Of these, only Ground Tactics was still directly associated with traditional Army war-fighting concepts and the Department of Air Tactics and Strategy was considered to be by far the most important (Finney 21).

Conflict with Higher Headquarters

Even after the creation of the GHQ Air Force in 1935, the Army's General Staff still considered the air arm “a highly mobile and powerful combat element which ... conducts the operations required for carrying out army missions” (Finney 26). Major General Drum, the Army Deputy Chief of Staff, told a 1934 board of inquiry that there should be “no air operations not contributing to the success of the

ground campaign” (Overy 33). Some went so far as to argue that the War Department was really the Department of the Army, with some air and sea forces playing supporting roles, and that the Navy also did not support the air arm as they resented its claim to autonomy and wanted to retain as much naval control as possible of the nation’s warfighting instruments (Overy 31-34).

Unfortunately, the core ACTS doctrine—precision daylight bombing of strategic targets deep inside hostile territory¹⁹⁰—was anathema to the War Department General Staff (WDGS). Per Finney, “responsible airmen were careful to avoid the advanced concepts of the ACTS in their arguments favoring the new plane,” resulting in the B-17 being sold to WDGS and Congress as a “defensive” weapon (34). Despite Tactical School curriculum, attitude, and training to the contrary, all official War Department doctrine showed airpower as being support for the surface campaign, with little regard to the exact employment or capabilities of the new technology. Greer describes the conflict more bluntly, saying the prevailing attitude of the ACTS from 1926 to 1941 opposed “almost to the point of heresy” the doctrinal assumptions of the War Department (40). Perhaps that’s why the nascent airpower concepts were not consolidated into a single document, instead being incorporated throughout Tactical School texts, lecture notes, and other means of dissemination (West 5).

Despite the lack of broad support, the Tactical School continued to hone its doctrine. The school believed that improvements in bomber and bombsight technology would yield the extreme accuracy necessary for pinpoint targets, and that airpower should be used at the onset of hostilities to aid in shortening the duration of the war (Finney 35). A 1935 Air Force text noted that the “interlaced social, economic, political, and military divisions made up a national structure and that dislocation in one of these divisions would produce sympathetic disturbances” (Finney 35). The ACTS theorists were convinced the way to win a war was to break the will of the enemy citizenry through these disturbances.

The Suspension of Studies

The expansion of the Air Corps in the late 1930s caused considerable strain on the school, both in throughput of students and demands for the experienced and well-versed faculty members for other assignment. In the 1939-1940 school year, the regular nine-month program was suspended in favor of four 12-week courses designed to boost student throughput and basic exposure to the school concepts. The intent was to resume the standard nine-month program in the 1940-1941 school year; however, the outbreak of war resulted in the school completing the series of short courses and then suspending all training activities in order to prepare for war (Finney 40-41). The Tactical School never reopened but

¹⁹⁰ Finney reports that this doctrine was in firmly in place at the Tactical School by 1935, and remained its core doctrine until the school closed.

instead after World War II a new institution, the Air University, took over the bulk of the roles and functions of the Tactical School. In addition, the Army Air Force School of Applied Tactics was established, so that between the two institutions the strategic and tactical catechism of air power continued to develop.

Development of Airpower Doctrine

Early Doctrinal Developments

While the Tactical School is generally credited with maturing the concept of strategic bombing, Maclsaac and West both note that in 1917 Lieutenant Colonel Edgar S. Gorrell, head of Strategic Aviation of the American Expeditionary Force, developed a plan subsequently approved but never employed due to lack of means. Colonel Gorrell is quoted as saying:

When we come to analyze the targets, we find that there are a few certain indispensable targets without which Germany cannot carry on the war....[such as] the output of a few specific, well-known factories turning out chemicals for them, so we can readily see that if the chemical factories can be blown up, the shell output will cease. (Maclsaac 2-3)

Major General Laurence Kuter¹⁹¹ noted that Gorrell's plan was the "earliest, clearest, and least known statement of the American conception of air power..." (qtd. in Greer 10). Gorrell's plan provided the seed for the eventual culmination of the Tactical School doctrine, which Billy Mitchell—fresh from World War I—encouraged and advocated.

Finney and West both go so far as to nominate Billy Mitchell as the one person who exerted the most influence on the school (27; 19), and Greer cites Mitchell heavily throughout his text. Mitchell was among the first to recognize bombardment as a basic function of the nascent air force, and many of the principles espoused by Mitchell and other air advocates derived from Giulio Douhet, an early Italian airpower theorist. A key concept of Douhet was that of the interdependence of the segments of national structures, and the possibility of airpower upsetting the delicate balance thereby breaking the civilian morale (Finney 27). This concept has echoed throughout World War II, Korea, Vietnam, and on up to Desert Storm embodied in Colonel John Warden's "the enemy as a system" strategy.¹⁹²

An area of divergence between Douhet and the Tactical School involved the timing and intended accuracy of the bombing; while Douhet advocated nighttime bombing of broad areas, the Tactical

¹⁹¹ A student and then faculty member of the ACTS, he was one of the key authors of the Air War Plans Division, Plan-1 (AWPD-1) doctrine used to fight the air war of World War II, practically without modification from its initial form. He was "jump" promoted from Lieutenant Colonel to Brigadier General (skipping the rank of Colonel) at the age of 36. After his participation in World War II, he was given a succession of higher commands and reached the rank of four-star general before his retirement in 1962.

¹⁹² A difference between ACTS' "industrial web" and Warden's "enemy as a system" is that the industrial web was aimed at the grassroots level, while the system was aimed at the leadership level (West 10).

School favored daylight precision bombing of specific targets.¹⁹³ The driving force behind the Tactical School's position was Major Donald Wilson,¹⁹⁴ and his persuasive efforts ensured the doctrine of daylight precision bombing was the policy for the United States' World War II air war plans. In general terms, the school developed doctrine for two kinds of bombardment, tactical and strategical [*sic*], based on their intended effect upon the ground campaign (Finney 27, 29).

Going against the grain of then-current military thought—that infantry would be the deciding factor for all battles—the 1926 Tactical School text Employment of Combined Air Force asserted that an enemy's capital, commerce, industrial centers, or resources had not been considered proper military objectives because of the limited mobility and striking power of surface forces (Finney 30). Therefore, the rules of warfare were now changing with the beginnings of the “industrial web” construct (West 6-7), with part of the underlying notion being that airpower was inherently offensive in nature and for the most part independent of the enemy's armed force (Overy 42). The mindset driving the thinking came from post-World War I trench warfare—if only the airplane had been fully developed, that wrenching stalemate would probably have been much foreshortened. In an attempt to prevent that kind of saga from happening again it was easy for airpower theorists to become convinced that bombardment was *the way to win in the next war*.¹⁹⁵

Evolution of Strategic Bombardment

By 1930, the notion of the supremacy of bombardment had become fully integrated into the Tactical School. The belief was that pursuit aircraft were limited in their ability to defend against hostile aircraft, so the best defense was a good offense—in this case, bombardment of the hostile aircraft while they were still on the ground. An air force was now viewed as a powerful warfighter, whose chief characteristics were “intensity and volume of fire, speed, flexibility, long range and, when in flight, independence of the terrain.” Still, the targets were expected to be those in a distinct military kill-chain, which would directly affect on-going or future military operations (Finney 31).

This changed in 1933 when Major Donald Wilson came to believe the appropriate targets for the strategic bombing would be those which would disrupt the entire fabric of the enemy's economy and therefore undermine the will of the people to continue the war effort. The concept hinged on the

¹⁹³ Arguably, this is another example of the Tactical School's doctrine overreaching the technology of their time, given the inaccurate meaning of “precision” bombing of that era. For example, in forming AWPD-1, the bombing technology and procedures resulted in a 95% chance of missing a particular target by up to one mile (Perret 51).

¹⁹⁴ A graduate and faculty member of the Tactical School.

¹⁹⁵ Also running the risk of “planning to fight the last war instead of the next one,” a common criticism of military strategic planning.

principle of pinch points, such as railroad intersections or the factories producing highly specialized propeller assembly springs: take out the pinch point, and the entire system comes to a halt. This new philosophy was then applied to the modern industrial world, in an attempt to find the points in the close-knit chain which would result in a collapse of enemy civilian morale—via attacking the “sinews of war” (Arnold and Eaker 5). The goal of the strategy was summed up by Major Muir Fairchild¹⁹⁶ as “the nation-wide reaction to the stunning discovery that the sources of the country’s power to resist and to sustain itself are being relentlessly destroyed, can hardly fail to be decisive” (Finney 31-32, 37).

As new technology was fielded—such as new aircraft models and better bombsights—the Tactical School adapted its doctrine to keep pace, establishing a pattern for airpower doctrine and tactics, techniques, and procedures (TTPs) as being closely tied to the state of technological development. As the newer technology provided more capability, strategic bombardment moved from limited area nighttime bombing in 1926 to more-precise daytime raids in the 1930s in order to take advantage of improved bombsight technology and higher altitudes afforded by newer aircraft. The shift in tactics was very noticeable in the 1931 bombardment text and continued evolving until by 1933 the school was strongly in the daylight-only camp (Finney 32). Also, with the development of faster bombers, such as the B-9, B-10, and B-12 in the early 1930s, the school’s belief in the supremacy of the bombers over pursuit/fighter aircraft solidified, as the newer bombers were able to outrun or outdistance the less-capable pursuit aircraft. The arrival of the B-17 in 1935 encouraged another of the school’s erroneous suppositions—bomber invincibility (Finney 33). While the blinders of bomber supremacy aided the development of strategic bombing doctrine, they also prevented the Tactical School from giving appropriate consideration to the role of pursuit¹⁹⁷ and bomber escort, eventually producing a weakness in World War II operations—something that Greer concedes (55, 61).

Greer is the only author to delve into the ethical implications of this strategic bombardment concept. Between the lack of real precision and the fact that bombing of factories inherently means bombing some of the civilian population,¹⁹⁸ the will of the American people to support such tactics is important. Greer discusses the overwhelming opposition to such tactics, quoting the 1919 Secretary of

¹⁹⁶ A graduate and faculty member of the ACTS and also considered to be the father of Air University.

¹⁹⁷ Greer says of pursuit that during World War I “the cocky little single-seater became the chief focus and symbol of airpower” (7), and despite the intervening supremacy of the bomber (until 1982), that fighter mindset continues today. However, the 2008 resignations of Secretary Wynne and Chief of Staff of the Air Force Moseley and the nomination of General Schwartz—with his mobility and special operations forces background—may be a harbinger of change.

¹⁹⁸ Rare is the factory which only employs military, and has no civilian population living near the factory (such as spouses and children of the workers).

War, Newton D. Baker, as saying bombardment of civilian areas “constituted an abandonment of the time-honored practice among civilized peoples of restricting bombardment to fortified places or to places from which the civilian population had an opportunity to be removed” (14). Arnold and Eaker likened bombers to “a snake in the grass... a particularly unpleasant fellow... unpopular with all and sundry because of his ability to drop high explosives, not always well aimed... the vision of the bomber dropping his deadly cargo on defenseless women and children... was provocative of unpleasant emotion” (8-9).

Of course, Greer also notes that this “moral blockade...proved most difficult for the air leaders to overcome,” (15) suggesting that these ethical reservations made no real sense while never examining those issues in detail. In contrast, West notes that Warden felt it was “morally reprehensible” to attack civilians, and that past experience showed it ineffective, as well as difficult (11). The ACTS doctrine was unique (compared to other national strategies) in making industry, not urban population centers, the targets of strategic bombing even though such targets would be more difficult to destroy and would exact more casualties (McFarland and Newton, *American Offensive* 183-184).

Technology and Doctrine

Overy argues that “no major doctrinal breakthroughs occurred after 1918” [emphasis in original] insisting instead that once the concept of aerial bombardment was established, it was more of a national debate about implementation and targeting rather than concept (26-27). While this clearly invokes the concept of semantics, Overy’s statement does raise the question of whether the debate was so much about the means as the methods, and supports the concept that the implementation of new technology is often less about the technology and its capabilities and more about the culture it is situated in.

Greer notes the interesting interrelationship between doctrine and aviation technology, and how the great theorists could see the possibilities, but yet be limited by then-current state-of-the-art (44)—Overy calls it the “gap...between doctrine and operational reality” (38). Ignorance of some cutting edge technologies, such as radar, actually assisted in the development of a singular and cohesive airpower doctrine. Greer cites General Hansell¹⁹⁹ as saying “if our air theorists had had knowledge of radar in 1935, the American doctrine of strategic bombing in deep daylight penetrations would surely

¹⁹⁹ First a student and then a faculty member of the ACTS and retired as a Brigadier General after World War I. He was recalled to active duty during World War II (during which he flew combat missions), eventually retiring as a Major General.

not have evolved” (60). This introspective approach extended to lessons learned by other air forces—the Air Corps “ignored” foreign wars (Perret 62), instead content with its internal dialogue.

The weakness of the pursuit advocates within the Air Corps and especially at the Tactical School partially stemmed from a lack of knowledge of other fields of technological research (Overy 43). In contrast, Warden’s “enemy as a system” theory relied on currently-available technology allowing parallel simultaneous attacks, versus the Tactical School’s reliance on as-yet-unfielded (and sometimes undeveloped) technology (West 33). Compared to the ACTS, Warden’s theory was more of an evolutionary change as the fielded technology evolved, rather than a revolutionary new doctrine supplanting existing thought on warfare.

Certainly, the Tactical School’s doctrine was not perfect, as the early part of World War II demonstrated. The purported invincibility of the omnipotent bomber—due to advances in airplane technology—prevented the ACTS members from seeing that advances in pursuit and other forms of technology would also change the dynamics of air power. Eventually, experimentation during the war led to modifications of airpower doctrine; nonetheless, given the lack of historical precedent and limited capabilities, the ACTS’ cornerstone doctrine is impressive for its endurance and substance.

The ACTS and STS

As visible in the Tactical School case study, there is a clear schism beginning between the aviators and the regular Army, in particular about the utility and function of the new technological artifact, the airplane. The fast-paced changes in aviation technology coupled with a lack of aviation support for exercises and hands on practicum (for much of the school's existence) actually contributed to the focus on airpower doctrine rather than on the airplane itself. While there were (and are) unresolved matters, such as ethical issues, concerning the airpower doctrine as developed by the aviators at the ACTS, nonetheless the emerging aviators managed to take the lessons learned from World War I, technological changes occurring in the interwar period, and some forward-looking thinking and combine it into the Air War Plans Division, Plan-1 (AWPD-1)²⁰⁰ just in time for World War II.

The ACTS and the Humanities Philosophy of Technology

Within the context of the ACTS, the humanities philosophy of technology (HPT) perspective will focus on the development of strategy, the arguments over tactics, and the divide between the pursuit and the bomber sects. The airplane is the technological focal point, but the HPT perspective involves the employment and larger context for the airplane, rather than concentration on the airplane itself. There continued to be numerous debates and disagreement among the aviators at the Tactical School, but as opinions coalesced around a "war-winning" bomber strategy, the heroic single-seat fighter (pursuit) pilots took a reluctant back seat to the bomber mafia, which reigned supreme until the Vietnam era.

Discourse & Metaphor of the ACTS from the HPT Perspective

The techniques of the ACTS involved carefully stoking the energies and enthusiasm of the prophetic students and the excitement of aviation while avoiding too much conflict with the pugilistic mainstream Army staff. Boyne refers to the ACTS as a "military think tank and a hotbed of ideas" in which airpower enthusiasts "became advocates of Billy Mitchell's concept of air superiority... and proponents of the bomber" (Boyne, Beyond 206). The supporting of prophetic vigor enabled creative thinking and boundless enthusiasm, necessary components in laying the groundwork for a new way to fight and win wars.

Primarily, the technologies used in shaping discourse from the HPT perspective were those of the airplane itself. While the technological possibilities of pursuit and attack aircraft were minimized, the possibilities of bombers seemed endless. By the late 1930s, both attack and pursuit aviation were

²⁰⁰ The air plan created and executed as part of America's strategy in World War II.

completely overshadowed by strategic bombing advocates, despite a few heretical believers such as Vandenberg and Chennault (Perret 25-27). The aircraft itself played a role in the debate, as the arrival of advanced airplanes like the Boeing Flying Fortress heavy bomber with its “beautiful, flowing lines” could “prickle a man’s scalp” (Perret 27). These “technological developments... conjured up a Mitchellian dream world, where heavy bombers flew unimpeded deep into enemy territory, where endless strings of bombs flashed through the sunlight to shatter small, precise targets at will” (Perret 28).

The experiences of the early aviators taught them that to have an independent air force they would need clear justification of the unique nature and role of the airplane. This is one reason for the supremacy of strategic bombing theory—the possibility of a decisive, even war-winning, capability solely possessed by aviators and unencumbered by the Army or Navy. Thus, books like Billy Mitchell’s Winged Defense and “Hap” Arnold and Ira Eaker’s Winged Warfare were careful to emphasize the need and advantages to a separate Service dedicated to the unique role of airpower. As the vision of a separate, equal Service took hold, it shaped the way the Air Corps trained, organized, equipped, and imagined itself (Perret 29).

The Army leadership, via their language, continued to maintain that the purpose of airpower was to support ground forces. This disconnect between the rising dogma of strategic bombing—which required expensive airplanes capable of delivering large payloads—and the Army leadership’s belief in the use of airpower primary to support the ground forces caused friction throughout the interwar period. As World War II loomed and rapid advances in aeronautical technology created ever more capable bombers, the airpower enthusiasts began arguing for the supremacy of the bombers and the foolishness of placing such expensive aircraft in jeopardy in close support of ground forces (Tilford 6-7).

Within the context of the military religion metaphor model, the ACTS was associated with bands of prophets busy developing key doctrine—soteriology—by which the war and the nation might be saved. The zeal and fervor of the prophets stoked the fires of prophecy, and the excitement of human domination of the air, in the age of air-mindedness, inspired visions of the spectacle of aerial warfare. In the story of the Tactical School are the seeds of the sacredness of technology, and in particular the airplane, and this worship of technology has sustained the Air Force for its entire existence. The airplane is what enabled the possibilities for AWPD-1, and fueled the subsequent beliefs that airpower alone could win wars and bring peace and prosperity to the world. The Air Corps—and the Air Force—was nothing without the airplane, and airplanes that were faster, better, and more technologically sophisticated were especially sacred.

The voice of the heroes is found in the risks taken by many of the ACTS prophets. In the early days of flying, especially military flying, the risk of crashing was great either due to pilot mistake—as much of the learning was by trial and error—or mechanical malfunction as the infancy of the technologies resulted in low reliability. Further, many of these aviators, such as Billy Mitchell, took personal career risks in pressing for the supremacy of airpower and the need for a separate air force to maximize the utility of the airplane. The martyrdom of Billy Mitchell cemented his strategic bombing doctrine in the minds of the airpower prophets, and as time passed others, such as the “visionary high priest” Arnold, were able to convert the “nonbelievers to the gospel of strategic bombing” (Worden 14).

Outcomes of Discourse & Metaphor from the HPT Perspective

There were two primary results of the discourse and metaphor from the HPT perspective: first, the ingrained sacredness of the airplane; and second, AWPD-1. The sacredness of the airplane—a concept which extends to most technology in the Air Force—is one of the significant outcomes of this era. This worship at the altar of technology, as Builder calls it, is unique to the Air Force and markedly different from the cultural artifacts of the parent Army—which instead worships at the altar of the country via service to that country, with emphasis on brotherhood and cohesion (Builder, *Masks of War* 19-20, 33). It was during this interwar period, and primarily via the auspices of the ACTS, that the strong bond between the Air Force and technology was forged.

Disregarding the ultimate utility of AWPD-1, the very fact that the Tactical School was able to develop AWPD-1 on such relatively short notice is a tribute to the years of experience and effort undertaken during the interwar period.²⁰¹ The ACTS set the pattern for aerial warfare used in WWII and beyond (Boyne, *Beyond* 206): eliciting the doctrines, tactics, strategies, and thinking that could be readily shaped for contingencies. The nascent aviators were filled with purpose and a realization that they were laying the foundation of a new and powerful Church—what was soon to become the independent United States Air Force.

The ACTS and the Engineering Philosophy of Technology

The engineering philosophy of technology (EPT) perspective, dealing as it does directly with the specific technology, focuses on the Tactical School itself rather than its products. The moving of the

²⁰¹ Also of note from the HPT perspective, the air power advocates cut a deal with the Army head of the War Plans Division, Brigadier General Leonard Gerow, to write the air component of the plan independent of the larger effort, in order to short-circuit the bureaucracy and have freer rein over the contents of the air part of the plan. With a little maneuvering around other bureaucratic strictures, the plan was approved and incorporated into the overall U.S. plan for WWII (Perret 49-52).

school about the country, lackluster facilities, inadequate manning, minimum support (especially aviation-related), and recurring curriculum changes are examples of shortcomings from the EPT perspective.

Discourse & Metaphor of the ACTS from the EPT Perspective

The larger Army senior leaders used a technique, likely unappreciated at the time, of sabotage—the lack of funding, equipment, or prestige associated with the fledging organization for most of its existence, but especially its early years. The use of temporary buildings (until 1930) for the school, insufficient quarters for personnel assigned, and lack of airplanes for demonstration and practice were the primary shortages (Finney 14). However, the technique in large part backfired; the “underdog” status seemed to build cohesion and identity while stimulating the release of prophetic visions for air power, resulting in this think tank and “hotbed” of ideas paving the way for AWPD-1 as well as establishing theories of airpower to last for generations.

In the area of technologies, the airplane is clearly the focus. While the addition of practical flying to the curriculum was a useful addition, the lack of dedicated aviation support until 1939 made viable warplanning and doctrinal development difficult. From the EPT viewpoint, access to sufficient quantities and types of airplanes was vital for the successful evaluation of the Tactical School’s evolving doctrines and controversies. Not only were the particular flight characteristics of each type of airplane important in developing tactics and strategies, but the exercises required a detailed working knowledge of how airplanes could work together in teams—and much of this information required hands-on expertise to build the required tacit and explicit knowledge of the technology.

One of the ways in which experiences—or more correctly, the lack of experience—fed the discourse was by approaching the theory of airpower with a clean slate. There were very few truly seasoned aviators available in the Army after World War I, and the experience gained from WWI was fairly limited in scope (Finney 15-16), especially given the relatively rapid changes in aircraft design and capability during the interwar period. In many ways, not having to “unlearn” bad habits or improper precedents aided in the development of radical concepts and possibilities for the use of an air force.

The language of the curriculum provides an additional insight into the discourse. The constant changes in curriculum content and focus also indicates the churn associated with the Tactical School’s efforts to define its role and purpose. The accentuation of air subjects and the concomitant reduction in ground subjects (see Table 3) highlights the growing separation from the parent Army—and even the academic departments became very air-centric and distanced themselves from traditional Army

content. Also, the changes in the very name of the school underscored a search for airpower identity—three name changes occurred within a six-year time span.

The roots of the Air Force religion are found in the ACTS. The school, building upon the Army foundation, established the dogma of air power and re-molded the Army's military religion into a new revealed truth. The faculty and students, often interchangeable at the ACTS (Finney 9), were essentially prophets arising from the laity of the Army. Their strong identity with each other but especially the airplane set the stage for the Air Force's romance with technology and view of technology as the creator and savior of the institution. In this era of high fatality rates among aviators coupled with the broad "airmindedness" of America, they were considered heroes and the cultural worship of pilots (particularly military pilots) continues to the present. Even the genderization of the Air Force finds its roots in the Tactical School—the all-male organization emphasized combat and virtuosity values, discounting feminine user or support roles such as transport aircraft.

A final thread of the AF religion involves the development of organizational ethics and the rationale for use of strategic bombing against civilian targets—the instantiation of a new way of war (via the air) caused considerable debate as to the new set of ethical rules. Eventually, the controversy was settled in World War II, and by the end the firebombing of Japanese cities was supported by the majority of Americans, and established much of the organizational ethics of the Air Force religion.

It was the very lack of focus on the Tactical School's technology that brought out the prophetic role of the faculty and students. A small, under-equipped, scrappy collection of men and machines, fighting against larger Army institutional odds, with a daring message of revolution in warfare solidified the rebirth of Army aviation into the soon-to-be U.S. Air Force.

Outcomes of Discourse & Metaphor from the EPT Perspective

The establishment of the ACTS in its final form in 1939—shortly before the suspension of classes as war loomed—with the assigned aviation assets, acceptable manning, and reasonable facilities, finally acknowledged the value of the Tactical School. In many ways, the Tactical School was to become a template for developing similar related schools—such as the Advanced Airlift Tactics Training Center (AATTC) and the Air Mobility Warfare Center (AMWC), which are discussed in the following chapters—and demonstrates the prophetic power of small, agile organizations.

The ACTS and the Social Construction of Technology

The relevant social groups associated with the Tactical School are readily broken into categories based on whether they were airpower advocates or not, and then the sub-categories of airpower enthusiasts: bomber, fighter (pursuit), or attack.

Social Group	Goals	Key Problems	Artifacts ²⁰²
Priests (traditional Army officers)	Ensure Army support from aviation assets, develop winning doctrine	Maintaining control over aviators, integration of airplanes into Army	Bureaucratic processes, airplane
Prophets—bomber (Billy Mitchell, Hap Arnold)	Fully realize airpower’s promise, prepare for imminent war, develop winning doctrine, independent air force	Lack of support for role, ethical issues, resistance from Army priests	Airplane, ACTS
Prophets—fighter (Chennault)	Fully realize airpower’s promise, prepare for imminent war	Lack of support for role, lack of vision/leadership	Airplane, ACTS
Prophets—attack (Vandenberg)	Fully realize airpower’s promise, prepare for imminent war	Desire to support Army brethren, lack of support for role	Airplane, ACTS

Closure in the case of ACTS was achieved when the Tactical School was shut down due to the impending war and so the meaning of airpower was changed via redefinition—there was no longer a great deal of question about whether airpower could contribute to the upcoming war effort, but simply to what extent. The answer to that question was not fully known even by the airpower advocates until they had the experiences and lessons of actual combat. The Air University, which has subsumed the Tactical School (and taken on other educational and doctrinal missions as well), is a mainstay of the Air Force, so the value and meaning of the ACTS was redefined as well within the minds of the relevant social groups.

The SCOT diagram on the following page captures the power asymmetry and structural considerations of the Tactical School, along with the usual artifacts, social groups, problems, and solutions.

²⁰² Recall from Bijker that within the SCOT lexicon, “artifacts” consist of technical processes as well as physical objects (Bijker, *Of Bicycles* 291). That is slightly different from my usage in this dissertation.

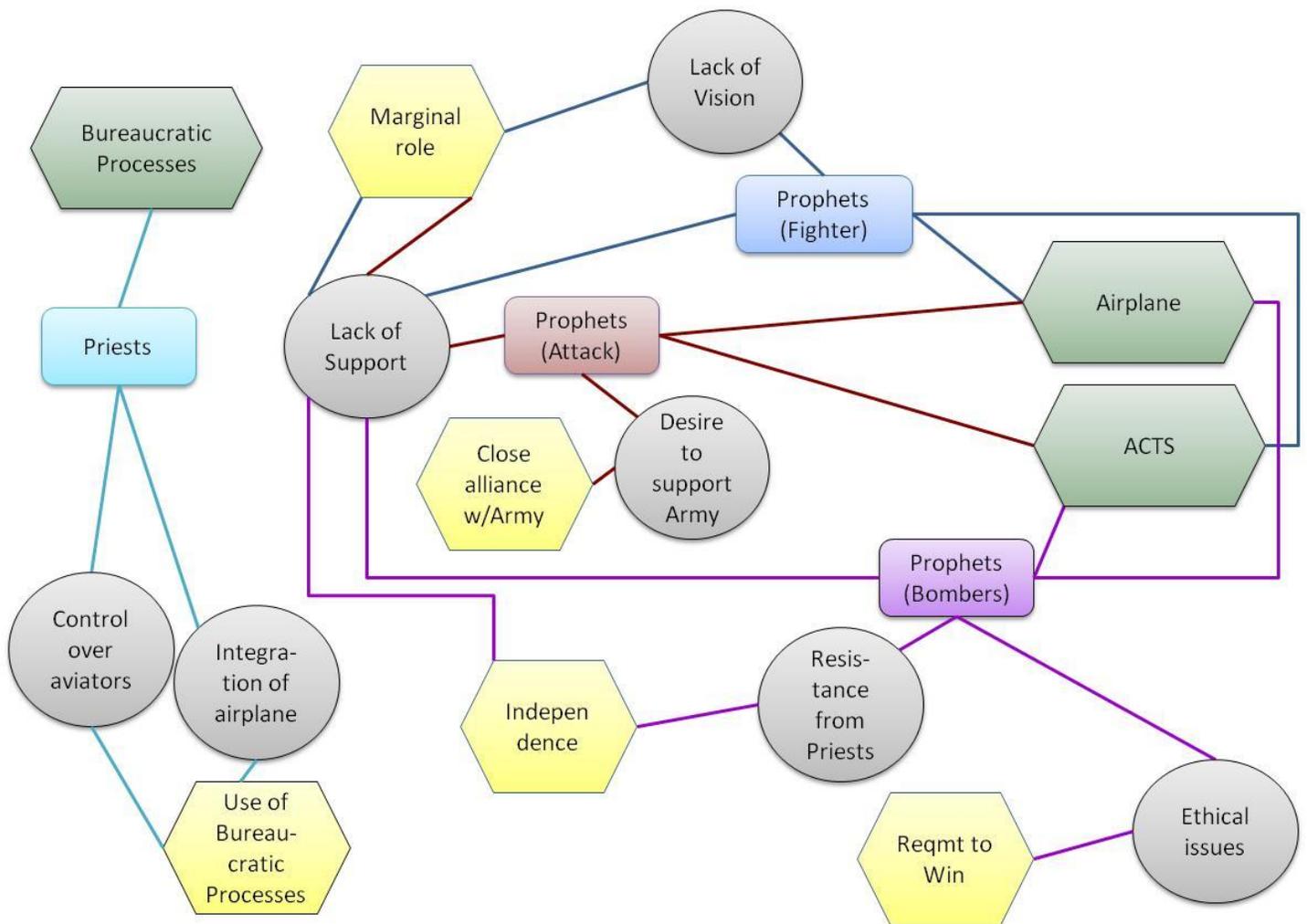


Figure 17 - SCOT Diagram of ACTS

Conclusion: Legacy of the Apostles

The Air Corps Tactical School was a small group of Army aviation operational personnel bent on fully venerating the new technology of aerial flight. The challenge was to integrate the fledgling technology into the strategies of war-making, and develop the doctrine and tactics which would demonstrate the unique role of airpower. The lessons learned during World War I were captured, expanded upon, and used to create new strategies of war previously unrealized.

The ACTS of the apostles was so effective that in the foreword to the 1993 book Crosswinds Dr. Ziemke, of the Institute for Defense Analysis, remarks:

Strategic bombing is not mere doctrine to the USAF; it is its lifeblood and provides its entire *raison d'être*. Strategic bombing is as central to the identity of the Air Force as the New Testament is to the Catholic church. Without the Gospels there would be no pope; and without strategic bombing there would be no Air Force. The theology of strategic bombing has influenced every aspect of the Air Force's development since well before World War II. (Tilford ix)

The net result of the Tactical School's heresy regarding the opinion of higher headquarters is that, during World War II, the United States had the doctrine, tactics, plans, organization, and trained personnel to execute the strategic air war which in due course contributed significantly to WWII. The Air War Plans Division, Plan 1 (AWPD-1) reflected ACTS prewar thinking and incorporated daylight precision strategic bombing while underscoring the value of airpower to winning the war (McFarland and Newton, *American Offensive* 183-184).

The controversy surrounding the ACTS was resolved upon entry to World War II when the contribution of the airplane—and the Tactical School-trained aviators—became evident. This redefinition of the meaning of combat and utility of institutions such as the ACTS resulted in a lasting legacy to the U.S. Air Force. The Air Force culture continues to excel when prophet-aviators and small, agile organizations think beyond the bureaucracy and embrace new technologies and tactics in veneration of the principles of the Air Corps Tactical School.

Chapter 7

Prophets in the Wilderness: The Advanced Airlift Tactics Training Center

Strategy without tactics is the slowest route to victory. Tactics without strategy is the noise before defeat.

-Sun Tzu
(qtd. in Walker 7)

The Advanced Airlift Tactics Training Center (AATTC) was established to fill a need for tactically sophisticated airlift crews in the United States Air Force. By the end of the 1970s, the culture of the U.S.' Mobility Air Forces (MAF)²⁰³ was one of complacency, and any lessons learned from Vietnam were more of a political than tactical nature. The rapid shuffling of the backbone of tactical airlift, the C-130 Hercules, from one major command to another and back again contributed to a community-wide feeling of insignificance.²⁰⁴ The minimum low-level altitude for tactical flying had been raised to 500' above the ground constant leg altitude, there was little in the way of a tactical body of knowledge or formal

²⁰³ Recall that in the modern lexicon, transport and tanker aircraft (C-130s, KC-135s) are considered "mobility" while fighters and bombers (F-16s, B-52s) are "combat" air forces. A small tertiary category is special operations forces (SOF) such as the AC-130s and HH-53s.

²⁰⁴ The majority of airlift C-130s were in the Mobility Airlift Command (MAC) when it was redesignated the Air Mobility Command (AMC) in 1992. Just over a year later on 1 October 1993, all C-130s were transferred to the Air Combat Command (ACC-the fighter command), until 1997 when they returned to AMC.

aircraft employment procedures, and the published doctrine limited airlift C-130s to low-threat areas only, tending to produce an “airline” rather than warfighting mentality.

The Air National Guard unit at Rosecrans Air National Guard Base, St Joseph, MO, known in the 1980s as the 139th Tactical Airlift Group, was one of the airlift C-130 units during this era. At a Red Flag exercise, the frustration of being easy pickings for fighter combat air patrols coupled with certain indiscretions²⁰⁵ into no-fly zones resulted in a decision to not just complain, but actually *do* something about the situation. The final outcome of the sustained prophetic efforts was the AATTC, a Total Force²⁰⁶ organization receiving support from, and training members of, the Air Mobility Command, Air Force Reserve, and the National Guard.

The purpose of this chapter is to present the history of this organization through the end of 2005 as told by its members, leaders, and official documents, and to outline the contribution of the Center to MAF tactics and strategies, along with a short discussion of the outside influences on the AATTC, such as technology and other military organizations. The chapter will reveal a prophetic organization—distant from the rarified priesthood in both geography and mindset—in many ways propagating the legacy of the Air Corps Tactical School (ACTS) within the mobility community.

²⁰⁵ Encroachment of a no-fly zone results in punishment, and potentially being sent home—severe instances may cause disciplinary action to be taken against the crew.

²⁰⁶ Referring to the Total Force policy of the Air Force, which considers Active Duty, Guard, and Reserve members as equal and part of the “one-team, one-fight” mentality—interchangeable, synonymous and equally important.

History and Issues of the Center

Pre-Center History

It all started at Red Flag, the premier Air Force tactical warfighting exercise held in the desert outside Nellis Air Force Base (AFB), Las Vegas, NV.²⁰⁷ In 1980, Major Howard Dixon was the aircraft commander of a 139th Tactical Airlift Group (TAG)²⁰⁸ crew which had a few unfortunate navigation errors resulting in inadvertently penetrating “Dreamland” (also known as “the Box”) no-fly airspace²⁰⁹ while being tagged seemingly non-stop with simulated shoot-downs from the fighter combat air patrols (CAPs). Upon their return home, Dixon resolved to do something about the situation, and the prophetic vision crystallized as a desire to establish a training center modeled after the Air National Guard’s A-7 Fighter Weapons School located in Tucson, AZ (Cotter). Dixon, later the first commander of the AATTC,²¹⁰ went right to work and six months later produced a set of flying training profiles, and the unit started training its own members on improved tactics (DePastino, Personal Interview). In early 1981, Dixon and other unit members—inspired by their successes and new converts—also instituted an annual Air National Guard C-130 Tactics Conference.²¹¹

Another result was the “Proposed C-130 Tactics Training Center” document presented to the Air National Guard Director of Operations at the National Guard Bureau (NGB) on April 8, 1981.²¹² This document discussed the “C-130 Loss Factors” and the dismal level of C-130 warfighting readiness, such as the 500’ constant altitude,²¹³ lack of education on threats, and the poor knowledge of tactics to defeat them. The document proposed a flying and academic curriculum to “instill confidence” and provide survivability to the crews (139th Tactical Airlift Group 2, 4).

²⁰⁷ As a side note, Red Flag was another bottom-up initiative—fighter pilots tired of high attrition rates and useless tactics in Vietnam instigated the exercise (Kitfield 168, 52).

²⁰⁸ See appendices for a history of the unit designations and a current organizational chart.

²⁰⁹ As Ken Hatfield-Baker (an early member of the AATTC) eloquently says, they “visited the Box a few times” referring to the Dreamland no-fly airspace, which includes the famed Area 51.

²¹⁰ See appendices for a historical list of AATTC Commanders.

²¹¹ The now-renamed Tactics Symposium has continued annually to the present.

²¹² The 139th TAG originally pitched the concept to Military Airlift Command senior leadership, but after being turned down gave the same spiel to the National Guard Bureau (NGB).

²¹³ Constant altitude refers to maintaining the same straight-and-level altitude and attitude for all or part of a leg length on a low-level route regardless of the dips and hills of the underlying terrain, potentially resulting in a very high altitude for parts of the leg. The alternative usually practiced today is called “modified contour” as the aircraft climbs and descends continuously all during the low level route with the goal of always maintaining a particular altitude above the ground.

The proposed curriculum included such things as low level psychology, map reading and navigation, terrain masking,²¹⁴ cockpit discipline, formation flying, aircraft handling, and air threats and tactics (139th Tactical Airlift Group 4). A key part was the actual hands-on flying, which provided the practical application of the theory and academics. The schedule was compressed into a one-week event (including weekends) in keeping with the need for minimum time off from civilian employers, as the course was originally intended to be taught by the Guard for the Guard (Weigler).²¹⁵

Activation of the AATTC

With a great deal of support from Major General John Conaway, then-Director of the Air National Guard, and other key leadership such as Major General Stan Newman, the Adjutant General from Oklahoma,²¹⁶ the proposal for a tactics center was approved and the Center formally activated in 1984. While the bureaucratic wheels were turning, the curriculum was formalized and put through service tests in 1982 and 1983, with appropriately enough the final validation test of training effectiveness conducted during Red Flag 83-2, January 22-February 5, 1983 (Point Paper on AATTC).

The first official class was held in early 1984—a year in which 11 classes, in all, were conducted. The following year, 22 classes were held as full-time manpower came online and startup issues with the training process resolved—building on its success, that same year the Guard-only organization approached the Air Force Reserves (AFRES)²¹⁷ requesting instructor augmentation. An agreement between the Air National Guard (ANG) and AFRES was signed in May 1985 and the manpower authorizations appeared in Fiscal Year 1986 (Point Paper on AATTC). The leadership of the AATTC deliberately tried to bring in outside talent; as Lieutenant Colonel (retired) Hatfield-Baker²¹⁸ recalls, the early hires included aviators from Special Operations MC-130 Combat Talons, Navy A-6s, Air Force A-7s,²¹⁹ and other diverse backgrounds because “it was evident that there was a big tactics vacuum in the C-130 community” (Sloan).

²¹⁴ Use of terrain to hide the aircraft from fighter CAPs or ground personnel.

²¹⁵ Hatfield-Baker supposes that one reason MAC was reluctant to sponsor the Center in the beginning was that “MAC wanted [a] longer [training period]—they didn’t think the training could be done in so short a time.”

²¹⁶ “Lots of people called him the godfather of [airlift] tactics because he really pushed tactics. All we had was the Vietnam era tactics and they seemed to accept a little more in Vietnam, I mean, small arms took down more aircraft than SAMS or AAA... and C-130s did not operate in SAM areas” (Cotter). Newman recognized the vulnerability of the C-130s due to the lack of defensive systems and tactics and was willing to go to bat for them (Hatfield-Baker).

²¹⁷ AFRES was later organized into a command and is now the Air Force Reserve Command (AFRC).

²¹⁸ Mr Hatfield-Baker was one of the first members of the AATTC, and is presently working for HQ AMC.

²¹⁹ A-6s and A-7s are fighter-type aircraft, not mobility.

Master Sergeant Kathleen “Katie” Harshman, one of the original staff members at the startup of the Center, recalls “everybody on base said, ‘the school’s not going to last, it’s going to go away’” and part of the tension was the impact of the Center on the rest of the base, especially supply, aircraft maintenance, aerial port, and vehicle maintenance. These organizations, authorized both full-time and traditional²²⁰ manning the same as any other unit with eight C-130s assigned, were tasked to support the AATTC but with no additional resources. “You’ll never know we’re here” was how the pitch was made to the rest of the base about the Center’s startup, perhaps establishing different expectations than the reality of the situation (Sloan).

In the late 1980s some permanent full-time support positions were added, specifically one aerial port²²¹ and five aircraft maintainer positions. Nonetheless, the continued growth to meet the needs of the warfighters stressed the small organization, causing a return to the National Guard Bureau to solicit additional manpower in the early 1990s. The result was the June 1992 “Manpower Additive Requirement” document, originating from ANGRC/MOE.²²² This document noted the five aircraft maintainers and one aerial port full-time manpower already authorized, and recommended adding two transient maintenance, three aerial port, and one civil engineer as full-time positions (ANGRC/MOE 3-4). Unfortunately, the validated manpower study was of little effect; there were no additional permanent manpower authorizations added to the AATTC manning document.²²³

The Center proved itself and its mission on multiple fronts, garnering an “Outstanding” assessment on its first Military Airlift Command²²⁴ Inspector General (MAC/IG) Management Efficiency Inspection in February 1986 (Point Paper on AATTC), and demonstrating success at improving C-130 tactics. The C-130s went “from absolute zero survivability to ‘hey, wait a minute, [C-130s] aren’t just sitting ducks,’” recalls Colonel Steven J. Cotter, presently Commander of the 139th Airlift Wing and a former Commander of the AATTC, adding that fighter tactics for dealing with the slow-moving C-130 improved as well. As the C-130 survivability successes became noticed at Red Flags, it became more challenging for the fighters and they would subsequently expend a little more effort at taking out the C-

²²⁰ A “traditional” Guard member has a full-time job in the community, and contributes part-time to the ANG. In the old vernacular the member was called “part-time Guardsman” but that minimized the significant commitment required, hence the use of the more appropriate “traditional” verbiage.

²²¹ Note that the formal detailed analysis by the aerial port squadron commander recommended adding 6-7 full-time positions to support the AATTC workload.

²²² Manpower and Organization Division of the Air National Guard Readiness Center, part of the National Guard Bureau corporate structure.

²²³ Technically, positions were added to the unit manning document per a January 26, 1993 letter from the ANGRC, but as “unfunded” which means “yes, the position is required, but no, we’re not actually going to provide the funding to hire people.”

²²⁴ The Mobility Airlift Command was renamed the Air Mobility Command in 1992.

130s, so the Center would have to “up the ante a little bit” on survival techniques, leading to better tactics for both communities (Cotter).

The fighter weapons school at Tucson continued to play a key role in the development of airlift tactics. Cotter credits them with providing everything they had, “probably equating to ten years’ worth of testing” data and information, and the Center adopted many of the fighter techniques, such as “knock-it-off” calls, a phrase which immediately breaks off an engagement or maneuver and gets all participants to a safe altitude in order to ensure flight safety. Another crucial input from the Tucson fighter school was the concept of looking at how the aircraft performs, and how the flight²²⁵ works together, a holistic approach which Hatfield-Baker says translated well to the crew-based C-130 world.

The Center was very cautious, being reluctant to prove the doubters’ safety concerns correct. They invited Mr. Leo J. Sullivan, the chief engineering C-130 test pilot for Lockheed,²²⁶ out to observe procedures and ensure nothing they were doing exceeded the aircraft performance envelope. The endorsement of Sullivan went a long way—after all, the legendary pilot flew the first C-130 off the assembly line and was involved in the development of the different models (Hatfield-Baker). This was important given that safety people thought “the next C-130 accident would be at the [Center], so we took it serious” recalls Hatfield-Baker, further explaining that, especially during the early years, every night after the student crews went back to the hotel, the staff met to “review the day and prepare for the next, sometimes [the meetings] lasted for hours out in the desert in Arizona, sweaty and hot, before we even had dinner.” There were issues in figuring out how to communicate both tacit and explicit knowledge from the faculty to the students, but having a diverse faculty core group, and the deliberately close integration of support functions such as intel²²⁷ and maintenance, really helped build up the key cross-flow of information and the “team” approach required to succeed (Hatfield-Baker).

Growth of Coursework

As soon as the coursework was fully developed, the Center opened enrollment to active duty and Reserve aircrew as well, integrating the components of the Total Force and encouraging the essential cross-flow of tactics, techniques, and procedures (TTPs). However, the Center didn’t focus just on the aircrew in the Operations building, but over time established training for support career fields as well; for example, the Munitions course was developed in 1996 to ensure the munitions loaders had the

²²⁵ Fighter-speak for the “crew” which makes up the formation of fighters.

