

Toward Omniscient Command: How to Lead in the Information Age

**A Monograph
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Abstract

TOWARD OMNISCIENT COMMAND: HOW TO LEAD IN THE INFORMATION AGE by
Lieutenant Colonel William P. Jensen, USAF, 68 pages.

This study examines information age leadership in the United States armed forces. The intent is to develop specific skills that will enhance future military operations in the information age. The study will investigate a number of issues with regard to information age leadership: historical background, its nature and dynamics, significant factors, and doctrine covering information management and leadership. This multi-pronged approach will serve as the catalyst to a better understanding of information age leadership and the development of applicable skills.

The study will open with a historical perspective of selected wars spanning the history of humankind. The following conflicts will be analyzed in terms of leadership: Peloponnesian Wars, Napoleonic Warfare, the American Civil War, World War II, and Operation Allied Force. The analysis and resulting factors will focus primarily on how commanders received and used information, and how it affected their leadership. These resulting factors will be analyzed to determine information age leadership skills.

The study will then conduct a review and analysis of joint and service-specific leadership doctrine. Through this review, the study will examine what the military's doctrinal position is on leadership and information management. This step will also evaluate current doctrine as compared to the previously identified information age leadership skills to discover current leadership skill shortfalls. The study will also place these leadership skills into the context of the Joint Operating Environment (JOE) to determine how these skills will answer the challenges of our anticipated dynamic combat environment.

The study concludes with an extended description of those leadership skills required to lead effectively in the information age. This will include a discussion on the advantages and challenges of leading in the information age. The United States armed forces must develop new leadership doctrine that reflects the skills needed to dominate adversaries in the information age.

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Part I

INTRODUCTION

Leadership: The Ultimate Force Multiplier

Everything ... everything ... everything comes down to leadership. Every action, every reaction; each decision, any indecision; ultimately, every success and failure is the result of a decision made by a leader. Advanced technology, sophisticated employment tactics, and the latest doctrine are useless without experienced, well-trained commanders who can harness these force multipliers, dominate the battlefield, and lead their forces to victory.¹ In fact, leadership is the ultimate force multiplier because it directs or enables all other aspects of warfare to perform at their maximum capacity.² This salient truth, however, may be losing ground in our high-speed, data-saturated age of information.

The military's focus on leadership seems to have deteriorated over the last thirty years as the armed forces entered the information age and became increasingly enamored with the latest technology and advanced weaponry. Long gone are the days when we looked to the commanders, those who led vast armies and campaigns, as the primary reason for victory. Credit for victory now goes principally to the weapon, precision guided munition, or computer system which delivers measurable, media-friendly results. During the Vietnam War, General William C. Westmoreland, then the commander of Military Assistance Command Vietnam, provided us with what is perhaps the best example of the military's focus on technology. When asked how he

¹ The apparent over emphasis on leadership is intentional and purposeful. The author seeks to re-focus the thoughts of military minds on that which will provide the most leverage in any information-dependent situation. That said, the author does not fail to understand the tremendous value of both tangible assets (M1A1 Abrams Tank, RC-135 Rivet Joint, et cetera) and intangible assets (morale, camaraderie, et cetera).

² For the purposes of this monograph, the terms "leader," "leadership," "command," and "commanders" will be used interchangeably to reflect those members of the military chain of command at the operational level and above who are charged with prosecuting war. In short, the focus will be on senior leadership (defined as the rank of Colonel and above).

planned to win the war his simple response was, “firepower.”³ To expand on this one-word reply, General Westmoreland clearly expected victory to come to the combatant with the most advanced weapons and who could destroy more of the other side’s warfighting capability. This quote, intentionally chosen from the dawn of the information age, represents what many defense industry intellectuals and well trained, experienced military officers believe: Firepower = Technology = Victory. In other words, modern firepower is derived from advanced technology which can ensure victory. It must be understood that firepower has historically taken many forms of weaponry, from infantry, to artillery, to battleships, to submarine launched ballistic missiles, to air and space power. This monograph will show, however, that modern technology is providing the military with a new method of firepower. What is this latest high-tech weapon of choice? Information.