²²⁶ Manufacturer of the C-130.

²²⁷ Short for “intelligence,” the support function which briefs aircrew on threats and prepares them for combat missions.

proper training to safely upload the C-130 chaff and flare dispensers. The service tests occurred in 1997, and the final approvals were given by the NGB in 2002 (Advanced Airlift Tactics Training Center [AATTC]).

The demand for additional unit-level training for those supporting the aircrew prompted the creation of the Practical Intelligence Course (PIC), designed to assist integration of unit intel staff with unit aviators, resulting in better products and interaction for both. Major Jim Boekenoogen, an intelligence officer with the 139th TAG, developed the course along with Senior Master Sergeant Jim Stamp, an intel technician, and some operators who provided the aviator input (Sloan). The proposed PIC was briefed to the National Guard Bureau in late 1986, with service tests starting in 1987 and the first official course held in 1988 (Point Paper on AATTC). In a Total Force gesture, ACC even provided two active-duty manpower positions for a single tour to provide augmentation for the startup of the PIC.²²⁸ Another intel initiative was the Intelligence Formal Training Unit (IFTU), a follow-on course conceived in 1998 as the Top-Off Intelligence Course (TOIC) for the purpose of providing dedicated training for intel personnel newly-assigned to C-130 units. By 2001, the TOIC had been redesignated the IFTU and a service test performed in 2002. “Jim Boekenoogen brought a lot of threat awareness to tactics development” lauds Hatfield-Baker, remarking on the successful integration of the intel and aircrew training.

The Center was always reaching out to future technology, and so brought in night vision goggles (NVGs) and an NVG laboratory in 1992—just before the flood of '93,²²⁹ as Hatfield-Baker recalls. While NVGs and operating at night took many years—until after 9/11 as a matter of fact—to catch on in the mainstream MAF world, the AATTC was thoroughly versed and well prepared by the time everyone else caught up to the technology and realized the edge night operations provided for mobility force survivability. “Flying at night took away the optical threat” said Hatfield-Baker, elaborating that if the enemy can’t see you at night, they often can’t shoot at you either. When asked why he thought it took so long for NVGs to catch on in the MAF world, Hatfield-Baker says “we don’t want to change” and that it’s hard to recognize a new paradigm. Undaunted by the challenge, as early as 1995 the AATTC prophets were qualified on NVGs, and developed and obtained NGB approval of a syllabi to teach aircrew by 1997. The AATTC started teaching the NVG airdrop course in 1998, and added the NVG airland and NVG ground operations courses in 2002 (AATTC).

²²⁸ Air Combat Command was then the major command (MAJCOM) for the 139th Tactical Airlift Group. The two positions consisted of one intel officer and one intel enlisted position.

²²⁹ The St. Joseph, MO area experienced a massive flood in 1993, putting the entire Air Guard base under several feet of water.

Another course the Center developed based on requests from the field was the airlift defensive systems short course, a basic course on the use and tactics of radar warning, chaff, and flare systems. Following on the success of the short course and a request from AMC,²³⁰ in 2000 the AATTC developed the Mobility Electronic Combat Officer Course (MECOC); using a tradition from the start of the Center, the fighter version (FECOC) was used as a template along with the short course's basic outline (DePastino, Personal Interview). The MECOC was very successful and has had steady enrollment since then, providing the critical training to the operators that is often lacking when new technology systems are installed on mobility aircraft.

A groundbreaking program of the AATTC was the NVG Ground Personnel Course (NGPC), the eventual goal of which is to train the maintainers, security personnel, airfield managers, air traffic controllers, and other support personnel how to operate in low-light conditions—the same conditions the aircraft often operate in during conflict. The need was identified shortly after 9/11 when the Afghanistan campaign (Operation Enduring Freedom) kicked off and was executed primarily during hours of darkness. Few C-130 crew members had night vision goggle training, much less the personnel refueling the planes, marshalling them into parking spots, or repairing them,²³¹ so the Center built up the syllabus in early 2002, doing the final tryouts in August 2002. Unfortunately, a cumbersome coordination and approval process with the Air Mobility Warfare Center (AMWC),²³² a direct reporting unit (DRU) to Headquarters Air Mobility Command (HQ AMC), resulted in the syllabus languishing for nearly two years before the Center obtained the necessary approvals and started officially performing the training in 2004 (Denny).

Cotter believes the Center's success rests on a key vision of being "Guard focused, not unit focused"—its primary mission has always been to get information out to the operators. Among other successes, he credits the AATTC with spearheading the push to get defensive systems on the C-130s, supporting big initiatives such as the Visual Threat Recognition and Training (VTRAT) equipment, and

²³⁰ AMC provided no funding or other resources for the original MECOC development. Funding for MECOC support came later, after the Center went to AMC and said "hey, this is something you asked us to put together" and finally AMC provided the funding for the on-going tests required to ensure currency of the defensive systems programming loads and academics (DePastino, Personal Interview).

²³¹ Both aircrew and ground support personnel were given NVGs and essentially told "here's some [NVGs], use 'em if you want to," despite being required to function at night under the cover of darkness (Denny).

²³² The mission of the AMWC is to be AMC's "single focal point for advanced training, testing, and educating mobility forces" (Air Mobility Command [AMC]). See chapter eight for a look into parts of the AMWC, while noting the syllabus issue for the NGPC course was not associated with the Mobility Weapons School or Mobility Battlelab, the two organizations within AMWC focused on in that chapter.

seeing the need for and forging ahead with night vision goggle training for ground personnel—all essential elements for enabling survivability of America’s warfighters.

A catastrophic flood in 1993 unfortunately destroyed many of the Center’s electronic records. The Bernoulli removable-media hard drives on which historical data was stored were ruined by the flood and much of the information on courses, student records and other information remains unrecoverable. After many years of living in temporary trailers, flood-damaged buildings and using cast-off office furniture, the Center moved into a brand-new facility in 1996, still at Rosecrans Air National Guard Base, St Joseph, MO (Pankau, Personal Interview).

Challenges to Success

Manpower has always been the greatest challenge of the Center. The 28 full-time Guard positions, plus the eight full-time AFRC positions, have been static since shortly after the Center was activated, despite a huge growth in demand for both current and new coursework (Pankau, Personnel). While the NGB has been very helpful in allocating some temporary full-time positions, it’s harder to fill and retain temporary slots as the position has to be reauthorized every fiscal year, with no guarantees of continued employment. The AATTC fills a need in honing the skills of the warfighters and those who directly support them, and there is so much still on the to-do list. However, Colonel Michael A. Pankau, presently the Commander of the AATTC,²³³ says the unit is “done” until the manpower situation is fixed because the organization just has no more “hide”²³⁴ to go around.

Lieutenant Colonel Kurt Westfall, Director of Operations (DO) of the Center, says the organization simply couldn’t function without the AFRC manning, and the integration is so seamless that “if it weren’t for the AFRC patches they wear on their flightsuits, nobody would know who was AFRC and who was a Guardsman.”²³⁵ He argues that active duty staff is still needed for their perspective and viewpoints, and to yield a true Total Force organization that is responsive to the entire Air Force—and beyond that, “active duty guys are really the ones that who ultimately call a lot of the shots which really affect us a lot in the Guard” (Westfall).

The support for providing critical new training is limited at best. The National Guard Bureau, while always a staunch supporter of the Center, is unable to provide as much funding and manpower as the Center needs, but at the same time technically it is not the function of the NGB to support training

²³³ As of the end of 2005 and this case study; in 2006 he was selected to be the 139th Vice Wing Commander.

²³⁴ When extra taskings are absorbed via existing resources they are taken “out of hide.”

²³⁵ Note that after Pankau was selected as the Vice Wing Commander in Spring 2006, Colonel Mike Hurst—an AFRC member—moved up to take the AATTC Commander position, underscoring the true integration of the organization.

and tactics development.²³⁶ Major Gerald S. “Dee” DePastino, resource advisor and instructor at the Center, says “it’s a fighter world,” and Lieutenant Colonel R. Darin Sloan, chief of scheduling and also an instructor at the Center, agrees that “everywhere you go, the fighter rules the [Air Force]” accentuating the underdog position of mobility forces and explaining the difficulties in getting a larger piece of the funding pie.

Flying hours, mandays,²³⁷ and funding are always in short supply, resulting in the Center being unable to accommodate all requests for tactics testing and courseware. The NGB does provide additional flying hours, but there are also limitations on availability of aircraft due to the on-going demands on the 139th Operations Group, which is treated the same for warfighting rotational requirements as any other ANG unit with eight assigned C-130s.

²³⁶ United States Code, Title 10, directs the Services to “organize, *train*, and equip” [emphasis added] their forces.

²³⁷ The Center occasionally makes use of traditional Guard members of the 139th Wing, which requires mandays to put them on orders and pay them.

The AATTC Today

Westfall brags that the basic Aircrew Course has improved greatly over the past few years—“the guys who came through here in a flying course ten years ago probably wouldn’t recognize the place now.” The students are getting better and better, there are fewer problems with students, overall a more professional attitude, and best of all, they are smarter and more capable aviators. DePastino agrees, saying the students tend to be much smarter, more engaged in tactics, and more likely to be familiar with tactics manuals and procedures.

The basic Aircrew Course is still the mainstay of the AATTC, and a near-requirement for Air Force crews flying into combat areas. For the German Air Force, the course *is* a requirement for its crews to be fully combat-ready (Pankau, Personal Interview), something the Center is very proud of, along with the record of training crews from 13 allied nations plus of course all United States military Services and mobility aircraft (Weigler). “[The] MAF world is a much better place than it was 20 years ago. Not necessarily because of us, but if it weren’t for us getting on AMC to do things and get some tests done and all that, and exposing other crews to all this...it’s a change of mindset, and the airlift world’s a much better place now” (Sloan).

Eventually, the annual Air National Guard C-130 Tactics Conference was renamed the Tactics Symposium to underscore the MAF-wide and Total Force inclusiveness of the conference. In recent years, there has been even more focus on non-airlift mobility assets such as KC-135 aerial refuelers and the 25th Annual conference (January 2006) theme of “Training for Combat.” AMC has reluctantly accepted the Center and their programs—it took a few years before AMC decided the AATTC was a good thing, and a few more years after that before the HQ AMC Tactics folks started occasionally co-sponsoring the Tactics Symposium (Hatfield-Baker).

The Center believes in providing support to any mobility airframe, having supported tactics reviews and development for a wide variety of airframes such as the RC-26, C-17, C-130J, and more. The scope often requires extreme flexibility on the part of AATTC staff—to accommodate the C-17, the Center sent some of their C-130 pilots to the C-17 simulator to gain insight on the functions and operations of the new aircraft (Weigler).

The 2005 course offerings per year include the following (Harshman):²³⁸

²³⁸ Shaded cells are calculated by author.

Course	Number Offered Per Year	Max Number Of Students Per Course	Length of Course (in days)	Max Students Per Year	Max Mandays Per Year
Basic Aircrew	16	25 (5 crews)	9	400	3600
NVG Aircrew	8	20	4	160	640
MECOC	4	48	5	192	960
PIC	4	12	14	48	672
IFTU	4	8	19	32	608
NGPC	16	8	5	128	640
VTRAT	30	20	1	600	600
Munitions	4	8	3	32	96

Table 4 - 2005 AATTC Course Offerings

The decision to translate the fighter tactics to the mobility world and not reinvent the wheel greatly enabled the success of the AATTC. Still, “we can do a lot more work” in the integration between the Combat Air Forces and Mobility Air Forces, according to Westfall, since “*everything* is tactically driven.” He argues that every CAF sortie is a tactical event, such as always having defensive systems on and monitored, which has not been typical in the C-130 world.

Interaction with External Organizations

The fight for the Center usually involves convincing higher headquarters to support their initiatives. Much like the Air Corps Tactical School of the interwar period between World Wars I and II, the Center often operates on a shoestring and spends a lot of time pitching ideas to higher headquarters as they try to meet the needs of operational personnel. An example is the NGPC, which the AATTC developed in response to operational field requests. The curriculum was developed and tested by August 2002, but as noted previously the courseware review and approval process took until 2004. Sometimes it’s simply a matter of funding priorities, especially when major commands (MAJCOMs) have to arbitrate between multitudes of competing needs. “[Their approach is] almost an economical thing, as opposed to ‘is it the right thing to do,’” says Colonel Larry Weigler, Vice Commander of the 139th Airlift Wing through the end of 2005.

AMC has somewhat of a “standoffish” approach to the Center, as they perceive it to be somewhat of a “cowboy” organization with its grassroots emphasis of operators training operators on how to survive (Cotter). Cotter supposes it is because the AATTC is “doing something they’d love to do, but don’t have the connectivity... The disconnect between senior [AMC] leaders and the field is just

amazing.” Major Andy Deubel, an ANG staff integrator²³⁹ at HQ AMC Logistics, believes it comes down to “inertia, a tremendous amount of inertia” along with “too much reorganization at HQ AMC” which slows down the large MAJCOM in its agility and flexibility. Nonetheless, Cotter says the Air Mobility Command is getting on the right track with the new Phoenix Rally meetings²⁴⁰ and the attendant opportunities to talk directly to the three- and four-star generals.

Westfall’s field-level perception is that Major General Mark A. Volcheff’s “tactics first” policy during his tenure as the AMC Director of Operations²⁴¹ hasn’t produced a sea change, despite the best of intentions. Unfortunately, the push toward tactics doesn’t seem reflected in AMC budgets, and DePastino firmly believes the AMC Tactics office is seriously undermanned. “If the answer is that AMC should have a rein on everything going on, then you need to man it so you have that capability, and AMC has never done that.” People still have the Stan/Eval²⁴² perspective, and there’s too much inertia built up over the years with Stan/Eval personnel as the leaders of flying organizations (DePastino, Personal Interview). Weighing in with a slightly differing opinion, Hatfield-Baker notes that over the course of his five-plus years at HQ AMC, he’s started seeing more of the taskings going to Tactics instead of Stan/Eval, indicating that perhaps gradual change is happening after all.

Cotter argues that the NGB tends to be more supportive and agile because “the folks are right out of the field units... and the focus tends to be more mission-oriented.” He feels the Guard Bureau—the primary backer of the AATTC with manpower and funding, and always willing to encourage its mission—has been the strongest supporter of the Center because of the value of the Center and its reputation, and the recognition of its great operational and safety record. When asked why the ANG culture in general and that of the Center in particular was more innovative, Hatfield-Baker opined two reasons: “experience level in the Guard...and more autonomy available to Guard commanders.” He especially appreciated the Guard’s “old maintenance guys” who had decades of experience and often thought about ways to improve “their” airplanes and processes, who had more “pride of ownership.” Even though, he notes, a lot of active duty folks wind up in the Guard, they become “Guardized,” and the nice buffer the NGB provides due to administrative control (ADCON) and operational control (OPCON) oversight allows more flexibility to crews. Colonel Elizabeth G. Josephson, ANG Advisor to the

²³⁹ A full-time member of the Air National Guard assigned to an active duty organization to assist in explaining the capabilities and limitations of the ANG, while also providing coordination and staffing between the NGB and the assigned organization.

²⁴⁰ A Total Force Commander’s conference held twice yearly by HQ AMC.

²⁴¹ November 2003 to April 2005.

²⁴² Short for Standardization/Evaluation, the office responsible for setting many aviation policies, and perhaps most importantly, giving the checkrides to ensure compliance with those policies.

Commander, HQ AMC, believes innovation derives from “[extensive] contact with the civilian community, less full-timers so the personnel are used to doing more with less, and more decentralized Wings.”

Cotter thinks the Air Mobility Warfare Center (AMWC) almost sees the AATTC as “a rival” and says “they get so wrapped up in the bureaucratic red tape, every time we would try to do a program with them, their main concern was how to get credit for this course in the Community College of the Air Force” along with concerns over college degrees for instructors and other ancillary issues. Major General Christopher A. Kelly, the most recent AMWC Commander,²⁴³ meant well but was often stymied by the bureaucratic processes, and perhaps the sheer size of the organization (Cotter). The bureaucratic roadblocks impede efficiency, and Cotter compares it to federal, state and local governments:

Which one is more efficient? Probably the local government because it’s smaller, it’s more connected, it’s where the rubber meets the road... The lowest level you can do something, the better off you are... It is hard to staff something from the Commander of the Air Mobility Command down to a field unit. There are huge barriers and disconnects between a Wing Commander and the Commander of AMC.

Cotter believes the more embedded one gets, the more connectivity one has; “[we talk about] jointness but you don’t see any Army folks running around here.” But to open lines of communication, Cotter believes exchanging staff between the AMWC and the AATTC would help spread the culture of each and enable more interaction between the two organizations. Pankau agrees, opining that both the AMWC and the AATTC provide services, slightly different but complementary ones and his desire is to “become one smooth operation” to the end users.

Technology’s Impact on the AATTC

The Center has always tried to leverage cutting-edge technologies into increased survivability and mission effectiveness, and are always ready to conduct testing and hands-on trials of developmental and beta equipment within their resource constraints. Weigler suggests the biggest challenge involved with technological change revolves around the limitations of the Center to keep track of it all, especially equipment not assigned to the Center or the 139th Airlift Wing. The differences in models, software

²⁴³ July 2002 – May 2005.

loads and programming,²⁴⁴ and changes in equipment specifications all contribute to the challenge of being able to effectively provide instruction in a panoply of different combinations.

The Airborne Broadcast Intelligence (ABI) system is one such product. The carry-on, carry-off hardened laptop and antenna package was designed to be strapped down on the crew bunk at the rear of the C-130 cockpit, and provide the crew with “battlespace awareness,” a term meaning a picture of the ongoing war with locations of friendly and enemy aircraft, ground troops, and more. This big-picture view of the war includes up-to-the minute intel information, enabling crews to dodge around unexpected threats before they enter that threat’s kill zone. While the final report from the AATTC was less than glowing—concerns involving implementation, not the concept²⁴⁵—AATTC’s in-depth testing and extensive report will help produce a better product for the Mobility Air Forces.

The Center also pressed for the acquisition of the Virtual Threat Recognition and Avoidance Trainer (VTRAT), a high-tech system involving voice recognition, high-speed graphics, and multiple computers working together to provide extremely realistic threat depictions and train the crewmembers on how to properly identify and react to different threats. Their efforts resulted in the Center being the first unit in the MAF with a VTRAT system, and the training has proved immensely popular for crews preparing to deploy to combat areas, with over 1,000 students trained since their VTRAT went operational in 2003. Weigler remarks that:

[Crews returning from combat sorties in-theater are asked during] post-flight interviews with intel, they’ve asked the crews ‘What did you see? What did you see?’ and they go ‘look, just like the VTRAT’ so that’s been a great tool as far as survival, I think you could probably say we’ve had crews survive because of that training... After hearing some of the stories from in-theater, we finally pulled enough teeth and got some AMC folks over here to take a look at it, and the next thing we know AMC is buying them for several of their [active duty] locations.

Cotter believes this is the first time in 20 years that people are paying attention and if a system saves lives, it’s likely to get support—and cites VTRAT as an example of something that was “a risk” for the NGB to fund, but has turned out to be a tremendous asset and is now being promulgated throughout the Mobility Air Force. Lieutenant Colonel Cory R. Ball, the 139th Airlift Wing Comptroller, sums up one

²⁴⁴ Referring to aircraft avionics software loads, and the settings (programming) required for optimal operation in particular circumstances. For example, aircraft chaff and flare dispenser systems have different software loads to run the hardware, and the operators can program in particular responses based on the expected threat.

²⁴⁵ For example, the original version was based on bulky UNIX-based laptops rather than slim Windows-based laptops, requiring a certain amount of training for the crews to be able to use it, and took up too much space in the cockpit.

of the problems of cutting edge technology best: “if you wanna get into [new technology], I really hope the [sustainment] funding comes with it.”

Westfall wonders why it is so hard to transfer fighter technology to airlift, noting that so much of the fighter technology is tactics-related and enables better survivability and situational awareness, but how rarely the technology is migrated over to the mobility world. For example, the C-130J is one of the first mobility airframes to have a head’s-up display (HUD) installed, yet this technology is “old school” for fighter planes. Even the APN-59 radar, currently installed on most of the C-130 fleet, is very outdated (DePastino calls it “World War II vintage”), but even the APN-241 radar, gradually being installed on some C-130s and perhaps fleetwide should the C-130 Avionics Modernization Program (AMP) ever be fully funded,²⁴⁶ is still several generations behind as radar technology goes.

Future Goals

Pankau would like to see the Center have full funding and permanent full-time manpower to continue with the Night Vision Ground Personnel Course (NGPC). There are many career fields—such as aircraft refuelers, airfield managers, air traffic controllers, and more—which need the training beyond the old “here’s some goggles use them tonight” saw. Presently, the NGPC course is being supported by some temporary manpower positions from NGB and funding promises from AFRC and AMC, despite the four years since 9/11 and the subsequent AMC declaration²⁴⁷ that nighttime was now the standard operating environment for mobility forces.

Flight testing is another Center growth area—for example, expansion of the electronic warfare expertise of the AATTC into a full-fledged testing center able to develop and test new defensive system programming and provide the training for MAF crews on those critical systems (Pankau, Potential). The AATTC has an excellent working relationship with the ANG and AFRC Test Center (AATC) located in Tucson, AZ, but the emphasis for the AATC is primarily on fighter initiatives. Formally designating the AATTC as an official Air Force test center for mobility tactics, and providing the necessary manpower and funding, would enable a focus on MAF needs by an airlift-centric and operations-focused organization.

Based on customer input—always a primary consideration for the Center—the existing intel course needs expanded into comprehensive, standalone blocks providing the level of detail required for modern-day warfighting, but “the AATTC is currently understaffed for existing missions... [and] manpower shortfalls must be addressed prior to adopting any [new] initiatives” (Pankau, Potential). Other possibilities for the future includes working on more joint training, and better integration with

²⁴⁶ HQ AMC has been trying to update the aging C-130 fleet via the AMP for years and years.

²⁴⁷ The AMC Director of Operations issued a message requiring NVG training in 2002.

Coalition/allied military mobility assets. Cotter sums up the AATTC vision by noting that joint operations and multi-Service missions are part and parcel of the AATTC's future, and tactical integration of U.S. and allied forces will yield a true jointness that really matters rather than something higher headquarters uses as a tagline.

The AATTC and STS

The Center has many parallels to the original Air Corps Tactical School—a small organization distant from higher headquarters and staffed by personnel with a prophetic vision and desire to develop the tactics and doctrine for success. Undermanned, underfunded, and generally under-represented to the high priests, they continue to deliver strategies and technologies for the greater community. Both the AATTC, and the Air Mobility Warfare Center (AMWC) addressed in the next chapter, essentially explore reverse salients within the art of the possible, looking for opportunities to capitalize on near-term acquisition or employment strategies.²⁴⁸ The technology under review—like with the ACTS—is the Center itself, with the HPT perspective focusing on the output and utility of the Center, and the EPT perspective on the facilities, curriculum, and structure of the Center.

The AATTC and the Humanities Philosophy of Technology

The search for improved tactics and technologies consumes the Center and its staff. These “products” of the Center reflect its value within the wider social and military context and its contribution to the military community. The distance from headquarters and its staid, bureaucratic priesthood helps keep the AATTC flexible, but also makes it a very “lean” organization—one which has to fight for every bit of resource or manpower, and constantly prove itself to avoid budget cuts or deactivation.

Discourse & Metaphor of the AATTC from the HPT Perspective

The techniques of the AATTC focus on zeal and agility—zeal on the part of the staff and faculty in finding and maximizing military advantage in technology and tactical procedures, and agility in adapting to the needs of the community. The AATTC has shown consistent willingness to go the extra mile to “do the right thing” across its existence, demonstrating persistence in finding funding and support that only comes from prophetic vision—for instance, the VTRAT added great capability for mission success, yet it took a while for the Center’s prophets to inculcate the concept within the mobility community and ultimately attract the interest and support from NGB and an active-duty high priest.²⁴⁹ The agility involves finding a need from across the broad MAF community, such as for night vision goggle training for ground personnel, and then filling it despite obstacles to the contrary.

²⁴⁸ Understanding that identification of reverse salients is more art than science (T. P. Hughes 67-74), senior leadership needs to understand that initiatives will not always be successful; but like a small-business incubator, the occasional wildly successful endeavor usually makes up for the misses.

²⁴⁹ Volcheff, the AMC/A3 (Director of Operations) from 2003-2005, finally saw the VTRAT in operation at the AATTC and funded six of the systems for active duty bases.

Different from the ACTS, the technologies affiliated with the AATTC discourse are not that of the airplane itself, so much as ancillary aircraft equipment instead—the VTRAT, aircraft avionics systems (such as chaff and flare dispensers), night vision goggles (NVGs), and so on that are associated with the airplane. In this case, the Center has demonstrated a ready grasp of the possibilities of many of these technological advances, often embracing the technology well ahead of the methodical pace of the priesthood. The purpose of the search for technology is to better execute the mission of the Center: to enhance aircrew survivability and mission success in a combat environment.

The experiences of the Center clearly drove the culture and shape of the institution. From flying into “the Box” to fighting for every resource—occasionally within the host Wing, but more frequently with higher headquarters—the AATTC has managed to renew and reinvigorate its prophetic zeal over the years. One advantage in sustaining that zeal is the low turnover rate of the Guard members—some have spent most of their careers at the Center, resulting in a huge historical knowledge base and excellent continuity of operations and activities.

Language is seen in the changing of the name of the annual tactics conference, and in the shaping of the discourse to include not just C-130s or even other Air Force aircraft, but rather a joint Service and allied/Coalition approach to tactics. The thrust of the Center, and its product, is sharply focused on mobility forces regardless of the component, patch,²⁵⁰ Service, or country. This use of language helps unite the Center, keep it on track, and help share the consecrated vision.

In the realm of the Air Force religion, while embracing technological possibilities, the Center also seems careful to avoid attributing too much sacredness to that technology—it is rare that the Center missteps and places too much faith in the technology. They emphasize knowing what technology can deliver, and a thorough understanding of the aircrew’s responsibilities, while viewing the technological object as more a means to an end rather than an overly holy totem.

Training, technology, integration, and teamwork are the creed of salvation taught by the Center to the USAF’s Mobility Air Forces. The goal of the AATTC is to help shape the religion’s soteriology by saving the mobility aircrews, and often by expounding upon the mysteries of the faith: tactics, techniques, procedures, intelligence, and technological capabilities. The exploration of the mysteries is part and parcel of the training provided by the Center, with the goal of encouraging the laity to delve into the revealed truth to stimulate lay intellectualism and a deeper understanding of the faith.

²⁵⁰ The major command patch is worn on the upper right part of the flight suit and denotes the major command to which an individual is assigned.

The AATTC sect fosters a strong organizational ethic centered on the principles and urgency of the faith, and an identity with mobility air force underdogs is a unifying theme. Another central cultural manifestation of the Air Force religion is the earning of parity despite the traditional feminine role of the mobility “support” forces—as the mobility community gains the fighter’s respect as a worthy opponent, they help to establish the parity and value of the mobility forces. As this trend continues, it will hopefully bring more attention (and resources) to the needs of the mobility forces as peers in the ranks rather than simply “support.”

Outcomes of Discourse & Metaphor from the HPT Perspective

The AATTC is one of the organizations responsible for moving the mobility community from the “airline” mentality of the post-Vietnam era to the capable and well-trained force it is today. The focus on technology employment—rather than just the nifty technology itself—provides significant value to the mobility community, and the willingness to fight for a voice, for resources, and for the community at large has resulted in positive changes to the Air Force.

The AATTC and the Engineering Philosophy of Technology

From the EPT view, the Center itself is the area of study—how the organization is structured, funded, organized, and sustained, to include the curriculum as well. The functions of the AATTC process provide insight on possible templates for other organizations in similar circumstances. In many ways, the very hungry-dog approach to fighting for resources and recognition contributes to its prophetic mindset and willingness to think outside standard channels and approaches.

Discourse & Metaphor of the AATTC from the EPT Perspective

The techniques used from the EPT vantage included flexibility and multiple approaches. The flexibility of the AATTC is observed in their willingness to work across the components—Active, Guard, or Reserve—in their ability to adapt coursework to more than just C-130s but also C-17s, RC-26s, and other aircraft, to include ensuring the fighters participating in some of the flying practicum gained valuable experience as well. The multiple approaches to creating coursework involve begging, borrowing, or stealing fighter and special forces (SOF) curriculum and instructors to assist in cross-germinating the Air Force community and kick-starting the mobility air forces tactical culture.

While ultimately not fully successful, the manpower studies and reviews initiated by the Center are an example of technologies—these processes helped define and formalize the manpower shortages of the AATTC, and provided the basis for continuing to press higher headquarters for additional resources and support. Future, the use of studies and reviews highlights the Center’s knowledge of

higher headquarters (HHQ) bureaucratic processes, and the ability of the Center’s leadership to “speak” the HHQ language and benefit from that communion.

Experiences of the Center members helped teach them when to say when—as Pankau noted, the Center was already understaffed and more manpower and resources were necessary prior to adopting additional missions. While there are plenty of opportunities for additional support to the mobility community, the organization recognized that quality products and training could not be produced successfully with limited resources.

The common understanding across the Air Force—that “it’s a fighter world”—is the kind of language that shapes the Air Force, the mobility culture, and concomitantly the culture of the AATTC. It is relatively true—generals with fighter backgrounds dominated the top Air Force leadership positions from 1982 until 2008 (Worden ch. 8)—and is also indicative of the attention, funding, resourcing, and manpower priorities of the Air Force in broad terms.²⁵¹ In many ways, this sort of language is why small, prophetic organizations like the AATTC have sprung into being: because otherwise, there would likely not be such organizations.

One of the key contributions to the Air Force religion evidenced by the EPT discourse is the shaping of the mobility forces identity; first, as underdogs, and second, as a core part of the Air Force’s warfighting contingent. Like the ACTS, the AATTC consists of a small band of underdogs fighting for resources and recognition from the larger organization and this creates a tight-knit identity across the Center and the mobility air forces, and even impacts the identity of the fighter culture within the larger AF culture as the C-130s become more challenging adversaries. As the fighter community comes to view the mobility forces less as non-warriors and more as part of the warfighting team, the reduction in tension across the previously-gendered roles aids in the sophistication and capabilities of all communities. In turn, this improves the ability of the Center to create more realistic and demanding training curricula, encouraging a continuous improvement loop to the betterment of the Air Force.

Outcomes of Discourse & Metaphor from the EPT Perspective

In the final analysis, the lack of attention from the EPT perspective has, in many ways, made the AATTC a stronger organization. As a scrappy, prophetic organization struggling to do the right thing and support the broader community, it has maximized utility and found opportunity where others have not.

²⁵¹ As of the end of this case study timeline. The 2008 nomination of General Schwartz (with a mobility and SOF background) may indicate a change to the dominant Air Force culture.

Execution of guerilla marketing tactics, entrepreneurial spirit, and a willingness to think outside “the Box”²⁵² has created an unparalleled think tank and “hotbed” of tactics, strategy, and technology.

The AATTC and the Social Construction of Technology

Given its unique location in the hierarchy—or lack thereof—the AATTC occupies a unique niche. It essentially bridges the gap between the primary priestly social groups associated with the mobility air forces (NGB and AFRC, and AMC), the priestly warfare center (AMWC—discussed in detail in the next chapter), and the mobility forces laity.

Social Group	Goals	Key Problems	Artifacts
High Priests—AMC	Support broad Air Force goals; organize-train-equip mobility forces	Requirement for organized, methodical approach to tactics	AMWC, Bureaucracy
Priests—NGB and AFRC	Support Guard and Reserve activities	Need for tactically-oriented mobility air forces	AATTC
Priests—AMWC	Support AMC direction on MAF tactical development	Lack of resources; desire for clear relationships	AMWC, Bureaucracy
Prophets—AATTC	Directly support operators in the MAF	Lack of resources, need for priestly support	AATTC
Laity—unit mobility forces personnel	Fly, fight, and win	Need for survivability and mission success	Airplane

Closure is an on-going process for the AATTC, with both redefinition and rhetorical closure occurring depending on the circumstances of a particular situation. Broadly speaking, the AATTC is an open-ended endeavor, and any closure with finality (e.g., the Center being shut down or absorbed into a larger entity) is yet to come. However, in the case of individual controversies (such as the VTRAT), usually closure occurs via redefinition of what the requirements are for the mobility community to execute their mission safely and successfully. The SCOT diagram below graphically depicts the information in the preceding table. Note that it includes the Air Mobility Warfare Center’s SCOT diagram information as well due to the tight linkages and inter-relationships between the two organizations.

²⁵² Pun intended.

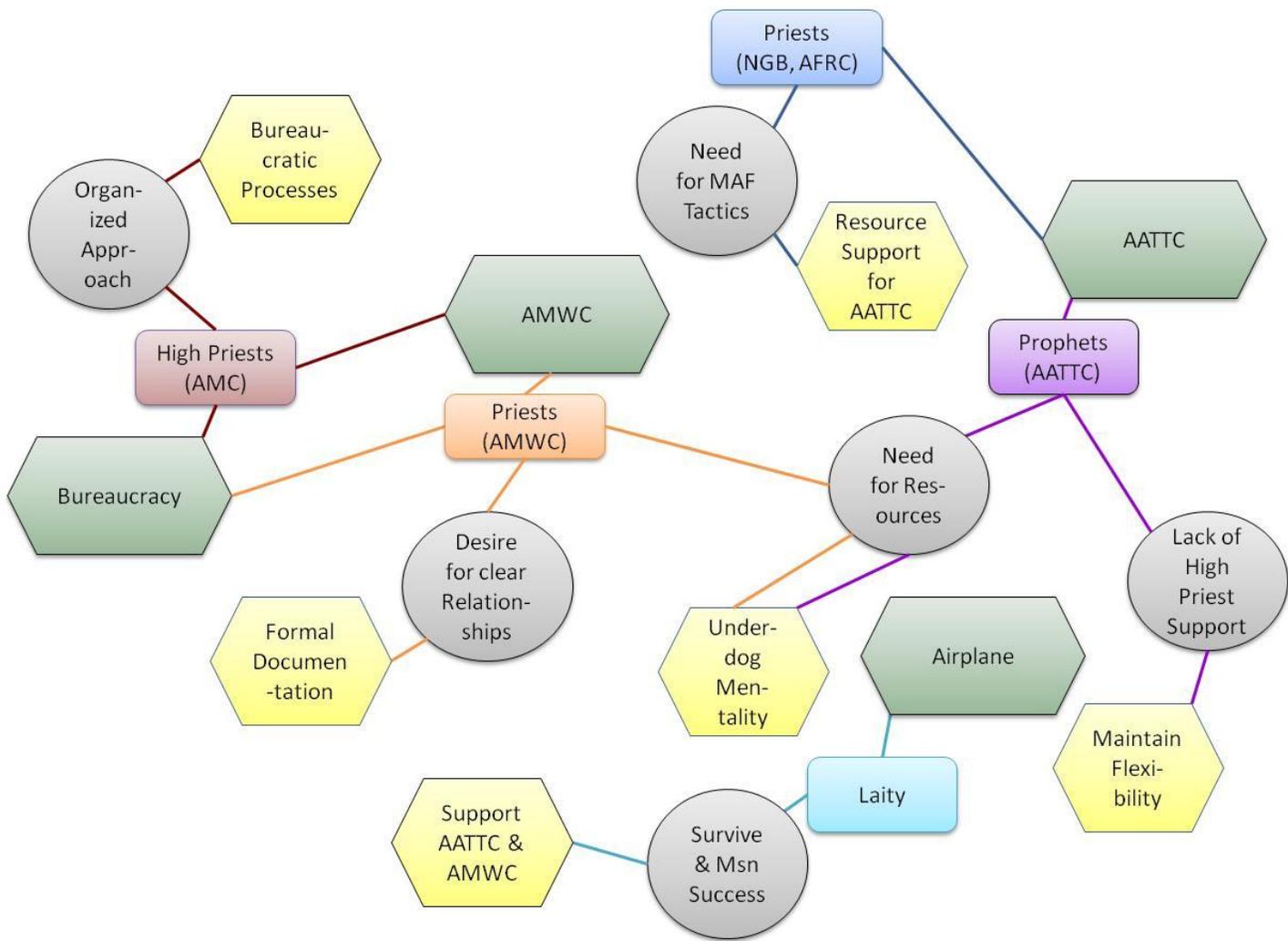


Figure 18 - SCOT Diagram of the AATTC and AMWC

Conclusion: Look toward the Wilderness²⁵³

The Advanced Airlift Tactics Training Center was started by operators in a field unit who saw the need for MAF survivability and mission success and worked to fill it. The concept was nurtured and supported primarily by the National Guard Bureau, and as the AATTC grew and excelled the Air Force Reserve Command, and to some extent the Air Mobility Command, contributed resources to the Center, further enabling its growth. “The school is a great thing, and I don’t say that because we developed it, I say it because I think that it has really helped raise the awareness of the C-130 community as to how to survive in a tactical environment, and I think that it’s really come a long ways over the years, and I would like to see higher headquarters realize that to the point that they’d be willing to give it the manpower and funding it really needs” summarizes Weigler.

When the C-130s went to ACC in 1993, the perceived mindset was “you’d never see C-130s in a ‘dirty’ environment like chemicals or high threat, [but now] everyone sees the need for departure and arrival tactics, and flying at night and that sort of thing” (Westfall). “Gotta continue [tactics and training], we go into places the fighters won’t go... we gotta maintain a leading edge of technology and development of tactics to come up with new ways of doing things, better ways of doing things” (Sloan). The staff and faculty of the Center, with the far-ranging support of the 139th Airlift Wing, continues to adopt new technologies and capabilities, integrate them into the tactics, techniques, and procedures of the mobility air forces and then disseminate that crucial information to the warfighters both in the air and on the ground. Perhaps Pankau reflects the mentality of the Center best, saying “I’ve always been a fan of doing what’s right—that’s what we do.”

²⁵³ “...they looked toward the wilderness, and, behold, the glory of the LORD appeared in the cloud” (King James Bible Exodus 16:10).

Chapter 8

The Creation of a Seminary: The Air Mobility Warfare Center

It's about communication—whether plane to plane or office to office.

Jared "Pat" Curtis
(Personal Interview)

The Air Mobility Warfare Center was the brainchild of General Ronald R. Fogleman while he was commander of the Air Mobility Command (AMC). He felt the many small training centers scattered around the country should be consolidated under one centralized organization, and in 1997 his vision came about and the Air Mobility Warfare Center (AMWC) was activated. A multitude of various centers, functions, and trainers were assigned to the Center, and it was headquartered on Fort Dix, located adjacent to McGuire Air Force Base, NJ.

While the AMWC is a large organization, the Mobility Weapons School (and in particular, its Tactics Division) and the Air Mobility Battlelab are the key components which affect the tactical and technological orientation of the mobility air forces and will be the focus of this chapter. I will briefly review the history and recent developments of these two suborganizations from activation through the end of 2005, and explain how they fit into the overall makeup of the current state of the tactical mobility culture.

These “priestly” organizations—because they were instituted not by laity in a well-spring of prophetic fervor, but rather by a high priest—have a different flavor than the Advanced Airlift Tactics Training Center (AATTC) described in the previous chapter. Both the AATTC and the AMWC contribute to the viability and success of the mobility forces, but they do so from different vantage points and position within the overall organizational structure. Both the similarities and the discontinuities between these organizations reveal differences in approach and are enlightening as to the relative contribution and mode of operation of prophetic and priestly organizations.

History and Issues of the AMWC

Pre-AMWC History

Throughout the 1980s, airlift C-130s and mobility forces in general struggled to find the right cultural mix somewhere between the combat mindset and the peacetime airline mentality—with neither end of the spectrum entirely appropriate. With no offensive capability and no defensive systems equipment²⁵⁴ on the aircraft (Fravel, Tactics I 8), the mobility community was often left alone, ignorant, and afraid. While some of the crewmembers were Vietnam combat veterans, the lessons learned in Vietnam often didn't translate well to future combat scenarios, such as a force-on-force engagement with the Soviets, and there seemed to be little interest from senior leadership in developing formal tactics, techniques, and procedures (TTPs) based on Vietnam lessons or future scenarios.

The movement in 1993 to the Air Combat Command was very beneficial for airlift C-130 tactics. General John M. Loh, Commander of ACC,²⁵⁵ was a strong proponent of the C-130s and after a year of effort established the USAF Combat Aerial Delivery School (CADS) at Little Rock Air Force Base, AR on October 1, 1994 (Little Rock). The CADS developed training and tactics programs which helped to resurrect a tactical mindset in the C-130 community. Eventually CADS moved to AMC along with the rest of the airlift C-130 assets on April 1, 1997, and later morphed into the Mobility Weapons School, which was one of the schools and centers consolidated into the Air Mobility Warfare Center.

Activation of the AMWC

The concept of an Air Mobility Warfare Center (AMWC) was articulated by Fogleman while he was the Commander of AMC.²⁵⁶ The intent was to consolidate AMC's training, education, and operational test entities into one center of excellence, with seven different organizations coming together at Fort Dix, NJ and the official activation declared on May 1, 1994 (AMWC/PA, History).

Organizations as diverse as the 33rd Flight Test Squadron and the 421st Ground Combat Readiness Squadron were pulled into the new organization, and over time its scope and mission grew. Various other entities were added or created, such as the Operations Directorate and later the Resources Directorate, the Dean of Education along with the Advanced Study of Air Mobility (ASAM) program, and the Air Mobility Battlelab. When the airlift C-130s moved back into AMC in 1997, the

²⁵⁴ Such as radar warning systems, chaff and flare dispensers and the like.

²⁵⁵ Commander of TAC from March 1991 to June 1992 when TAC was converted into the Air Combat Command (ACC). He continued as the Commander of ACC until his retirement in July 1995.

²⁵⁶ From August 1992 to October 1994.

CADS was assigned to the AMWC, and in June 2003 it was realigned as part of the USAF Mobility Weapons School (AMWC/PA, History).

The Mobility Weapons School’s primary focus is in conducting the Weapons Instructor Courses (WICs) for the key mobility weapon systems (C-130, C-17, and KC-135). It also performs tactics development and evaluation, intelligence formal training courses, oversees mobility participation in Red Flag exercises, and is the office of primary responsibility for tactics, techniques, and procedures (TTPs) manuals and other publications (AMWC Overview).

The Air Mobility Battlelab, or AMB, was established as an AMWC Directorate on May 4, 1998, and formally activated as an organizational entity on January 1, 2001. It is one of seven Air Force-wide Battlelabs,²⁵⁷ designed to explore and rapidly demonstrate innovative technologies to improve the capability of Mobility Air Forces to execute their missions by generating high-payoff initiatives at minimum cost (AMWC/PA, History). The motto of the AMB is “Transforming Today's Technology into Solutions for Today's Warfighter.”

The AMWC streamlined and reorganized its directorates and schools on December 1, 2003, resulting in the following organization (AMWC/PA, History):

AMWC Organization	Functional Description
USAF Expeditionary Operations School	Agile combat support center of excellence dedicated to the education, training and exercising of combat support personnel
USAF Mobility Operations School	Dedicated to educating, training and exercising department of defense personnel in the full range of mobility operations
USAF Mobility Weapons School	Tactical development and Weapons Instructor Courses
Air Mobility Battlelab	Explores and rapidly demonstrates innovative ideas and technology with Mobility applications
Resources Directorate	Financial and facility management

As of the end of 2005, the AMWC is headquartered at Fort Dix, NJ, with sites at McGuire Air Force Base (AFB), NJ; Fairchild AFB, WA; Fort Leavenworth, KS; Hurlburt Field, FL; Little Rock AFB, AR; Nellis AFB, NV; and Scott AFB, IL. It has 580 personnel assigned (counting civilian, military, and

²⁵⁷ As of the end of the case study timeline, 2005.

contractors), an annual budget of \$74 million, and runs 5,000 students through its 56 in-residence courses and another 7,000 students through distance learning courses annually (AMWC/PA, Fast Facts).

Description of Key AMWC Organizations

The Tactics Division of the Mobility Weapons School (MWS) is the primary element of the AMWC of interest to this chapter, while the Air Mobility Battlelab (AMB) provides some insight into the infusion of technology into the Mobility Air Forces (MAF). The Mobility Weapons School, besides the WICs located elsewhere around the country, has the Intelligence (Intel) and Tactics Divisions located at Fort Dix and working for the MWS Commandant, who reports to the AMWC Commander. The Air Mobility Battlelab is located solely at Fort Dix and the Commander reports to the AMWC Commander. See below for an organizational chart (AMWC Overview; Fravel, Interview).

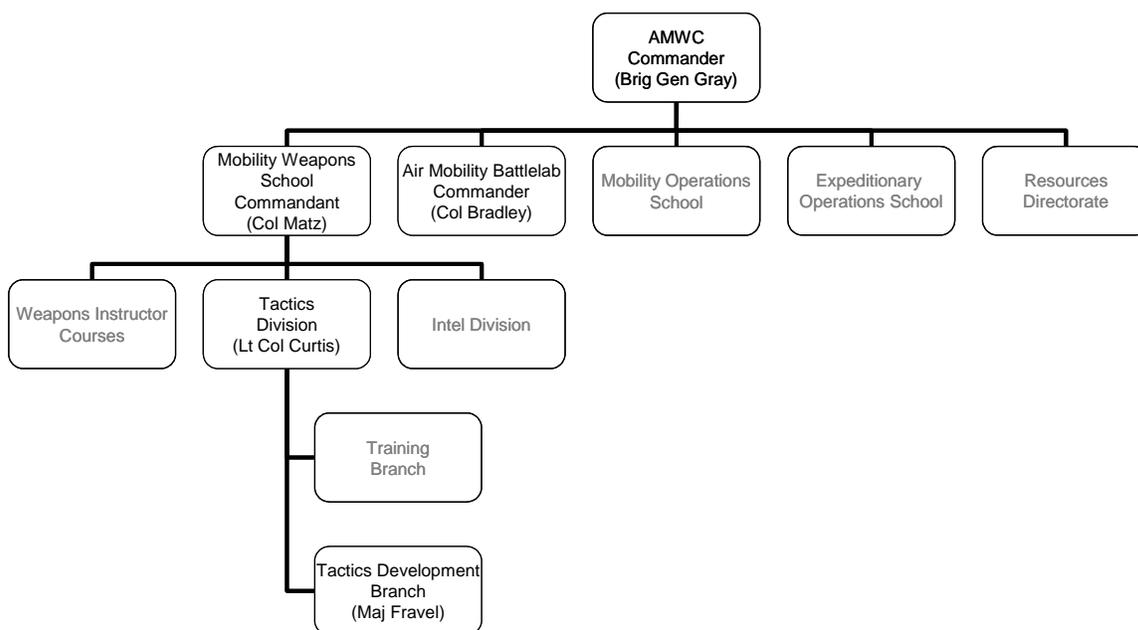


Figure 19 - AMWC Organizational Chart

According to Curtis, within the Tactics Division everyone's a team player and focused on the overall mission, an important attribute with a total staff of only 17 members.²⁵⁸ The Training Branch and Tactics Development Branch personnel work together fluidly, surging as necessary to keep up with workload especially when one branch is under a time crunch. The present course offerings per year for the Tactics Division are (Curtis).²⁵⁹

²⁵⁸ Counting personnel at Fort Dix, NJ and at Nellis AFB, NV.

²⁵⁹ Shaded cells are calculated by author.

Course	Number Offered Per Year	Max Number Of Students Per Course	Length of Course (in days)	Max Students Per Year	Max Mandays Per Year
Combat Aircrew Tactics School	8	30	14	240	3360
Senior Officer Tactics Course	4	12	2	48	96
Advanced Air Mobility Operations Course	4	40	1	160	160
Director of Mobility Forces (DIRMOBFOR)	3	6	1	18	18

Table 5 - 2005 AMWC Tactics Division Course Offerings

Lieutenant Colonel Jared P. “Pat” Curtis, Chief of the MWS’ Tactics Division, describes the original 1995 Tactics Division as having 16 personnel and including a Tactics Development Branch, but when the Air Mobility Battlelab was unofficially set up in 1997, it took ten manpower positions from the Tactics Division along with that branch. At one point, with a lack of backfills, the division only had three people working in it.

The impetus to re-create a tactics development branch started back in the late 1990s, but it took general officer level involvement²⁶⁰ and a sustained effort on the part of many offices. Around 2002, Lieutenant Colonel Jim “Friar” Tuck, Curtis’ predecessor as Chief of the Tactics Division, looked at the organization’s history and decided it was time to fight for the manpower. Using the USAF Weapons and Tactics Center²⁶¹ as a model, he built a case for additional manpower and got the ball rolling, convincing leadership of the need to support the initiative. The analysis, using currency requirements, training courses, conference attendance, time required for tactical assessments, and other metrics revealed a tactics development branch alone required 14 personnel.

Colonel Jon A. Matz, Commandant of the Mobility Weapons School, also worked diligently to create the Tactics Development Branch within the Tactics Division, and it was finally established in June 2005 with a staff of four. The four personnel assigned to the branch consists of two personnel at Fort

²⁶⁰ Major General Chris A. Kelly, the past Commander of AMWC, was the “most visibly enthusiastic [general officer] with the tactical culture effort,” and has been very helpful in his new position as the Vice Commander of AMC (Curtis).

²⁶¹ This organization has been around since the 1966 establishment of the USAF Tactical Fighter Weapons Center. Over the course of the years its name has changed to the USAF Fighter Weapons Center (1991), USAF Weapons and Tactics Center (1992), USAF Air Warfare Center (1995), and finally the USAF Warfare Center (2005). During this entire period, it has reported to the combat forces command (TAC and now ACC).

Dix, the branch chief and one other action officer, with two others located at the USAF Warfare Center at Nellis AFB, NV. Major Linden A. “Pete” Fravel, the Chief of the Tactics Development Branch, says the most difficult part is convincing the manpower people at HQ AMC that they really do need additional personnel to make significant progress with tactics development, and while they aren’t slated to get as many as they need, by fiscal year 2008 they should have 11 positions on the books for the Division.

Fravel notes that the Tactics Development Branch doesn’t “own” tactics; instead he insists they are just enablers for tactics development—“data pimps” is how he puts it. His goal is for the branch to be the conduit between field personnel, HQ AMC Tactics (AMC/A39),²⁶² and organizations like the Advanced Airlift Tactics Training Center (AATTC), AMC’s Test and Evaluation Squadron (TES),²⁶³ and the WICs. By tracking the Tactics Improvement Proposals (TIPs) and the various other official forms for change requests to publications (Form 847) or requests for modification to aircraft (Form 1067), as well as the outputs from Tactics Review Boards (TRBs), the branch can provide a valuable one-stop source for coordination and information on the status of various initiatives and concepts for tactics development.

The HQ AMC Tactics folks are really more about guidance, Air Force Instruction coordination and publishing, working on procurement of the bigger equipment systems like Airborne Broadcast Intelligence (ABI), and just run out of time for all the possible tasks, especially given their limited manpower (Fravel). That’s where Fravel’s branch comes in, providing the intermediary between the field and the headquarters personnel, and at enough of a distance from HQ AMC to avoid the workload “volume” problem of actually being located within the HQ (Fravel, Interview).

The Air Mobility Battlelab (AMB) came about because Major General William Wesler III, then-Commander of the AMWC,²⁶⁴ wanted a small, agile organization working on mobility issues and such an entity wasn’t one of the initial six official Air Force battlelabs. Originally the organization manning came “out of hide” with manpower begged or borrowed primarily from other AMWC organizations and the battlelab existed essentially on paper, rather than as a formal entity. Eventually the battlelab received official Air Force recognition and formally activated on January 1, 2001. The organization today has 27 personnel assigned, counting civilian, military, and contractors, and an annual budget of about \$3.5 million (Tollefson). The average cost per AMB initiative is \$160k (Lathrop), and while they’ve spent up to \$650k, they try to keep project costs beneath the \$250k mark (Tollefson).

²⁶² AMC/A39 is the office symbol of the Operations Directorate’s Tactics Division of HQ AMC.

²⁶³ This was originally the 33rd FTS and part of AMWC until October 1, 2003 when it was moved to Pope AFB, NC and now reports directly to HQ AMC (AMWC/PA, History).

²⁶⁴ August 1997 to August 1999.

The AMB has a tight-knit relationship with the HQ AMC Requirements (AMC/A58) and Integration (AMC/A38) staff, and are starting to work more closely with the Expeditionary Combat Support (AMC/A4) staff. They tend to interact heavily with the Test and Evaluation (AMC/TE) offices as well, as the test and evaluation personnel often do the final fielding for operational use after entities like the battlelab have finished proof of concept tests.

Generally, the battlelab demonstrates the utility of certain technologies, then provides the appropriate HQ AMC staff with a full report of their findings, and leave the decision as to how and whether to proceed with the headquarters staff. In some circumstances, if a proof of concept test is deeply involved, they require sponsorship from the Test and Evaluation staff to get a thorough operational assessment completed.

Challenges to Tactical Growth

“Stan/Eval and Tactics are really starting to talk at HQ AMC,” Fravel says, discussing what a sea change this is for those two organizations. Still, it takes high-level interest to sustain a cultural shift toward a warfighting mindset, and the bottom line is it requires headquarters-level staff to make it happen. Fravel points out that the Air Combat Command (ACC),²⁶⁵ which runs the USAF Warfare Center at Nellis,²⁶⁶ has an entire Group²⁶⁷ dedicated to tactical development, not to mention the entire range complex at Nellis in which to operate the Red Flag exercises.²⁶⁸ Still, he’s doing what he can to contribute to MAF tactics and grow his branch, looking to find mandays for reservists, perhaps obtain an Individual Mobilization Augmentee (IMA)²⁶⁹ while holding out for the follow-on staff he’s supposed to get in future years. For his part, Curtis tries to limit what’s on the plate and establish priorities for the overwhelming workload, and provide “top cover” for the branch when necessary.

While the concept of the AMWC is good, it can be hard to see the value-added across the board. There are so many disparate functions lumped within one entity that often there seems to be little overlap or synergy between those functions. Another potential pitfall of the organizational structure is the funding streams—with the AMWC’s Resources Directorate controlling the purse strings, a political dimension enters into the pursuit of project funding. On the plus side, while it can be disconcerting and

²⁶⁵ Lead command for the Combat Air Forces (CAF).

²⁶⁶ Among other activities, they run the Red Flag exercises, considered the premier aerial training exercise in the world.

²⁶⁷ An Air Force Group is comprised of several squadrons. Squadrons are normally around 100 individuals or so. See chapter two’s description of the modern Air Force.

²⁶⁸ The USAF Warfare Center presently consists of four Wings, a Battlelab, and a couple other smaller entities (Nellis Units).

²⁶⁹ An AFRC program in which individual traditional Reservists are assigned to active duty organizations.

add layers of bureaucracy, being part of the AMWC also provides general officer “push” when an issue needs to have high-level advocacy via the two-star²⁷⁰ commander.

Funding for tactics development is always in short supply, and the Tactics Division’s \$570k budget is pretty meager (Curtis). “The limitation to tactics is the funding for testing, the range time, test equipment, contractors and so on,” he says, elaborating further that “the backlog is in the testing, not the ideas.” A sensor blinding test is one project Fravel recalls as languishing for years due to lack of funding, despite its high priority; “there’s stuff back to ’97 never tested because it’s an expensive test and so keeps getting passed over,” he laments. The lack of a flight test organization directly reporting to the AMWC, and preferably to the Weapons School, is also a shortcoming for getting tactical development and testing completed.²⁷¹ Workarounds come into play, such as by using the “bubba network” to get units to volunteer for projects (at their own expense) via unofficial channels, but that’s not always an efficient or effective way to get projects accomplished (Fravel, Interview).

The Air Mobility Battlelab (AMB) is migrating away from aircraft-based activities and over to more research in the expeditionary combat support arena. The AMB, together with the USAF Expeditionary Operations School, make up the AMWC’s Expeditionary Combat Support Center of Excellence (AMWC Overview). Lieutenant Colonel Jeffrey R. Lathrop, Deputy Commander of the Air Mobility Battlelab, makes the case that they’ve picked a lot of the “low-hanging fruit” in the aviator side of the house in the past few years, and are seeing a need for their services in the support functions and career fields.

The battlelab was never more than cursorily involved in tactical development, being more focused on any unique training requirements for a potential technology than the tactical aspects. However, they work with the AMWC Tactics Division should a particular project seem to warrant an operational/tactical look prior to sending the final report up to HQ AMC (Lathrop).

²⁷⁰ A two-star is a major general.

²⁷¹ Recall that these were similar issues with the ACTS and the lack of organic aviation support.

The AMWC Today

Interaction with Outside Agencies

The Tactics Development Branch works well with outside organizations, Fravel warrants. He thinks there is room for improvement, and he's trying to make it better, but overall most operations personnel understand the drivers for tactics and the need for success. As Curtis puts it, the relationships just aren't "habitual" enough right now—that "we need regular communication more often." He thinks there isn't any real resistance to more engagement on tactics issues, it's just a matter of "encouraging divvying up [the workload] where it makes best sense—we want to exploit expertise where we find it."

Of course, Fravel notes it can also depend on the particular personalities in various positions, as well as the perceived or real support from senior leadership for a particular initiative. As time permits he intends to strengthen the relationship between the AMWC, AATTC, and the Air Force Reserve Command's (AFRC's) 22nd Numbered Air Force (NAF)²⁷². Fravel thinks something missing is a more formalized relationship between all the players in tactics development, including active and reserve component organizations.

The branch also looks to new methods of communicating information, having set up a Community of Practice (CoP) on the Air Force Portal and insisting on each unit tactics shop having an organizational email inbox. This allows the branch to quickly send notification of time-sensitive information, such as the Tactical Analysis Bulletin System (TABs), which is a one-page document specific to a particular community on late-breaking tactics-related information. Curtis even floats the idea of "blogging" TIPs—perhaps as a way to quickly vet ideas and get a broad-based community gut-check on new proposals.

There's definitely a need for a well-defined forum for MAF/CAF/SOF tactics interchange, Fravel argues, especially given the potential value for the Air Force institution. As an example, he cites the research on in-flight refueling of unmanned aerial vehicles (UAVs). The ACC fighter types are busy figuring out how to refuel UAVs, but don't seem to be working very closely with the tanker community which is presently unequipped for this new concept. This same disconnect occurred with refueling fighters on night vision goggles (NVGs)—the tanker lighting systems aren't currently set up for NVG-compatible operation, so it doesn't matter that the fighters are now ready to refuel on NVGs, because the tankers aren't ready technologically to support that capability (Fravel, Interview). The same disconnect seems to occur between the MAF and special operations forces (SOF) C-130s—in some

²⁷² The organization which oversees tactics for the Reserve mobility units.

instances, the aircrew responses to a certain type of threat is different depending on whether they are using MAF or SOF procedures. There may be good reasons for that, but until everyone sits down and reviews the other's TTPs, it's going to be confusing and one of the responses may not be optimal. Curtis highlights the lack of overall Air Force community interaction by mentioning he was the only AMC attendee out of 700 folks at the 2005 CAF Weapons and Tactics Conference.²⁷³

Even the linkages between the Services could use some formal structuring. Certain projects will require collaboration between the Army and the Air Force airlift C-130s, but generally collaboration tends to be somewhat informal and rather narrow in scope. While there aren't always a lot of overlaps, where they exist more effort should be expended ensuring tactics are as joint as possible and not developed in a vacuum—for example, Curtis conveyed the story of an Air Force tactician who happened to be at a Navy flare conference and was able to save them \$1 million on a flare test they were about to perform because the Air Force had already funded the test.

The battlelab experiences are similar, although being a small organization with a relatively narrow focus they tend to have more overlap with the other Air Force battlelabs, which are in various other Air Force major commands, so there is a greater amount of information exchange between these specialized entities. Mr. Art W. Tollefson, a contractor working for the Battlelab, even notes the battlelabs will pass projects back and forth—if at some point one battlelab believes a project is better suited to another battlelab or major command, they'll "shop around" the project to find an appropriate home for it. Of course, he says "[battlelabs] generally don't play well with other Services," but that a Joint Services Battlelab is being considered to help that joint information flow.

Technology's Impact on Tactics

Technology is a real driver for tactics, as new systems and capabilities will usually drive new ways of flying and fighting. To have the appropriate level of tactician input to new technology can be very time-intensive though, and an example is the Joint Precision Airdrop System (JPADS). The JPADS is a global positioning system (GPS) controlled airdrop platform that, once dropped from a cargo aircraft like the C-130, self-steers to the desired point of impact as long as it's dropped within its Launch Acceptance Region (GlobalSecurity.org). Presently, this system is soaking up a lot of time as the Tactics Development Branch works closely with the Army and testing organizations to ensure appropriate TTPs are developed for the new system. General Duncan J. McNabb, presently the Commander of AMC,²⁷⁴

²⁷³ The CAF WepTac is the premier conference for exchange of tactical ideas, concepts, and procedures for the fighter and bomber community.

²⁷⁴ October 2005 through the end of the case study period.

has made JPADS a priority—setting the goal of May 1, 2006 for it to be in theater and functional (Fravel, Interview). “JPADS is the JDAM²⁷⁵ of the Mobility world,” claims Curtis, underscoring the JPADS importance to the mobility community.

Fravel believes this is the “dawn of the period” for operational technology, and that the biggest problem right now is that “there are too many systems out there, and we end up with too many legacy systems.” The next problem is figuring out how to smartly employ the systems, while maintaining the “centralized control – decentralized execution” doctrine of the Air Force, especially with the continued push to trim down the crew complement by removing engineers and navigators from cockpits (Fravel, Interview). “If the [Combined Air Operations Center (CAOC)] can retask on the fly, is this effectively a doctrine change?” he asks.

Information technology can also overpromise. Air tasking orders (ATOs)²⁷⁶ can still take 72 hours or more to produce, resulting in a lengthy observe-orient-decide-act (OODA) loop despite all the connectivity and information management tools available. The Defense Messaging System (DMS) still doesn’t work reliably or consistently, despite being declared the official messaging system back in 2001. Curtis expressed frustration with DMS, wondering why it was still being pushed despite clear evidence it just wasn’t working, while email was more reliable and more useable than DMS. Fravel thinks information technology is overall a good thing, but data overload is a real problem—one doesn’t want people “frozen” because of too much information, or waiting on every available bit before making a decision. A positive example of an information technology toolset is the Virtual Electronic Combat Training System (VECTS), a plug-in module to the Portable Flight Planning System (PFPS)²⁷⁷ which stimulates the aircraft’s defensive systems in-flight to provide realistic training on threat responses by aircrews. VECTS, an initiative of the Air Mobility Battlelab, can provide an excellent, very low cost training simulation at home station, avoiding expensive range time and travel expenses.

Of course, the Battlelab is really all about technological artifacts, and trying to find ways to fast-forward off-the-shelf concepts to the warfighters, while ensuring synchronization with the end users and their employment paradigms. After all, as one study on the operational use of a night vision goggle heads up display (NGB HUD) noted, “if the crews won’t [use] it, it doesn’t help the mission” (Tomko, Evaluation 23).

²⁷⁵ Joint Direct Attack Munition, a “dumb bomb” which has been upgraded with fins and a GPS guidance system to make it a precision-guided munition. It is dropped by fighters and bombers and used heavily by all the Services, but was a radical change in tactics and capabilities when initially developed.

²⁷⁶ ATOs are the lengthy documents assigning missions to units in a warfighting theater.

²⁷⁷ This suite is the standard for aircrew mission planning for most Air Force aircraft.

Lathrop thinks the Air Force (AF) is starting to see, and will see more of in the future “tech-savvy troops with an openness to embrace IT and get past old grease-pencil mentalities.” As the AF moves into the future, he says software will be a hard train to drive, because who does it belong to—AMC, the Air Force, the combatant commander? Tollefson echoes this sentiment, saying the important thing will be to ensure there is a “one-stop shop for systems” and those systems will all “have to talk, to communicate with each other.” He thinks a big problem is in the requirements definitions and that “what we really need to do is to define good requirements up front, [right now] we’re really bad about continually changing requirements.” The trick is to avoid the “band-aid” solutions to getting systems to communicate, and instead have built-in interoperability requirements right from the start (Tollefson).

Future Goals

For Fravel, the chief future objective for his branch is getting the community to know they exist and are effective, two goals which feed off each other. Overall, he thinks the future is bright for the mobility community at large, that it’s maturing and evolving, that aircrews are asking more questions, digging into the data more frequently, and critically assessing the tactics. He says “it’s pretty impressive seeing guys in the community—and not just the zealots—asking questions.” There are still bugs and communication difficulties and the mobility community still isn’t where it needs to be, but he feels it’s moving in the right direction.

Manpower is sure to remain an issue, and not just within the Tactics Division. Curtis compares the size of the HQ AMC Tactics Division (around 12 positions) to the HQ AMC Stan/Eval Division (66 positions). “AMC still has legacy emphasis on evaluation—the true evaluation is that we’re not getting shot,” he says, while still conceding that “we’ve come a long ways.” Still, his future goals are all “primarily people-related” in trying to ensure the manpower flows like it’s supposed to, and that he enables his current staff to really shine and make a real contribution to MAF crew members’ tactical prowess.

Lathrop believes the battlelab will remain status quo into the future with respect to manpower and funding, and sees them as migrating toward expeditionary combat support (ECS) and such things as cargo loaders and other support-focused technologies. He also thinks they will get more involved with cooperative research and development agreements (CRADAs) with various industry partners, as a way to broaden their resource base and leverage outside resources. As part of the migration to ECS, he thinks they’ll start having more interaction with ACC as it is the lead command for ECS, and that might be a good opportunity for information and idea sharing across the major command seams.

The AMWC and STS

The STS analysis of the Air Mobility Warfare Center (AMWC) parallels that of the Advanced Airlift Tactics Training Center (AATTC)—the technology under review is the AMWC itself. Part of the controversy is the output of the AMWC, as well as the manning and resourcing of the organization. A chief difference between the AMWC and the AATTC is that the former is a priestly organization, with a clear location within the hierarchy, while the latter is a prophetic organization with a more opaque status.

The AMWC and the Humanities Philosophy of Technology

Like the AATTC discussed in the previous chapter, the AMWC's humanities philosophy of technology (HPT) perspective focuses on the product of the organization: the tactics, aircrew tactical development, and use of related technology. These factors represent the broader social and military context of the AMWC, instead of focusing on the AMWC itself (which occurs in the EPT section).

Discourse & Metaphor of the AMWC from the HPT Perspective

The primary techniques used by the AMWC involve a reliance on general officer leadership and higher headquarters. The AMWC is headed by a two-star major general, and that position is used to help remove roadblocks and shortfalls when difficult situations arise, and this two-star advocacy can often engender success for initiatives. The AMWC also looks to higher headquarters, in particular the Air Mobility Command (AMC), for direction and support—for example, the crash course in JPADS tactics development occurred as direction from higher headquarters, and when the mobility battlelab is complete with an assessment of a project, that information is sent to HQ AMC for final consideration or further action.

The technology contribution to the discourse is the intercalation of AMWC within the bureaucracy—those human processes which enable the larger organization. The AMWC tries to use the military bureaucracy to its advantage (unlike the AATTC which tries to avoid the priestly bureaucracy) in order to promulgate ideas, artifacts, and solutions across the MAF. The attempt to use the bureaucracy is in line with the priestly origins of the AMWC and its relationship to its headquarters, Air Mobility Command.

A strong link between the use of the bureaucracy and the experiences of the organization is the method of soliciting input from the individuals out in the field. The AMWC tries to funnel ideas and concepts into the organization via official paperwork, such as Forms 847 and 1067, and then work the suggestions via bureaucratic processes. These ideas and concepts originate with experiences at

locations such as Red Flag (and other exercises and deployments), and the AMWC acknowledges the value in gleaning these experiences by having individuals permanently assigned to the Red Flag location.

The AMWC uses language in several ways, such as a “need for communication” being a theme of the Tactics Division personnel. In their intended role as information broker between HQ AMC, other sister organizations, and the field, this theme helps shape the discourse concerning the place of the organization in the larger scheme. Other language was used to capture the feeling of the state of MAF tactics development: the phoenix, rising from the ashes. Fravel used this metaphor in two articles for the Mobility Weapons Journal, and those articles are also on the Division’s community of practice site accessible via the Air Force Portal, for ready reference and dissemination.

This concept of rebirth ties into the Air Force religion as well with the acquisition of a new soul necessary for heroes to achieve superhuman deeds. These superhuman deeds often result in salvation—of the aircrew and often the mission, which can save the nation—and so builds upon the foundation of soteriology, one of the key doctrinal elements of the AF religion. The religious mysteries also figure prominently into the mission and goals of the AMWC, as they search for classified information and special secrets which may yield greater tactical insights for the select. The trend toward subculture equality across the AF religion continues in the work of the AMWC, which is oblivious to the physical gender of the aircrew and also working to bring parity and equality to the mobility community.

Outcomes of Discourse & Metaphor from the HPT Perspective

Overall, the combination of discourse and metaphor results in a successful priestly organization, one which is lean enough to maximize the embrace of technology and technological change, while attempting to leverage the strictures and structures of the larger clerical organization. While much of the AMWC’s output mirrors the AATTC’s, its philosophical approach often plays on different organizational strengths such as an embrace of bureaucracy and institutional structures. The net result of discourse and metaphor from the HPT perspective is useful tactics, techniques, and procedures for the mobility forces community.

The AMWC and the Engineering Philosophy of Technology

The engineering philosophy of technology (EPT) perspective as relates to the technology of the AMWC is concerned with the institution itself: the manpower, facilities, resources, and other operational considerations. These issues highlight the relative capabilities of the organization and its support from within and outside the mobility air forces.

Discourse & Metaphor of the AMWC from the EPT Perspective

The primary technique from the EPT perspective is that of formalized relationships. The members of the AMWC seemed very concerned about formal relationships, and an understanding of how everyone fits into the larger organizational structure. So as part of the AMWC's discourse, situating outside organizations within the tacit mapping of relationships is important for the priestly organization, so it can better understand the relative power positions within the Church hierarchy. This reliance on bureaucratic structure is leveraged as a strength for the AMWC, unlike the AATTC, and is part of its role as a priestly seminary.

The technology within the discourse is, unlike the AATTC, the fighting for resources within the bureaucratic system. As a bureaucratic organization, it collectively strives to work within those human processes to find the resources necessary to fulfill its assigned tasks and mission.²⁷⁸ The manpower studies and other efforts have only one venue—HQ AMC—for promulgation and justification of additional resources, while the AATTC has the local Wing, HQ AMC, NGB, and AFRC as possible venues for obtaining necessary resources.

The experiences of the AMWC relate directly to the short manning situation and the lack of priority for the organizational mission. In particular this would tend to create an “underdog” scenario, similar to the circumstances of the AATTC in the previous chapter, as well as a tendency to focus on obtaining necessary resources rather than working on the assigned tasks.²⁷⁹ The experiences and priestly nature of the AMWC make turning down projects very difficult, as many of the assigned tasks are directed by higher headquarters.

The waxing and waning of the tactics development branch is one use of language from the EPT perspective. The organizational flux and reassignment of personnel based on high priest priorities underscores the relative value and contribution of the branch more in action than words—but nonetheless, the manpower documents and direction from on high to realign positions implements the higher calling. The phoenix metaphor also applies to not just MAF tactics, but to the AMWC organization itself—as it rebuilds its tactics offices and re-establishes its value to the overall MAF organization, it gains respect and credibility within the MAF and overall AF institution.

The theme of rebirth is, of course, part of the AF religion and is very applicable to the AMWC as its tactical focus, and MAF tactics, arise from the ashes. Tied closely to rebirth is the effervescence

²⁷⁸ Conversely, the AATTC voluntary finds tasks and missions for which it then assumes responsibility.

²⁷⁹ This is not a criticism of the Division for fighting for resources; rather, a commentary on how small, under-resourced organizations often cannot perform their primary mission very well due to those shortages and the need to convey the difficulties to the resource arbiters.

exhibited by Fravel, Curtis, and other tacticians as they work long hours striving to deliver, and their feelings of pride and zeal as they discuss the contribution the organization is making to MAF tactics. The AMWC identity is also closely aligned with the underdog mentality of the AATTC, and the struggle for resources against competing demands.

While the AMWC is part of priesthood, it nonetheless tries to bridge the space between the laity and high priests at HQ AMC, as well as interact with prophetic organizations like the AATTC. In some ways it creates a “trading zone”²⁸⁰ of information and ideas across the various organizational roles of the AF religion. Finally, the battlelab and the Tactics Division both underscore the sacredness of technology—the battlelab because it exists for technological “fast-forwarding” and the Tactics Division because it brings together the operations and the technology for greater opportunities of mission success and aircrew survivability.

Obviously, the organizational roles are important, as the AMWC was chartered by a high priest and is sustained via its commander and the higher headquarters organization. This makes the members of the AMWC priests, rather than prophets, yielding a distinctively different flavor for the organization and affecting its dynamics with organizations above, below, and alongside it. For example, Curtis says the way to continue development of the MAF tactical culture is for general officers to spend time with line crew dogs to see what’s happening, underscoring the reliance on priests rather than prophets for organizational momentum.

Outcomes of Discourse & Metaphor from the EPT Perspective

The Tactics Division is attempting to grow in size and develop new tactics and capabilities for the community while trying to provide the organizational bridge between the different interest groups. The members of the Tactics Division and the Air Mobility Battlelab exhibit a sense of pride at their contribution to the overall MAF community and the Air Force as a whole, despite the under-resourcing and constant struggle for additional resources. The recent interest by senior leadership for increased manpower indicates the value of the organization and its processes within the context of the MAF.

The AMWC and the Social Construction of Technology

The AMWC social construction of technology decomposition mirrors that of the AATTC in the prior chapter. One advantage of the AMWC is that being priestly it leverages the bureaucracy while also inspiring prophetic visions within the organizational constraints.

²⁸⁰ See Galison’s [Image and Logic](#) for a discussion of trading zones.

Social Group	Goals	Key Problems	Artifacts
High Priests—AMC	Support broad Air Force goals; organize-train-equip mobility forces	Requirement for organized, methodical approach to tactics	AMWC, Bureaucracy
Priests—NGB and AFRC	Support Guard and Reserve activities	Need for tactically-oriented mobility air forces	AATTC
Priests—AMWC	Support AMC direction on MAF tactical development	Lack of resources; desire for clear relationships	AMWC, Bureaucracy
Prophets—AATTC	Directly support operators in the MAF	Lack of resources, need for priestly support	AATTC
Laity—unit mobility forces personnel	Fly, fight, and win	Need for survivability and mission success	Airplane

Like with the AATTC, closure is an on-going process for the AMWC, with both redefinition and rhetorical closure occurring depending on the circumstances of a particular situation. In a similar parallel, final closure is yet to be determined in the case of the AMWC, but primarily smaller-scale closure is achieved through redefinition. The SCOT diagram below graphically depicts the information in the preceding table. This diagram is the same as used previously in the AATTC chapter due to the tight linkages and inter-relationships between the two organizations.

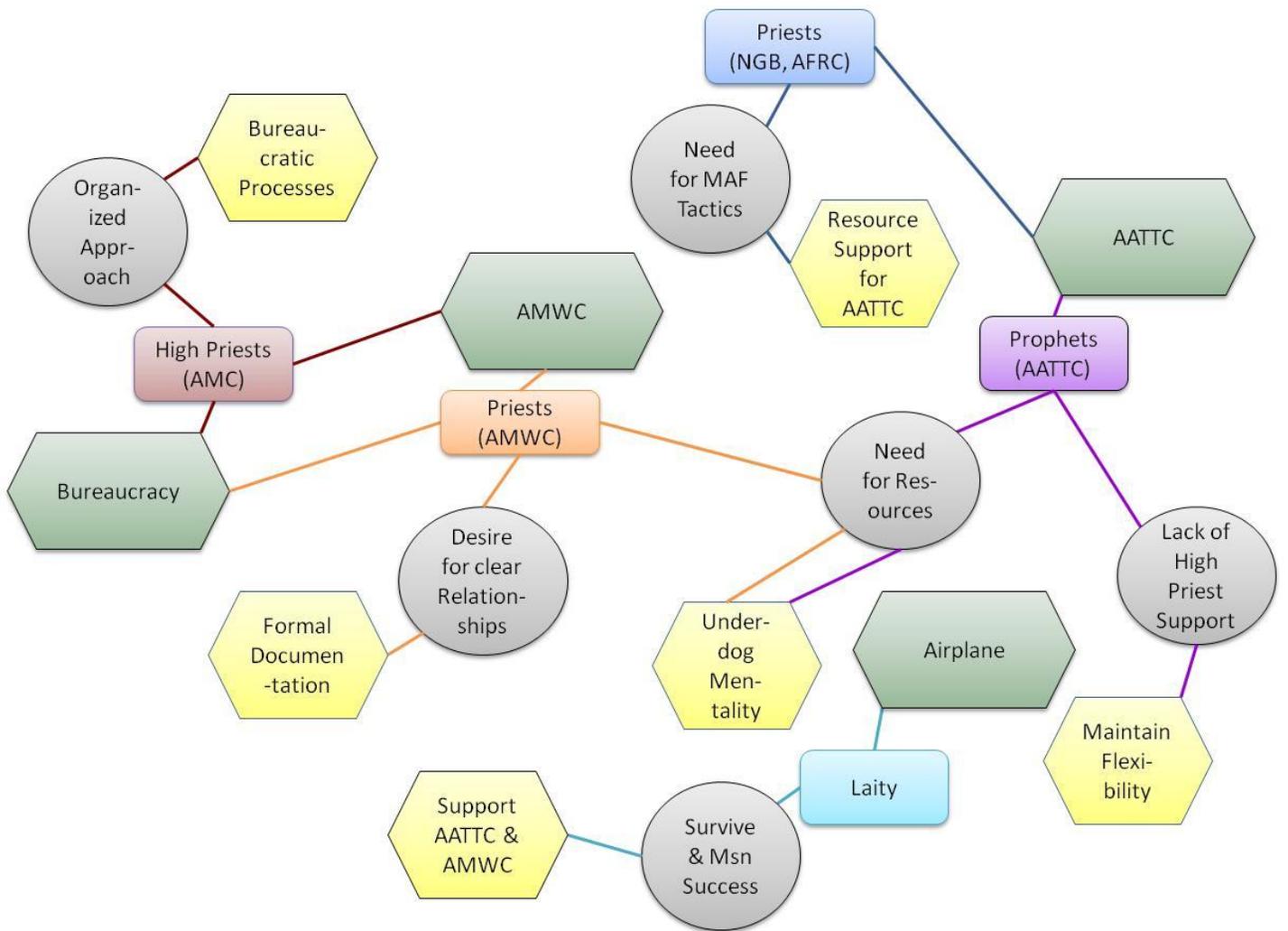


Figure 20 - SCOT Diagram of the AATTC and AMWC

Conclusion: The Value of Seminary²⁸¹

The Air Mobility Warfare Center was conceived and built by Fogleman in his position as the Commander of Air Mobility Command and it has contributed to the influx of tactical culture within the Mobility Air Forces, and is a reflection of the gradual cultural change toward tactical precepts. In particular, the Tactics Division of the Mobility Weapons School, and the Air Mobility Battlelab, has been supportive of successful mission accomplishment and aircrew survivability.

Fravel is optimistic about the future. Priority for participation in Red Flag events has increased for mobility units, which should get more crews out to Nellis and exposed to that superb tactical training exercise. His two staff members out there are working hard to collect and disseminate lessons learned from the events, so that “lessons learned don’t become lessons forgotten” (Fravel, Interview). He likens the cultural shifts within the MAF to a pendulum, and while he’s not sure it’ll continue as far toward the warfighting mindset as he’d like, it still won’t swing backwards as far as it was. Fravel says the move toward a focused tactical orientation is a “total doctrine change” for the mobility forces, noting that most of the strategic airframes, like the C-5, didn’t even have published TTPs until a couple of years ago. Curtis agrees, saying that “culture change will take a generation, and in the Air Force that’s maybe six years—the time it takes for certain people to be rotated out of units.” He doesn’t say that all culture change is necessarily good though, highlighting the importance of doing a “vector check every so often to see if things are going the right way.”

Planned for the Spring 2006 issue of the Mobility Weapons Journal, Fravel’s second article on the rebirth of MAF tactics compares it to the phoenix, and using that analogy says that tactics is now “newly arisen and renewed” (Fravel, Tactics II 3). To ensure future success, he wants to make tactics a “thing of enduring and unsurpassed excellence by enabling, supporting, and coordinating with the numerous organizations that are striving to develop AMC’s future tactics” (Fravel, Tactics II 3).

²⁸¹ “All scripture is given by inspiration of God, and is profitable for doctrine, for reproof, for correction, for instruction in righteousness” (King James Bible II Timothy 3:16).

Chapter 9

“A New Creature”:²⁸² The Department of Defense Readiness Reporting System

It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.

*-Machiavelli
(21)*

The readiness of the United States military can influence Presidential elections. At the 2000 Republican National Convention, then-Governor George W. Bush stated that “If called upon by the commander in chief today, two entire divisions of the Army would have to report, ‘Not ready for duty, sir’” (Grossman). These statements—and others during the run-up to the elections—resonated with proponents of a strong military.²⁸³ Many Americans were concerned over Defense budget cuts during the Clinton-Gore years and the perceived need for a strong military (Pomper), while the possibility of another post-Vietnam “hollow force” after the successes of the Gulf War was a concern of many in (or associated with) the military (Kitfield 423-435). Issues raised by the Presidential candidates and their

²⁸² “Therefore if any man be in Christ, he is a new creature: old things are passed away; behold, all things are become new” (King James Bible 2 Corinthians 5:17).

²⁸³ The October 2000 Bush/Gore debate also highlights additional military readiness issues (GlobalSecurity.org). Betts (Military Readiness) provides an analysis of other elections in which military readiness played a role.

debates over military readiness helped drive the radical changes to readiness reporting intended by the Department of Defense Readiness Reporting System (DRRS).

The humanities philosophy of technology (HPT) and engineering philosophy of technology (EPT) perspectives in the co-construction of human and technology, social construction of technology (SCOT), military religion, and the Air Force culture are all very evident in this case study. The Air Force religion created the conditions in which a change in readiness reporting processes and information technology systems caused the organization turmoil and confusion. This case study also moves this dissertation's focus from an internal viewpoint—one restricted primarily to Air Force internal matters—to a description of external Air Force interaction with other organizations; in particular, the Office of the Under Secretary of Defense (OUSD) for Personnel and Readiness (P&R), the Joint Staff, and the other military Services.²⁸⁴ In the current conflated Joint operating environment, this case study provides view of the current state of integration between the Services in particular when confronted with a revolutionary prophet-priest.

This chapter is broken into two parts. The first part is an abbreviated overview of the far-ranging history of readiness reporting and current readiness policy and requirements for the military. From this vantage point, the second part concentrates on DRRS and its development from inception through the end of calendar year 2007. I will describe this revolution in readiness reporting, and articulate the approach and limitations of the Air Force to the cultural change represented by DRRS. Along the way, I will present the reaction of the other Services and the Joint Staff in order to situate the Air Force in relation to its military counterparts. In this manner, the relatively maturity of the Air Force and its manner of supporting and interacting with its sister Services is revealed.

²⁸⁴ This case study focuses on those military Services that are part of the Department of Defense (DoD): U.S. Air Force, U.S. Army, U.S. Navy, and U.S. Marine Corps. Not intended as a slight on the fifth military Service, the U.S. Coast Guard, this approach helps by limiting the scope of the chapter to a single Department.

History and Issues of Readiness Reporting

“Readiness is vital, yet anyone hardly knows what it is” (Betts 4)—one of the reasons for this background section is to ensure the reader has a good understanding of the what, why, and how of military readiness. In order to monitor the readiness of the military forces, Congress has long directed the Department of Defense to provide reports to Congress on the status of the forces. Title 10 United States Code (10 USC) section 482²⁸⁵ contains the minimum requirements for readiness collection and reporting and is the legal requirement for the Secretary of Defense.²⁸⁶

“Readiness” is the relative preparedness of a military organization to perform its mission(s), while “readiness reporting” is the process of collecting that information. Consulting JP 1-02 again, the Department-wide definition of “readiness” is:

The ability of US military forces to fight and meet the demands of the national military strategy. Readiness is the synthesis of two distinct but interrelated levels. a. **unit readiness** — The ability to provide capabilities required by the combatant commanders to execute their assigned missions. This is derived from the ability of each unit to deliver the outputs for which it was designed. b. **joint readiness** — The combatant commander’s ability to integrate and synchronize ready combat and support forces to execute his or her assigned missions. [emphasis in original] (JCS, JP 1-02 451)

Thus there are two approaches to evaluating and understanding readiness: from the discrete unit level (a member of the congregation), and from the aggregated combatant command level (the congregation as a whole). The unit approach requires that each warfighting entity in the Department report certain information on a recurring basis, in order to assess joint readiness, report to Congress, maintain command and control (C2) of units, ascertain warplan constraints and risk, and assist in resourcing decisions (the running of the Church as a whole).

History of Unit Readiness Reporting

Prior to World War II, the U.S. Army and the U.S. Navy were quite autonomous in their organization, training, equipping, and functional processes.²⁸⁷ However, the creation of the Joint Chiefs

²⁸⁵ See appendices for full text of 10 USC 482.

²⁸⁶ Note that all Title 10 cited, except as otherwise noted, is prior to passage of the National Defense Authorization Act (NDAA) for Fiscal Year 2008 (also known as Public Law 110-181), which was signed by the President on 28 Jan 2008.

²⁸⁷ They were even separate Departments: the Department of War and the Department of the Navy. The National Security Act of 1947 aligned the Departments (to include the newly-formed U.S. Air Force) under the rubric of the National Military Establishment (Frye)—and in 1949 the NME was remade into the Department of Defense.

of Staff occurred shortly after the start of the war²⁸⁸ to meet the coordination and logistical challenges of the all-out struggle against the Axis (Schnabel 1), and this integrative body has continued to the present (with some modification of powers, duties, and responsibilities²⁸⁹).

As the joint structure grew in the years after the National Security Act of 1947 it became necessary to collect readiness information from the Services in a standardized format and store it in a computer database for analysis. The earliest formal joint system for aggregating Service readiness information²⁹⁰ came about in the early 1960s and was called the Operational Readiness Report.²⁹¹ By 1968, that system evolved into the better-defined Forces Status and Identity Report (FORSTAT) system (U.S. Government Accountability Office [GAO], *Measuring Military Capability* 10).

FORSTAT

The FORSTAT system compiled Service readiness information into a standardized database format, where the information was used for a variety of Joint Staff and Office of the Secretary of Defense (OSD) analytic purposes. The FORSTAT reports included a measurement of the status of four subareas for each unit: personnel (P), equipment and supplies on hand (S), equipment readiness (R), and training (T), or “PSRT” for short. The measurements are based on a four-tier set of categories,²⁹² as follows (GAO, *Readiness of U.S. Air Forces* 16):

Category	Standard
C-1	Fully ready. A unit fully capable of performing the mission for which it is organized or designed
C-2	Substantially ready. A unit has minor deficiencies which limit its capability to accomplish the mission for which it is organized or designed.
C-3	Marginally ready. A unit has major deficiencies of such magnitude as to limit severely its capability to accomplish the mission for which it is organized or designed.

²⁸⁸ The first meeting of the Joint Chiefs of Staff (JCS) occurred 9 Feb 1942 (Schnabel 1). The JCS obtained legal status with the passing of the National Security Act of 1947 (Schnabel 6)—this same Act created the U.S. Air Force.

²⁸⁹ For example, the Goldwater-Nichols Department of Defense Reorganization Act of 1986 created major changes.

²⁹⁰ The focus on the succession of joint systems (rather than Air Force specific systems) is due to the Air Force abandoning its Service-unique feeder systems in favor of using Joint systems.

²⁹¹ The precise origins of the Operational Readiness Report are somewhat obscured by the fog of history. However, DoD Directive S-5100.44, “Master Plan for the National Military Command System,” dated 9 June 1964, appears to be the earliest directive requiring consolidation of Service readiness information (GAO, UNITREP 2).

²⁹² These categories originated with the Continental Army (CONARC) in 1962 (Institute for Defense Analysis G-17).

Category	Standard
C-4	Not ready. A unit not capable of performing the mission for which it is organized or designed.

Table 6 - FORSTAT Category Levels

In addition to those four subarea ratings, an overall unit C-rating was reported as the lowest of the four measured subareas or as a commander’s subjective upgrade or downgrade²⁹³ (GAO, Readiness of U.S. Air Forces 16). The Air Force’s internal readiness reporting system, the Unit Capability Measurement System (UCMS), acted as a feeder for sending reports to FORSTAT and so collected much the same information using similar business rules. After Government Accountability Office (GAO) reports noting process shortcomings and other perceived inaccuracies,²⁹⁴ a Joint Staff study produced some significant results and findings, resulting in a new system to replace FORSTAT.

UNITREP

In 1980, the Unit Status and Identity Report (UNITREP) replaced FORSTAT, as described by the Chairman of the Joint Chiefs of Staff (CJCS) Memorandum of Policy No. 172, “Combat Readiness Reporting.” Beyond just changing unit readiness, UNITREP tied unit readiness and joint readiness together into a strategic-level report. UNITREP was one of the inputs for the Joint Chiefs of Staff (JCS)²⁹⁵ Capability Report (GAO, UNITREP 9), an early forerunner of the Joint Quarterly Readiness Review of today.

The UNITREP was an evolutionary modification of FORSTAT, and shared a number of consistencies and similarities. A significant addition was the inclusion of a “C-5” level, indicating the unit was not combat ready due to a Service-directed reorganization²⁹⁶ (GAO, Measuring Military Capability 8, 14). The Air Force, along with the other Services, had its own UNITREP database serving as the feeder to the Joint Staff UNITREP database.²⁹⁷ Additionally, the Air Force was the only Service to fully comply with

²⁹³ If the commander felt that, due to intangibles such as unit morale, the readiness of the unit was either higher or lower than the quantitative objective assessment suggested, he or she could direct (subject to Service limitations) an upgrade or downgrade of the unit’s overall C-rating.

²⁹⁴ “Perceived” because the Air Force disagreed with the 1979 GAO report findings, stating that the estimation of aircraft status within the DOC response time was a realistic manner of ascertaining readiness (GAO, Readiness of U.S. Air Forces viii). The Joint Staff declined to comment due to an on-going Services-wide study of readiness reporting criteria (GAO, Readiness of U.S. Air Forces ix).

²⁹⁵ Within this dissertation, the “Joint Chiefs of Staff” (JCS) and “Joint Staff” (JS) refer to the same organization.

²⁹⁶ E.g., the unit was undergoing a change in major equipment (Institute for Defense Analysis G-31).

²⁹⁷ The Air Force had a number of other Service-unique systems supporting readiness information and assessment, not all of which provided data upstream to the Joint Staff. For example, the Tactical Air Command Peacetime Assessment of Combat Readiness of Reparable Spares (TAC PACERS), the Weapon System Management

UNITREP measurements and criteria as intended (GAO, Measuring Military Capability 12). Nonetheless, a readiness task force established by the Secretary of Defense issued a January 1985 report with a number of recommended changes to the system (GAO, Measuring Military Capability 10), and the Joint Staff eventually initiated a significant upgrade to UNITREP, especially in the underlying hardware and support architecture.

SORTS

The next evolutionary upgrade to readiness reporting systems occurred in 1986 with the replacement of UNITREP by the Status of Resources and Training System (SORTS), as described by CJCS Memorandum of Policy No. 11 entitled, oddly enough, “Status of Resources and Training System (SORTS).” One change of significance was in the definition of the lowest of the four-tier “C-ratings”—with the transition to SORTS “C-4” came to mean that a unit could undertake portions of its wartime mission but with severe limitations, rather than “not ready” as with FORSTAT and UNITREP (GAO, Reports to Congress 15).

Of course, SORTS also had its share of shortcomings, and as usual in due course the GAO and the DoD Inspector General (DoD IG) investigated and summarized them in a series of reports.²⁹⁸ The DoD IG report stated that SORTS was “ineffective in accomplishing its highest priorities ... and the [senior commanders] cannot rely on the SORTS” (Department of Defense-Inspector General [DoD-IG], Eval Report on SORTS i).

Despite recurring concerns over inadequacies,²⁹⁹ SORTS reports “probably do indicate whether units carry out their designated training, whether equipment is ready to be used, and how readiness of forces varies over time” (U.S. Congressional Budget Office). Nevertheless, as it was part of the World Wide Military Command and Control System (WWMCCS)—a multi-billion dollar kludge of disparate information technology (IT) systems constantly receiving severe criticism from many quarters—as WWMCCS changed, so did SORTS.

Information System (WSMIS, which was also slated to be a feeder to UNITREP), and the Air Force Capability Assessment Program (AFCAP) were all such systems (GAO, Measuring Military Capability 17-20).

²⁹⁸ See DoD IG Report #96-086 (DoD-IG, Eval Report on SORTS), GAO/NSIAD-95-29 (GAO, DoD Needs to Develop), GAO/T-NSIAD-95-117 (GAO, Improved Assessment), GAO/NSIAD-98-68 (GAO, Reports to Congress), and GAO/NSIAD-98-124 (GAO, Congress Needs).

²⁹⁹ Per a GAO study, “at least 41 reports issued between 1984 and 1996 that, in part, discussed the effectiveness of SORTS or its immediate predecessor, [UNITREP]” (GAO, Reports to Congress 20).

GSORTS

As WWMCCS components migrated to become the Global Command and Control System-Joint (GCCS-J), in 1997 SORTS also evolved into the Global Status of Resources and Training System (GSORTS). Promulgated by a new Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3401.02, “Global Status of Resources and Training System,” the change primarily represented upgrades in information technology (IT) system infrastructure and capability (GAO, Reports to Congress 4), and inclusion in the new Global Command and Control System enterprise. The change was mostly transparent to end users, as noted by the retention of the SORTS moniker in many venues.³⁰⁰ In general, the Defense Information Systems Agency (DISA)—the developer of SORTS and GSORTS—and the Joint Staff—the operational sponsor of SORTS and GSORTS—preferred an evolutionary approach to software development as it allowed for a disciplined, measured pace of change rather than repeated shocks to the system from radical new upgrades.

One upgrade to GSORTS eventually funded and fielded was the Readiness Assessment System-Input Tool (RAS-IT), a web-based tool for end users to submit their GSORTS reports directly into the master GSORTS database. This enabled the Air Force and Marine Corps to abandon their Service-unique systems and rely solely on the Joint Staff’s GSORTS system for Service readiness reporting as well as readiness data analysis. After various audit and oversight organizations issued desultory findings for “more than a decade ending in 1998” (GAO, New Reporting System 1), Congress took action to revamp the existing readiness reporting system via adding a requirement for a “comprehensive readiness reporting system” to Title 10.³⁰¹

DRRS

DRRS was to be “first real change in readiness reporting in forty years” (Angello, DRRS - Netcentric 3). After an extensive report from the Institute for Defense Analysis (IDA) describing some limitations and issues with GSORTS, along with the aforementioned GAO and Department of Defense Inspector General (DoD IG) reports, the Office of the Under Secretary of Defense (OUSD) for Personnel and Readiness (P&R) developed a plan for a new Department of Defense Readiness Reporting System (DRRS). A seminal Department of Defense Directive (DoDD) was published in 2002 to capture the new

³⁰⁰ For example, the 1998 GAO report critical of GSORTS still referred to it as SORTS, with a footnote in the introduction stating that the term SORTS was used “throughout this report because it is more familiar and continues to be commonly used” (GAO, Reports to Congress 12).

³⁰¹ Note that the 2000 legislation demanding an independent report and Department action coincided with the contentious Presidential election year and associated sound bites on military readiness.

approach, along with subsequent serial guidance.³⁰² Primarily, the novel approach placed significant emphasis on joint readiness via a “capabilities-based” framework built around mission essential tasks (METs), while recasting unit readiness more as “asset visibility”—meaning the display of the personnel and resources information directly from Service authoritative database sources, rather than aggregated broad bands of resources and personnel assessments as with the extant PSRT measurements.

Another significant change was a move from a four-tier rating schema to a three-tier (Chu, Serial 2 2):

Color Code	Description	Meaning
	“Yes”	The organization can accomplish the task to prescribed standards and conditions. The “Yes” assessment should reflect demonstrated performance in training or operations.
	“Qualified Yes”	The organization is expected to accomplish the task to standard, under most conditions, but this performance has not been observed or demonstrated in training or operations. Organizations assessing their task or mission as a “Qualified Yes” can be employed for those tasks.
	“No”	The organization is unable to accomplish the task to prescribed standards and conditions at this time.

Table 7 - DRRS Y/Q/N Readiness Assessment Schema

Modern Unit Readiness³⁰³

As of the end of calendar year 2007, GSORTS remained the authoritative readiness system for the Department for unit readiness information. All Army units reported into a system funded and developed by the Army called NetUSR (also known as DRRS-Army³⁰⁴), and similarly the Navy had funded and developed the Navy Readiness Reporting System (NRRS—renamed DRRS-Navy). Air Force and Marine Corps units all reported directly into GSORTS via the RAS-IT discussed earlier. Steeped in historical precedent, today there are three broad groupings of unit GSORTS information required by the

³⁰² “Serial Guidance” consisted of four memorandums containing additional DRRS implementation guidance signed out by the Under Secretary of Defense – Personnel & Readiness (USD(P&R)).

³⁰³ This section is intended to provide a snapshot of the breadth and scope of readiness information, so the reader understands the complexity of not only the readiness systems in place, but also the difficulties in defining and capturing the meaning of “readiness.”

³⁰⁴ The Army’s upgrade from PC-ASORTS (Personal Computer-Army SORTS) to NetUSR (Net Unit Status Report) coincided with the adoption of the “DRRS-Army” name (Hall) so the Army could claim compliance with the DRRS initiative.

Joint Staff: registration, visibility, and readiness.³⁰⁵ Each unit is responsible for informing higher levels of command on their readiness status, per guidance promulgated from higher echelons of command.

The purpose of the “unit registration” group of data elements is to uniquely identify each unit, define the unit’s purpose and approximate size, and other information requirements to provide insight into unit shape and structure. An example of a unit registration data element is the Unit Identification Code (UIC), a unique identifier (essentially a “social security number”) assigned to each unit that provides positive identification of that particular unit. By way of quantification, in 1996 there were 10,197 registered Air Force units in SORTS (DoD-IG, Eval Report on SORTS 50).³⁰⁶

The “unit visibility” group of data elements is necessary for joint command and control functions that enable the Joint Staff, Combatant Commands, and other organizations to maintain situational awareness of units. The information is used to locate units (or parts of units), analyze unit activity, and build rollups of command relationships for units, among other activities. Units must be registered in order to provide unit visibility information, although usually only units which report readiness maintain their unit visibility information. Examples of unit visibility data include home location, present location, operational control, and unit activity codes.

The “unit readiness” grouping is the main component of, and prime purpose for, the unit readiness reporting process. This information is used to assess unit preparedness for its designed (also known as “wartime” or “full-spectrum”) and assigned (“current operations”) mission and as an overall measure of the readiness of the military forces. In 1996, there were 2,458 Air Force units reporting readiness in SORTS (DoD-IG, Eval Report on SORTS 50).

Key data elements of the unit readiness grouping include the unit’s Personnel (P), Supplies (S), Equipment Condition (R), and Training (T) readiness levels; Overall (C) level based on unit designed mission; an assigned mission overall (“PCTEF”)³⁰⁷ level based on the unit’s currently assigned mission; and various other indicators and metrics. Additionally, the Office of the Secretary of Defense (OSD) has introduced the use of MET assessments as a holistic indicator of readiness: either a unit can do the task, or it can’t—more detail on this concept in the second part of this chapter. Overall unit readiness

³⁰⁵ This information developed from Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3401.02, “Global Status of Resources and Training System (GSORTS)” dated 20 October 1997, various GAO reports, and interviews. The most current version of this publication, CJCSI 3401.02A, is limited release and not available for this study. See the appendices for more detail on data elements associated with each grouping.

³⁰⁶ Information used from the 1996 open-source DoD IG report to avoid any possible security issues. Note that generally the number of registered and reporting units is fairly static.

³⁰⁷ The PCTEF data element provides an overall subjective assessment based on the four-tier system of a unit’s ability to execute an “assigned” mission, rather than the “designed” war-time mission (the Overall C-level).

(including PCTEF) is categorized within GSORTS into one of four possible broad bands, using a modified four-tier system (based on historical precedent—see page 188) as follows (JCS, CJCSI 3401.02):

Overall Level	Overall Level Definition
1	The unit possesses the required resources and is trained to undertake the full wartime mission(s) for which it is organized or designed. The resource and training area status will neither limit flexibility in methods for mission accomplishment nor increase vulnerability of unit personnel and equipment. The unit does not require any compensation for deficiencies.
2	The unit possesses the required resources and is trained to undertake most of the wartime mission(s) for which it is organized or designed. The resource and training area status may cause isolated decreases in flexibility in methods for mission accomplishment, but will not increase vulnerability of the unit under most envisioned operational scenarios. The unit would require little, if any, compensation for deficiencies.
3	The unit possesses the required resources and is trained to undertake many, but not all, portions of the wartime mission(s) for which it is organized or designed. The resource or training area status will result in significant decreases in flexibility for mission accomplishment and will increase vulnerability of the unit under many, but not all, envisioned operational scenarios. The unit would require significant compensation for deficiencies.
4	The unit requires additional resources or training to undertake its wartime mission(s), but it may be directed to undertake portions of its wartime mission(s) with resources on hand.

Table 8 – Current Overall Level Definitions

Along similar lines, the “PSRT” subareas are calculated and assigned a rating based on a process that translates subarea percentages into a four-tier band.³⁰⁸ Using the Personnel subarea as an example, the table below demonstrates how to obtain a P-Level from a calculated percentage obtained by dividing the total number of personnel on-hand by the total number of personnel authorized (JCS, CJCSI 3401.02):

³⁰⁸ Note that a level “5” category exists, which indicates “The unit is undergoing a Service-directed resource action and is not prepared, at this time, to undertake the wartime mission(s) for which it is organized or designed” (JCS, CJCSI 3401.02). Also, in special certain cases (e.g., a cadre unit without any equipment assigned), at Service direction units may report a “6” in a subarea to indicate that subarea that is not measured.

P-1	P-2	P-3	P-4
>=90%	80-89%	70-79%	<70%

Table 9 - Personnel Level Calculations

The three groupings of unit information are used for a variety of purposes. Planners use rollups of unit readiness indicators to determine an aggregate readiness level for a particular warplan, usually via counting the number of units reporting each C-Level (e.g., how many units are C-1, how many are C-2, etc). Services may use unit readiness trends to identify resource and training shortfalls, and then make resourcing decisions to manage overall trends and, in their component role to a combatant command, sourcing solutions for identifying units to rotate to theater. Congress, per 10 USC 482(e), requires specific information on active units who report an overall of C-3 (or below). The Joint Chiefs of Staff also analyze unit readiness information to prepare senior leaders for testimony to Congress, to provide responses to Congressional and other queries, and miscellaneous Joint Staff purposes such as joint readiness assessments.

The timeline of these readiness reporting information technology systems:

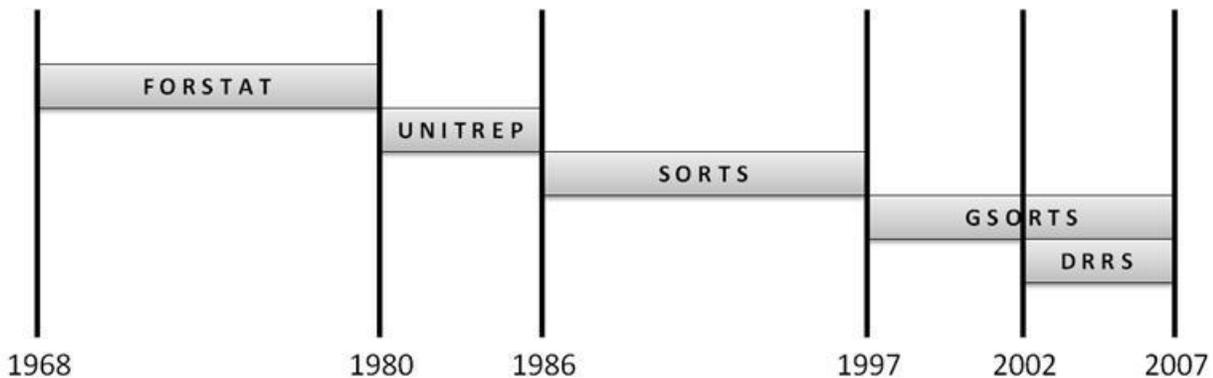


Figure 21 - Timeline of Readiness Reporting Systems

History of Joint Readiness

Joint readiness takes a different approach than unit readiness. Rather than collecting reports from individual units, the goal of joint readiness is to assess the ability of the military to collectively execute war plans. These schemas for battle, known as operational plans (OPLANS), concept plans (CONPLANS), war plans, or just “plans,” contain the initial force requirements, order of battle, logistical requirements, timelines, and other information necessary to engage in conflict and achieve the desired objective. Joint readiness is the assessment of those plans in a systematic fashion across the Department to determine capability gaps, deficiencies, and other risks.

“The overall relationship between what we see (quantifiable inputs) and what we get (a degree of ‘readiness’) may be nonlinear” (Conetta 3)—measuring readiness is easier said than done due to the lack of a simple formula for aggregating readiness data from one level to the next (Marquand; Prueher). It is this problem—how does one take the inputs and predict outcomes?—that has plagued senior decision makers trying to allocate scarce resources to maximize readiness. One early attempt to solve this problem was the JCS Readiness Report.

JCS Readiness Report

The Joint Chiefs of Staff (JCS) Readiness Report (JRR) began as an input to the Force Readiness Report (FRR). Originating in 1977 with the passing of Public Law 95-79, the FRR required an annual readiness report to Congress (GAO, Measures of Military Capability 15-16). As expected, over the years there were a number of GAO studies with recommendations for improvement to the JRR/FRR processes (GAO, Unit Training 20-31). Partially in response to this report, the JCS Readiness Report was eventually transformed into the JCS Capability Report in 1984.

JCS Capability Report

The JCS Capability Report was intended to overcome a number of errors and provide better information to senior leaders. The military’s capability was captured via commander’s Situation Reports (SITREPs) from the Combatant Commands which evaluated their ability to meet requirements of JS plans (Institute for Defense Analysis G-42). These SITREPs were inputs to the annual JCS Capability Report to the Secretary of Defense, and used four-tier S-ratings (for Sustainability) which were comparable to the unit-level C-ratings in meaning, providing a somewhat commensurate linkage between unit ratings and joint ratings (Betts 92). Due to a number of limitations including a lack of objectivity and no linkage to the budgetary cycles, it was eventually replaced by the Joint Monthly Readiness Report (Institute for Defense Analysis G-44—G-45).

Joint Monthly Readiness Report

The Joint Monthly Readiness Report (JMRR) was instituted in December 1994 (JCS, J-3 Readiness Division) shortly after the establishment of the Senior Readiness Oversight Council (SROC) earlier that same year. The SORTS database was the source of much of the data for the JMRR, with some flexibility for each Service in submission of aggregated information for the report. The development and presentation of the JMRR was collectively referred to as the Chairman’s Readiness System (CRS), a term which continues to the present. The JMRR was reported up to the SROC, and then consolidated into the Quarterly Readiness Report to Congress (U.S. House of Representatives [HoR], Steele Statement).

Partly in response to GAO findings,³⁰⁹ the JMRR changed significantly in 1999 and among the changes were a revamped rating schema and greater emphasis on assessing readiness for engagement activities in addition to warfighting (Institute for Defense Analysis G-52—G-56). Over time the JMRR process morphed into a de facto quarterly process, due to workload and staffing imbalances, a lack of significant change from one month to the next, and overall bureaucratic inertia (Institute for Defense Analysis G-48—G-50). Naturally, it took several years for the name change to reflect the reality.

Joint Quarterly Readiness Review

The Joint Quarterly Readiness Review (JQRR) was formally instituted in 2004 and coincided with the cessation of the JMRR; the primary change was recognition of the transition from monthly to quarterly report cycles. The JQRR is a manual process that pulls together information from the Combatant Commands, Services, and Combat Support Agencies to provide a briefing on the readiness of the joint community to execute war plans, as well as capture the deficiencies and shortcomings associated with joint execution of assigned missions. Like the JMRR, the JQRR includes information derived from GSORTS, so it builds upon the existing unit-level readiness information to feed the strategic decision-makers. In addition, it uses Joint Mission Essential Tasks (JMETs) and Functional Areas (FAs) assessments to evaluate strategic readiness at the headquarters level.

Modern Joint Readiness³¹⁰

In particular, 10 USC 482(c)(2) is the code which directs the quarterly reports to Congress to contain results of readiness assessments by combatant commands, while 10 USC 153 directs the Chairman of the Joint Chiefs of Staff to monitor the “preparedness” of the military forces.³¹¹ The results of these joint readiness assessments have been briefings rather than a compilation of electronic database information, and the reports to Congress a distillation of those briefings into a document. The JS process for joint readiness is captured in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3401.01, “Chairman’s Readiness System.”

³⁰⁹ The quarterly reports “did not fulfill the legislative reporting requirements ... because they lacked the specific detail on deficiencies and planned remedial actions...” (GAO, Congress Needs).

³¹⁰ Note that there are other readiness reports required, such as installation readiness reports and institutional training readiness reports (both required by 10 USC 117), and the Combat Support Agency review (10 USC 193). However, the reports generally considered as the standard joint readiness reports have been discussed herein.

³¹¹ See appendices for full text of 10 USC 482 and 10 USC 153.

At the end of 2007,³¹² Combatant Command joint readiness assessments used joint mission essential tasks (JMETs), while the Services used Functional Areas (FAs) and were in the process of transitioning to joint capability areas (JCAs). JMETs are “mission task[s] selected by a joint force commander deemed essential to mission accomplishment and defined using the common language of the universal joint task list in terms of task, condition, and standard” (JCS, JP 1-02 291). The FAs and JCAs are broad descriptions of requisite capability, such as “intelligence support” and “offensive counterair operations” which are necessary for military operations. Per CJCSI 3401.01, each organization provides an overall Readiness Assessment (RA) level, based on a four-tier scale aligned with the unit readiness four-tier scale (JCS, CJCSI 3401.01D D-9):

Readiness Assessment Level (RA-Level)	Readiness Assessment Definition
RA-1	Issues and/or shortfalls have negligible impact on readiness and ability to accomplish assigned mission(s)
RA-2	Issues and/or shortfalls have limited impact on readiness and ability to accomplish assigned mission(s)
RA-3	Issues and/or shortfalls have significant impact on readiness and ability to accomplish assigned mission(s)
RA-4	Issues and/or shortfalls preclude accomplishment of assigned mission(s)

Table 10 - Readiness Assessment Level Definition

The figure below depicts the Chairman’s Readiness Assessment (CRS) as described in CJCSI 3401.01D (A-1):

³¹² While there were significant changes afoot for the CRS at the end of 2007 in the form of the Joint Combat Capabilities Assessment (JCCA) integrative process, the extant published guidance (at the time of this study) dated 10 Dec 2004 is the process discussed in this case study.

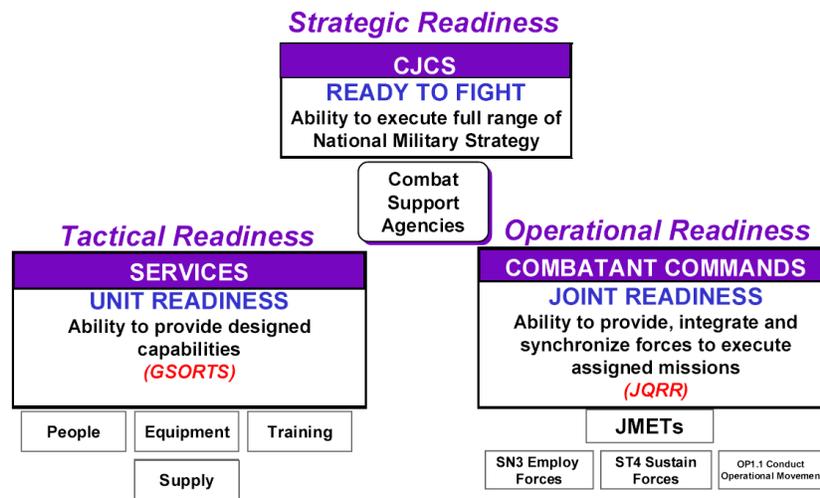


Figure 22 - Chairman's Readiness System

This is the overarching description of the process in use, certified current as of 14 December 2007 per CJCSI 3401.01, "Chairman's Readiness System" (JCS, CJCSI 3401.01D 1).

Modern Air Force Readiness Reporting Requirements

The Air Force identifies three main uses for SORTS: provide data critical to crisis war planning, assist with peacetime war planning and review, and guide assessments of the Air Force Title 10 responsibility to "organize, train, and equip" forces (DAF, AFI 10-201 8). Roughly 2,700 Air Force (including Air National Guard and Air Force Reserve) units presently report into GSORTS (USAF, Readiness Reporting Event 8), providing insight on the status of personnel, supplies, equipment condition, and training of those units.

Beyond the requirement for units to report in GSORTS, and for HQ USAF and its major commands (MAJCOMs) to participate in the JQRR, the Air Force also requires units to report deployment readiness into the Air and Space Expeditionary Force (AEF) UTC Status Reporting Tool (ART). ART is the software application that allows deployment managers assigned one or more deployment packages to report both the readiness and availability information on those packages. It is a standalone³¹³ Air Force system mandated, funded, developed, and fielded by HQ USAF, to support the unique requirements of the Air Force. The AEF construct is:

the Air Force's methodology for organizing, training, equipping, and sustaining rapidly responsive air and space forces to meet defense strategy requirements. Through the AEF, the

³¹³ Meaning it does not connect to other Air Force or Joint databases or information technology systems.

Air Force supports defense strategy requirements using a combination of both permanently assigned and rotational (allocated) forces. (DAF, AFI 10-244 4)

The Air Force has a Service-unique method of structuring deployment packages—groupings of people and equipment—into modular “unit type codes” (UTCs) (DAF, AFI 10-244 4). For example, a UTC package of four C-130s plus the aircrew, maintenance, and support staff to fly missions is one UTC package.

In order to manage the readiness and rotations of these deployment packages, the Air Force requires readiness reporting on these deployment packages separate from the JCS unit readiness reporting requirements. However, because the size of these deployment packages is usually smaller than a squadron, and consists of personnel and equipment from across multiple units, a meaningful one-to-one correlation between unit identification codes and the deployment packages is not possible

The Air Force’s ART uses a simple three-tier system to assess the deployment readiness of each UTC package, although the color codes definitions are not commensurate with DRRS’ three-tier system. In consideration of the required UTC response time, equipment requirements, and manpower details, UTC readiness is rated as follows (DAF, AFI 10-244 14-15):

Color Code	Description	Meaning
Green	“GO”	All MEFPK (MANFOR, LOGFOR) ³¹⁴ identified personnel, equipment and training for the AEF allocated UTC are available for deployment within 72 hours of notification or sooner if subject to more stringent criteria.
Yellow	“CAUTION”	The UTC has a missing or deficient capability; but that missing or deficient capability does not prevent the UTC from being tasked and accomplishing its mission in a contingency and/or AEF rotation. ³¹⁵
Red	“NO-GO”	The UTC has a missing or deficient capability that prevents the UTC from being tasked and accomplishing its mission in a contingency and/or AEF rotation.

Table 11 - AEF Reporting Tool (ART) Readiness Assessment Schema

However, the units are still required to report into GSORTS and ART, as well as the new DRRS reporting requirement against mission essential task lists (METLs). Air Force Policy Directive (AFPD) 10-2, “Readiness,” dated 30 October 2006 highlights the need for “integration of DRRS and ART” as being

³¹⁴ These are MAJCOM-level documents defining resource requirements for unit type code (UTC) packages.

³¹⁵ From DRRS Serial 2 guidance, a yellow rating means the unit can accomplish the task to standard, “under most conditions,” but this performance has not been observed or demonstrated (Chu, Serial 2).

critical to providing required visibility of Air Force capabilities and resources while still supporting the AEF construct and the reporting via UTC (DAF, AFPD 10-2 3). As of the end of 2007, Air Force units were triple reporting: into ART, GSORTS, and DRRS.

The DRRS and STS

The National Defense Authorization Act for Fiscal Year 2000 (United States Government [USG], NDAA 2000)³¹⁶ section 361 directed “an independent study of requirements for a comprehensive readiness reporting system for the Department of Defense, as required by Section 117 of Title 10, United States Code.” This verbiage spawned a nearly 500-page report from the Institute of Defense Analysis (IDA), entitled “Independent Review of DoD’s Readiness Reporting System” (Institute for Defense Analysis). The lead researcher, John C. F. Tillson, was an adherent of the systems approach³¹⁷ to process analysis as is evident throughout the IDA report. The overall conclusion of the report was that further improvements were needed, such as comprehensive guidance, developing capabilities to evaluate overall system readiness, and developing better management information systems (Institute for Defense Analysis S-9). This document, coupled with the language of the recently-added 10 USC 117, provided the opportunity for the civilians in the Office of the Under Secretary of Defense (OUSD) – Personnel & Readiness (P&R) to wrest strategic control of readiness from the Joint Chiefs of Staff (JCS).

The Vision for Change³¹⁸

“When everyone agrees that something is vital in principle, but they are not sure what that something is in practice, the stage is set for controversy” (Betts 87). The Strom Thurmond National Defense Authorization Act (NDAA) for Fiscal Year 1999 (USG, NDAA 1999) created 10 USC 117 that specified the establishment of a “comprehensive readiness reporting system.” This system was to be applied “uniformly” throughout the Department of Defense, with 15 January 2000 set as the implementation deadline (USG, NDAA 1999).³¹⁹ Additionally, Congress directed that an implementation plan for the new readiness reporting system be developed and submitted by 1 March 1999.³²⁰

Colonel (retired) Jerry Macken, an Air Force officer with nearly 10 years of military and civilian experience in the Joint Staff (JS) J-39 Readiness Division, recalled the Directorate of Readiness

³¹⁶ Also known as Public Law 106-65.

³¹⁷ See “A Systems Approach to Readiness Reporting” (Tillson). The seeds of DRRS were planted in this article—Joint Mission Essential Tasks, asset visibility from Service authoritative systems rather than manual entry by unit staff, and so on.

³¹⁸ “Where there is no vision, the people perish...” (King James Bible Proverbs 29:18).

³¹⁹ Section 117 had historical precedent in driving readiness reporting. Public Law 97-295 created a Section 133a “Secretary of Defense: annual report on North Atlantic Treaty Organization readiness.” Public Law 99-433 (also known as the Goldwater-Nichols Department of Defense Reorganization Act of 1986) renumbered Section 133a to Section 117 and retitled it to “Annual report on North Atlantic Treaty Organization readiness.” The National Defense Authorization Act for Fiscal Year 1991 (also known as Public Law 101-510) repealed Section 117, until NDAA 1999 restored and updated that section.

³²⁰ See full text of 10 USC 117 in the appendices.

Programming & Assessment (RP&A), part of OUSD(P&R), led the effort to produce the implementation plan for the new readiness reporting system (Personal Interview). This working group, which included the Joint Staff, Service, and Combatant Command readiness staffs, developed additional readiness metrics such as the PCTEF-Level, along with the concept of expanded reporting entities to include organizations like Joint Task Forces (JTFs).³²¹ OUSD(P&R) sent the implementation plan to Congress in mid-1999 (Macken).

Nonetheless, during the development of the Fiscal Year 2000 National Defense Authorization Act, Congress perceived a lack of enthusiasm for implementation of the desired changes to the readiness reporting system. The resulting NDAA 2000 mandated an independent report eventually produced by IDA (as discussed above), and also extended the deadline for implementation of the comprehensive readiness reporting system from 15 January 2000 to 1 April 2000. Additionally, the House Report for NDAA 2000 contains some scathing language concerning the Department's seeming unwillingness to comply with 10 USC 117: "The committee has been discouraged to learn that bureaucratic intransigence, opposition to reform, and the persistence of outmoded practices are placing the prospects for improving the readiness reporting system in doubt" (HoR, Report on HR 1401 Sec 353).

IDA delivered their report in November 2000. The lengthy document included a number of recommendations, including a proposal for modifying GSORTS into an "Expanded GSORTS (E-GSORTS)" to accomplish five primary goals (Institute for Defense Analysis C-31-C-34).³²² Among those goals were resource allocation decision support, a "systems" approach for higher headquarters in assessing readiness, and predictive (future) readiness analysis.

After several meetings and rounds of coordination,³²³ Deputy Secretary of Defense Paul D. Wolfowitz signed Department of Defense Directive (DoDD) 7730.65, "Department of Defense Readiness Reporting System (DRRS)" on 3 June 2002. Subsequently, Secretary Donald Rumsfeld signed a memorandum "Policy Implementation to Establish Commander, USJFCOM, as the Primary Joint Force Provider (JFP)" on 25 June 2004 containing explicit language about the development and use of DRRS: USD(P&R), in accordance with DOD Directive 7730.65, will develop the Defense Readiness Reporting System to support [Global Force Management] commitment, availability, readiness, deployment and redeployment data requirements as identified by the Chairman of the Joint

³²¹ The direction for the expansion of reporting entities was captured via a CJCSM 3150.02A interim change released 1 April 2001.

³²² The report contained a theme throughout of what was to become the DRRS slogan: "Ready for What?" (Institute for Defense Analysis 11). Note that Betts had already asked a similar question: "Readiness for *what?*" [emphasis in original] (33).

³²³ In military terms, "coordination" means formal staffing of a draft document for official comments.

Chiefs of Staff, the combatant commanders, the Secretaries of the Military Departments and the Chief, National Guard Bureau.

While the new directive contained language directing that the Enhanced Status of Resources and Training System (ESORTS) be built upon GSORTS, it was also clear that ESORTS would eventually replace GSORTS. For instance, one of the responsibilities of the CJCS was to “maintain the [GSORTS] until the ESORTS becomes fully operational” (Office of the Secretary of Defense [OSD], DoDD 7730.65 3-5). Given the 12 “shortfalls” the IDA report found with the GSORTS system³²⁴ (Institute for Defense Analysis C-21—C-29), and the Department of Defense Inspector General (DoD IG) and Government Accountability Office (GAO) reports on GSORTS shortcomings, the desire to once again replace the existing system with a new system may not be surprising.

However, the indictment was not just against the GSORTS information technology (IT) system, but also against the Chairman’s Readiness System (and its Joint Quarterly Readiness Review (JQRR) component) as well. As discussed in the first part of this chapter, joint readiness is captured and assessed via the Chairman’s Readiness System (CRS) and provides inputs to the Quarterly Readiness Report to Congress (QRRC). Many of those reports critical of GSORTS were also critical of the CRS—for example, the IDA report found 24 problems with the CRS, double the number of GSORTS shortfalls (Institute for Defense Analysis D-7—D-29).

The goal for DRRS was to fix these shortfalls via a revolutionary approach, recasting both readiness assessments and their use throughout the Department. With an initial operational capability (IOC) for DRRS achieved in late Fiscal Year 2004 (DoD, PAR 2005), and software development well underway toward broad and enterprise-wide ends, limitless possibilities and enthusiasm drove the OSD staff. RP&A developed the DRRS concept of operations (CONOPS) draft version 5 in December 2004, and proceeded apace to change the very culture of the Department towards a sacred vision of a capabilities-based, net-centric, technologically-leveraged future. As stated on the unclassified DRRS website:

The real key to success will be Department-wide collaboration and cooperation by all stakeholders, who must be aware of the capabilities, interdependencies, and possibilities made available by the enhanced DRRS environment. DRRS is changing how we look at readiness, how we measure readiness, and how we use readiness information... The mission of DRRS is to establish a mission-focused, capabilities-based, common framework that provides the

³²⁴ However, note that some of the “shortfalls” do not appear to be a problem with the GSORTS system, but rather as a training or policy issue (e.g., shortfall #6 concerns inaccurate reporting (Institute for Defense Analysis C-24), which appears to be less about the GSORTS system than it is about the training of the personnel using the system).

combatant commanders, military services, Joint Chiefs of Staff (JCS), and other key DoD users a data-driven environment and tools in which to evaluate, in near real-time, the readiness and capability of U.S. Armed Forces... (InnovaSystems, DRRS Login Page)

DRRS and the Humanities Philosophy of Technology

With the repudiation of GSORTS and a sublime vision for DRRS in mind, the OUSD(P&R) staff in the Readiness Planning and Assessment (RP&A) division began the process of cultural change within the Department of Defense.³²⁵ The intent was to revolutionize the Departmental discourse to enable a new range of possibilities for readiness information via the concept of the DRRS information technology (IT) system. Mr. Joseph J. Angello, Jr., the director of RP&A since 1995, was a former Air Force officer (and a graduate of the wellspring of the Air Force religion, the Air Force Academy) who joined the Office of the Secretary of Defense (OSD) staff in 1990.³²⁶ In his RP&A position as a one-star equivalent (SES-1),³²⁷ he oversees a staff of civilian GS-15s and military O-6s, along with support staff. In 2004, Angello established an informal office within RP&A dedicated to overseeing the development of DRRS, and called it the DRRS Implementation Office, or DIO (Chu, Serial 1).

Assigned to RP&A in 2002, Army Colonel Patrick Sherman essentially took over day-to-day oversight of DRRS implementation across the Department. Mr. Bruce Juselis, as an Air Force Lieutenant Colonel, served in the U.S. Pacific Command Readiness office until his retirement from active duty in 2003. Upon retirement, Camber Corporation hired Juselis as a DRRS contractor, until selected by Angello as an IPA³²⁸ to work in the DIO as one of the primary proponents of DRRS. Mr. Fred Thompson, a contractor, was hand-picked by Angello in late 2004 as the lead DRRS system architect, and had worked for many years previously on U.S. Navy programs associated with readiness and force management. From 2004 to the end of calendar year 2007, these three made up the core of the DIO, and reported directly to Angello.

The following organization chart provides a structural representation of selected offices within the Church (Department of Defense) hierarchy, with color coding to indicate the counterpart offices for

³²⁵ This goal articulated specifically by the Director of RP&A in briefings to various groups (Angello, DRRS - Netcentric; Angello, DRRS - DoD's).

³²⁶ Between 1990 and 1995, Angello served on the staff of the Director, Program Analysis and Evaluation (OSD, Angello Bio).

³²⁷ The Senior Executive Service (SES) grades are roughly equivalent to general officer ranks. An SES-1 is equivalent to a one-star general, while an SES-4 is equivalent to a four-star general. The government civilian GS-15 rank is one step below an SES-1 and is equivalent to the military O-6 rank (which is also one step below a one-star).

³²⁸ "Intergovernmental Personnel Act" – a provision which allows for the temporary hiring of personnel who can act on behalf of the Government but are not part of the military civil service program.

DRRS issues. In particular, the chart focuses on the Office of the Secretary of Defense (OSD) and the Joint Staff structure, and the imbalance in structural position occurring at the “action officer” level.³²⁹

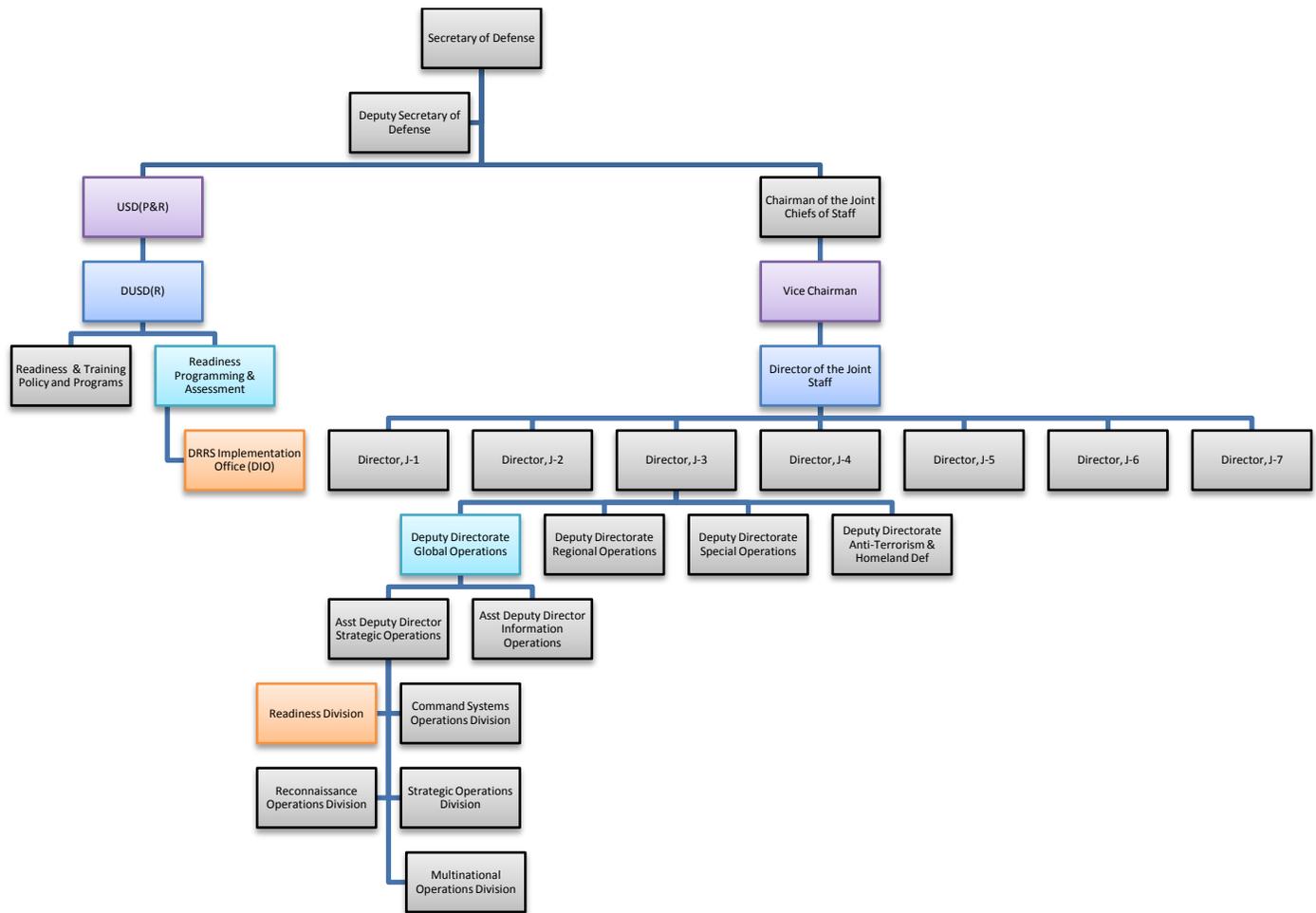


Figure 23 – OSD and JS Organization Chart

Angello took on the DRRS project with a religious fervor,³³⁰ a true prophet-priest striving to change the very foundation of military readiness. His intent was to erase all PSRT measurements and C-Level unit readiness information, as well as most of the manually-input unit visibility information, in favor of direct “asset visibility” from authoritative data sources. Commander “Hak” Hakimzadeh, a Naval officer assigned to the JS J-39 Readiness Division for three years, recalled the RP&A goal was to substitute a subjective assessment as the criteria for readiness and eliminate the objective readiness measurements—quite a cultural shift given the operational systems currently relying on the existing

³²⁹ Action officers are the O-4s (Majors in the Air Force) and O-5s (Lieutenant Colonels) who perform the staffing functions necessary to set policy, develop organizational positions on matters, and coordinate concepts and information across the organization. The “worker bees,” so to speak.

³³⁰ As described in various interviews, Angello was intimately connected to every aspect of DRRS development and implementation, worked unusually long hours, and was consumed with the desire for radical change in readiness.

data elements (Personal Interview). RP&A seemed to focus on human psychology; a significant investment of time, energy, and imagination; relationships with targeted groups; and leveraging cooperative partnerships—all key tenets of the guerilla marketing concept (Levinson).³³¹ Taking a page from a book on military readiness challenges and choices, RP&A appeared to be executing the old formula for change as described by Betts:

[Change in readiness reporting systems came about] first, by denigrating the standard unit status report (UNITREP); second, by shifting attention away from narrow mission capable measures of immediate availability for combat and toward other models and measures that emphasized broader concepts of capability; and third, by reforming the rating system. (136)

Discourse & Metaphor of DRRS from the HPT Perspective

As introduced in earlier chapters, the themes of technique, technology, experience, language, and metaphor provide the underpinnings for an analysis. This discourse and metaphor is approached from the HPT viewpoint in this section; which is to say, the attempt to bring non- or trans-technological perspectives to bear on the meaning of technology (Mitcham). In the case of DRRS, this perspective embraces the social discourse of DRRS dissociated from the technological artifact itself, although shaping its meaning and concomitantly the meaning of readiness to the Department.

One technique used was the constant effort to inculcate DRRS into the consciousness of the U.S. Government. This started with official Secretary of Defense guidance, such as Rumsfeld’s “Annual Report to the President and the Congress” as venues for spreading the message and propagating the concept of DRRS to a wide audience, starting in 2003 and running through 2005, which contained language describing the vision for DRRS and how it was to change the Department.³³²

Other Secretary of Defense venues included updates on transformation priorities to the President, the Strategic Plan for Training Transformation, Directives on military training, and more. Reaching out to Congress, many GAO reports affiliated with military readiness, force sourcing, or the National Guard included comments from DUSD(R) describing DRRS as part of (if not the) solution for shortfalls.³³³ Dr. David S. C. Chu,³³⁴ the Under Secretary of Defense for Personnel & Readiness (USD(P&R)), assisted in implementation of this technique as well. In briefings to the Senate Armed

³³¹ Jay Conrad Levinson made a cottage industry out of the idea of guerilla marketing and finding non-traditional paths to success.

³³² The reports end with the 2005 report. See the appendices for excerpts of the reports.

³³³ In one example, the DUSD(R) response to a GAO report on force sourcing noted that GAO did not explicitly recognize and support the use of the “newly developed” DRRS (GAO, DoD Needs to Integrate 25).

³³⁴ An SES-4 (four-star equivalent), Chu served as the USD(P&R) from 2001 through the end of the case study timeline (OSD, Chu Bio).

Services Personnel Subcommittee in April 2005 and March 2006, he stated unequivocally that “DRRS contains near real time assessments of military capabilities in terms of the tasks or missions that they are currently able to perform...” (U.S. Senate [Senate], Chu Statement 2006). Additional effort was expended to tie DRRS to the Department of Homeland Security (DHS) preparedness efforts as well (Griffard).

To intercalate DRRS within the Department, RP&A sent out messengers to strategic venues across the organization, ensuring incorporation of the impending changes in readiness across the enterprise. For example, RP&A always sent representatives to the JCS Worldwide Training Conference to brief attendees on DRRS, never missing a year from 2002-2007. Tying training to readiness proved a popular linkage, and garnered a great deal of support from the various training shops, but especially from the JS J-7 Training offices,³³⁵ in part because of the proposed data linkage between DRRS and the Joint Training Information Management System (JTIMS).³³⁶ RP&A was keen on developing such collaborative partnerships to promulgate DRRS as well as intertwine the success of DRRS with other endeavors. Another such partnership occurred with the Global Force Management Data Strategy, sponsored by JS J-8³³⁷ and RP&A, which declared that “a major impetus...was the development of reliable and maintainable data sources for the new Defense Readiness Reporting System” (Chamberlain and Sprung).

A central technique of Angello was the maintenance of very tight control over the DRRS message. This included never-ending reviews of most documents, briefings, or statements on DRRS to leave RP&A, as well as full control over the software requirements and development priorities. Angello’s chief disciples—Sherman, Juselis, and Thompson—were of the same mold, or quickly learned the boss’ habit patterns, as Angello could be harsh on subordinates (Hakimzadeh). The manifestation of control extended to the use of technology to achieve ends.

Recollecting that technology consists of processes as well as objects, RP&A used the theme of technology to great effect via the staffing processes of the Department. While the DoD Directive establishing DRRS required collaboration, it did not specify how that collaboration was to take place. The usual approach by RP&A was to develop documents (such as the Transition Plan, Serial Guidance, and memorandums) without outside input, and then send out for Department-wide coordination with

³³⁵ Starting in approximately 2004, nearly every J-7 Training publication contained a DRRS theme (Macken).

³³⁶ JTIMS was a relatively new software application sponsored by the JS J-7 Training Division, with development starting in 2003. By tying DRRS to JTIMS, Angello was able to link Rumsfeld’s Training Transformation (T2) initiative to DRRS as a package of integrated solutions (B. Hughes), providing another venue for intercalation.

³³⁷ The JS J-8 is the Force Structure Resources and Assessment Directorate.

only a few business days for review and response (Hakimzadeh). Since this coordination process required handling of the documents through official administrative channels at the receiving organization, often the responsible office would have at best a day to read and provide comments back on a document. These staffing protocols discouraged detailed comment, and the timeline often prevented a review by ancillary offices within the receiving organization.

Another use of the staffing process was the requirement for only “critical” comments—those comments that, if not adjudicated, would result in a non-concur from the submitting organization. While organizations could submit comments with a lower status, those were often ignored out of hand by RP&A. Many documents, such as the CONOPS and requirements documents, were not staffed at all but rather just posted to the DRRS Web site without any coordination. Some felt that the intent of this discourse theme was to “impose a new process on an organization without giving the organization time to react” (Hakimzadeh). In this way, control was maintained via adherence to the absolute minimum standards while committing venal process “sins.”

Relying on the experience of past readiness reviews and their perceived shortcomings, Angello was able to gain a great deal of critical support from the Combatant Commands and Combat Support Agencies, who historically had little use for GSORTS³³⁸ and unresolved issues with the JQRR. Lieutenant Colonel Chuck Tomko, an Air Force officer assigned to the JS J-39 Readiness Division for nearly two years, felt the Combatant Commands were generally in the “beggars can’t be choosers” category when it came to force allocation, resulting in readiness and other related information being of little tangible value (Personal Interview). RP&A not only insisted that future readiness assessments would be from the perspective of the Combatant Commanders (DoD, PAR 2004), but also funded one or more DRRS Readiness Specialist (DRS) contractors on-site at the Combatant Command readiness offices (Hakimzadeh). This situation provided RP&A direct access to the Combatant Command staffs and also helped assimilate DRRS within the host organization.

One of RP&A’s chief goals, repeated dogmatically, was speed of development. After experiencing years of lengthy development timelines and extended schedule slippages from the Defense Information Systems Agency (DISA),³³⁹ the developer of SORTS and GSORTS, his goal was to avoid the encumbrances of formal acquisition processes in order to ensure an agile development schedule. Regarding the careful maneuvering to avoid being in a formal acquisition process, Sherman was recalled

³³⁸ GSORTS information had “limited utility” to the Combatant Commands (DoD-IG, Eval Report on SORTS 8)

³³⁹ For example, a five-year delivery slip on the development of a sub-component of GSORTS known as the Readiness Assessment System (RAS)—Output Tool (OT). See DoD IG report #D-2002-133 (DoD-IG, GCCS RAS-OT).

as saying “we took proactive measures to avoid falling into an acquisition system... we dodged that bullet!” (Tomko, Personal Interview).

While the language contained in 10 USC 117 specified a “comprehensive” readiness reporting system, RP&A instead propagated the concept of a “single” readiness reporting system and made that objective a core principle in the DRRS creed. Toward that end, DRRS Serial Guidance 2 outlined the subsuming of the Air Force’s ART into DRRS, along with a mechanism for reporting all GSORTS information via the DRRS ESORTS module. The first formal reference to the single readiness reporting system concept occurred in a Sep 2005 Chu memorandum, and thereafter became a core part of the message. Despite lacking a definition for this single readiness reporting system concept (it was never codified or described), the Department’s readiness discourse became enmeshed with the phrase.³⁴⁰

Another way in which the theme of language altered the discourse was the changing of readiness metrics. RP&A propagated the term “asset visibility” in an effort to move away from the resource-based PSRT and C-levels, despite previous indications to the contrary. RP&A believed that if one had full visibility of the assets (people, equipment, equipment condition, and training), the need for PSRT and C-levels was obviated by a god-like omniscient view of the exact data from the Service authoritative database sources. From the first part of this chapter, it should be clear that “readiness” encompassed a great deal of information and a wide range of stakeholders and broad revolution ran great risk as compared to evolution. RP&A’s revolutionary goal was to use the military’s “can-do” subjective assessments of METs as the sole readiness metric and eliminate both the objective PSRT and the subjective C-Level assessments (Hakimzadeh).

The primary metaphor used throughout this dissertation has been that of religion, and that metaphor is useful here as well. Based on the structural position of RP&A within the Department of Defense, Angello was clearly one of the most high priests, and this organizational advantage was maximized at every opportunity. Not only did the very position lend a great deal of prestige, but the patina of confidence and surety—as Tomko recalled, “between an assumption of legitimacy and mass confusion, RP&A got implicit buy-in.” For laity to disagree with a most high priest is to disagree with the religion itself, so there was a natural reluctance to commit heresy.

Using the aegis of the OUSD(P&R) offices, Angello set up briefings extolling the virtues of DRRS and the impending catalytic change across the Department at the National Guard Bureau (NGB),

³⁴⁰ Some examples: briefings to the President, language to Congress, GAO reports, presentations to various interest groups (such as infrastructure, environmental, etc).

Combatant Command directorates, the Joint Staff,³⁴¹ and other Office of the Secretary of Defense (OSD) directorates. The inner circle of disciples was always willing to provide information briefings, although the fact that they were “information” briefings is telling—the briefings were to inculcate their sacred message, not to submit to oversight, solicit decisions, or obtain input.

Outcomes of Discourse & Metaphor from the HPT Perspective

As portrayed above, to revolutionize the Department’s culture Angello established and executed strategic mission goals using the themes of technique, technology, experience, language, and metaphor, and these engagement strategies were quite effective at shaping the meaning of readiness. The remarkably small ratio of DRRS apostles to the size of the Department makes this accomplishment an amazing study in the leveraging of the humanities philosophy of technology (HPT) perspectives to accomplish a change in the social understanding of a technology. Angello’s recognition as a Fiscal Year 2007 Presidential Rank Awardee for outstanding leadership was undoubtedly a result of his efforts at instantiating DRRS across the Department (U.S. Office of Personnel Management [OPM]).

By “bombarding” the Department with a single philosophy, Angello made great strides in gaining acceptance of his vision (Hakimzadeh). References to DRRS started showing up in JCS training publications, military War College papers (Dewey), environmental conferences, State National Guard force development publications (DC National Guard 6), journals such as the Joint Force Quarterly (Junor)—even the Joint Staff chaplain’s office wanted to start reporting METs using DRRS (Tomko, Personal Interview). Lieutenant Colonel (retired) “Duck” Wawrzynski, a Marine Corps officer who served on the JS J-39 Readiness staff for three years, agreed that RP&A had reached a lot of people; “I recall strange organizations calling up trying to figure out how to register” in DRRS (Wawrzynski).

It wasn’t just the “strange organizations” wanting to get on the DRRS bandwagon, but senior leadership went on record in support of DRRS as well. In testimony before the Senate Armed Services Committee Subcommittee on Readiness and Management Support, 9 April 2003, the Deputy Commandant Plans, Policies, and Operations of the U.S. Marine Corps stated his support for DRRS (Senate, Bedard Presentation), and another senior military leader, General Victor Renuart, Jr., Commander of North American Aerospace Defense Command (NORAD) and United States Northern Command (USNORTHCOM), plugged DRRS in a prepared statement to the Senate Committee on Homeland Security and Governmental Affairs. “USNORTHCOM has made significant strides in preparing the [weapons of mass destruction response force] for success, to include developing Joint Mission

³⁴¹ For instance, the Directors of the JCS J-3, J-4, and J-8 were all personally briefed between August and December 2006, although “who *didn’t* he brief” is how Tomko expressed it.

Essential Tasks, which are integrated into the Defense Readiness Reporting System...” (Senate, Renuart Statement). By working at the highest levels, RP&A caused a flow-down effect to the thousands of units submitting readiness reports, who by Serial guidance and Service direction were required to report in DRRS as well as existing readiness systems. For example, by 2007 all Air Force units were required to report into OSD’s DRRS, the Joint Staff’s GSORTS, and the Air Force’s AEF Reporting Tool (ART).

Even organizations outside the Department were persuaded by the message;³⁴² whether by accident or design Congressional language, especially from committee reports, often reflected key tenets of the DRRS vision. For example, the Appropriations Committee report for the 2008 Department of Defense Appropriations Bill strongly supported DRRS and expressed concern over the “misleading” nature of GSORTS (HoR, DoD Appropriations 2008 94). In another example, in 2007 and shortly before the end of this case study timeline, the Senate Committee on Armed Services included verbiage in its report on the National Defense Authorization Act for Fiscal Year 2008 noting that DRRS was scheduled to achieve full operational capability at the end of fiscal year 2007 (Senate, NDAA 2008 Report 317-318). This language supports Betts’ model for changing readiness reporting systems: denigrate and eliminate competitors, shift attention toward broader measures of capability, and change the meaning of readiness measures and metrics.

DRRS and the Engineering Philosophy of Technology

Mitcham defines engineering philosophy of technology (EPT) as “analyses of technology from within, and oriented toward an understanding of the technological way of being-in-the-world” (39). Within this dissertation, the analysis of EPT is related to an understanding of the social construction of the technological artifact itself, in particular its design and development.

In 2003, RP&A competitively (OSD, FY 2004 R-2) awarded the DRRS contracts to Booz-Allen-Hamilton (BAH) and Alion Science and Technology for development, Dynamics Research Corporation for systems integration and planning, Computer Sciences Corporation for architecture, and Camber Corporation for training and support (DoD, PAR 2004 83-84). BAH was also the company developing the JTIMS software, so there was a natural linkage between the two projects and the teams.³⁴³ Initial efforts by the contractor teams involved developing a “proof of concept” as demonstrated in 2002 (Rumsfeld, Annual Report 2003).

³⁴² “...this Paul hath persuaded and turned away much people...” (King James Bible Acts 19:26).

³⁴³ JTIMS is the source of the MET dictionary, and DRRS uses that dictionary to assemble METs into a list (METL) consisting of key tasks associated with a particular mission or operation. Thus, JTIMS relies on DRRS data and vice versa in order to function smoothly.

An early capability was fielded and put on the military's secure version of the Internet, called the secure internet protocol router network (SIPRNET), and "initial operational capability" (IOC) was declared in September 2004 (DoD, PAR 2004 84). The stated IOC (also referred to as "Spiral 1") requirements included an ability to build and assess mission essential tasks (METs), CFAST³⁴⁴ data incorporated into the DRRS plan analysis suite, DRRS web portal and net-centric web services, and web enabling of selected resource datasets (OSD, FY 2004 R-2). However, it was unclear if the IOC requirements were actually met, and there was little enthusiasm on the part of the Services to report into yet another system—especially for the Air Force which was already reporting readiness into GSORTS and ART. Additionally, the "legacy DRRS" application, the version fielded between 2002 and 2006, had a rather cumbersome interface (Hakimzadeh), resulting in a lack of user satisfaction.

After what was viewed as slow progress,³⁴⁵ in late 2005 Angello brought in the InnovaSystems software development team along with Fred Thompson by leveraging the existing Navy contract with InnovaSystems, and ended the relationship with BAH, Alion Science and Technology, and Dynamics Research Corporation. InnovaSystems had won a competitive bid in 2005 to develop the Navy Readiness Reporting System (NRRS—later renamed DRRS-Navy), a \$47.5 million dollar contract running until 2010 if all options were exercised (InnovaSystems, Company News and Announcements). The InnovaSystems team rebuilt DRRS from the ground up, releasing a completely new version (DRRS Version 1.0 Release 3.0) in June 2006 (DoD, PAR 2006 51). The new version's revamped look and feel became the baseline platform for developing and integrating additional capability throughout the rest of the case study timeline. Camber continued the training and support functions for the DRRS system and the propagation of the good news throughout the Department via the DRRS Readiness Specialist (DRS) program.

Discourse & Metaphor of DRRS from the EPT Perspective

Over time the difference between the promise of DRRS and the actual software application required to support that vision undermined the initiative. While the culture of the Department was rapidly³⁴⁶ embracing the DRRS gospel, the continuing difficulties in delivering the vision began to exhaust the patience of many believers—Macken noted that certain sentiments started to be heard, an

³⁴⁴ The Collaborative Force-Building, Analysis, Sustainment and Transportation (CFAST) system is a collection of collaborative force sourcing and analysis tools which complement the Joint Operational Planning and Execution System (JOPES).

³⁴⁵ "Legacy DRRS" represented a more efficient means of doing what was already being done—but wasn't the radical change in philosophy desired by Angello (Hakimzadeh).

³⁴⁶ "Rapidly" being a relative term with an organization the size of the Department of Defense. However, in the span of several years a significant sea change had occurred across the Department.

attitude of “tired of talking about it—give me something and let’s do it.” The HPT techniques used to insinuate DRRS across the Department backfired when employed on the development of the technology.

For instance, the techniques of inculcation and intercalation worked fine until the product was unusable by social groups anxious to solve their problems via the tool. RP&A would offer to build DRRS to meet any requirements, but once the requirements were delivered to DIO, the sponsoring organization had no visibility as to whether the requirements were accepted or how they prioritized against other requirements. Outside of Angello and his closest disciples, software delivery timelines were close-hold even as late as the spring of 2007, and outside oversight or visibility into the actions and priorities of software development was strictly limited.

The technique of control became a hindrance due to the “cone of silence” surrounding the requirements process and software delivery milestones—“very opaque” visibility on developmental requirements and priorities (Macken). The user community—not Angello’s DRS contractors at the Combatant Commands but rather the military members actually trying to use the software—seldom knew what was going to happen with a given monthly release. The migration to the InnovaSystems Version 1.0 Release 3.0 rebuild of DRRS is an example,³⁴⁷ one of the side effects of the migration to the new version involved a complete loss of all user data entered to date—there was no migration plan to preserve and maintain the existing data, resulting in a great deal of end-user angst. Many organizations, such as the Air Guard, had proactively started working in legacy DRRS, not knowing the user accounts and other data would not transfer—and the migration caused a great deal of consternation. “You had no idea” what was going to happen with a new release (Hakimzadeh).

Another side effect of the control technique was the attempt to implement policy by information technology system development. Rather than collaboratively create and promulgate readiness reporting policies, RP&A instead coded unwritten policies into the software. One of the chief shortfalls during the DRRS lifecycle (through the end of 2007 and the case study timeline) was the lack of clear policy and guidance. The GSORTS instruction and manual consisted of 20 and 300 pages, respectively, while DoDD 7730.65 combined with the four Serial Guidance memos was less than 25 pages. Part of the difficulty was the way in which RP&A inextricably linked the “Department of Defense Readiness Reporting System”—the process—and the “Defense Readiness Reporting System”—the information technology application supporting the process. The general approach was to build all

³⁴⁷ Hakimzadeh believes this version came about because the “legacy DRRS” was not accomplishing the RP&A intent of a radical new philosophy for readiness.

process requirements into the IT application so it would embody the policy without staffing and coordination. For instance, classification procedures for mission essential task assessments—the DoD guidance remained silent on this point other than to say such guidance would be forthcoming (Chu, Serial 2). Another example was the use of assessment metrics, which in the DRRS IT application was the three-tier Yes, Qualified Yes, or No, while the Chairman’s guidance specified a four-tier rating for both joint and unit readiness assessments.

The technology theme of processes fared similarly. A key part of the Department-wide transition to DRRS was the GSORTS to DRRS Transition Plan, mandated by the Assistant Secretary of Defense for Networks and Information Integration (ASD(NII)), Mr. John Grimes, in a memorandum dated January 2006. However, the Transition Plan languished—the Joint Staff, for example,³⁴⁸ repeatedly returned critical comments before finally culminating on version 16.5 with a critical non-concur and request for a three-star committee. The primary reasons cited for the critical comments involved a lack of IT system capability and processes necessary to support the migration.

The experience in dealing with previous readiness review limitations assisted with the HPT discourse, but the lack of testing and stability required for DRRS to be an authoritative source continued to hinder progress. The Joint Staff J-39 office sponsored a number of meetings to identify disconnects and link up the right agencies in order to develop a way ahead for DRRS, to no avail. As one example, there was a 5 December 2006 meeting on testing requirements necessary to support the transition plan; of the 7 due-outs, RP&A only met one of them (Tomko, Personal Interview). Oddly enough, exactly one year later on 5 December 2007, the exact same meeting occurred, this time with four critical due-outs, which as of the end of 2007 RP&A had failed to produce any (Tomko, Personal Interview).

Thompson, via a by-name sole source \$1.5M five-year contract award, appeared to be the driving force behind the move from BAH to InnovaSystems; partly because of his long-term experience with Navy readiness information technology (IT) systems, he relied heavily on his Navy contacts to support DRRS development and fielding. For instance, the Space and Naval Warfare Systems Command (SPAWAR) performed the original security testing and evaluation (ST&E in IT management vernacular) in March 2006, prior to the rollout of DRRS Version 1.0 Release 3.0. For a joint system, this was somewhat unusual, as normally a joint organization such as the National Security Agency (NSA) or Defense Intelligence Agency (DIA) would perform that testing.

³⁴⁸ A few other organizations would occasionally return critical comments, but usually that was the exception. The Air Force generally concurred with all documents.

The experiences with slow software development by DISA and the avoidance of a formal acquisition system did not produce the anticipated positive results. The DRRS release cycle was a monthly rollout of new capability in an attempt to quickly and effectively support users, but developmental problems plagued DRRS from the very beginning. There was more than one instance of a release “roll-back”—when a new release to the production server was un-installed due to bugs and a lack of testing (Tomko, Personal Interview). The meeting of milestone timelines was difficult at best for the DIO—DRRS Serial Guidance 2 outlined a number of timelines, including a migration of all Service readiness reporting from GSORTS to DRRS by the end of 2005 (Chu, Serial 2).³⁴⁹ Despite the avoidance of a formal acquisition process, Angello was quickly approaching the RAS-OT five-year schedule slip,³⁵⁰ with no firm timeline or useful plan to migrate the Service reporting to DRRS.

The phrase “single readiness reporting system” became inculcated across the Department and while the change in language occurred, the information technology system did not become a single readiness reporting system. As time passed it became clear that GSORTS would be difficult to remove and replace *in toto* with DRRS given that the authoritative information forming the backbone of GCCS-J and the joint planning and execution community was supplied by GSORTS. The “transition to one readiness reporting system for DoD” metric showed up in both the FY 2008 and FY 2009 RDT&E Budget Item Justifications (OSD, FY 2008 R-2; OSD, FY 2009 R-2), with no way forward and no plan on how to accomplish the ill-defined task.

As mentioned in the first part of this chapter, the overall unit readiness indicator, the C-Level, originated in 1962 and, with minor modifications to the definition, remains in use today. However, one of Angello’s chief goals was to eliminate the C-Level as an overall assessment of a unit’s readiness. “Killing the C-Levels would be a win for the Secretary,” is how Juselis described it at one policy workshop, underscoring the clear opposition to any objective readiness indicators (to include PSRT) other than raw asset visibility data and the three-tier subjective assessment³⁵¹ (Tomko). As the intended

³⁴⁹ Other examples of timelines issues: The Joint Capabilities Board received a DRRS briefing in April 2006 with a timeline showing all the Services switching over from GSORTS to DRRS by Fall 2006. A different DRRS briefing presented in January 2007 showed the cutover to DRRS occurring by April of that year, while a later document showed cutover by the end of calendar year 2007. None of these cutovers occurred because the software was still under development.

³⁵⁰ The DoD IG cited one reason for the five-year slip for RAS-OT fielding was that “DISA does not appear to have thoroughly investigated the costs and feasibility of fielding the RAS Output Tool and does not appear to be testing operational performance requirements that agree with user requirements” (DoD-IG, GCCS RAS-OT 14). This verbiage is applicable to DRRS as well.

³⁵¹ The policy workshop resulted in several impasses, and no new policy was forthcoming from the meetings.

replacement for an overall unit readiness metric was the Y/Q/N construct—or essentially, Yes/No³⁵²—there was confusion as to whether this construct provided an adequate level of fidelity for all the users of the readiness information.³⁵³ Dr. Paul Mayberry, the Deputy Under Secretary of Defense for Readiness (DUSD(R)) and Angello refused to budge, and avoided any type of compromise by simply not developing the DRRS application to support any ratings other than Y/Q/N. In fact, some observers speculated that all the GSORTS information being manually imported into DRRS was being deliberately marginalized as it was very difficult to display and analyze within DRRS (Hakimzadeh).

The religion metaphor naturally permeated the oversight of the design and development of the technological artifact. The most high priests in OSD retained full control of DRRS oversight, with complete authority for the oversight and implementation of DRRS (Tomko, Personal Interview). Mayberry fully supported the goals and intent of DRRS, and Angello had his “strong support” (Hakimzadeh).

This arrangement—having the most high priest “checking his own homework”—brooked no dissonance to the prophetic vision. A great failure of the system was the short-circuiting of an outside agency to identify shortcomings and missteps with DRRS development. As one observer noted “the functionality of the IT system didn’t matter” (Hakimzadeh), and with the support of the “Church” hierarchy and the small band of disciples, RP&A was apparently unstoppable and responsible to no one but his direct boss.

Outcomes of Discourse & Metaphor from the EPT Perspective

In 2003, the Government Accountability Office (GAO) released a report on DRRS, expressing concerns over the lack of performance goals, metrics, and accountability for software development, among other issues such as lack of an implementation plan (GAO, New Reporting System). The GAO initiated another review of DRRS early in 2007 but the results were still pending at the end of calendar year 2007. “There appeared to be little accountability to the Department for accomplishing the tasks [RP&A] promised,” recalled Tomko.

³⁵² Note that there was confusion even within the DRRS ranks as to the definitions of Y/Q/N, in particular the Q. The “Handbook for Conducting Mission Assessments in DRRS” Version 3.0, August 2005, stated that “Qualified Yes” was “used as a commander’s upgrade or downgrade ... [when] the commander believes he can conduct the task/mission to the conditions and standards prescribed” (DRRS Implementation Office [DIO] 20). This conflicts with the official definition of “Q” contained in Serial 2: “to standards, under most conditions” (Chu, Serial 2 2).

³⁵³ In particular, the Services were unsure how to switch from using C-levels and PSRT levels to using just a yes/no metric. As Hakimzadeh summed it up, such a change would have been “a tremendous shock to the system—may have paralyzed the organization’s ability to function.”

The 2003 GAO report recognized that GSORTS had mitigated many of the issues raised in their 1998 report—such as consolidation and upgrades to the database, and the ability to report on not just the wartime missions but on assigned missions as well. The report noted that DoD had complied with “most, but not all, of the readiness reporting requirements added by Congress” in the NDAs from 1998 to 2002 (GAO, New Reporting System 8, 12). “Without an implementation plan [as required by Title 10] neither senior DoD leadership or the Congress will be able to determine if the resources spent on [DRRS] are achieving their desired results” (GAO, New Reporting System 21).

Due to sufficient pressure from the Director of the Joint Staff (DJS), USD(P&R) finally agreed to establish a DRRS Executive Committee (DEXCOM) to oversee shortfalls and issues associated with DRRS development. The DEXCOM was to be a three-star level³⁵⁴ forum, co-chaired by the DUSD(R) and DJS, with membership from the readiness community (Chu, DEXCOM). However, the DEXCOM got off to a slow start; the Chu memo was signed in November 2007, but due to “scheduling issues” the first meeting didn’t occur until 15 January 2008—exactly eight years after the original Congressional deadline for implementation of the comprehensive readiness reporting system outlined in 10 USC 117.

A serious concern from the community was the lack of visibility on software development requirements. Generally acquisition processes specify that a requirements document drive software development timelines and allow for milestone and progress reviews. With the tight RP&A control over the requirements, the Services, Joint Staff, and other users were never sure when or if particular functionality was to be delivered. The continuation of this theme into the EPT realm obscured information truly necessary for other organizations to function.

A final issue was the lack of a roadmap for DRRS software development. While initial operational capability (IOC) was declared in September 2004, and full operational capability (FOC) was planned for October 2007 (OSD, DRRS CONOPS 31), neither goal was ever well-defined or based on a coordinated set of community requirements or seemed to be reached. Based on publicly-available funding information, from 2004 through the end of calendar year 2007 RP&A spent over \$80 million on DRRS,³⁵⁵ and yet the Department overall still had a number of serious underlying concerns—spanning policy, IT system implementation plan, operational and interoperability testing, even a solid concept of operations (CONOPS) on how the new system would be used. Beyond those issues, a great deal of software development remained incomplete; for instance, the asset visibility data pulls from Service

³⁵⁴ Referring to the next-to-highest general officer rank or the SES-3 equivalents.

³⁵⁵ See appendices for source and breakdown of funding information.

authoritative systems were only partially functional, the business intelligence tools³⁵⁶ remained undelivered, and the system still did not have real-time³⁵⁷ linkages to the joint planning and execution systems like JOPES and CFAST³⁵⁸.

While possibly violating laws such as the Clinger-Cohen Act or Departmental regulations due to a lack of established goals, performance standards, and accountability for taxpayer dollars,³⁵⁹ it also left the military without a good feel for the intended end state of DRRS. The Air Force was uncertain when or if DRRS would include the ART functionality and the necessary business intelligence tools to support research and analysis of the Air Force unique ART data elements. More importantly, it was unclear if DRRS would even develop sufficiently to reduce the unit-level reporting burden by incorporating GSORTS unit-level input.

DRRS and the Air Force

The overall attitude of the Air Force to the DRRS initiative was one of acquiescence, which given the Air Force's worship of technology—especially technology promising to be faster and better—seems to match expectations. There was also a lack of urgency on the part of the Air Force; the technology would field or it would not and, in reality, the Air Force was not a big user of GSORTS as they were focused mostly on ART (Wawrzynski). The primary force readiness, sourcing, and availability tool for the Air Force was the AEF Reporting Tool (ART), which lacked a commensurate mapping of data elements to JS or OSD unit readiness data elements.

The Air Force relied on the Joint Staff to ensure that enterprise planning systems such as JOPES and CFAST were able to access the unit readiness information necessary to support operations. This viewpoint, coupled with low manning in the HQ USAF readiness office (and elsewhere throughout the major commands), resulted in staffing acquiescence on Serial Guidance, Transition Plans, CONOPS, test plans, and other documentation associated with DRRS. Structurally, the Air Staff readiness priests were even lower in the hierarchy than the Joint Staff priests when compared to the OSD's high priests:

³⁵⁶ To provide ad-hoc queries and customizable data manipulation, standard requirements for database information extraction and use.

³⁵⁷ A cumbersome manual import process was available; however, as soon as the information was exported from JOPES or CFAST, it was instantly "dated" as there was no mechanism for tracking whether the authoritative information in JOPES had changed or not.

³⁵⁸ The Joint Operations Planning and Execution System (JOPES) and the Collaborative Force-Building, Analysis, Sustainment, and Transportation (CFAST) are IT suites used for force planning and movement. Especially in the case of JOPES, it is a no-fail system used daily to execute warplans and prepare for possible contingencies.

³⁵⁹ It seems intuitively difficult to hold a contractor accountable without some sort of yardstick by which to measure progress.

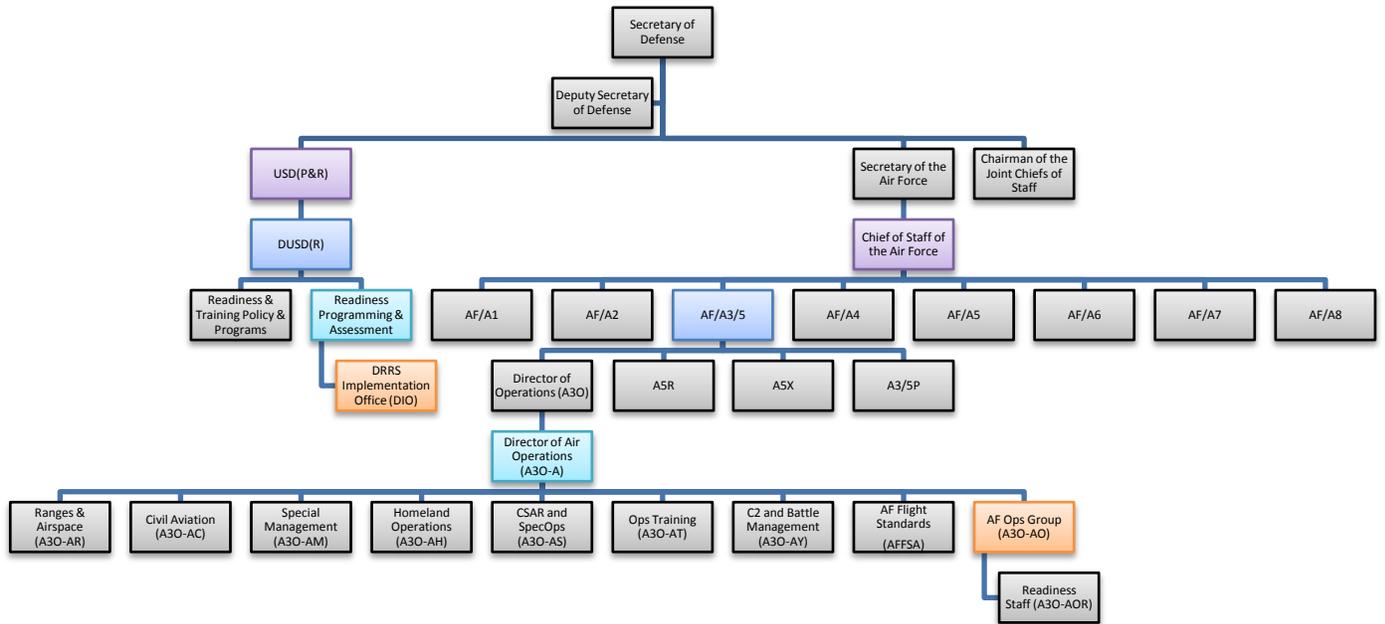


Figure 24 - OSD and HQ USAF Organization Chart

Serial Guidance 2 (published in August of 2005) had assured the Air Force that inclusion of ART functionality within DRRS was merely a short matter of time, further promulgating the hope that these disparate information technology systems would be synchronized and integrated. Indeed, with the vision of a “single” readiness reporting system, the implication was certainly one of an integrated future. The Air Force’s budget crunch during this period—due to the attempt at modernizing the aging fleet of aircraft while still managing on-going operations—resulted in a low priority for readiness reporting. Additionally, as DRRS had its own funding line, there was the possibility that RP&A would deliver on their promises and at no cost to the Air Force.

A research paper developed for the Air Force 2025 defined readiness as “not a binary ‘yes or no’ issue; instead it is a matter of how much, what kind, how soon, and at what cost, including the corresponding opportunity costs” (Snyder, Dieryck and Long 9). While exhibiting a good understanding of the complexities of readiness as outlined by Betts, described by GAO and DoD IG reports, and exemplified by Congressional and media debates, the Air Force seemed to put little effort into allocating the personnel resources necessary to implementing such a robust concept of readiness.

The Air Force performed a readiness “Rapid Improvement Event”³⁶⁰ in July 2007 in an effort to identify and document the processes involved, and determine “unnecessary and redundant steps” associated with readiness reporting (USAF, Readiness Reporting Event 3). One of the weaknesses noted

³⁶⁰ This is part of the “Air Force Smart Ops for the 21st Century” or “AFSO21” process reengineering initiative.

was that “DRRS is moving target (beta software)” along with the “lack of policy and guidance” and “lack of leadership” (USAF, Readiness Reporting Event 6). Shortcomings cited included “letting go of ‘working’ system in favor of a ‘possibly working’ system” along with the intended expansion from 2,700 to 12,000 reporting units without sufficient manpower or funding to support the increase (USAF, Readiness Reporting Event 8).

The Air Force clearly expected DRRS to reach full operational capability per the September 2007 timeline promulgated by OSD, as this target was identified in a 2007 AF/A3O-AOR message to the field.³⁶¹ The Air Force believed that FOC would bring “a single log-in, multi-purpose readiness reporting system,” with relief from manual SORTS reporting “imminent” as DRRS approached FOC; in the meantime, the additive DRRS reporting constituted “yet another administrative burden on units” (USAF, DRRS Implementation).

At the December 2007 General/Flag Officer Steering Committee (GOSC), Angello announced a change in program goals: rather than developing a robust Service input tool which auto-populated and auto-calculated the GSORTS readiness information, instead he would deliver a “worksheet” into which the information would be typed by hand. This was considered a step backwards in capability by the Air Force (and the Marine Corps as these two Services were intended users of the tool), especially given the prior promises of streamlined/automated GSORTS-type reporting. Eventually, negotiations with RP&A resulted in the promise of full duplication of the existing GSORTS input tool, the Readiness Assessment System—Input Tool (RAS-IT), used by both the Air Force and Marine Corps.³⁶² By the end of calendar year 2007, most Air Force units were triple-reporting,³⁶³ with uncertain timelines for relief from one or more of these reporting requirements.

³⁶¹ An Air Staff “message” is a formal document sent out via communication channels with official information.

³⁶² Although there were slight differences in data requirements between the Services, resulting in customized versions of the RAS-IT. Note that the Army and Navy used Army SORTS (ASORTS) and TYCOM Readiness Management System (TRMS), respectively, to feed their Service unit readiness information to GSORTS. Both separate standalone systems funded and developed by the respective Service, so interaction with DRRS and GSORTS was more a matter of data exchange, rather than full user interface data reporting. The Army’s upgrade, originally named NetUSR (Unit Status Report) was re-named DRRS-Army to indicate compliance with the DRRS concept, while the next evolution of TRMS, originally referred to as the Navy Readiness Reporting System (NRRS) was renamed to DRRS-Navy, undoubtedly for the same reason.

³⁶³ Into the Air Force’s ART, the Joint Staff’s GSORTS, and the OSD’s DRRS. Not all units were fully in compliance with the requirement to report into OSD’s DRRS.

The Air Force Religion and DRRS

As noted in chapter two, usually the only way to stop a prophet is to kill him or her,³⁶⁴ and when a prophet also has the power of the priesthood they are particularly influential. In terms of organizational roles, the members of the OSD staff are most high priests, sitting in structurally powerful positions high in the Department of Defense, with easy access to the arbiters of holy script—not just that of the Secretary of Defense and the Deputy Secretary of Defense, but also Congressional lawmakers. The fire and zeal of Angello and his closest disciples indicates a prophet-like obsession with instilling his vision for readiness into the Department, making him a prophet-priest, the most potent of all organizational roles.

While the HQ USAF readiness staff also occupied priestly organizational roles, they were a number of levels down from Angello, and with generally less support from their high priests (the general officers) to take on a pitched crusade. The Air Force readiness staff also considered the Joint Staff to be their intermediary with RP&A, and generally relied on them to protect the interests of the military writ large (to include the Air Force).

The laity—the hundreds of Air Force members out at the units, submitting the readiness reports—were whipsawed by the constant change and lack of planning and bore the brunt of the careless acquisition process and increased workload. However, as usual, few of the high priests really cared much about the abuse of the laity and, in any event, if the pain were severe enough, surely there would've been more indications of rebellion. For the laity, whether it was ART, GSORTS, or DRRS, it was simply additional higher headquarters requirements yielding little tangible benefit. Part of the Air Force's Rapid Improvement Event (discussed above) was an abortive attempt to find those linkages, but without putting the real resources and effort to solve what is truly an intricate and multi-dimensional problem.

As enamored as the Air Force is with new technology, it is unsurprising that the desire was to embrace the DRRS construct. There are few examples of the Air Force declining the adoption of new technology, and as other chapters have shown, a lack of policy, tactics, or planning for a new technology has seldom slowed “progress” down. Coupled with the high level of sacredness that technology has for the Air Force and the sponsorship by the high priesthood of OSD, the allure of the DRRS gospel was naturally irresistible. While this was information technology, rather than aviation technology, it still occupied a coveted place in the hierarchy of the sacred. The Air Force, in an effort to claim turf in the

³⁶⁴ While often religions are known for a literal take on this, I intend it only metaphorically. Then, to “kill” a prophet of a military religion would be for that person to die (of natural causes), retire, or accept a new position unrelated to the prior one.

ownership of a new core competency, was including cyberspace as one of the key pillars of the Air Force along with air and space (Moseley, Nation's).

DRRS and the Social Construction of Technology

The discourse and controversy of DRRS described above used the military organizational structure in lieu of the social construction of technology (SCOT) “relevant social groups” introduced in chapter four. These organizational structures are reassembled into SCOT relevant social groups in which “all members... share the same set of meanings, attached to a specific artifact” (Pinch and Bijker, Social 30). The following matrix is not all-inclusive, but is the author’s impression of the chief groups³⁶⁵ and their central goals and problems:

Social Group	Goals	Key Problems	Artifacts ³⁶⁶
Prophet-Priests—Angello, DIO	Complete change in how readiness is reported and used in the Department	Bureaucratic inertia, historical understanding of existing readiness reporting and use, oppositional groups	DRRS
Priests—Joint Readiness OPRs (all)	Comply with Title 10, adequately capture military readiness and shortfalls, support strategic decision making by senior leaders	Ascertaining the correct manner of conveying complex information, ensuring accurate information presented to senior leaders	GSORTS, JQRR, ³⁶⁷ QRRC
Laity—Unit Readiness OPRs (JS, USJFCOM, USSOCOM, Service Readiness offices)	Minimize disruption on Service personnel (especially at unit level), ensure ability to analyze and assess readiness trends, support resourcing decisions	Constant churn from DRRS guidance, development, and conflict, plus the lack of policy guidance from either JS or OSD	GSORTS, NetUSR/DRRS-Army (Army), TRMS/DRRS-Navy (Navy)
Laity—Force Sourcers (USJFCOM, USSOCOM, Services)	Identify most capable units to fill a particular request, maintain availability models to ensure constant supply of forces	Granularity of information in GSORTS, need for units to report readiness against possible assigned missions rather than just designed mission	GSORTS, JOPES
Laity—Planners (JS, Combatant Commands)	Greater fidelity in assessing plans and their attendant risk	Long timeline for DISA software development, lack of flexibility with GSORTS information	JOPES, CFAST

³⁶⁵ It is important to recognize that these are, in fact, just the broad types of some of the more important social groups. For example, the Defense Commissaries (the on-base grocery stores) are all registered units in GSORTS—they need to have a unit identification code (UIC) in order to be part of the military logistics system. A small thing but readiness information can be very far-ranging, with second- and third-order unintended effects to changes.

³⁶⁶ The artifacts indicate the process and/or IT system that was authoritative as of the end of calendar year 2007.

³⁶⁷ Despite efforts to incorporate the JQRR (and its follow-on, the JFRR) into DRRS, due to functionality limitations in DRRS, many organizations still relied on PowerPoint slides emailed to the Joint Staff rather than DRRS.

Social Group	Goals	Key Problems	Artifacts ³⁶⁶
Laity—Joint Training Staffs (JS, Combatant Commands)	Implementation of Rumsfeld’s Training Transformation: revamping and integration of joint training with other processes (such as planning)	Lack of support for robust integration, need for interdependent information technology systems to aid in Departmental change	JTIMS
Laity—Support Organizations (Combat Support Agencies, misc. functional areas such as Chaplains)	Greater visibility of contribution to the Department and shortfalls /requirements	Lack of venue for airing issues, difficulties in getting senior leader focus on limitations	JQRR ³⁶⁸
Congress	Greater fidelity on military readiness, and more detailed and clearer understanding of issues	Complexity of the meaning of “readiness,” GSORTS data difficult to assimilate, confusion over the meaning of the readiness indicators	QRRC

The matrix above summarizes the case study into a SCOT model of interpretive flexibility—that is, an attempt to show how the different social groups viewed the artifact (DRRS), in relation to their key problems and apparent solutions—and the figure below translates that matrix into a visual depiction.

The Air Force falls into three main social groups: joint readiness OPRs, unit readiness OPRs, and sourcers. As described previously, the Air Force has a responsibility to provide requisite data elements to a higher power (in this case, the Joint Staff and OSD), and participates in the joint readiness assessments and analyses with a Service-wide report. The Air Force also performs force sourcing functions required to task its units and issue orders allocating the units to the appropriate Combatant Command. The ART system provides these functions for the Air Force—the availability and UTC package readiness of the units is contained in that standalone system.

“Closure”—the cessation of controversy—has not yet been fully realized in the case of the Department’s readiness reporting system; however, the tendrils of change seem firmly established, and the inevitability of DRRS assured. There have been elements of both the rhetorical and redefinition forms of closure; some problems have been swept away via fiat (a declaration that the problem doesn’t exist any longer), and others by redefining a “problem” so that it is no longer a problem for a social group.

Rhetorical closure is occurring via elimination of arguments over system testing,³⁶⁹ after lengthy negotiation, it appears that RP&A is agreeing to a minimum amount of interoperability testing but

³⁶⁸ See footnote #367.

³⁶⁹ There are elements of the “knock-down argument” aspects of rhetorical closure (Bijker, *Of Bicycles* 86).

holding fast to the concept that the new net-centric environment doesn't require the extensive testing required for "legacy" development. Software delivery timelines were another example of rhetorical closure—by updating target dates on every new PowerPoint slide deck, it always seemed that DRRS was on track, rather than constantly falling behind. Therefore, the DRRS development still seemed very rapid compared to DISA developmental timelines and with no accountability for actually delivering capability on a schedule, there was then no controversy over timelines.

Closure via redefinition has occurred via the "single readiness reporting system" refrain and the shaping of the discourse so that readiness is now considered an integrated system centrally controlled by the Office of the Secretary of Defense (OSD). Even in the instances of DRRS-Army and DRRS-Navy, those Services felt compelled to re-designate their independently funded and developed information technology systems to indicate alignment with OSD's DRRS. With the "problem" of readiness now redefined as something under the control of OSD, and the broad acceptance of that re-shaping of meaning, many arguments fade away as the new power structure becomes the norm.

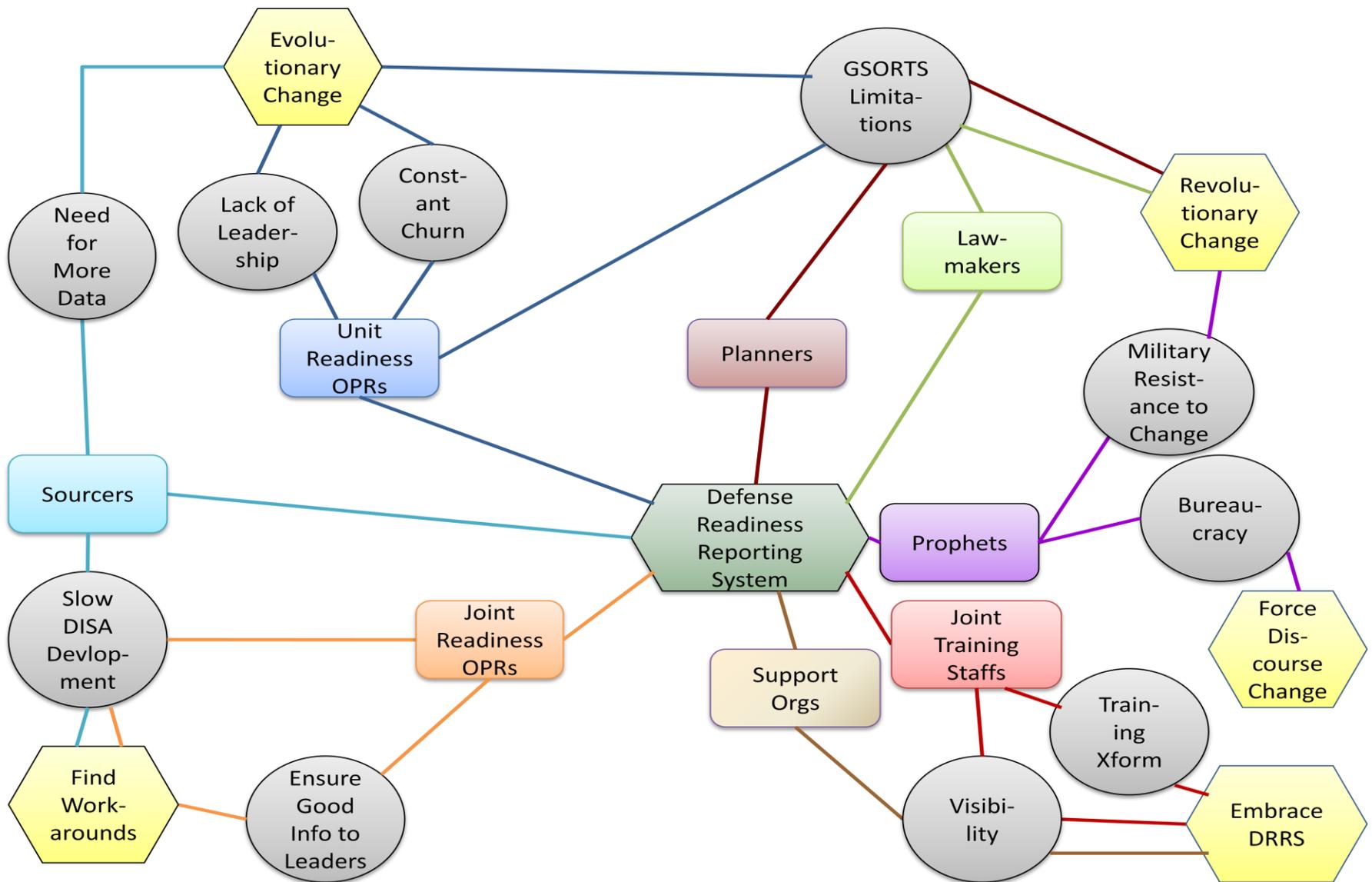


Figure 25 - SCOT Diagram of DRRS

Conclusion: Not by Might, Nor by Power³⁷⁰

This chapter has argued that the decades-long struggle to define, collect, and present readiness information in a cohesive manner across the Department of Defense is far from over. The current construct of unit readiness and joint readiness, and the symbiotic interaction between them, has long been a source of frustration and discontent by civilian and military senior leaders, within and without the Department. The Air Force has repeatedly strove to find a good solution to the competing requirements, but historically fallen short.

Readiness of the United States Air Force is a complex and multi-faceted example of the social construction of technology and how the Air Force religion factors into organizational decisions and response and hints at applicability beyond just the Air Force. This case study also captured relationships external to the Air Force to provide a new dimension from prior chapters—an opportunity to see how the Air Force engages with its sister Services and interacts with outside agencies like the Joint Staff and the Office of the Secretary of Defense.

A continuing theme with Departmental software development is failure, and a concomitant tendency to focus on the IT system shortcomings even when some of the problems are related to training and process issues. This inclination is especially strong in the Air Force due to its tendency to give the technology preeminence and a revered position relative to the people of the organization. RP&A's attempt to change the Department's view of readiness included the noble goal of faster and efficient software delivery, but to date his approach has failed to deliver. The sublime application of HPT perspectives in modifying the Department's discourse on readiness, using the themes of technique, technologies, experience, language, and metaphor was quite effective. Conversely, the misapplication of those same discourse themes from the EPT perspective has caused considerable dissonance and turmoil.

The Air Force generally took the path of least resistance which, given the institutional tendency toward the worship of technology and subservience to high priests, is the expected approach from the military religion model. Still, the lack of obvious consternation from the HQ USAF staff is somewhat surprising—the sanguine approach of hoping the Joint Staff would eventually move OSD toward a collaborative and effective process seems risky, and not in keeping with a conservative ethos.

A glaring epiphany from all the election-year controversies; Congressional reviews; GAO, DoD Inspector General, and Service audit reports; and continuing shortcomings in utility is that military readiness is a truly “hard” problem. Problems of this nature take more than one prophet-priest with a

³⁷⁰ “Not by might, nor by power, but by my spirit, saith the Lord of hosts” (King James Bible Zechariah 4:6).

new idea and the charisma and position to push the Department toward a pet solution. “Readiness lends itself to political controversy because critics and apologists alike can find ample evidence to support their positions if they use the relevant indicators selectively. A deeper problem, which abets politicization even if such slick selectivity in the presentation of data can be policed, lies in the complex interdependence of conflicting indicators and the different meanings that any given indicator can impart in different contexts” (Betts 88).

In 2000, Governor Bush remarked, “The current administration inherited a military ready for the dangers and challenges facing our nation. The next president will inherit a military in decline” (Online NewsHour). In the same transcript, Vice President Gore stated, “Our military is the strongest and best in the entire world” (Online NewsHour). Clearly, military readiness matters to the nation; but just as obviously, it is not a trivial matter or one easily reduced to sound bites. In the long run, the good news of DRRS may not help the Department and the Air Force analyze and assess readiness, but its tumultuous creation is likely a harbinger of things to come.

Chapter 10

Fueling the Future:³⁷¹ Policy Recommendations for the United States Air Force

There is also a need for developing a wider cultural awareness, both internal to the Air Force and external... We need to understand better the role of religion and culture more broadly in the way people think, act, and make decisions.

Lieutenant General Roger A. Brady
(HoR, The Religious Climate at the U.S. Air Force Academy 14)

Technological artifacts are both driver and enabler of the U.S. Air Force, and technological artifacts are widely identified as an enabler of tactics, and “tools of warfare” usually frame the conduct and dialogue of modern conflicts. Technology has a distinct impact on the culture and warfighting tactics of the Air Force, affecting training, career specialties, and forms of human interaction. The culture also has an effect on technology, and in particular whether new weapons and processes are embraced or rejected. Therefore, an understanding of the Air Force religious culture is critical to any understanding and management of the organization.

Cultural change is often complicated because many of the assumptions of identity and values are at the subconscious level, making them difficult to confront directly. Further, the old norms must be

³⁷¹ A takeoff from the Air National Guard’s old slogan, “Fuel your Future.”

unlearned before the new norms can be adopted, making it difficult to incur cultural changes quickly or easily (English 23). As the old Sir Basil Hart quip goes, “the only thing harder than getting a new idea into the military mind is to get the old one out” (qtd. in Worden 211). The ultimate purpose of cultural change is to ensure the Air Force is harmonized with its religious nature and ready to be an interdependent part of the U.S. military team. As discussed in a previous chapter, during the latter half of the 20th century it has become imperative that the four Services be able to plan operations, acquire systems, and operate jointly. Some of the mid-2008 changes in the Air Force organization—the resignation of Secretary Wynne and the Chief of Staff of the Air Force Moseley—have been in part due to the Air Force not meeting expectations as part of the overall Joint team.

While it may be difficult to manage technological change within the Air Force—recognizing that acquisition policies are often powered by politics outside the control of the Services resulting in processes with a logic all their own—there appear to be only limited conscious efforts to do so. One of the recurring themes throughout this dissertation is the need for the Air Force to make conscious, deliberate decisions about technology (to include processes), within the context of its unique Air Force religion and the significance of technological artifacts to the creed.

This chapter will begin by reviewing the broad issues of technology, cultural change, and “Joint” as applicable to the Air Force. I will then use the AF religion model to describe how these issues and the STS concepts can be used by Air Force leadership to harmonize the institution and its culture with technology and technological change. Finally, a brief analysis of the recent top-level leadership shakeup will be tied in to the concepts discussed in this dissertation.

The Issues of Technology

Neil Postman, chair of the Culture and Communication Department at New York University (until his death in 2003), remarked that very few public or personal problems arise because of insufficient information, yet too often people believe that simply grasping and assimilating more information, processed with technological aids, will correct a limitation (60, 119). Other commentators are concerned that “seeking military advantage through layering complexity into systems may increase vulnerability to accumulating systems failure” because “in the advanced industrial countries the established pattern of military technological development tend to emphasize high precision weaponry, autonomous systems, and removal of ‘men from the loop’” (qtd. in Smit, Grin and Voronkov 257).

When technology is given too high a preeminence, it gains “agency”—a state in which responsibility for outcomes is shifted from humans to technology. A routine example is when a customer service agent is unable to provide assistance because “the computers are down”—it’s not the organization’s fault, nor the customer service representative’s fault, or even your fault; it is an inanimate piece of technology’s fault. Far from a convenient excuse, this behavior is the act of relinquishing control to a device, an artifact, a “moron” (Drucker ch. 10). Postman believes bureaucrats tend to embrace this kind of responsibility-shifting technology because it helps create the illusion that decisions are not under the direct control of the bureaucrat (115), while Peter F. Drucker, the godfather of modern business practices, acridly remarks that “the main impact of the computer has been to create unlimited jobs for clerks” (105).

Drucker continues on: “what we lack primarily are large concepts which will enable people to use the machine” (105), a reference translated to the Air Force environment as a need for doctrine fully supported by processes and technological artifacts rather than driven by them. Drucker asks some important questions that are still valid today: “Does [technology] free you?” “Does it enable you to spend less time controlling and more time doing the important things?” “What should the manager try to do with it?” (106). He sums up the concepts as “control is not an abundance of facts, but knowing what facts to have and what they mean” (106).

Applying Drucker’s ideas to military institutions, Dr. John Stone, a Department of War Studies professor at King’s College, cautions “the enthusiasm with which military organizations have regarded new technologies...has not always been matched by their ability to exploit them to their fullest potential,” elaborating further that most difficulty arose when overhauling long-established roles or organizations to make best use of the new technologies (qtd. in Terriff 187). Thomas McNaugher chides the U.S. military for its “preference for ultimate weapons over well-organized and trained forces” (254).

Eventually technological superiority may not be able to provide the warfighting advantage sought by the U.S. Air Force—non-state actors, guerrilla tactics and low-tech insurgencies are an asymmetric threat not easily overcome with high technology. This point is not made to advocate discarding high-tech artifacts, but rather is raised in an attempt to underscore that balance is required between the human and the technological especially for the Air Force which is born of technology. Van Creveld poignantly reminds us of the human face of war:

When the chips are down, there is no “rational” calculation in the world capable of causing the individual to lay down his life. On both the individual and collective levels, war is therefore primarily an affair of the heart. It is dominated by such irrational factors as resolution and courage, honor and duty and loyalty and sacrifice of self. When everything is said and done, none of these have anything to do with technology, whether primitive or sophisticated. So it was at a time when war was limited to face to face clashes between hide-clad, club-armed cavemen, 50,000 years ago; so it will be when laser-firing flying saucers permit it to be fought over interplanetary distances 100, or 500, or 1,000 years hence. (van Creveld 314)

The allure of technology is seductive: it appears to be the solution to all problems while really it's a self-perpetuating circle of more and better technology.³⁷² In Transformation of War van Creveld contends that most high-tech weaponry is made to fight similar weaponry, and the use of asymmetric tools for war negates the advantage of high-tech. In another of his books, Technology and War, van Creveld notes that “the simpler the environment in which war is waged the greater the advantages offered by high technology” (272). As present operations in Iraq are demonstrating, the Long War against terror is neither a simple nor an easy environment, and in many ways the conflict is underserved by high technology.

This is a problem with technology and expectations: Postman says that one must be free “from the belief in the magical powers of numbers” and do not “regard calculation as an adequate substitute for judgment, or precision a synonym for truth” (184). The important consideration here is that technological artifacts do not stand independent of humanity—not in design, not in development and fielding, and not in operational functioning. Clearly then, technology is intricately linked to, and part of, any human endeavor, and human beliefs and expectations are informed by the technologies people create—and those beliefs and expectations can bring about the desire to reshape institutions to match fantasies about technology.

³⁷² The allure of technology (meaning artifacts) is also that it is perceived as easier to fix technological problems than it is to correct human problems, so technology often receives the funding and attention.

Postman, in his book Technopoly, describes people who are over-enamored with technology: “they gaze upon technology as a lover does on his beloved, seeing it as without blemish and entertaining no apprehension for the future. They are therefore dangerous and are to be approached cautiously” (5). He states that in cultures with a democratic ethos and a high receptivity to new technologies, people tend to be enthusiastic about technological change (11). Later in his text, he claims that tools are not just integrated into a culture, but rather they “attack” the culture, in a bid to become the culture (28), reinforcing the concept of a feedback loop between culture, change, and technology.

Terry Terriff argues that the military changes are based on a real or perceived shift in the balance of power and/or threat, or in order to exploit opportunities provided by new technologies in an effort to gain warfighting advantage (91). An interesting contrast compared to Builder, who argues that the military, and in particular the U.S. Air Force, will continue to change and embrace technology not for warfighting advantage but for the nifty “toys” (Builder, *Masks of War* 23). For the Air Force, the needed antidote to the glitter of technology is to understand the cultural inclination toward worship of technology, and work to reduce the sacredness of technology while increasing the sacredness of the people and the mission.

The Issues of Cultural Change

As culture is a stabilizing force in human systems, in general organizational cultures are intrinsically opposed to change, and change of nearly every type includes alteration of the culture (English 17). Theo Farrell, a lecturer on international relations at the University College Dublin, and Terry Terriff, a senior lecturer in international security at the University of Birmingham, argue that “large bureaucracies (militaries included) are designed to produce routine, repetitive, and orderly action; that is, they prefer continuity, not change”(Farrell and Terriff, Sources 4). While it’s common to consider the military as resistant to change, the observation is not entirely misplaced and after all, most large organizations tend to be “reluctant to move away from that which is familiar and seen to work” (Farrell and Terriff, Military Change 265). However, change is often not an option but rather a necessary activity, and by establishing a flexible and responsive organizational culture the process of change can be made easier and more productive for the organization as a whole.

General Michael V. Hayden, principal deputy director of national intelligence, in a recent Air Force Magazine article said the Air Force’s “preference for absolute quantification will have to shift a bit toward ‘liberal-artsy’ considerations” and “that cultural thing is going to be a big deal” (Tirpak 29). However, it is important because a shared culture endorsed across the institution is more likely to create that a sense of mission—the “one big thing”³⁷³—that will provide the identity and cohesion the Air Force requires for success.

The Air Force is presently more like the fox, knowing many things but not one big thing, and this causes it to lack cohesion—and the basis of the problem is technology (J. M. Smith 52). The very thing that gave the Air Force life is also that which pushes it apart and causes fragmentation of its mission, values, and goals. Further, since its inception, the CAF has dominated the institution, running the risk of stunting true growth of the organization:

If the leadership rivalry of the Air Force has become limited to pilots... then the Air Force may have tied its fate to one means and not the ends of air power. If the leadership rivalry has been limited to pilots mostly in the belief that the prerogatives or preeminence of pilots must be preserved within the institution, then even greater mischief may result, for such self-serving elitism sows the seeds of discontent among those whose contributions to the mission have been denigrated and who have been excluded from any hope of leadership. (Builder, Icarus Syndrome 227)

³⁷³ In the 7th century B.C., Archilochus wrote “the fox knows many things, but the hedgehog knows one big thing.” This concept is used heavily by Collins in his books on business change and competitiveness.

It is important to prevent a homogenous culture at the very top of the Air Force institution. Worden's text highlighted the "enduring dangers of parochialism and bias" in describing the rise of the fighter generals to topple the bomber mafia (238), and yet it appears that the fighter community is making the same mistakes as their predecessors. The shared experiences and bonds of the fighter subculture have manifested as a "consuming focus on a purpose or mission that favors the dominant culture" (Worden 238), limiting outside perspectives and options. Clearly, change has been occurring in the Air Force religion; women are accepted in nearly every career field, and the new Chief of Staff of the Air Force is not a fighter or bomber pilot. But were these cultural changes by intent, or by accident?

There are numerous models for implementing organizational change, either applicable to business, military, or both (Schein; Collins, *Good to Great*; Collins and Porras, *Built to Last*; Kotter and Cohen; J. M. Smith; English). These texts use the standard concepts of change templates for the military; however, religious models have a great deal of applicability to the very religious Air Force and many of those models have utility for Air Force leadership in understanding and managing cultural change.

Religious and military institutions have a number of parallels: they claim to exist for the greater good, a return on investment is very difficult to quantify, they demand utter obedience, and a great deal of trust is required both of the members and the leadership. Therefore, religious models and case studies are likely to reveal truths applicable to the Air Force religion, and provide the most high priests with concepts and tools to better establish and manage organizational goals. For example, "Competitive Strategies of Religious Organizations" states that technology for religious organizations is usually focused on processes rather than toys, and provides some thoughts on ecumenism—which is "jointness" by another name (Miller). Other examples of religious academic papers include discussions of how religious organizations reflect the values of the community they reside in (Brannon), the use of religious ideology in promoting change (Mirola), broad theories of religious organizational behavior (Benson and Dorsett), thoughts about religious change (Albrecht and Cornwall), syncretism and changes in population values (Houtman and Mascini), and other concepts and ideas (Sherkat and Wilson; Neal). The point is that the Air Force—a religious organization pretending otherwise—should focus less on business-related organizational behavior concepts and more on religious-related studies and concepts.

The Issues of Joint

The lack of full interdependence of the Services does not imply that a single “General Headquarters” staff, or a single military Service containing all the warfighters, is the answer. Rather, any operational tensions which exist between the Services need reduced to preclude difficulties on the battlefield, a process which starts with the higher headquarters but should trickle down to frontline military members as well. Often, the operators at the tactical level simply work around the systems or processes or resign themselves to suffering with the problems—a hotline to an entity designed to help reduce these problems just doesn’t exist.

The reduction in Air Force manpower requires a smarter and more capable force at every level. The 2003 Independent Study of Joint Officer Management and Joint Professional Military Education (PME) report substantiates a need for more tactical-level joint integration. The second bullet under “Future Requirements” states:

An increasing number of people (including [Reserve Component] officers, junior grade officers, noncommissioned officers (NCO), and civilians) are involved in joint matters, and they will need knowledge, skills, abilities, and other qualities not needed by their predecessors. (Booz Allen Hamilton ES-6)

Additionally, the report recommends a combination of training, experience, and education at earlier stages in officers’ careers, earlier joint experience for officers, as well as joint competence for some civilians, NCOs, junior grade officers, and reservists (Booz Allen Hamilton ES-6, ES-7).

While working to eliminate tactical-level inter-Service disconnects via interfaith collaboration, consistent joint training opportunities must be provided so that the military can “train like we fight.” Dr. John P. White, who served as a senior civilian in the DoD in the late 1970s and again in the early 1990s, in his address during the Ten Year Retrospective Symposium put it succinctly as “Joint training means more than a set of theater exercises every year. It has to mean a new attitude that focuses on Joint operations from the earliest training events” (56).

There are a number of shortcomings in truly operating as an interdependent Joint force. One example is the lack of joint military bases stateside—while there are Air Force organizations on Army posts, they are normally in a host-tenant situation and it is not truly a joint installation.³⁷⁴ However, today in the Middle East the military is operating in a tightly-integrated fashion from multi-Service installations and are discovering barriers to smooth joint operations. It would be more useful—and

³⁷⁴ While some movement toward multi-Service bases has been made, it has continued to be along the host-tenant concept rather than tightly integrated, truly joint bases.

better preparation for real-world operations—for airfield managers from both the Army and Air Force to work together supporting the same airfield during peacetime. Another example is the lack of association between peers of the Services during a military career, which exacerbates the ability to find disconnects and resolve them during the leisure of peacetime. While the Air Force provides a few company-grade³⁷⁵ airlift C-130 officers to serve as liaison officers with Army units, few individuals jump at the chance to learn joint at the grassroots level due to the negative impact on their careers. A deliberate inter-Service personnel exchange program of similar military career field specialties would enable NCOs and company grade officers to integrate into the other Services and then be a bridge for joint understanding and communication for both the parent and host Service.

Overall the U.S. military has made significant strides toward integration over the past twenty years, although clearly there is still room for further improvement to really become interdependent. While some of the steps taken, such as joint PME at the field grade officer levels, has aided in changing the segregated and disconnected cultures of the military Services, additional measures need taken to extend this cultural change into the lower ranks as well. While it is often easier to change things than to change people, only by changing the cultures will a lasting effect be created across the Services.

Why the Air Force Team Needs More Integration

In an effort to provide a visual presentation of my impression of the relative balance between each of the Services' overall people-focus and technology-focus, I developed the quadrant chart below. The Air Force is very high in its technology-focus, and slightly below-average in its people-focus. However, with the on-going unconventional warfare, the Air Force should seriously consider trading some technology-focus for people-focus, which would improve its capability in the unconventional arena.³⁷⁶

Across the Air Force institutional barriers exist which limit the Air Force from being a cohesive, solid airpower team. At the operator level, the lack of a formal cross-flow environment for tactics, techniques, and procedures between the fighter, mobility, and special forces tacticians limits lessons learned and synergistic overlap. The combat air force (CAF) world, being more culturally focused on tactics and survivability than the mobility air force (MAF), could assist in the metamorphosis of the MAF culture, while also benefiting CAF tactics as well. Fighters participating in tactics training events with C-130s often learn as much about the problems of engaging small slow-movers as the crews of the

³⁷⁵ Company grade officers are captains and below. Field grade officers are majors and above.

³⁷⁶ This is the opposite of what the Air Force tried to do under Moseley by trading in 40,000 people for the F-22 and other technological modernization.

transport planes learn about avoiding fighters—and given the rarity of movement between the career tracks, this kind of training and cross-flow of information is crucial to unified success of the team.³⁷⁷

It is an economic fact that the U.S. military must continue on the road toward interdependence; weapon systems continue to increase in cost and complexity, and the need to avoid duplication of effort drives the integration of requirements and acquisition processes toward the joint realm. The Air Force—

which has worked for most of its existence to shed the aegis of its parent Service—must instead now embrace the Army and other Services in order to serve the best interests of the nation.

Religion is not necessarily based on a cold, rational logic, and this matters a great deal when the allocation of resources across the Services is purported to be rational. An understanding that joint factors are as much a matter of the heart as logical considerations will assist in identifying implicit barriers. In this new era of post-Goldwater-Nichols interdependence and ecumenism must be the new watchwords among the U.S. military’s religions.

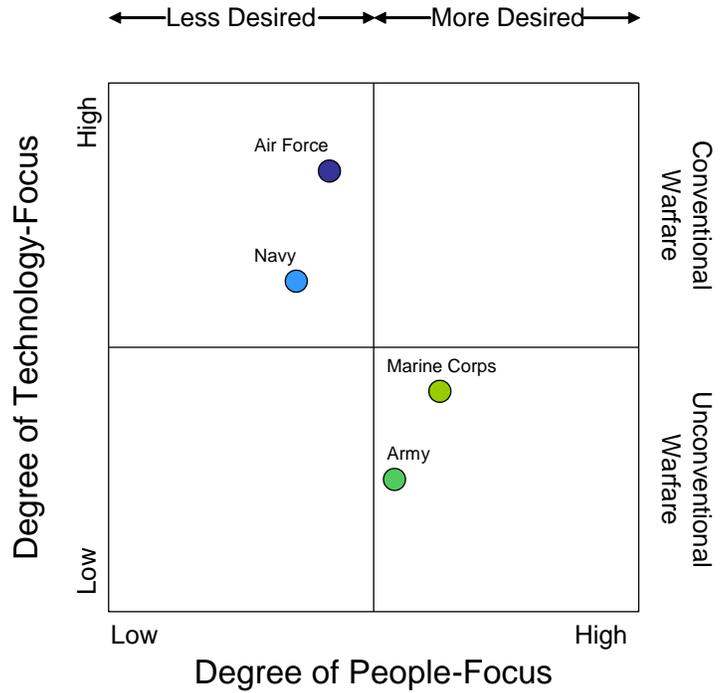


Figure 26 - U.S. Military EPT - HPT Focus

³⁷⁷ This limitation goes all the way back to Vietnam: “you go into fighters and you stay in that track for pretty much your career. The same with bombers, tankers and other aircraft” (Boese).

The Air Force and STS

Durkheim believed that “...the fundamental categories of thought... have religious origins” and “...we can say that nearly all the great social institutions were born in religion” (421). The promise of air power is that it offers a domain in which “supremacy brings omnipresence and omnipotence” (Builder, Icarus Syndrome 73). The Air Force’s original conceptual statement “Global Reach—Global Power” was signed out in 1990, and “Global Vigilance” was added to the guiding construct in 2000 (Moseley, Airmen 16)—completing the holy trinity of godlike powers.³⁷⁸

As used in this dissertation, the interdisciplinary field of science and technology studies (STS) links the technological, military, and political viewpoints. This section will relate earlier topics to the Air Force, and integrate the case studies and STS framework to provide insights for the Air Force for the future, as it is important that the Air Force preserve its institutional nature and resist occupationalism in order to function effectively (Segal and Segal 164).

The Air Force Religion

Carl Builder believes that at some point an individual’s views come from “deeply held personal perspectives of the world, how the world works, and values much more than they do from objective evidence” making those views difficult to change (20). This description invokes the power of religious beliefs—along with the difficulty associated with changing those views. Therefore, the priest class within the Air Force religion must understand that it is a religion, and deliberately use that knowledge for the good of the organization. Neophytes must be appropriately indoctrinated, promotion must depend on resonance with the sacred precepts, and prophecy must be a holy calling within the Air Force.

The underlying precepts of the Air Force—effervescence, the sacred/profane divide, and the positive and negative cults (rites)—are important to understanding and resonating with the institution. The effervescence of identity with an organization responsible for patrolling the heavens and protecting the nation, the worship of high technology and especially aviation-related totems, and the rituals of association are all touched on in the earlier case studies.

The utility of these concepts is that senior leaders and others should ensure that any potential changes to the institution recognizes and pays homage to these underlying precepts. For instance, recently the Air Force has included cyberspace as one of the three pillars of the Air Force, along with air and space. To ensure this new mission resonates with the underlying precepts, the Air Force should

³⁷⁸ Omnipresence, omnipotence, and omniscience.

build an “airpower” lexicon into this new mission area—using terms like 1-v-1, “fam” flights, “freely” zones³⁷⁹ and the like will help extend the current AF culture into the new mission area.

Care should be taken to ensure there is an appropriate sacred/profane divide, and that new positive and negative cults are established that are similar to existing Air Force rituals. The intent is not to suppress the new mission area’s unique contribution, but rather to inculcate the dominant AF culture into the new area to link it closely with overall institution. Airmen should be Airmen,³⁸⁰ regardless of the patch or job specialty. The Air Force tends to fall short in truly embracing new missions and supporting them appropriately: one has to only compare the new high-tech facilities at Langley AFB, VA built for the new F-22 squadron and the temporary trailers at Creech AFB, NV for the unmanned aerial vehicle (UAV) squadron—the most sacred fighter totems get full respect while the “unimportant” support mission gets little recognition or funding. It is likely that the Army and Marine Corps would rather see full support for the UAVs than the F-22, given the current “Long War” against terror and its asymmetric nature.

Likewise, the key doctrinal elements of the AF religion—soteriology, mystery, and theodicy—are important aspects of the culture. Salvation of the Air Force members and their mission, and of the nation, is a foundational aspect of the Air Force creed and leadership should always be answering the question: how does this action help save? Closely linked are the concepts of mystery and theodicy; the mysteries of classified information and need-to-know³⁸¹ are associated with how to perform the mission, while theodicy provides the rationale and legitimacy required for executing the mission.

Naturally, the AF religion relies on organizational roles—the priests, prophets, and laity—and these roles were described and highlighted at length in the case studies. In particular, the role of the prophets is extremely important for the health of the institution as they will receive visions and then struggle hard to implement those revelations. While not all visions are appropriate for the institution at large, a healthy encouragement of heresy will benefit the organization in the long run, as should be evidenced from the case studies—without “Machine Gun Parker” the U.S. Army would have been a lot less prepared for the reality of World War I. Likewise, the pressure of prophet-priests like Angello on the Department encourages broad improvements in information technology, despite some issues with method and effectiveness. At the highest level of the model, there are the cultural manifestations—the organizational ethics, identity, heroes, rebirth, and gender aspects of the Air Force religion.

³⁷⁹ 1-v-1 is “one versus one” or combat between individual fighter pilots; “fam” or familiarization flights are those flights taken in a new location in order to become familiar with the local terrain and flight areas; freely zones are those in which there are no flight restrictions.

³⁸⁰ The capitalization is deliberate; Moseley instituted the use of “Airmen” to mimic the “Marine” terminology.

³⁸¹ Not only is one required to have an appropriate security clearance, but also a “need to know” in order to access information.

Organizational Ethics

In the AF religion, organizational ethics stem from theodicy and enable individuals to rationalize the use of weapons and the circumstances for use of such against other peoples. Organizational ethics will always need to be an important part of the AF religion, regardless of the particular mission area, as ultimately the purpose of the institution is combat and physical coercion. Air Force leaders will need to constantly ensure the AF is on the side of “right” both organizationally and operationally: the institutional leaders should always be respected for their moral clarity, and circumspection in the development and use of weaponry should be of importance.

As discussed in chapter three, the U.S. military tends toward the “transcendent-historical war myth” which invokes the quest for justice as rationale for conflict, and so active management of the culture is important to ensure perception resonates with reality. An example of shaping organizational ethics is a 2006 Letter to Airmen from the Secretary of the Air Force, in which he discussed the three Air Force core values, emphasizing “it is imperative that we maintain the moral high ground – our nation depends on it” (Donley). A negative example is 1950 memorandum by the Joint Chiefs of Staff calling it “folly to argue whether one weapon is more immoral than another... it is war itself which is immoral” when justifying development and employment of the Super hydrogen bomb (qtd. in Herken 317).

Identity

It is important that all members of the Air Force identify with the institution in order to establish cohesion—and a potential cultural issue the Air Force may need to address is the limitations of Mumford’s “megamachine.” While a megamachine—the large assemblage of people and machines working together—may enable the building of the pyramids, Corn believes that few people can “easily and enthusiastically identify” with the construct as it lacks the “romance of more individualistic or small-group adventures” (152). In order to have an overarching identity, every member of the Air Force needs to know one big thing—the institutional *raison d’être*—before knowing their particular function within the institution.

Part of Builder’s intended use of the altar metaphor is that worship at a common altar unifies an organization (Builder, *Icarus Syndrome* 35). Whether that altar is airpower, technology, or cultural artifacts like cohesion, it needs to be clearly articulated and permeate the organizational culture in order to be effective. Goldberg believes that the high incidence of “no religious preference” among the U.S. military (relative to the U.S. population) might be due to the perceived dominance of Protestant denominations (71-72), and he speculates that selecting “no religious preference” may help minority religions “fit” better into the mainstream military culture, with a concomitant increase in chances of

promotion and success in general (72). As noted earlier, the Air Force has close identification with Christianity (even more so than America at large) but nonetheless in recognition of American's multiculturalism, the AF religion needs to be sensitive to the metaphysical religious preferences of its members, among other factors, to foster strong identity with the Air Force.

Heroes

As with most military organizations, heroes are an important part of the myth, and the Air Force religion relies on the exaltation of "great men" to pass along the religious creed and indoctrinate neophytes into the faith. Billy Mitchell, "Hap" Arnold, Lance Sijan, and others are all revered, studied, and deified as heroes of the faith, as a Secretary of the Air Force remarked in 2006:

It reminds us that we stand on the shoulders of giants: heroes like Billy Mitchell, and Doolittle, Spaatz, and Rickenbacker; heroes who faced and beat incredible odds. We have inherited a history of excellence, courage and greatness. We must live up to that heritage, become part of it, and pass it on. (Donley)

In support of the Air Force religion, the priests need to ensure that appropriate modern heroes are canonized and venerated, and that the traditions and rituals of commemoration are kept in vogue to prevent the AF religion from becoming just another job rather than a sacred calling.

Rebirth

The cultural manifestation of rebirth is, as evidenced in the case studies, another enduring thread of the AF religion. Because rebirth is often associated with prophets arising from anonymity, the Air Force institution needs to not only foster respect for rebirth, but support initiatives associated with rebirth. For instance, changing oneself for the better (a personal rebirth) is usually greeted with enthusiasm within the ranks of the devout, and assists in the making of heroes, while phoenix-like emergence of tactical culture within the MAF (an organizational rebirth) needs the active support of high priests to gain and sustain traction.

In the larger scheme, the Air Force itself is in the process of a rebirth, with the selection of the non-CAF Schwartz as the new Chief of Staff of the Air Force. As the Air Force rebuilds itself, there is no better time or opportunity to enable an organizational rebirth which can resonate with the individuals experiencing their rebirth as well.

Gender

There are two themes of gender running throughout this dissertation; first, the role of women within the Air Force, and second, the genderization of the subcultures of the Air Force, and the changes

in both over time. As noted previously, historically Western militaries have been great-man endeavors—and given the traditional military’s biographical norm of male heterosexual Christians (Harrington 51), it is “men”—paralleling for the most part Western religions. However, over the course of time from the Civil War to the present, the Air Force has continued to lead the other Services in gender indifference.

Also over the development of the Air Force, there has continued to be a move toward equality of the different subcultures within the institution. While transport/mobility roles were long regarded as one short step away from the airline business,³⁸² these aviators have gained respect and prestige—and concomitantly, more resources and support from the most high priests. As the aviation subcultures gain equality, the rising tide should also bring equality to the Air Force’s non-aviation subcultures: space,³⁸³ missiles, cyber, Battlefield Airmen,³⁸⁴ and others. It is decidedly in the best interests of the institution to provide as much parity as possible—as will be discussed later in this chapter, some of the issues Builder raised in The Icarus Syndrome about the splintering of the Air Force remain today, mostly due to a lack of parity.³⁸⁵

The Air Force and the Philosophies of Technology

A theme throughout this dissertation has been to deliberately separate two philosophical perspectives and consider each separately: the humanities philosophy of technology (HPT), and the engineering philosophy of technology (EPT). The purpose of this pedagogical exercise is to demonstrate how framing technological thinking within these perspectives provides a useful structure for managing both perspectives and understanding how each affects the discourse and metaphor of the Air Force religion.

The Air Force tends to favor quantitative processes and results, tangible products and physical artifacts that can be accounted for, measured, and easily categorized.³⁸⁶ This tendency produces a preference for technological artifacts, which can be readily demonstrated, touched, measured, and for

³⁸² And therefore, not “real” warriors at all.

³⁸³ While somewhat dated, a research paper by Cynthia Grey noted that in the Air Force, space was simply a “means to assist the Air Force pilot in gaining and maintaining air superiority” rather than any other possible utility or role in warfighting (vii).

³⁸⁴ Battlefield Airmen are a group of Air Force members who provide ground combat capabilities, usually outside the perimeter of an Air Force base. The career fields include Combat Weather, Pararescue, Combat Control, and others.

³⁸⁵ Second- and third-class citizens know they are such, and usually don’t care for that status very much.

³⁸⁶ Note that quantification often produces the patina of objectivity, but often simply masks political decisions and otherwise legitimates subjectivity (Rose; Porter; Scott). See also Baird’s discussion of the ramifications of putting one’s “faith” into supposed objectivity, and particularly “push-button” objectivity (19).

which there is a history of performance and systems of measure and feedback. Meanwhile the human element, in many ways representing inverse qualities from technological artifacts, has few of these characteristics. When more than thirty years have been spent developing a better understanding of the technical performance of weapons, but relatively little time or effort spent understanding the skills of the operators, there is a serious imbalance in perspectives (Biddle, Victory 178-179).

The intangible factors—leadership, morale, tacit skills—are often as important as the technology, as validated by Biddle and others. The Advanced Medium Range Air-to-Air Missile Operational Utility Evaluation (AMRAAM OUE) in 1981 and 1982 is one such event validating the importance of maintaining balance between the people and the technology:

Over 20,000 sortie equivalents were “flown.” The simulated sorties pitted fighters with varied weapons and avionics against various numbers of threat aircraft with fixed capabilities. The test results indicated that human interactions are statistically more important than aircraft performance, avionics, weaponry, or any other test variables. (GAO, Measures of Military Capability 31)

The issues of balance apply with aircraft as well, and the concern that pilots are too often systems operators rather than aviators. “There must be a balance between the amount of attention spent on high level weapon system prowess, versus mundane aircraft operation—young [pilots] are attracted to and also guided towards mastery of complex and very capable killing technology at the cost of basic aviation skills” (Wawrzynski).

Another example of the Air Force over-focus on technology is the purpose of the seven battlelabs: technological artifacts. A 2003 article entitled “Battlelab Success Stories” touts the many technological achievements of the Air Force battlelabs, but no process or people successes (Jackowski, Phillips and Jordan). Where is the “process” or “people” battlelab, if indeed people are the Air Force’s most important resource³⁸⁷? In April 2008 remarks at Maxwell AFB, AL, the Secretary of Defense noted that there were two types of “out-of-the-box” thinking: technology and capabilities, and processes and the bureaucracy—and that the Air Force (and all organizations) were organized to stifle out-of-the-box thinking (Gates, Maxwell).

An example of a possible issue for a process battlelab is the current promotion system, which is likely of very high importance to the organization and its members—but many argue that the present

³⁸⁷ In a 2005 speech, then-Chief of Staff of the Air Force General Jumper “reiterated that despite all the technology, people remain the most important resource of the Air Force” (Spencer and Gudge). This is a typical statement by Air Force leadership.

promotion system needs revamped, including the Secretary of Defense (Gates, Maxwell).³⁸⁸ The Air Force also needs to expend resources to find ways to measure the efficacy of current training regimens, and the effectiveness of this training for individual members. Whether this analysis is performed through the use of testing, feedback, hidden observers, or brain wave analysis is up to the experts—the important thing is to take the time and effort to find credible metrics for the people side of the equation, just as the Air Force does for its technological artifacts.

The Air Force and Knowledge Management

Knowledge management has been another central theme—how knowledge is collected, managed, and passed up and down the organizational hierarchy is of great importance to the Air Force. As alluded to in the Air Mobility Warfare Center chapter, the Air Force needs to leverage a hybrid of the community and cognitive knowledge management models (as introduced in chapter four) with a “bridging” function. Headquarters organizations can provide the conditions necessary for these organizations to develop and implement a clearinghouse function for the subcommunities, along the lines of the AATTC and AMWC. Especially in the area of technological innovation for the improvement of warfighting capability and survivability, the Air Force needs to ensure that a mechanism exists to provide as much support as possible for good ideas and talented people, while understanding that in many cases individuals acquire knowledge and information through “boundary spanning activity” (Swan, Newell and Scarbrough 262).³⁸⁹

The story of technological development is usually a complicated web that does not lend itself to the myth of good ideas and rational choices ensuring the logical best outcome. The main point of Vincenti’s chapter on the Davis airfoil is that history is a lot more complex than sterile minutes, notes, test manuals and results, and so forth would lead one to believe.³⁹⁰ Instead, there is a significant human element permeating the entire process, and many strategic and politically complicated situations are about “belief” rather than facts. The Air Force should design processes and organizations to be open, transparent, and with appropriate knowledge management and feedback loops. By designing small, mediating, “social”³⁹¹ organizations whose purpose is to provide the trading zone that fosters combined and interpenetrating activities, the Air Force can strive for balance between the social and the

³⁸⁸ For another example, T.X. Hammes in his book *The Sling and the Stone* advocates innovative ideas like 360-degree feedback and other concepts to revise the antiquated current system (237-239)—while Hammes is a retired Marine, his comments are made from a Joint perspective.

³⁸⁹ Recognizing that in some instances, corporate risk strategies will decline a particular innovation.

³⁹⁰ See also Porter’s chapter nine, in particular the section on negotiation and autonomy.

³⁹¹ Using Ackoff’s meaning of a new generation of highly adaptive individuals forming a “social organization.”

technological perspectives, leverage the best characteristics of knowledge management models, and better understand the social aspects of its technological artifacts.

The establishment of an institution to formalize this middle ground is necessary to provide the structure and support for innovation and invention (Vincenti 239) within the Air Force—although as demonstrated by the AATTC and AMWC, this does not necessarily have to be a priestly organization. This mediating organization would provide the advocacy for the field, and the interface with the headquarters, to enable the right level of engagement across both organizations. Note that this organization would need to have senior leadership sponsorship,³⁹² and be small and agile enough to function as the requisite trading zone, speaking the “creole” of both the headquarters and field organizations.

With advanced technological organizations such as the Air Force employing equally advanced technological artifacts such as sophisticated aircraft, the community model will continue to form the underpinnings of small-scale innovation and design. In order to provide the best possible environment for innovation and invention, the enabling processes need careful designing to provide the best possible foundation. However, management of the headquarters constraints associated with its cognitive model and focus on artifacts will prevent the suppression of that innovation. Conversely, a studied understanding of the field’s community model and increased focus on social efforts should help the overall organization find balance, and the implementation of a “trading zone” can enable communication between the subcommunities while preserving the utility of both types of organizations. The objective is not to suppress the prophetic visions, nor to enshroud the efforts in priestly bureaucracy, but rather provide an incubator structure for the ideas and revelations struggling to be realized. These independent organizations should be relatively small size-wise and somewhat underfunded—as Hatfield-Baker notes one has to be careful not to grow the organization too much, or it’ll lose its agility.

A primary benefit of a small, agile organization such as the AATTC away from the large headquarters bureaucracy is the ties to the tactical-level operators. The AATTC was conceived and pushed by field personnel, and sold to senior leadership. This “bottom-up” underdog culture has been exceedingly beneficial in AATTC’s ability to retain a close relationship to the tactical warfighters, see the needs and shortfalls and then attempt to fill them. The AMWC was the opposite; a “top-down” entity conceived and pushed by senior leadership, and sold to the field. Due to competing demands on

³⁹² In other words, work directly for the commander of the headquarters organization, and for the commander of the field organizations.

resources, arguably it has been harder for the AMWC (as a whole) to maintain a tactical-level warfighter focus—but nonetheless, both of these types of organizations (prophetic and priestly) are critically important to the health of the overall institution.

If net-centricity is truly part of the new American Way of War, and is critical to future joint warfighting, then senior leaders need to understand that a certain amount of chaos is inherent in operations of this type. It is not necessary to maintain full control and oversight over every possible initiative and impetus—the goal is to stimulate out-of-the-box thinking and allow prophetic visions, within reason, to run their course and perhaps engender additional revelations. As the Secretary of Defense has put it, “figuring out how to integrate into a big organization and promote and protect a group of people that are trying to think outside the box...is one of the challenges for every senior leader” (Gates, Maxwell).

The Air Force and the Social Construction of Technology

The social construction of technology (SCOT) is usually applied to particular situations rather than large, dynamic institutions, especially because the relevant social groups are often likely to change depending on a particular set of circumstances. However, in broad terms I shall attempt to capture a rough SCOT diagram as relates to the Air Force religion and the broad institutional issues. In particular, it will be relevant to see how this SCOT diagram compares to the next section’s review of the 2008 shakeup in Air Force senior leadership, and how the relative positions of the social groups and the artifacts appears to be substantiated by current events.

Social Group	Goals	Key Problems	Artifacts
Most High Priests—CSAF and other four-star generals	Ensure interdependence of Air Force with other Services; manage AF culture; organize, train, and equip organization	Enabling Joint interdependence; maintaining Air Force cultural health; resourcing for present and future	Bureaucracy; Airplane
Priests—at HQ organizations	Support broad Air Force goals; maintain extant culture	Competition for resources across AF subcultures; maintenance of status quo	Bureaucracy; Airplane
Prophets—individuals and prophetic organizations	Create revolutionary change in support of the institution	Lack of resources; need for change	Airplane; Weaponry; Other Artifacts
Laity—unit members across the Air Force	Fly, fight, and win; belief in the Air Force religion	Need for survivability and mission success; resource limitations; reliance on priests for doctrine and salvation	Airplane; Weaponry; Other Artifacts

Closure for the Air Force will never completely occur, but adjusting the SCOT diagram to move the relevant social groups into a closer harmony would be a method of redefining what it means to be

part of the Air Force institution, and also be a tool for methodical management of the Church by the most high priests. Below is the SCOT diagram of the preceding table.

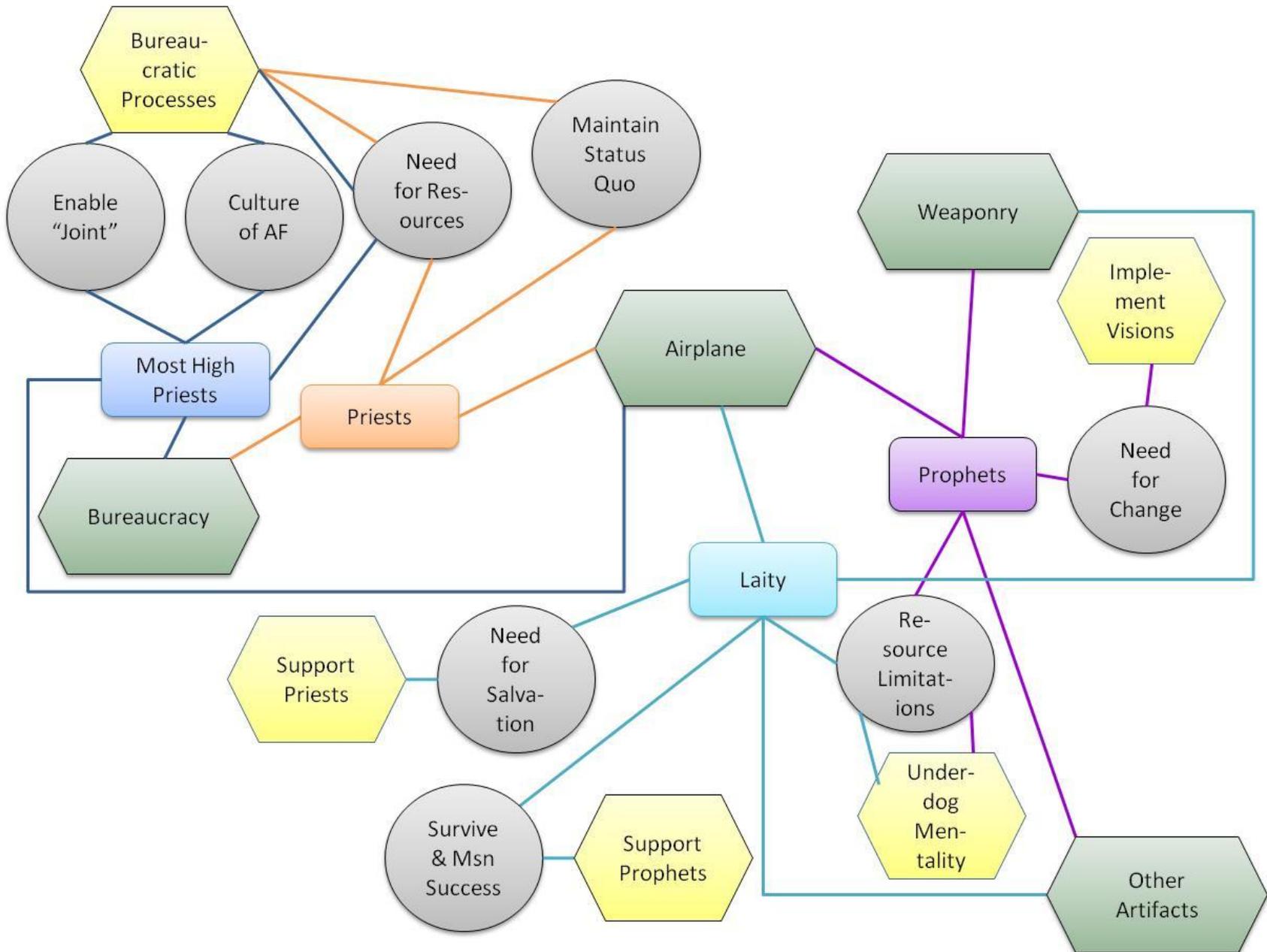


Figure 27 - SCOT Diagram of the Air Force

The Air Force Cultural Shakeup of 2008

The institution and doctrine of the Air Force was created by bomber pilots, yet a power shift began in Vietnam led to the dominance of the organization by fighter pilots beginning in 1982 (Worden ix-xi). Once again, Departmental organizational ennui with the Air Force institution has led to a shakeup, and possibly the loss of the fighter community's preeminence.

On June 5, 2008, Secretary of the Air Force Michael Wynne and Chief of Staff of the Air Force (CSAF) T. Michael Moseley resigned at the request of the Secretary of Defense, Dr. Robert M. Gates. In his speech announcing the resignations, Gates cited two international incidents in which nuclear weapons or components were mishandled,³⁹³ and the lack of immediate attention by the Air Force senior leadership to take remedial actions (Gates, Wynne-Moseley). While Gates did not cite other rationale, in remarks at Maxwell AFB, AL, he had expressed concern over the Air Force's lack of enthusiasm for unmanned aerial vehicles and cultural change, and what he perceived as a need for focus on the current war rather than too much focus on potential future war:

But in my view, we can do and we should do more to meet the needs of men and women fighting in the current conflicts while their outcome may still be in doubt. My concern is that our services are still not moving aggressively in wartime to provide resources needed now on the battlefield... Because people were stuck in old ways of doing business, it's been like pulling teeth... All this may require rethinking long-standing service assumptions and priorities about which missions require certified pilots and which do not. For those missions that still require manned missions, we need to think hard about whether we have the right platforms -- whether, for example, low-cost, low-tech alternatives exist to do basic reconnaissance and close air support in an environment where we have total control of the skies -- aircraft that our partners also can afford. (Gates, Maxwell)

A few days after announcement of the resignations, the Secretary of Defense also decided to halt the downsizing of the Air Force (Shanker)—an initiative by Wynne and Moseley to basically trade in 40,000 personnel in an effort to buy more F-22s—underscoring another potential area of disagreement between Gates and Wynne.

³⁹³ In August 2007, a B-52 from the 5th Bomb Wing, Minot AFB, ND, flew to Barksdale AFB, AL unknowingly carrying nuclear weapons. In another incident, in 2006 Air Force logistics personnel inadvertently shipped sensitive nuclear weapon parts to Taiwan and did not realize the parts were missing for 17 months. Additionally, on a re-inspection of nuclear safety procedures at the 5th Bomb Wing in May 2008, the Wing failed with a number of significant write-ups (Pincus).

All of these incidents coalesced into Gates' resolve to "transition" the Air Force from fighter dominance to an outside perspective (Gates, Media), and he subsequently nominated General Norton A. Schwartz as the Chief of Staff of the Air Force—the first non-bomber, non-fighter Chief since the inception of the Air Force. Whether this transition becomes permanent remains to be seen, but certainly the shakeup in the ranks will have a far-reaching cultural impact.

Major General Curtis M. Bedke, commander of the Air Force Research Laboratory, on June 8, 2008 provided a first-hand account of the resignations as happened at the CORONA Top conference,³⁹⁴ and commented "we will fix what is broken; we will move forward, we will get back to doing great things for the security of our families, our friends, our citizens, and our ideals" (Bedke). On June 9, 2008, General Arthur J. Lichte, commander of the Air Mobility Command (AMC),³⁹⁵ sent a memorandum to all AMC personnel stating the need to "return the Air Force to the standards of excellence" and that "we, the Air Force, failed our Secretary and Chief" (Lichte).

Bedke's account of the resignations³⁹⁶ provides an excellent example of an understanding of the Air Force religion, particularly in his relating of the events of the traditional heraldic banquet held the evening of the resignations. The rites and cults of the event—display of a totemic heraldic device, explanation of its sacredness, the toasts made (and the deeming of worthy or unworthy toasts), the recounting of traditions and AF "glories and follies from the past," the distinct feeling of effervescence—are all foundational aspects of the AF religion. This kind of strategic communication—in this case, an email which literally permeated the Air Force—is the right way to share and shape context with an understanding—intuitive or otherwise—of the Air Force religion.

Strategic communication needs to be focused not just on the outside/external audience, but also on the internal audience. The members comprising the institution need to know what its values are, and how they as individuals fit into the larger organization. If Battlefield Airmen get secondhand body armor so the F-22 squadron can have the latest high tech whiteboards in their briefing rooms that sends a message about the Air Force's values, regardless of what's published in pamphlets or posted on websites.

³⁹⁴ The annual CORONA Top conference is the gathering of the highest Air Force leaders to review strategic issues and concerns. Both Wynne and Moseley were at Wright-Patterson AFB, OH for the CORONA conference when the resignations were announced.

³⁹⁵ Recall that AMC is the lead organization for the Mobility Air Forces (MAF) construct.

³⁹⁶ See appendices for his full narrative; especially relevant are the personal remarks toward the end.

Occupationalism, such as decried by Builder, may be coming back in vogue for the Air Force.³⁹⁷ Lackluster support for the “ugly” ground forces with the “beautiful” airplane is an Air Force historical norm, which explains attack pilots—while nominally a part of CAF—being the “lowest of the low” (Perret 88-89). It stands to reason, then, that personnel in ground support roles tend to be even lower, and more profane, with a commensurate loss of institutional cohesion. The seeds of occupationalism are created in the delineation of the “other”—and usually lesser—castes and genders within the institution. However, while the fighters and bombers are wrestling over preeminence and control of the Air Force, the mobility forces, along with support forces such as space, Battlefield Airmen, logisticians, intelligence, and others, are the primary warfighters in Iraq rather than the CAF.

The recent issues with nuclear security and firing of Wynne and Moseley underscores the splintering of career fields as these diverse groups vie for the resources, funding, and respect commensurate with their contribution to the current fight, as well as potential future conflicts. A carefully managed message—a vision of the Air Force that unites, rather than divides, and ensures that every member knows “one big thing”—will enable a stronger, more effective institution to engage in a whirlwind of religious rebirth.

³⁹⁷ Note that a leading sociological model by Moskos describes militaries as being either institutional and hence a calling or vocation, or occupational and thus related to dispassionate labor markets, a divide that drives certain consequences for the overall organization (Segal and Segal). The Air Force religion model relies on an institutional view and a strong allegiance to the organization and its mission.

Conclusion: The Air Force Phoenix

This chapter has reviewed the key arguments of this dissertation, to wit: the Air Force is a religion, the AF religion influences its approach to technology and technological change, and the use of the religion will harmonize senior leader goals with the extant Air Force culture. The goal has been to recap the chief thoughts and provide policy suggestions for the consideration of Air Force priests, with an eye toward improving the overall institution. The Air Force worships technology, and yet in this idolization sometimes forgets that technology and culture are co-constructed.

Drucker strongly believed that “major technological change creates the need for social and political innovation. It does make obsolete existing institutional arrangements...technological change of a revolutionary character coerces; it *demand*s innovation” [emphasis in original] (123). While not all technological change is of a “revolutionary character,” in many cases adapting to new technology drives new tactics, techniques, or procedures, which in turn will affect the culture of the U.S. Air Force. This feedback loop is particularly dynamic in the Air Force, where technology has an integral purpose in its roles and missions and, in fact, is part of the very fabric as a foundational element of the AF religion.

The underlying precepts, key doctrine, organizational roles, and cultural manifestations of the Air Force religion are important to understanding the culture, and anticipating how to shape that culture and ensure the critical leadership messages resonate and enhance the culture, rather than fighting it. Once recognized for what it is, the lens of the Air Force religion can be used to understand and anticipate cultural response to external and internal stimuli—and, like Bedke’s account of the resignations, couch the discourse in appropriate language.

Mitcham’s philosophies of technology perspectives were used throughout the case studies, and helped highlight the need for balance within the Air Force religion. “The missing element is a moderation of human and technological change, a decision making process that more holistically weighs the advantages of considered advances against what might be given up in the real ability use it” (Wawrzynski).

Arguably, the most recent Secretary of the Air Force and Chief of Staff of the Air Force lost sight of the changing Air Force religion: the de-feminization of the various subcultures, the growing sacredness of non-aviation-related technology, and the splintering of the subcultures as the core mission of the Air Force transforms. The incoming Secretary of the Air Force and Chief of Staff of the Air Force have a unique opportunity to adjust the social validation (Schein 29) of the institution’s beliefs and values, and create a new future of good tidings. This, then, is an opportunity for the Air Force as a whole to experience a rebirth and rise from the ashes into a new, and more balanced, phoenix. An

understanding of the religious nature of the Air Force culture, a deliberate attempt to seek appropriate perspective between the technological and the human, and the willingness to maximize the potential of all Airmen will posture the institution for today and the future.

Chapter 11: Revelations

Military culture will set the conditions of success in future peace and war as much as technology will.

-Allan English
(150)

History tends to be a) propaganda when it is without critical analysis, or b) provides a record of successes and failures so that they may be learned from—and useful history helps ensure a future (Tilford 202). The purpose of this dissertation has been to describe, in a unique way, some of the history of the Air Force with the goal of providing a new set of perspectives to help understand the institution’s past, and help it shape its future.

Technological achievement is not the same as operational success (Worden 127); while technology may dominate methods and practices, the outcomes in war are less influenced by technology than is often believed (Raudzens 432).³⁹⁸ The Air Force was born of technology, but it is the human employment of those technological artifacts which give it purpose. With an understanding that “every society gets the technology it deserves” (qtd. in Bucciarelli 15), the Air Force needs to be wary of the allure of technology, and always be pondering Drucker’s questions: Does the technology free you?

³⁹⁸ For example, van Creveld argues that during World War II, technological superiority decided the outcome of only two situations (229).

Does it enable you to spend more time on important things? Does the technology deliver what it promises?

The goal of this dissertation was to use STS concepts in a substantive way and in particular the concept of a religion within the Air Force. Unlike Builder's treatment—which in the end was merely a superficial device—here I have tried to show that the Air Force should embrace the notion of being religious and use those concepts actively to shape the organizational culture. This final chapter, then, will summarize the case studies and concepts and briefly present some areas of possible further inquiry.

The Confession

It doesn't matter so much that the U.S. is preparing for the last war instead of the next war, if its military culture has instilled the right set of flexible and agile processes across the organization to quickly alter its doctrine, training, and tactics, techniques, and procedures (TTPs) when the situation requires. As English puts it, "military culture will set the conditions of success in future peace and war as much as technology will," while also suggesting that the impetus required to change the culture is the rapid pace of technology deployment the military is experiencing today and in the near term (150). Many scholars posit that "the pace of technological change, in information technology in particular, is creating the possibility of revolutionary change in the conduct of military operations" (Farrell and Terriff, Sources 3).

There needs to be a balance within the military culture, and in particular the U.S. Air Force, of both people and technology—to understand that the altar of technology was created by humanity and it is the human element—not the technological artifact—which has the real significance on the battlefield. Further, the proper intersection of human and technology must not only be institutionally recognized but nurtured, in an effort to leverage the Air Force's greatest asset—its people—with its enabling tools—the technology.

Some scholars go so far as to argue that technology is a chimera, and at the very least, the value of technology is usually overestimated; for example, there is "no direct correlation between IT investment and business performance" (Swan, Newell and Scarbrough 265). Nonetheless, whether discussing operational technological artifacts or IT systems, deliberately searching for and striking an appropriate balance between the HPT and EPT perspectives will aid in maintaining an optimal environment. The U.S. Air Force needs to make a series of changes to its culture so the human element is fully prepared for not just the current endeavors but the future ones as well. The objective is to change the culture to emphasize the human end of the spectrum, while managing technological expectations.

Cultural change is not an "easy" problem—it's not as quantifiable as the number of beans and bullets, cost per aircraft, or precision coordinates—but it is the important problem to solve, and the resources to systematically review and manage culture need to be allocated. The U.S. Air Force doesn't treat culture the same as its technology, resulting in an eclectic and unfocused approach not just for culture as a whole but also for processes and organizational structures. The demands of the Long War and the interdependence needed for jointness requires adaptive organizations with flexible coping

mechanisms, along with Drucker's "large concepts" for integrating technology, managing expectations, and being freed from "clerk's" work (105).

A challenge for the military is the tendency to assume that knowledge lies at the top of the bureaucracy along with the authority. This tendency derives from the creation of a bureaucracy to handle knowledge as well as power, intertwining the two and presupposing that both are equal at each level (Spender). However, a realization by senior leadership that authority and knowledge³⁹⁹ are, if anything, inversely related should generate support for radical prophetic organizations—and even those sometimes insubordinate priestly organizations—in keeping with the Secretary of Defense's recent comment that "dissent is a sign of health in an organization, and particularly if it's done in the right way" (Gates, Maxwell).

One of the points of the Air Force religion model is that dissent is important, and the organization needs to better find a way to institutionally support useful prophecies and visions, while understanding that the priestly bureaucracy is, often, what the heretics are opposing. A worthwhile endeavor on the part of the most high priests is to constantly strive to find ways to support, perhaps even indirectly, those prophets among the laity, while realizing sometimes they argue concepts and ideas disagreeable to the catechism. Colonel (retired) John Boyd famously remarked, "machines don't fight wars, people do, and they use their minds" (qtd. in Spinney 45)—and in a play on that, Hammes sums up the point of his text: "technology does not solve problems; people do" (232). Active management of the Air Force culture, rather than its technology, can help reduce the specter of military failure.

³⁹⁹ Note that experience and knowledge are not commensurate. A four-star general has a great deal of expertise and experience, but his or her knowledge may well be seriously outdated from that of those on performing operationally.

Summation of Case Studies

While there are certainly risks associated with the generalization of case studies, nonetheless they present a way in which to situate the strategic arguments of this dissertation. The following will be a very brief attempt to capture the essence of the case studies, along with a chart summarizing the important discourse elements from each.

Gatling gun

The Gatling gun and the reaction of U.S. Army generals demonstrated the patterns of the patriarchal Service which spawned the Air Force. The lack of integration with the Navy, the bureaucratic responses, and the yearning for traditional culturally acceptable methods of war-making reveal the intransigence of the military norms. The cultural seeds of the heretical air power prophecy were evident, as the time of technological dominance of the heavens moved nigh.

Air Corps Tactical School

The Tactical School was the original seminal source of airpower culture and doctrine, and set the stage for the birth of the independent U.S. Air Force. The hotbed of activity is summarized in this description of Kenneth Walker, an instructor at the school and one of the four airpower advocates who wrote the WWII air strategy known as AWPD-1:

He believed [in airpower] so fervently and advocated it so vehemently that his very conviction seemed to overcome the nagging doubts of others. Even his supporters agreed that he was “rabid” in his single-mindedness. (Byrd xi)

Advanced Airlift Tactics Training Center

With the U.S. Air Force fully established, the AATTC case study provided insight into the composition and issues of its internal subcultures at a chronological distance from its inception. The optimistic prophetic underdogs struggled for literal survival and organizational success, while the bomber and fighter generals vied for dominance of the Air Force institution. The fighters came out ruling the world, while the C-130s tried to show they, too, could fly, fight, and win.

Air Mobility Warfare Center

Like the AATTC, the AMWC was part of the mobility community although the organizational activation was a decade after that of the AATTC, and it was instituted by a high priest rather than prophetic vision. The priestly underdogs also struggled for literal survival and organizational success but from a different perspective within the hierarchy. The AMWC demonstrated the methodical processes

associated with a priestly organization, in illuminating counterpoint to the less-structured existence of the prophetic AATC.

Defense Readiness Reporting System

Moving to a holistic Joint view, the DRRS case study provided insights into the play of the Air Force on the larger Departmental stage. DRRS represents an information technology system in a feminine support role of secondary interest to the Air Force, yet fully supported by a most high prophet-priest and so requiring an organizational response to the desired change. The integrated joint interdependence revealed in the DRRS case study also presents an interesting closure as airpower—which fought so hard for independence—now comes full circle back to interdependence with all Services. The case study was more complicated, as befits a system of high technological complexity being implemented across an organization with a half-trillion dollar budget.

	Gatling gun	ACTS	AATTC	AMWC	DRRS
Techniques					
<i>HPT</i>	Multiple approaches and zeal	Zeal and conflict avoidance	Zeal and agility	Reliance on general officers and higher HQs	Intercalate and control
<i>EPT</i>	Biased testing protocols	Sabotaging the Tactical School	Flexibility	Formalize relationships	Opaque requirements
Technologies					
<i>HPT</i>	Bureaucracy	Capabilities of the airplane (real or imagined)	Capabilities of ancillary technology	Bureaucracy	Bureaucracy
<i>EPT</i>	Multiple calibers and logistics	Airplane flight characteristics	Manpower studies and reviews	Fight for resources	Policy documents and products
Experiences					
<i>HPT</i>	Persistence and patience	Clear justification of unique nature of airpower	Flying into “the Box” and fighting for resources	Formal inputs from MAF aviators	Opportunity and speed
<i>EPT</i>	Lack of user input to weapon design and lack of training	Lack of historical precedent/ bad habits	Knowing when to stop taking on projects	Underdog role within organization	Testing and releases
Language					
<i>HPT</i>	Common vernacular and religious connotations	Defining purpose of airpower	Changing name and expanding scope of tactics conference	Establishment of role, phoenix metaphor	Sound bites and change in metrics
<i>EPT</i>	Controversy over proper role of weapon	Changes in school name and curriculum	“Fighters rule the world”	Manning of AMWC, phoenix metaphor	Software requirements specification, meaning of definitions
Metaphor					
<i>HPT</i>	Strength of priesthood; few prophets; profane nature of machine guns; identity with heroic and masculine view of warfare	Monastery of prophets; new soteriology; developing sacredness of technology; heroes tied to masculine role of aerial combat	Sacredness of tech; creed of salvation; mysteries of tactics, techniques, and procedures (TTPs); organizational ethics; equality for mobility forces	Leveraging of priesthood; identity with MAF community; mysteries of TTPs; themes of rebirth and salvation; equality for mobility forces	Power of prophet-priest; sacredness of technology to AF; theme of rebirth of reporting system
<i>EPT</i>	Salvation not achieved via use of profane machine gun	Strong identity with the airplane and each other; airplane as creator and savior; rebirth of Army aviation into new Service	Identity as underdogs within overarching religion; reaching out to other MAF organizations; effervescence	Bridge between organizational roles; sacredness of technology and technological processes; effervescence; identity as underdogs; rebirth	Ineffectual priesthood; impact on laity; lack of heroes

Possibilities for an Afterlife

Areas of further inquiry for the Air Force include consideration of how to best change the AF based on studies of change within religious organizations, and also how religions approach technology. Various studies and scholars suggest possible models, ideas, and opportunities within the intersection of technology and religion, and given the highly religious nature of the Air Force, this clearly should be an area of additional study.

The Army

The U.S. Army probably has the most opportunity to learn from the Air Force's mistakes and issues regarding technology—the Army is heading toward a technological future, with high-tech gadgets and weaponry comprising the current Army vision of the future of ground combat. The current initiative, considered the most ambitious modernization since World War II (A. Klein D-1), involves networking the soldiers, combat vehicles, sensors, and more—essentially, the battlefield—into the Future Combat Systems (FCS) construct. The project will cost somewhere between \$124 and \$203 billion as currently projected, not counting ancillary support systems required for FCS to function (A. Klein D-1).

In this case, the child may become the parent, and able to assist the Army in embracing technological change in such a way as to avoid some of the Air Force missteps—especially given that many of these missteps originated in the Army culture.⁴⁰⁰ The chapter on the Gatling gun, and to some extent the Air Corps Tactical School, provides some insight on the Army culture and unique approach to technology, although clearly there is significant additional research that needs to be done in this area.

Joint

It is the Joint intersection that holds the most promise for additional study. Most studies of military organizational culture focus on a single Service, or at least break out each Service for separate study. A comprehensive, integrative study of Joint culture is clearly needed to track both the history of the movement toward interdependence, and to examine the obstacles and objectives for the road ahead. The figure below ties together the case study timeline and the movement of the U.S. military towards interdependence:

⁴⁰⁰ Collectively, the Air Force and Army should be able to avoid “all the sins of his father”, and not repeat the same mistakes (King James Bible I Kings 15:3).

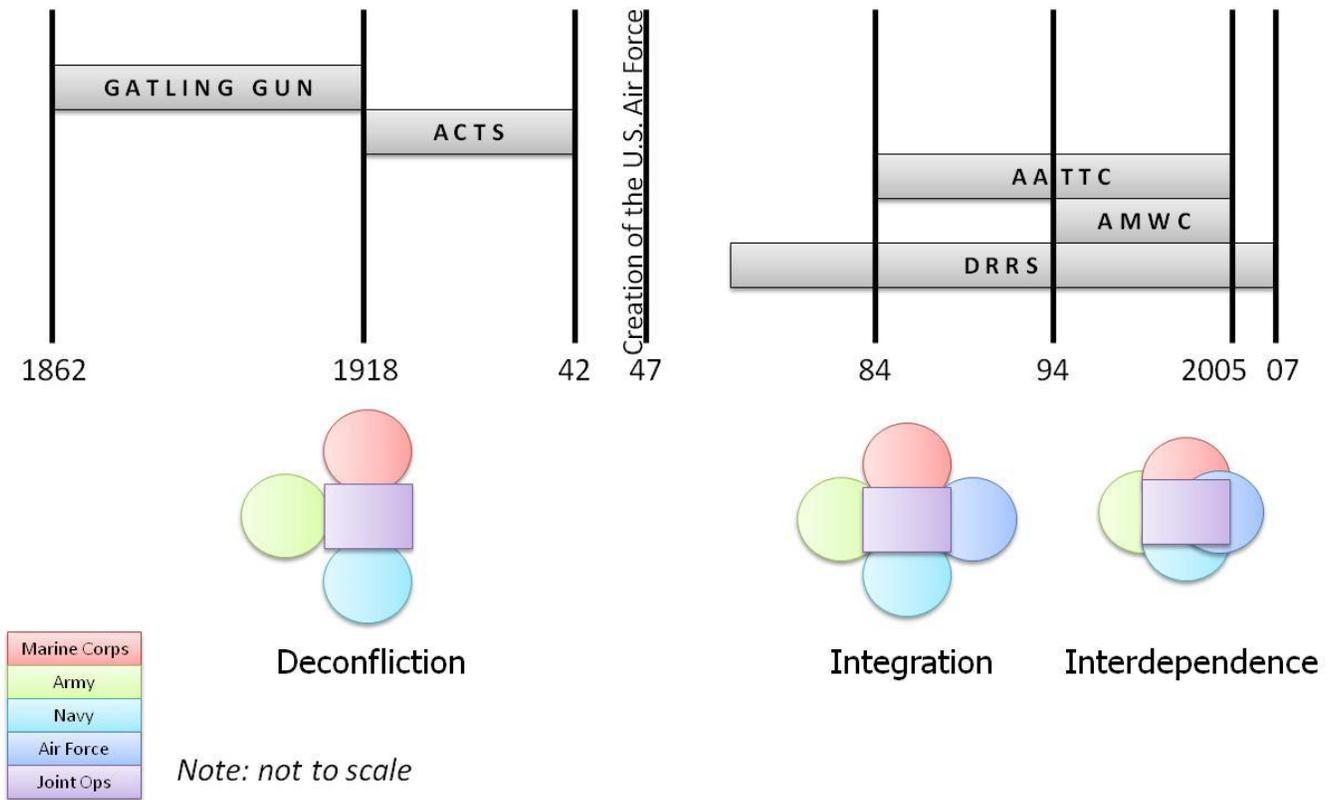


Figure 28 - Case Study Timeline and Jointness

As the Venn diagrams continue to draw in closer, and additional thinking produces various levels and meanings of interdependence (Paparone and Crupi), studies of the cultural intersection will grow in importance. The need for interfaith collaboration and, in some cases, religious reform will be a new way to look at jointness.

Miscellaneous

In addition, what is next after interdependence? Should the four Services break up into smaller, more agile (yet integrated) Services? In the tightly-coupled interdependent future, should the Air Force split out the space and missiles functions, the cyberwarriors, and other support roles? What about foreign militaries and societies, and their balance between the human and the technological⁴⁰¹—especially for their air force? How do the individual Service religions affect the discourse of interdependence in these scenarios?

⁴⁰¹ For example, see Burk's brief discussion of Japan's rejection of firearms (456).

The Omega

Finding new ways to look “out-of-the-box” is what interdisciplinary programs such as Science and Technology Studies (STS) is all about. The idea is to reach outside the usual comfort zone, and the usual viewpoints, and instead try to find new ways to understand the human condition. In the case of the United States Air Force, the objective is to find new ways to achieve its ultimately-noble goals.

To this end, I have pressed the idea of the Air Force being a religion, and tried to capture what that means functionally and operationally. Examples have been scattered throughout the dissertation to highlight positive and negative situations, and how the religious metaphor has power and utility to the institution. Orthogonal to the religious metaphor has been the division of the discourse into the humanities philosophy of technology (HPT) and engineering philosophy of technology (EPT) perspectives, a device intended to enable an analysis of discourse and metaphor in the co-construction of technology and culture.

A Center for Strategic and International Studies (CSIS) report (2004) recommends the U.S. military culture develop “new patterns of leadership” and “more agile, streamlined organizations” to embrace the 21st century with an effective and first-class fighting force. Air Force leadership can adapt culture and processes by exploring the ideas outlined in this dissertation, with the goal of a more integrated U.S. Air Force team and a better, more jointly interdependent military organization as well.

War is an affair of the heart, dominated by irrational factors (van Creveld 314)—so to give preeminence to technology for what is fundamentally a human endeavor is to deny the reality of war-making. The Air Force must embrace the hard problems of people, culture, and processes so it will be confident of success in the Long War or other future challenges to national security, whatever they may be.

Amen.

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Appendices

All great truths begin as blasphemies.

- *George Bernard Shaw*
(qtd. in A. Smith 182)

The following are referenced in the preceding chapters, or provide additional amplification of material.

Appendix A – Interviewees

(Alphabetic Order)

Ball, Lieutenant Colonel Cory R. A Guard baby,⁴⁰² he originally enlisted in the 139th Tactical Airlift Group as an accounting technician and commissioned in 1990 as a finance officer, Lt Col Ball has been the Wing Comptroller for the past 15 years. Given the juggling of resources required to maintain both the Center and the Wing as a whole, he's seen the buildup of the Center's offerings and has been a key enabler of their success. Ball notes the difficulties associated with forecasting fiscal requirements of the Center given the lack of real growth in the budget, and the lack of largess from AMC or AFRC. He continues to be the Wing Comptroller.

Cotter, Colonel Stephen D. Cotter, a Guard baby, has over 30 years with the 139th Wing, having joined August 24, 1975. Having experience both as a traditional Guard member and part of the full-time staff, he has extensive flying expertise in the C-130 world starting with the original C-130A models. Cotter assisted in the startup of the AATTC as a copilot, helping record data, perform research and learning how to defeat the threat. He was the commander of the AATTC from 2002 to 2003, and is presently serving as the 139th Wing Commander.

Curtis, Lieutenant Colonel Jared P. "Pat". Curtis has been the Tactics Division Chief of the USAF Mobility Weapons School since August 2003. He's been in the C-130 community since 1996, was a Weapons Instructor Course graduate in 1999, and has been assigned to Yokota, Little Rock, and other garden spots. Part of his duties as division chief includes providing some blocks of instruction for the Combat Aircrew Training course and the Senior Officer Tactics course, among others. Curtis is likely to receive a new assignment sometime in the next cycle.

Denny, Captain Barbara. Originally enlisted in 1984 as a crew chief with the 139th TAG, this Guard baby received her commission in 1998 as a communications officer. She's served as an executive officer, and is presently the Wing Public Affairs Officer (PAO) as well as the NGPC manager. While starting out as a traditional, Denny has been full-time since 2004 when hired on to help run the NGPC. She presently juggles both the PAO and NGPC assignments with the 139th Airlift Wing.

DePastino, Major Gerald S. "Dee". A Reserve Officer Training Corps (ROTC) graduate, after a washout at pilot training he switched to the navigator track and found his way into the C-130 world. He was stationed at Pope AFB, NC and Elmendorf AFB, AK, prior to joining the Center in 1998. After participating in Desert Storm, he decided it was time to clean out the "tactics closet," and so eventually

⁴⁰² Someone who has never been an active duty member, but joined the Guard directly, rather than after separating from active duty service.

wound up as the Chief of Tactics at Elmendorf. He was the Chief of Academics at the AATTC for three and a half years, overseeing 180 blocks of instruction. DePastino is now the Center resource advisor and historian.

Fravel, Major Linden A. "Pete". A tanker navigator assigned to operational units until his assignment as the Chief, Tactics Development Branch at AMWC about a year ago, Fravel has extensive qualifications such as Special Operations Aerial Refueling (SOAR), Weapons Instructor Course graduate, and has been chief of current operations and tactics at Robins AFB, GA in addition to other assignments. Fravel has been within the mobility air forces since commissioning, and overall is pleased with the movement toward a more tactically-focused orientation within the MAF. He expects to remain the Chief of the Tactics Development Branch for another two years before changing duty stations to a new assignment.

Hakimzadeh, Commander Kavon "Hak". Hakimzadeh has over 18 years with the U.S. Navy as an E-2C Naval flight officer with more than 2,000 total flying hours. Commissioned in 1992 via the Naval ROTC at Carnegie Mellon University, he held assignments at Pensacola, FL, Norfolk, VA, and Newport, RI, prior to assignment to the Joint Staff in 2004. He served three years in the J-39 Readiness Division, and in 2007 was assigned to Johns Hopkins School of Advanced International Studies to pursue a Master of International Public Policy. Hakimzadeh is scheduled to serve as a liaison officer for U.S. Southern Command's (USSOUTHCOM's) Washington office summer 2008, and will subsequently be assigned to VAW-126, Naval Air Station Norfolk, VA.

Harshman, Master Sergeant Kathleen M. "Katie". Harshman, also a Guard baby, was a traditional administration specialist with the 139th TAG prior to the standup of the AATTC. Once it was activated she was one of the original full-time staff of the new organization as its registrar and has been with it ever since. Harshman handles all the scheduling, Air Force Security Assistance Training (AFSAT—foreign military procedures required for attending the training), coordination with NGB and other outside agencies and so on, and has cross trained into the training career field from admin. She continues to serve as the Center's registrar.

Hatfield-Baker, Lieutenant Colonel (retired) Ken. Hatfield-Baker was one of the original members of the Center, being an instructor navigator from 1984-1993. He had a great deal of C-130 experience, having flown them in Vietnam for the CIA and having a number of interesting experiences there. He spent many years with the organization developing tactics, instructing MAF pilots and pushing for additional coursework, such as the PIC, which would improve the success of the overall mission. Hatfield-Baker retired militarily in 1998, and is now a civilian with Headquarters AMC, working in the A39 Operational Requirements Division.

Hitt, Mr. Mark E. Hitt started his career with the military in the active duty Air Force in Civil Engineering. After 13 years active duty he switched to the Air National Guard, and eventually found his way to the National Guard Bureau five years ago. Hitt has over 16 years experience in readiness issues, and is presently the Chief of Air National Guard Readiness. As such, he has oversight of all ART, GSORTS, and DRRS functional issues for the nearly 1,000 Air National Guard reporting entities.

Lathrop, Lieutenant Colonel Jeffrey R. Lathrop is presently the deputy commander of the Air Mobility Battlelab. An acquisition officer by trade, he's been assigned to special program offices (SPOs), laboratories, and other locations throughout the Air Force acquisition system. He's been at the battlelab for about a year after a "join spouse" re-assignment and is excited about the capability they provide to the warfighter, despite the small organization and budget. Lathrop expects to remain as the deputy commander for another two years or so before taking a new assignment.

Macken, Colonel (retired) Jerome A. "Jerry". Macken had over 26 years with the U.S. Air Force prior to his retirement in 2001. A 1975 graduate of the Air Force Academy, Macken subsequently earned his C-130 pilot wings and accumulated more than 4,000 flying hours. He held assignments at Ramstein, Pope, Little Rock, and Fort Leavenworth prior to his last assignment as the JS Readiness Division Chief from 1998-2001. Shortly after his retirement, Macken returned to the Readiness Division as a government civilian, where he serves as the Deputy Division Chief.

Pankau, Colonel Michael A. Pankau is another Guard baby, a hometown boy from the St Joseph area, who joined the 139th TAG in 1984. After spending some time as a traditional Guard member, including some time assigned to the Intel shop, he took a full-time position with the 139th in the late 1980s. After holding a number of positions within the Operations Group, Pankau was selected as the Commander of the AATTC in 2004, and he currently remains the Commander of the Center.

Sloan, Lieutenant Colonel Darin R. Sloan has been associated with the AATTC since 1989, and checked out as an instructor in 1994. As one of the AFRC members on staff he has a unique perspective of the Total Force organization, and has a long-term perspective due to the many years involved with C-130 tactics and the Center. He is presently the Chief of Scheduling.

Tollefson, Mr. Art W. As an information technologist, Tollefson oversees all IT-related projects for the battlelab, as well as providing cradle-to-the-grave information management support for all ongoing battlelab projects. A contractor, he's been with the battlelab for the past three years and provides continuity to the mostly-military staff. He's a retired Air Force member so brings a lot of hands-on expertise and experience to the battlelab, and Tollefson expects to remain at the battlelab indefinitely.

Tomko, Lieutenant Colonel Charles A. "Chuck". Tomko has over 17 years with the U.S. Air Force as an MC/HC-130 pilot with more than 2,400 total flying hours. Commissioned in 1991 via the Air Force Academy, he held assignments at Seymour Johnson AFB, NC, Patrick AFB, FL, Moody AFB, GA, and Duke Field, FL, prior to assignment to the Air Staff (HQ USAF) in 2004. Tomko was subsequently assigned to the Joint Staff in 2006 and served two years in the J-39 Readiness Division, with orders for transfer back to a line unit scheduled for May 2008, where he will assume the Director of Operations position for the 347th Operations Support Squadron at Moody AFB, GA.

Wawrzynski, Lieutenant Colonel (retired) Vincent P. "Duck". Wawrzynski had over 25 years with the U.S. Marine Corps prior to his retirement in late 2007. Originally enlisted in 1982 as a parachute rigger, he was later commissioned as a fighter pilot and primarily flew the F-18, accumulating over 2,200 hours flying time. Assigned to the Joint Staff in 2003, Wawrzynski served three years in the J-39 Readiness Division until July 2006. He is presently residing on his sailboat, *Duck On Fidelis*, and sailing wherever the winds go.

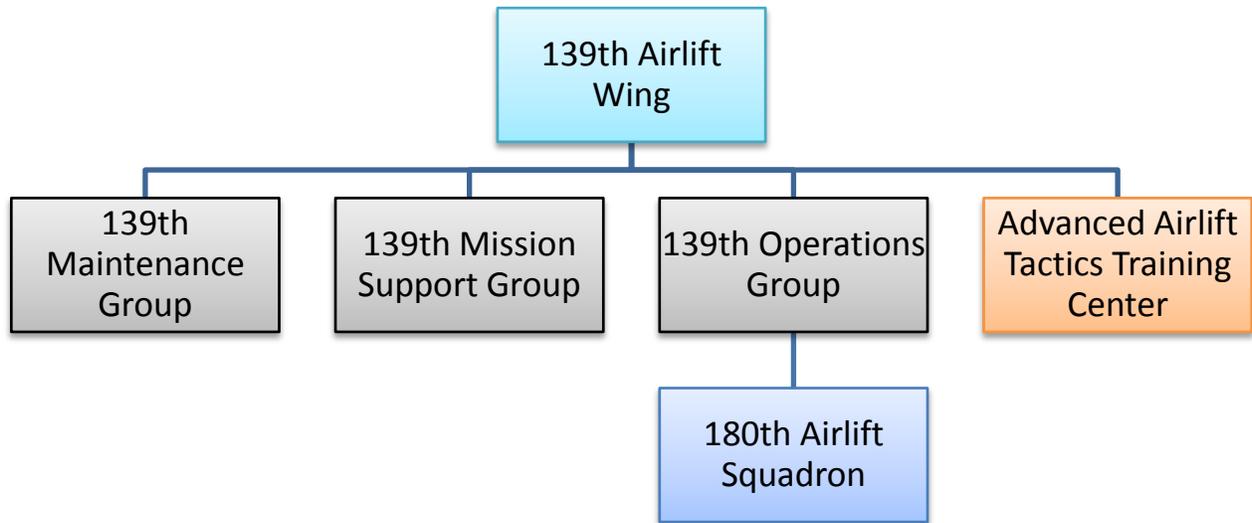
Weigler, Colonel Larry. Weigler was originally enlisted in the 139th TAW, and is another proud Guard baby. While never assigned to the AATTC, he interacted with it heavily as the base safety officer and the 139th Operations Group (OG) Commander. He was a traditional Guard member until about 1983 when he took a full-time assignment. In 1986, while serving as the base safety officer, he worked on a special project for the Center developing protocols and procedures for 100' low level tactical operations for C-130s.⁴⁰³ As the OG and Vice Wing Commander, Weigler has worked to support the needs of the Center as a way to help the 139th and the overall mobility community, while noting it does drive an impact on the rest of the Wing due to the extra training requirements of the Center staff, the tactics testing sorties, and the additional staff continuation training sorties. He is presently the Vice Commander of the 139th Wing.

Westfall, Lieutenant Colonel Kurt. Westfall was an active duty fighter pilot, flying RF-4s at Bergstrom AFB, TX; T-38s at Sheppard AFB, TX; and F-16s at Mountain Home AFB, ID until separating in 1995 to fly for Trans World Airlines and joining the 139th Airlift Wing as a traditional Guard member. In 1998, he took a full-time position with the Center, and recently was selected as the Director of Operations (DO) for the AATTC. Westfall noted that his fighter background really helped provide a unique perspective to his role in developing and teaching mobility tactics. He remains the DO of the Center.

⁴⁰³ The flight testing was disapproved by the Air Mobility Command Safety office.

Appendix B – 139th Unit Designations and Current Organizational Chart

<u>Organizational Name</u>	<u>Date Activated</u>	<u>Type Aircraft</u>
180th Light Bombardment Squadron ⁴⁰⁴	August 1946	B-26
180th Tactical Reconnaissance Squadron	1958	RF-84
139th Air Transport Group ⁴⁰⁵	1961	C-97
139th Air Transport Group	1968	KC-97L
139th Tactical Airlift Group	1976	C-130A, C-130H (1987)
Advanced Airlift Tactics Training Center	1984	(none)
139th Airlift Group ⁴⁰⁶	1992	C-130H
139th Airlift Wing	October 1995	C-130H



⁴⁰⁴ One of the first federally recognized Air National Guard units in the nation.

⁴⁰⁵ The 180th became the Squadron identifier under the Group. Today, the 180th Airlift Squadron is the operations squadron under the 139th Airlift Wing.

⁴⁰⁶ Name change due to MAJCOM reorganization and the move from the deactivated Mobility Airlift Command (MAC) to the Air Mobility Command (AMC). In 1993, the 139th was moved from AMC to the Air Combat Command (ACC). It moved back to AMC in 1997.

Appendix C – AATTC Commanders⁴⁰⁷

Lt Col Howard W. Dixon	1983 — 1988
Lt Col Steven R. McCamy	1988 — 1989
Lt Col David F. Deterich	1989 — 1992
Lt Col Gene E. Davenport	Sep 1992 — Dec 1998
Lt Col Greg D. Starkel	Dec 1998 — Jan 2002
Col Steven D. Cotter	Jan 2002 — Jun 2003
Lt Col Michael W. Hurst (acting)	Jul 2003 — Dec 2003
Col Michael A. Pankau	Jan 2004 — Present

⁴⁰⁷ Information as of 2005 (DePastino, History).

Appendix D – AMWC Commanders⁴⁰⁸

Col Stephen K. Raney (provisional commander)	May 94 – May 96
Brig Gen William J. Begert	Jul 1994 – Mar 1995
Maj Gen Richard C. Marr	Apr 1995 – Jul 1997
Maj Gen William W. Welser III	Aug 1997 – Jul 1999
Maj Gen Silas R. Johnson, Jr.	Aug 1999 – Jun 2000
Maj Gen Robert J. Boots	Jul 2000 – Jul 2002
Maj Gen Chris A. Kelly	Aug 2002 – May 2005
Maj Gen David S. “Scott” Gray	May 2005 – Present

⁴⁰⁸ Information as of 2005 (USAF EC).

Appendix E – 10 USC 482

Sec. 482. Quarterly reports: personnel and unit readiness⁴⁰⁹

(a) Quarterly Reports Required.--Not later than 45 days after the end of each calendar-year quarter, the Secretary of Defense shall submit to Congress a report regarding military readiness. The report for a quarter shall contain the information required by subsections (b), (d), and (e).

(b) Readiness Problems and Remedial Actions.--Each report shall specifically describe--

- (1) each readiness problem and deficiency identified using the assessments considered under subsection (c);
- (2) planned remedial actions; and
- (3) the key indicators and other relevant information related to each identified problem and deficiency.

(c) Consideration of Readiness Assessments.--The information required under subsection (b) to be included in the report for a quarter shall be based on readiness assessments that are provided during that quarter--

- (1) to any council, committee, or other body of the Department of Defense--
 - (A) that has responsibility for readiness oversight; and
 - (B) whose membership includes at least one civilian officer in the Office of the Secretary of Defense at the level of Assistant Secretary of Defense or higher;
- (2) by senior civilian and military officers of the military departments and the commanders of the unified and specified commands; and
- (3) as part of any regularly established process of periodic readiness reviews for the Department of Defense as a whole.

(d) Comprehensive Readiness Indicators for Active Components.--Each report shall also include information regarding each of the active components of the armed forces (and an evaluation of such information) with respect to each of the following readiness indicators:

- (1) Personnel strength.--
 - (A) Personnel status, including the extent to which members of the armed forces are serving in positions outside of their military occupational specialty, serving in grades other than the grades for which they are qualified, or both.
 - (B) Historical data and projected trends in personnel strength and status.
- (2) Personnel turbulence.--
 - (A) Recruit quality.
 - (B) Borrowed manpower.
 - (C) Personnel stability.
- (3) Other personnel matters.--
 - (A) Personnel morale.
 - (B) Recruiting status.
- (4) Training.--
 - (A) Training unit readiness and proficiency.
 - (B) Operations tempo.

⁴⁰⁹ Note that NDAA 2008 (see footnote 286) changed this section of Title 10 to include a requirement for the National Guard to report its readiness for civil support. However, this copy of the code obtained November 2007 so does not include the changes signed into law January 2008.

- (C) Training funding.
- (D) Training commitments and deployments.
- (5) Logistics--equipment fill.--
 - (A) Deployed equipment.
 - (B) Equipment availability.
 - (C) Equipment that is not mission capable.
 - (D) Age of equipment.
 - (E) Condition of nonpacing items.
- (6) Logistics--equipment maintenance.--
 - (A) Maintenance backlog.
- (7) Logistics--supply.--
 - (A) Availability of ordnance and spares.
 - (B) Status of prepositioned equipment.

(e) Unit Readiness Indicators.--Each report shall also include information regarding the readiness of each active component unit of the armed forces at the battalion, squadron, or an equivalent level (or a higher level) that received a readiness rating of C-3 (or below) for any month of the calendar-year quarter covered by the report. With respect to each such unit, the report shall separately provide the following information:

- (1) The unit designation and level of organization.
- (2) The overall readiness rating for the unit for the quarter and each month of the quarter.
- (3) The resource area or areas (personnel, equipment and supplies on hand, equipment condition, or training) that adversely affected the unit's readiness rating for the quarter.
- (4) The reasons why the unit received a readiness rating of C-3 (or below).

Appendix F – 10 USC 117

Sec. 117. Readiness reporting system: establishment; reporting to congressional committees

(a) Required Readiness Reporting System.--The Secretary of Defense shall establish a comprehensive readiness reporting system for the Department of Defense. The readiness reporting system shall measure in an objective, accurate, and timely manner the capability of the armed forces to carry out--

- (1) the National Security Strategy prescribed by the President in the most recent annual national security strategy report under section 108 of the National Security Act of 1947 (50 U.S.C. 404a);
- (2) the defense planning guidance provided by the Secretary of Defense pursuant to section 113(g) of this title; and
- (3) the National Military Strategy prescribed by the Chairman of the Joint Chiefs of Staff.

(b) Readiness Reporting System Characteristics.--In establishing the readiness reporting system, the Secretary shall ensure--

- (1) that the readiness reporting system is applied uniformly throughout the Department of Defense;
- (2) that information in the readiness reporting system is continually updated, with
 - (A) any change in the overall readiness status of a unit that is required to be reported as part of the readiness reporting system being reported within 24 hours of the event necessitating the change in readiness status, and
 - (B) any change in the overall readiness status of an element of the training establishment or an element of defense infrastructure that is required to be reported as part of the readiness reporting system being reported within 72 hours of the event necessitating the change in readiness status; and
- (3) that sufficient resources are provided to establish and maintain the system so as to allow reporting of changes in readiness status as required by this section.

(c) Capabilities.--The readiness reporting system shall measure such factors relating to readiness as the Secretary prescribes, except that the system shall include the capability to do each of the following:

- (1) Measure, on a monthly basis, the capability of units (both as elements of their respective armed force and as elements of joint forces) to conduct their assigned wartime missions.
- (2) Measure, on an annual basis, the capability of training establishments to provide trained and ready forces for wartime missions.
- (3) Measure, on an annual basis, the capability of defense installations and facilities and other elements of Department of Defense infrastructure, both in the United States and abroad, to provide appropriate support to forces in the conduct of their wartime missions.
- (4) Measure, on a monthly basis, critical warfighting deficiencies in unit capability.
- (5) Measure, on an annual basis, critical warfighting deficiencies in training establishments and defense infrastructure.
- (6) Measure, on a monthly basis, the level of current risk based upon the readiness reporting system relative to the capability of forces to carry out their wartime missions.
- (7) Measure, on a quarterly basis, the extent to which units of the armed forces remove serviceable parts, supplies, or equipment from one vehicle, vessel, or aircraft in order to render a different vehicle, vessel, or aircraft operational.

(d) Quarterly and Monthly Joint Readiness Reviews.—

- (1) The Chairman of the Joint Chiefs of Staff shall—
 - (A) on a quarterly basis, conduct a joint readiness review; and
 - (B) on a monthly basis, review any changes that have been reported in readiness since the previous joint readiness review.
- (2) The Chairman shall incorporate into both the joint readiness review required under paragraph (1)(A) and the monthly review required under paragraph (1)(B) the current information derived from the readiness reporting system and shall assess the capability of the armed forces to execute their wartime missions based upon their posture at the time the review is conducted. The Chairman shall submit to the Secretary of Defense the results of each review under paragraph (1), including the deficiencies in readiness identified during that review.

(e) Submission to Congressional Committees.--The Secretary shall each month submit to the Committee on Armed Services and the Committee on Appropriations of the Senate and the Committee on Armed Services and the Committee on Appropriations of the House of Representatives a report in writing containing the results of the most recent joint readiness review or monthly review conducted under subsection (d), including the current information derived from the readiness reporting system. Each such report shall be submitted in unclassified form and may, as the Secretary determines necessary, also be submitted in classified form.

(f) Regulations.--The Secretary shall prescribe regulations to carry out this section. In those regulations, the Secretary shall prescribe the units that are subject to reporting in the readiness reporting system, what type of equipment is subject to such reporting, and the elements of the training establishment and of defense infrastructure that are subject to such reporting.

Appendix G – 2002 Statement of Dr. Mayberry to SASC Subcommittee

The following is an extract describing the OUSD(P&R) vision for DRRS, as presented to the Subcommittee on Military Readiness and Management Support, Committee on Armed Services, U.S. Senate, March 21, 2002.

Readiness Reporting

...

In terms of the system we use to report unit readiness, we undertook a project last year, at the direction of the Secretary, to improve the way we both assess and report unit readiness. The Secretary asked us to specifically focus upon the readiness of our Armed Forces to execute fully their assigned missions. Over the last few months, we have been working closely with the Services and the Combatant Commands to identify possible improvements to the current system. We expect our study will be completed in the next several weeks, and anticipate publishing implementing instructions for a revised system soon after.

Our study results suggest that the Department should implement a new “capabilities-based” readiness system to provide timely and accurate information on the readiness of our forces and supporting infrastructure. This information would be readily available for our use in deliberate planning, responding to emerging crises, and to aid decision-making during hostilities.

In our charter for the study, we envisioned a system capable of providing real-time readiness information on the Department's ability to execute strategic missions and respond to crises. A broad spectrum of relevant information - provided by the Combatant Commands, Services, and Defense Agencies - will be available to aid both defense planners and decision-makers. The system will include valuable information on the readiness of forces to execute assigned joint mission essential tasks as well as the sustainability of the force over time.

Given the uncertainties in the strategic environment, we are planning for a flexible and adaptive readiness reporting system that will reduce the likelihood of the Department being surprised by unforeseen readiness challenges in the early stages of crisis planning.

The system will support assessments of force management and operational risk as outlined in the Quadrennial Defense Review. We believe that this improved reporting and assessment can be achieved by using existing personnel, training, and logistics databases. By incorporating information from existing transactional databases, we can reduce or eliminate workload and errors associated with manual input of data. This will further aid our goals of reducing the reporting burden, and responding more quickly to requests for readiness information.

The system will also provide information that reveals broad readiness trend information in the resource areas of personnel, unit training, equipment, supply, and ordnance, and will capture the military judgement of the unit commander in his assessment of his unit's readiness.

Our plan is to field the initial readiness system for operational use in FY 2004, with full operational capability achieved by FY 2007. (Senate, Mayberry Presentation 2002 5-7)

Appendix H – 2003 Statement of Dr. Mayberry to SASC Subcommittee

The following is an extract describing the OUSD(P&R) vision for DRRS, as presented to the Subcommittee on Military Readiness and Management Support, Committee on Armed Services, U.S. Senate, April 9, 2003.

Readiness Reporting

...

We are also improving the tools and systems we use to report and assess readiness, and are implementing a new “capabilities-based” readiness reporting system. This system, called the Defense Readiness Reporting System, or DRRS, will provide timely and accurate information on the readiness of our forces and supporting infrastructure for use in deliberate planning, responding to emerging crises, and decision-making during hostilities.

DRRS will transform our readiness assessment by focusing on a unit’s current capability to execute mission essential tasks in support of the Combatant Commander’s war plans. For the first time, the readiness reporting system will provide commanders—at all levels leading to the Secretary—specific information on the current readiness of units within the Department to meet mission essential tasks for the war plans. Not only will the combatant commanders be able to immediately assess the readiness of assigned and allocated forces, but they will also be able to assess the ability of the supporting commands, agencies, and the other Services in executing the war plan.

The core elements of the system will allow the Department to maintain almost near real time visibility on all current Global Status of Resources and Training System resource inputs and will be expanded to include additional critical information such as ammunition, supplies, and infrastructure. This expanded view of readiness will allow leadership to quickly answer the primary question “ready for what?” Given the uncertainties in the strategic environment, we need this flexible and adaptive readiness reporting system to reduce the likelihood of the Department being surprised by unforeseen readiness challenges in the early stages of crisis planning.

We believe that this improved reporting and assessment can be achieved by using existing personnel, training, and logistics databases. By incorporating information from existing transactional databases, we can reduce or even eliminate workload and errors associated with manual, multiple inputs of data. This will further aid our goals of reducing the reporting burden and responding more quickly to requests for readiness information.

Our plan is to field the initial spiral of tools for use in FY 2004, with the full operational capability achieved by FY 2007. (Senate, Mayberry Presentation 2003 13-14)

Appendix I – DRRS Funding

The following information was obtained via open source documents from the Office of the Secretary of Defense Comptroller’s website.⁴¹⁰ As this information only contains DRRS planned funding,⁴¹¹ additional funds transferred from other organization’s planned funding is not listed (in other words, this should be the minimum amounts of funding not representing other additional inflows).

In Fiscal Years 2002 and 2003, DRRS was funded via funds transferred from other planned funding lines and the information on amounts is not available. DRRS was assigned its own program element for Fiscal Year 2004. In chart below, estimates marked via italics.

FY	RDT&E ⁴¹²	O&M ⁴¹³	Source
2002	N/A	N/A	(OSD, FY 2003 R-2)
2003	N/A	N/A	(OSD, FY 2003 R-2)
2004	15.336	1.533	(OSD, FY 2004 R-2), (OSD, FY 2006 BE)
2005	19.335	7.343	(OSD, FY 2005 R-2), (OSD, FY 2007 BE)
2006	15.229	2.469	(OSD, FY 2006 R-2), (OSD, FY 2008 BE)
2007	13.231	2.132	(OSD, FY 2009 R-2), (OSD, FY 2009 BE)
2008	<i>11.784</i>	<i>4.815</i>	(OSD, FY 2009 R-2), (OSD, FY 2009 BE)
2009	<i>11.385</i>	<i>4.917</i>	(OSD, FY 2009 R-2), (OSD, FY 2009 BE)
2010	<i>11.427</i>		(OSD, FY 2009 R-2)
2011	<i>4.245</i>		(OSD, FY 2009 R-2)
2012	<i>6.374</i>		(OSD, FY 2009 R-2)
2013	<i>6.523</i>		(OSD, FY 2009 R-2)
Total:	<i>114.869</i>	<i>23.209</i>	

For comparison, the annual GSORTS RDT&E was typically \$3 million per year.⁴¹⁴

⁴¹⁰ http://www.defenselink.mil/comptroller/defbudget/fy2009/budget_justification/index.html. While a little difficult to navigate, an excellent site for taxpayers to review items of interest.

⁴¹¹ As part of McNamara’s Program Objective Memorandum (POM) process, each program element code (individual funding line) has to request and justify its planned funding.

⁴¹² Research, Development, Testing, & Evaluation funding, used to fund software development. On the Comptroller’s website, this information for DRRS is under “Vol III OSD” and then “OSD BA-6” (in some Fiscal Years, it’s identified by its program element, 0604774D8Z).

⁴¹³ Operations & Maintenance funding, used for current-year sustainment and training. On the Comptroller’s website, this information for DRRS is under “OM Vol I” then “OSD”.

⁴¹⁴ In 2007, Angello had the GSORTS RDT&E budget transferred to DRRS, forcing GSORTS into sustainment (OSD, FY 2009 R-2a 131); however, DRRS still did not provide the capability to replace GSORTS as the readiness for GCCS-J.

Appendix J – Rumsfeld Annual Reports

The following are extracts from Secretary Rumsfeld's Annual Report to Congress and the President from 2003-2005.

DoD Directive 7730.65, Department of Defense Readiness Reporting System, orders three fundamental changes to how we evaluate force readiness:

- Unit readiness will be measured against missions assigned to combatant commanders, rather than against doctrinal tasks unique to a military service.
- Real-time status reporting and scenario modeling will be used for assessments, not only during peacetime, but as a crisis unfolds and while operations are ongoing.
- Tighter linkages will be established between readiness planning and budgets.

The Defense Readiness Reporting System successfully completed a proof-of-concept demonstration in the fall of 2002. With the awarding of the prime development contract, we are working toward an initial operating capability in FY 2004 with full fielding planned during FY 2007. (Rumsfeld, Annual Report 2003).

DoD Directive 7730.65, Department of Defense Readiness Reporting System, orders three fundamental changes to how we evaluate force readiness:

- Unit readiness will be measured against missions assigned to combatant commanders, rather than against doctrinal tasks unique to a military service.
- Real-time status reporting and scenario modeling will be used for assessments, not only during peacetime, but as a crisis unfolds and while operations are ongoing.
- Tighter linkages will be established between readiness planning and budgets.

The Defense Readiness Reporting System successfully completed a proof-of-concept assessment in the fall of 2002. With the awarding of the prime development contract, we are working toward an initial operating capability in FY 2004 with full fielding planned during FY 2007. This year, we will begin fielding DRRS network architecture and plans assessment tools to selected units in one combatant theater, giving those units an initial joint readiness assessment capability. By the end of FY 2005, we will transition from the current Global SORTS to the Enhanced SORTS, or ESORTS. This will expand the number of theaters reporting and assessing readiness to execute select OPLANS via a robust and secure DRRS network. (Rumsfeld, Annual Report 2004).

DoD Directive 7730.65, Department of Defense Readiness Reporting System, orders three fundamental changes to how we evaluate force readiness:

- Reporting organizations (including tactical level units, Joint organizations, and support organizations) will assess their ability to conduct assigned missions rather than doctrinally based or otherwise generic missions.
- Real-time status reporting and scenario modeling will be used for assessments, not only during peacetime, but also as a crisis unfolds and while operations are ongoing.
- Readiness reporting will become part of a larger force management process that combines the force selection activities of Joint Force Providers, risk assessments and adaptive planning.

When mature, DRRS will prove a capabilities-based, adaptive, near real-time readiness reporting system for all of DoD. (Rumsfeld, Annual Report 2005)

Appendix K – Sample Readiness Data Elements

Sample data elements from each of the three groupings of unit information provided for background information. The “unit registration” grouping of readiness information requirements includes the following key data elements:⁴¹⁵

<i>Data Element</i>	<i>Description</i>
Unit Identification Code (UIC)	A unique identifier assigned to each unit which provides positive identification of that particular unit. Essentially the “social security number” of the unit.
Type Unit Code (TUCHA)	A unique identifier assigned to each unit that describes the overall purpose of the unit in broad joint terminology.
Unit Descriptor Code (UDC)	An indicator of the relative size and composition of a particular unit. For example, “headquarters,” “battalion,” “platoon,” and “center” are among the defined values.

The “unit visibility” grouping of readiness information requirements includes the following key data elements:⁴¹⁶

<i>Data Element</i>	<i>Description</i>
Location	The present location of the unit, as specified by using the Joint Operations, Planning, and Execution System (JOPES) ⁴¹⁷ geographic reference file (GEOFILE).
Operational Control (OPCON)	The UIC of the organization that has operational control of the reporting unit is specified. Operational control is the ability to direct the activities of the unit.
Administrative Control (ADCON)	The UIC of the organization that has administrative control of the reporting unit is specified. Administrative control involves personnel and organizational management.
Combatant Command (COCOM)	The UIC of the combatant command to which the unit is assigned. For example, for mobility forces such as C-130 units in the Air Mobility Command (AMC) the US Transportation Command (USTRANSCOM) is their COCOM.

⁴¹⁵ There are other data element requirements in each grouping, but these are the important ones for this case study. Information to build the table derived from interviews.

⁴¹⁶ Information to build the table derived from interviews.

⁴¹⁷ The JOPES system, part of the Joint Chiefs of Staff Global Command and Control System-Joint (GCCS-J), is the system used to develop warplans, source—the identification of units to support those plans—and deploy units to fight the war. It is the system in use every day by combatant commands around the globe to manage the movement of units, logistics tails, and equipment in support of military activities.

<i>Data Element</i>	<i>Description</i>
Unit Activity Code	A code from a standardized table that describes the type of activity in which the unit is currently engaged. For example, “exercises” would be the reported activity if the unit were participating in an exercise.

The “unit readiness” grouping of information requirements includes the following key data elements:⁴¹⁸

<i>Data Element</i>	<i>Description</i>
Overall (also known as the Category-Level or “C-Level”)	This is the unit’s Overall rating (C-Level) based on the four-tier system as an assessment of the unit’s ability to execute its designed (also known as “full-spectrum”) mission. This is either the lowest rating of the four “PSRT” categories (below), or a commander’s subjective upgrade or downgrade from the objective level.
Personnel (or P-Level)	The P-Level is derived by calculating the percentage of total personnel, percentage of filled critical specialties, ⁴¹⁹ or (at Service discretion) percentage of filled critical grades ⁴²⁰ with the lowest sub-area being the unit’s P-Level.
Equipment and Supplies On-Hand (S-Level)	The S-Level is derived by calculating the percentage of mission-essential supplies on hand, and the percentage of non-mission-essential supplies on hand, and with the lowest sub-area being the unit’s S-Level.
Equipment Condition (R-Level)	The R-Level is derived by calculating the percentage of mission-essential equipment rated “mission capable,” and the percentage of non-mission-essential equipment rated “mission capable,” and with the lowest sub-area being the unit’s R-Level.
Training (T-Level)	The T-Level is derived via one of three methods: days of training, percentage of mission essential tasks (METs) trained to standards, or crews formed. The days of training method requires the unit to compute the number of days of training necessary to be mission ready. ⁴²¹ The percentage of METs trained to standard involves determining the level of training competency demonstrated by

⁴¹⁸ Information to build the table derived from interviews.

⁴¹⁹ “Specialties” referring to the particular Service’s job classification system. In the Air Force, the specialties are referred to as Air Force Specialty Codes (AFSCs).

⁴²⁰ “Grades” referring to the rank structure; e.g., E-7 is the grade matching the Air Force rank of Master Sergeant. The Air Force does not compute the sub-area of filled critical grades.

⁴²¹ This method not used by the Air Force.

<i>Data Element</i>	<i>Description</i>
	the unit personnel on the unit's assigned METs. The crews formed method requires the unit to determine how many trained and ready crews can be formed as compared to the number assigned.
Percent Effective (PCTEF-Level) ⁴²²	The PCTEF is a subjective assessment based on the four-tier system of the ability of the unit to execute an "assigned" mission. An assigned mission may be the same as the designed mission, but is most commonly a "non-traditional" mission. ⁴²³
Chemical and Biological Defense Readiness and Training (CBDRT-Level)	The CBDRT-Level is a subjective assessment based on the four-tier system of the chemical and biological defense equipment on hand, and the unit's training competency to operate in the equipment and in a hazardous environment.

⁴²² The PCTEF-Level was added via Change 2 to CJCSI 3401.02, dated 1 April 2001. The change was added specifically to enable units to report assigned missions, rather than just designed (or wartime) missions (JCS, CJCSI 3401.02 Chg 2).

⁴²³ For example, if a Civil Engineering unit were to send personnel over to Iraq to drive trucks that would be a "non-traditional" mission for the deployed members.

Appendix L - Bedke's Account of SECAF and CSAF Resignations

From: Bedke, Curtis M MajGen USAF AFMC AFRL/CC

Sent: Sunday, June 08, 2008 7:16 PM

To: AFRL DL-Personnel-All

Subject: AFRL Commander's WIT #34: A Difficult Time for Our Air Force

Men and Women of the Air Force Research Laboratory-

I wish you could have been there. You would have been captivated, and mesmerized. You would have been proud.

I'll explain in a bit.

As you all know by now, on Thursday the Secretary of the Air Force, the Honorable Michael W. Wynne, and the Chief of Staff, General T. Michael Moseley, offered their resignations to the Secretary of Defense. A report on the way the Air Force has handled the nuclear mission over the past few years- including the incident at Minot when an aircrew flew a B-52 loaded with nuclear weapons to Barksdale AFB last fall, and a previous incident when nuclear-related materials were mistakenly shipped to Taiwan and left undiscovered for 17 months-had just been briefed to the SECDEF. It cited "lapses in discipline, compliance, focus, and attention to detail" in the Air Force's handling of that mission.

I'm going to approach this issue THREE WAYS:

First, I'm going to give you the official Air Force "Public Affairs Guidance and Talking Points on AF Leadership Resignations." You owe it to yourself to read it and understand it.

Second, I'll tell you my own personal thoughts on "What This All Means."

And finally, I want to give you a little insight into what I saw as this unfolded before me, because this occurred during the annual CORONA Top Conference, the year's most important gathering of general officers, right here at Wright Patterson Air Force Base.

SAF Public Affairs Guidance and Talking Points on AF Leadership Resignations

Media Queries:

- Any media queries regarding today's announcement (resignations and the results of Admiral Donald's report) are to be referred to the Air Force PA Ops desk at 703.695.0640.

- If media requests to interview Airmen about their reaction to the news please remind Airmen that while they are free to provide their personal opinions they should not speculate or stray into policy.

Internal Communication:

The current Air Force internal story can be found at: www.af.mil <<http://www.af.mil>> .

The full text of the SECDEF's comments are at:
<http://www.defenselink.mil/> <<http://www.defenselink.mil/>>

Messages:

- It's a difficult time for the Air Force. Yesterday the Secretary of the Air Force and the Chief of Staff offered their resignations to the Secretary of Defense. It is important for all Airmen to understand why.

- Secretary Gates saw systemic problems in the way the Air Force was handling a critical mission area for many years and held our leaders responsible.

- The Secretary and the Chief took responsibility and held themselves accountable for actions which occurred within the Air Force. They stood up and did the honorable thing that we hope any Airman would. We should admire and respect them for that.

- There were lapses in discipline, compliance, focus, and attention to detail in critical mission areas the Air Force performs for this country.

- As difficult as it is, we must use this occasion to examine ourselves and the missions for which we are responsible.

- We must assure a complete and total focus on every aspect and detail of our activities.

- Nothing has changed in our priorities; we have to fight today's fight, take care of our people, and prepare for tomorrow's challenges.

- The profession of arms is a demanding one and expectations are properly high.

- Every job in our Air Force is important, and it's critical that we perform them all to the standards that we have espoused in our core values of integrity first, service before self, and excellence in all we do.

- We are a nation at war, and we have a mission to perform for this great nation. Let's do it with pride and our heads held high.

Specifically regarding Admiral Donald's report:

- The United States Air Force acknowledges and appreciates the responsibility entrusted by the President, Congress, and the American public to maintain the highest standards regarding all facets of nuclear weapons stewardship.

- The Air Force is addressing concerns about the gradual loss of focus on the nuclear enterprise since the end of the Cold War, fragmentation of efforts in the nuclear arena, and multiple lines of authority.

- Since the August 2007 weapons transfer incident, the Air Force has been implementing over 120 recommendations culled from the initial Investigation at Minot Air Force Base, the Blue Ribbon Review, and General Welch's Defense Science Board Report.

- In addition to these efforts we will vigorously work with the Dr. James Schlesinger, former Secretary of Defense, Secretary of Energy and Director of Central Intelligence, as he leads the task force established by Secretary Gates to ensure sufficient far-reaching and comprehensive measures are taken.

SecAF Statement

"Since November 3, 2005, it has been my privilege to serve this country as the 21st Secretary of the Air Force. I have relished the opportunity President Bush gave me to lead the strongest Air Force in the world during a time of war, and I have marveled at the tremendous accomplishments of our Airmen and civilians in their valiant defense of this country and its interests. It has been an honor and pleasure to serve as their Secretary while working side-by-side with General Moseley and the magnificent patriots serving in the Department of Defense and the United States Government to win today's fight, take care of our people, and prepare for tomorrow's challenges.

I have been a long-time proponent of accepting responsibility and being accountable for actions and activities within our Air Force. I have read with regret the recent report concerning the control of nuclear-related assets. Control of this strategic area is a firm commitment by our Air Force to America.

It is in this spirit that I intend to offer my resignation as Secretary of the Air Force to Secretary Gates. I have to live up to the same standards I expect from my Airmen.

Even as I do, my heart, my thoughts, and prayers remain with America's Airmen who will continue to do magnificent things for this great country."

CSAF Statement

"Recent events have highlighted a loss of focus on certain critical matters within the Air Force. As the Air Force's senior uniformed leader, I take full responsibility for events which have hurt the Air Force's reputation or raised a question of every Airman's commitment to our core values. For the past 36 years I have been privileged to serve my country as an Airman in the United States Air Force in peacetime and combat. I was honored and humbled to be appointed the Air Force's 18th Chief of Staff and have been proud to serve our Airmen and their families. Upon taking office, I worked hard with Secretary Wynne to ensure the Air Force provided the right forces at the right time to help our Nation and allies win the Global War on Terror.

I think the honorable thing to do is to step aside. After consulting with my family, I intend to submit my request for retirement to Secretary Gates. The Air Force is bigger than one Airman, and I have full confidence that the Air Force will continue working with the Joint team to win today's fight, take care of its Airmen, and meet tomorrow's challenges. I love the Air Force and remain proud of America's Airmen."

My own personal thoughts on "What This All Means"

In many ways, it's simple. For all the water-cooler talk about whether the SECAF and CSAF were at fault, or whether there were more factors than just the two nuclear incidents, or whether there were personal animosities, it actually comes down to a few key points:

First: Accountability for our Responsibilities. The SECAF and CSAF are trusted with the United States Air Force. Everything that happens in, to, or because of our Air Force is their responsibility. That doesn't have to be fair, it often is not, but anyone who signs up for command or leadership must always understand that everything that happens is in some way their responsibility.

I read an article 21 years ago that has stuck with me ever since. It was written by a naval officer. He pointed out that the old expression-and the older tradition-that a Captain goes down with his ship-came about because out on the high seas, it was always clear to everyone on board that the person in charge was responsible to no higher authority. He could "play god", and in his judgment and decisions lay the fate of the entire crew. But the crews continued to sign up, to go to sea, to trust their Captain, because of one simple principle: that the Captain himself understood that if things turned bad, he was the ultimate authority, and he would pay the ultimate price. That understanding meant that the Captain needed to do everything he could, every day, in every way, to guarantee the safety and welfare and competence of the crew.

And so it is today, in more modern times, and in the most modern of organizations. Secretary Wynne and General Moseley are mature adults-as mature as you will ever find, I warrant-and they don't need coddling.

They did their best; their organization did many wonderful things, and will continue to do so as long as we exist, but there was a failure in an area so important that the SECDEF--who also has the same responsibility, at one level higher--decided that severe action was required. So they have resigned with dignity and grace.

Second: What we do is important. This isn't about next quarter's earnings. It's not about whether or not the particular science or engineering project we happen to be interested in-or which we've been working on so hard for months or perhaps years-gets funded next year.

It's about whether or not what we are doing is making the Air Force better able to defend our nation.

Third: Our system is strong. We shall endure this. We will fix what is broken; we will move forward, we will get back to doing great things for the security of our families, our friends, our citizens, and our ideals.

This is the first time in the history of the nation that both the civilian and military leaders of a service have been removed together.

Abraham Lincoln during his tenure fired quite a few generals. It happened again at the beginning of World War II, but this move is frankly unprecedented. And yet, our Air Force has the people, the organization, and the tensile strength that allow us to wake up the next morning and know that life will continue, our mission remains, and our confidence that we can do our jobs does not diminish.

I would submit that it is in tough times like this that we can be most proud of our chosen service.

What I Saw at CORONA Top

I'll preface by saying that the CORONA series are gatherings, three times a year, of the 4-star generals of the Air Force. They also invite some others to attend: 3-star commanders, and some 2-star commanders. If you're a 4-star, you sit at the big table and chime in at will. If you're a 3-star, you can sorta "raise your hand" and be recognized if you have a comment. (We 2-stars generally sit in the back and speak when spoken to!) CORONA Top, the most important of the three conferences, was held here on Thursday and Friday.

Thursday's schedule had been altered a bit as General Moseley would be unable to make the morning session—he had a meeting with the Chairman of the Joint Chiefs of Staff, Adm. Mike Mullen. Secretary Wynne kicked off the meeting with a talk that reminded us that we are all airmen, and that we in that room were "the leadership that we all used to pan when we were Captains and Majors." He talked about discipline, about the need to always take responsibility for our bases, even if we weren't the "base commanders," that we were accountable for our actions. He mentioned the nuclear incidents, and other examples not from our Air Force, that illustrate the importance of being ever-vigilant. We also discussed the concerns that perhaps we have let the lines between senior enlisted and junior enlisted blur, and even perhaps the line between senior enlisted and junior officer. We agreed that, in the military, over-familiarity between the ranks can lead over time to subtle losses of discipline and that while we were not going to over-react, we would all need to call upon our most senior NCOs to help us get things back in line.

In hindsight, I've asked myself if he somehow knew that within just a few hours he would be asked to resign. Knowing how it all played out, I believe he understood the gravity of the report that had been submitted to the SECDEF, but I think he was simply telling us that this business is serious and we would all have to do better in the future.

Late in the morning, during one of the briefings, the Secretary's aide came in to the room and whispered in his ear. He got up out of his seat and left the room. We did not see him again until that evening. The Chief never did make the morning session.

The afternoon session was a 4-star-only meeting. I had planned a separate side meeting with Brig Gen John Hyten, the AFSPC/A5, and with Lt Gen Tom Sheridan, the new Space & Missile Center Commander. Just before going into that meeting, I got a phone call from my office telling me the news was reporting the Secretary and Chief had been asked to resign.

That evening, as at every CORONA Top, was to be the Heraldic Banquet, held at the National Museum of the United States Air Force. At this traditional event, each commander brings a display that represents their command. We sit at one long table, about 50 of us, 25 per side, and dressed in our mess dress

uniforms, we salute the flag, and toast each other, and randomly, one by one we stand sometime during the evening and tell the story of our "heraldic device" (as the display is called) and then propose a toast to our organization, or to the men and women overseas, or to those who have gone before, or whatever one wishes to toast. (Toasts can be deemed "worthy" or "unworthy," so one dares not come unprepared!)

So the Big Question-or, I must say, just one of the many, many Big Questions-was, "Is the Heraldic Banquet still on? Or will we cancel it?"
Needless to say, nobody felt much like celebrating.

Then the word came down: The Heraldic Banquet was still on. And both the Secretary and the Chief would be there!

It began with a group photo in one of the museum hangars. I will not go into all the details of the evening. Suffice it to say that we were all lined up for the group photo, missing only one person, and when the Chief arrived, the entire crowd broke into spontaneous applause. It lasted a long time.

The Chief opened the dinner (after the flag ceremony and invocation) in his usual direct but calmly amusing way. He noted that the day had been interesting, that it had started for him with "a bit of an Administrative burp" (and then he smiled).and then told us that in the big scheme of things, this was a small "blip" in the progress the Air Force had made and would continue to make. He toasted the Secretary, sitting across from him at the center of the long table, and called him the single most engaged and important Secretary in the history of the Air Force since Sep. 18, 1947.

The Secretary then stood up and praised the Chief. (You may not know, but these two have been closer than any Secretary/Chief combination I've seen in my career.) He talked about what an honor it had been to be allowed to work with so many fine people in an organization that was so important to the world.

After that came dinner and one toast after another. Most talked a bit, as tradition required, about their heraldic device; others talked about Hap Arnold, or Billy Mitchell, or about the Japanese bushido warrior ethic (from 5th Air Force, Yokota), or told a story involving the Chief or the Secretary. But always, of course, it came back to toasting the Chief and the Secretary. The stories were alternately about flying, or about OEF or OIF, or about some incident from the past. They were funny or serious or witty or maudlin, sometimes in combination.

Now, the Chief is big on Air Force history. He knows his stuff. And I realized, as the evening progressed, that we were both living a moment of history, and we were recounting, as if channeled by those who have gone before us, the glories and follies of the past. The stories were as big as Doolittle's Raiders and as small as some recollection from a bar in Korea by a general who, as a Captain, had just passed the check-ride given to him that day by Major Moseley.

At one point, it was either Gen Moseley or Secretary Wynne who noted that it isn't the places you are assigned or the jobs you do, but rather the people you have the pleasure to get to know that makes for a wonderful life. And that's when I realized that-for these two men as well as for each of us-it may be the "big history" that entices us to join the Air Force, but it's the "little history"-the personal stories-that keep us in.

And so it went, throughout the night, with much laughter and a few tears, and eventually a general feeling of sad-but-accepting well-being suffused the crowd.

It struck me at one point that there was in fact some larger humor at work, and I mentioned it. People looked at me a bit quizzically, wondering where I could find the humor in the situation we were in at that moment. "Well," I said, "right now this evening, in homes and on bases and in theater, and in Air Force aircraft all over the world, about 690,000 airmen and their families are thinking to themselves: "My goodness, the Air Force has been dealt one shocking blow. Our leadership must be in a total panic, in complete disarray right now." And here we are, folks, banded together and telling stories and recounting our history and as closely knit as I'd bet we have ever been before. As General Moseley has told us, it's going to be all right. Now we need to go out and get that message to our people."

And so I am.

--CMBedke

CURTIS M. BEDKE

Major General, USAF

AFRL Commander

Appendix M – Acronyms and Abbreviations

A38	Integration Office at HQ AMC
A39	Tactics Office at HQ AMC
A4	Logistics Directorate at HQ AMC
A58	Requirements Office at HQ AMC
AATC	ANG and AFRC Test Center
AATTC	Advanced Airlift Tactics Training Center
ABI	Airborne Broadcast Intelligence
ACC	Air Combat Command
ACTS	Air Corps Tactical School
ADCON	Administrative Control
AEF	Aerospace Expeditionary Force (the Air Force deployment concept)
AF	Air Force
AFB	Air Force Base
AFCAP	Air Force Capability Assessment Program
AFDD	Air Force Doctrine Document
AFHSO	Air Force Historical Studies Office
AFI	Air Force Instruction (formally published guidance)
AFPD	Air Force Policy Document
AFRC	Air Force Reserve Command
AFRES	Air Force Reserves (now known as Air Force Reserve Command, or AFRC)
AFSAT	Air Force Security Assistance Training
AFSC	Air Force Specialty Code (identifies an individual’s duty specialty)
AMB	Air Mobility Battlelab
AMC	Air Mobility Command
AMP	Avionics Modernization Program
AMRAAM OUE	Advanced Medium Range Air-to-Air Missile Operational Utility Evaluation
AMWC	Air Mobility Warfare Center
ANG	Air National Guard
ANGRC	Air National Guard Readiness Center (part of the National Guard Bureau)
ANT	Actor Network Theory
ART	AEF Reporting Tool
ASAM	Advanced Study of Air Mobility
ASD(NII)	Assistant Secretary of Defense for Networks and Information Integration
ASTS	Air Service Tactical School
ATO	Air Tasking Order
AWPD-1	Air War Plans Division, Plan-1
BAH	Booz, Allen, Hamilton (Defense contractor)
BE	Budget Estimate
C2	Command and Control

C4ISR	Command, Control, Communications, Computers (C4) Intelligence, Surveillance, and Reconnaissance
CADS	Combat Aerial Delivery School
CAF	Combat Air Forces
CAOC	Combined Air Operations center
CAP	Combat Air Patrol
CFAST	Collaborative Force-Building, Analysis, Sustainment, and Transportation (an IT system for war planning)
CFC	Combined Federal Campaign
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
C-Level	Category Level—overall readiness of the unit to perform its wartime (full-spectrum) mission
COCOM	Combatant Command (e.g., USNORTHCOM)
CONARC	Continental Army
CONOPS	Concept of Operations
CONPLANS	Concept Plans
CoP	Community of Practice
CRADA	Cooperative Research and Development Agreement
CRS	Chairman’s Readiness System
CSAF	Chief of Staff of the Air Force
CSIS	Center for Strategic and International Studies
DAF	Department of the Air Force
DC	District of Columbia
DEXCOM	DRRS Executive Committee
DHS	Department of Homeland Security
DIA	Defense Intelligence Agency
DIO	DRRS Implementation Office
DIRMOBFOR	Director of Mobility Forces
DISA	Defense Information Systems Agency
DJS	Director of the Joint Staff
DMS	Defense Messaging System
DO	Director of Operations
DoD	Department of Defense
DoD-IG	Department of Defense-Inspector General
DoDD	Department of Defense Directive
DRS	DRRS Readiness Specialist
DRU	Direct Reporting Unit
DUSD(R)	Deputy Under Secretary of Defense for Readiness
ECS	Expeditionary Combat Support
E-GSORTS	Expanded-GSORTS
EPT	Engineering Philosophy of Technology
ESORTS	Enhanced Status of Resources and Training System
FA	Functional Areas
FCS	Future Combat System

FECOC	Fighter Electronic Combat Officer Course
FOA	Field Operating Agency
FOC	Full Operational Capability
FORSTAT	Forces Status and Identity Report
FRR	Force Readiness Report
FY	Fiscal Year
GAO	Government Accountability Office
GCCS	Global Command and Control System
GCCS-J	Global Command and Control System-Joint
GEOFILE	Geographic Reference File
GHQ Air Force	General Headquarters Air Force
GNA	Goldwater-Nichols Act, aka the Goldwater-Nichols Department of Defense Reorganization Act of 1986, aka Public Law 99-433
GO	General Officer
GOSC	General/Flag Officer Steering Committee
GPS	Global Positioning System
GS-15	General Schedule-15 (highest non-SES grade for government civilian employees)
GSORTS	Global Status of Resources and Training System
HHQ	Higher Headquarters
HoR	U.S. House of Representatives
HPT	Humanities Philosophy of Technology
HQ	Headquarters
HQ USAF	Headquarters United States Air Force
HUD	Head's Up Display
IDA	Institute for Defense Analysis
IFTU	Intelligence Formal Training Unit
IG	Inspector General
IMA	Individual Mobilization Augmentee
INSS	Institute for National Strategic Studies
Intel	Intelligence
IOC	Initial Operational Capability
IT	Information Technology
JCA	Joint Capability Area
JCCA	Joint Combat Capability Assessment
JCS	Joint Chiefs of Staff
JFP	Joint Force Provider
JMET	Joint Mission Essential Task
JMRR	Joint Monthly Readiness Report
JOPEs	Joint Operations, Planning, and Execution System
JP	Joint Publication
JPADS	Joint Precision Airdrop System
JQRR	Joint Quarterly Readiness Review
JROC	Joint Requirements Oversight Council
JRR	JCS Readiness Report
JS	Joint Staff

JTF	Joint Task Force
JTIMS	Joint Training Information Management System
JV2010	Joint Vision 2010 (vision document from the CJCS)
JV2020	Joint Vision 2020 (vision document from the CJCS)
MAC	Military Airlift Command
MACV	Military Assistance Command-Vietnam
MAF	Mobility Air Forces
MAJCOM	Major Command
MECOC	Mobility Electronic Combat Officer Course
MET	Mission Essential Tasks
METL	Mission Essential Task List
MIA	Missing in Action
MOE	Manpower and Organizational Evaluation
MWS	Mobility Weapons School
NA	National Archives
NAF	Numbered Air Force
NCO	Non-Commissioned Officer
NDAA	National Defense Authorization Act
NDU	National Defense University
NetUSR	Net-centric Unit Status Report
NGB	National Guard Bureau
NGPC	Night Vision Ground Personnel Course
NME	National Military Establishment
NORAD	North America Aerospace Defense Command
NRRS	Navy Readiness Reporting System
NSA	National Security Agency
NSC	National Security Council
NVG	Night Vision Goggle
O-6	The rank for Colonels in the Air Force and Army—one rank below a general officer
OEF	Operation Enduring Freedom
OG	Operations Group
OIF	Operation Iraqi Freedom
OODA	Observe-Orient-Decide-Act
OPCON	Operational Control
OPLANS	Operational Plans
OPM	Office of Personnel Management
OSD	Office of the Secretary of Defense
OUSD	Office of the Under Secretary of Defense
OUSD(P&R)	Office of the Under Secretary of Defense for Personnel & Readiness
P&R	Personnel & Readiness (shorthand for OUSD(P&R))
PA	Public Affairs
PACAF	Pacific Air Force
PAO	Public Affairs Officer
PAR	Performance and Accountability Report
PAS	Personnel Accounting Symbol

PC-ASORTS	Personal Computer-Army SORTS
PCS	Permanent Change of Station (a household move directed by the military)
PCTEF	Percent Effective (used to assess the readiness of a unit to perform their assigned mission)
PFPS	Portable Flight Planning System
PIC	Practical Intelligence Course
PME	Professional Military Education
POM	Program Objective Memorandum
POW	Prisoner of War
PSRT	Shorthand for Personnel (P), Equipment and Supplies On Hand (S), Equipment Condition (R), and Training (T), the standard areas measured for readiness reporting
QRRC	Quarterly Readiness Report to Congress
RA	Readiness Assessment
RAND	Research And Development
RAS-IT	Readiness Assessment System-Input Tool (part of GSORTS)
RAS-OT	Readiness Assessment System-Output Tool (part of GSORTS)
RMA	Revolution in Military Affairs
ROE	Rules of Engagement
ROTC	Reserve Officer Training Corps
RP&A	Readiness Programming & Assessment
SAC	Strategic Air Command
SAF	Secretary of the Air Force
SASC	Senate Armed Services Committee
SCIF	Sensitive Compartmented Information Facility
SCOT	Social Construction of Technology
SECAF	Secretary of the Air Force
Senate	U.S. Senate
SES	Senior Executive Service (civilian government employees that are general officer equivalents).
SIPRNET	Secure Internet Protocol Router Network
SITREPS	Situation Reports
SOAR	Special Operations Aerial Refueling
SOF	Special Operations Forces
SORTS	Status of Resources and Training System
SPAWAR	Space and Naval Systems Warfare Command
SPO	Special Program Office
SROC	Senior Readiness Oversight Council
ST&E	Security Testing & Evaluation
Stan/Eval	Standardization/Evaluation
STS	Science and Technology Studies
T2	Training Transformation
TABS	Tactical Analysis Bulletin System
TAC	Tactical Air Command

TAC PACERS	Tactical Air Command (TAC) Peacetime Assessment of Combat Readiness of Repairable Spares (PACERS)
TAG	Tactical Airlift Group
TE	Test and Evaluation
TES	Test and Evaluation Squadron
TIPs	Tactics Improvement Proposals
TOIC	Top-Off Intelligence Course
TRB	Tactics Review Board
TRMS	Type Commander (TYCOM) Readiness Management System
TTPs	Tactics, Techniques, and Procedures (“best practices” for a community)
TUCHA	Type Unit Code
U.S.	United States
UAVs	Unmanned Aerial Vehicles
UCMJ	Uniform Code of Military Justice (the “law” for military members)
UCMS	Unit Capability Measurement System
UDC	Unit Descriptor Code
UIC	Unit Identification Code (a “social security number” for DoD organizations)
UNITREP	Unit Status and Identity Report
USAF	United States Air Force
USAF EC	U.S. Air Force Expeditionary Center
USAFE	United States Air Forces Europe
USC	United States Code
USD(P&R)	Under Secretary of Defense for Personnel & Readiness
USG	United States Government
USJFCOM	U.S. Joint Forces Command
USNORTHCOM	U.S. Northern Command
USSOCOM	U.S. Special Operations Command
USSOUTHCOM	U.S. Southern Command
USSR	Union of Soviet Socialist Republics
USTRANSCOM	U.S. Transportation Command
USWD	United States War Department
UTC	Unit Type Code
VECTS	Virtual Electronic Combat Training System
VTRAT	Visual Threat Recognition and Avoidance Training
WDGS	War Department General Staff
WIC	Weapon Instructor Course
WSMIS	Weapon System Management Information System
WWI	World War I
WWII	World War II
WWMCCS	World Wide Military Command and Control System

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