Whether collected from space-based systems or “air breathing” assets, information is a primary focus of many military leaders and academics.⁴ The ability to collect, manage, and use information promises advantage, leverage and mastery of warfare, all of which are perhaps best summarized by “dominate battlespace knowledge” (DBK).⁵ DBK is one of several terms used by current writers both in and out of the military to describe a new level of gathering, analyzing, and exploiting information. It is important for the reader to understand DBK represents the use of information on both the friendly and enemy sides of the battlefield. Specifically, DBK is the advanced use of information for both dominating the enemy with superior understanding of his actions and intentions while also orchestrating the efforts of friendly forces with sophisticated

³ Andrew F. Krepinevich Jr., *The Army in Vietnam* (Baltimore, MD: The Johns Hopkins University Press, 1988), 197.

⁴ “Air breathing” assets are those which operate on or near the surface of the earth, to include Unmanned Aerial Vehicles (UAV).

⁵ Martin C. Libicki and Stuart E. Johnson, *Dominate Battlespace Knowledge* (Washington, D.C.: National Defense University Press, 1995), 4-5.

command, control, communications, computer applications, information and intelligence (C4I2).⁶ The conduit to DBK is information technology (IT), a term which represents the actual equipment that provides the modern commander with virtually every collectable piece of data he needs to execute the war. IT has developed at a blinding rate in its ability to provide a seemingly limitless depth and breadth of information; paralleling this phenomenal development of IT is the corresponding insatiable hunger for more information.

At its essence, the current penchant for information seeks to satisfy the desire for omniscience. Omniscience is infinite, total knowledge.⁷ It is the ability to *know and understand* everything there is to know, at the instant it can be known. To put the term in appropriate perspective, omniscience is most often used when describing an attribute of God. Although omniscience is not humanly attainable, this monograph has intentionally, but cautiously, used the term in the first half of the title to emphasize the tremendous focus given to information in current military thinking. The second half of the title provides the reader with what the author believes is the key vehicle, the primary solution, and the clear path toward omniscience: Information Age Leadership.

The pathway to greater, more efficient, and appropriate use of information comes not from the information itself or the IT used to collect and process it, but from the ultimate force multiplier: leadership. Specifically, a more current, information age-based perspective on leadership can help commanders maximize the use of information while limiting the potential pitfalls.

⁶ This definition is provided by Admiral William A. Owens, USN, Vice Chairman, Joint Chiefs of Staff in his introduction to *Dominate Battlespace Knowledge*, edited by Stuart E. Johnson and Martin C. Libicki (Washington, D.C.: National Defense University Press, 1995), 4-5.

⁷ As defined by Dictionary.com at <http://dictionary.reference.com/search?q=omniscience>, on October 16, 2004. It is important to understand that omniscience, as defined, cannot be achieved. This point will be expanded later in the monograph.

Purpose and Research Methodology

The purpose of this monograph is to provide an in-depth study of information age leadership; from this study, the monograph will develop specific skills that will enhance future military operations in the information age. The aim is to produce a monograph that is both practical and applicable; one that can be used by current commanders as they wrestle with the demands of leading in our information-centric world. The monograph will investigate a number of issues with regard to information age leadership: historical background, its nature and dynamics, significant factors, and doctrine covering information management and leadership. This multi-pronged approach will serve as the catalyst to a better understanding of information age leadership and the development of applicable skills.

The monograph will open with a historical perspective of selected wars spanning the history of mankind. The following conflicts will be analyzed: Peloponnesian Wars, Napoleonic Warfare, the American Civil War, World War II, and Operation Allied Force.⁸ The purpose of historical analysis is to determine the nature and dynamics of leadership from antiquity to the information age, and to identify the most significant factors affecting information age leadership. It is important to note that the analysis and resulting factors will focus primarily on how commanders received and used information, and how it affected their leadership. These resulting factors will be analyzed to determine information age leadership skills.

Next, the monograph will conduct a review and analysis of joint and service-specific leadership doctrine. Note that some doctrine currently does not specifically address information age leadership nor are such terms used. Rather, Command and Control (C2) doctrine is used to address how commanders manage information. Through this review, the author will examine what the military's doctrinal position is on leadership and information management. This step

⁸ The term "Napoleonic Warfare" will be used to collectively represent the numerous campaigns conducted by Napoleon.

will also evaluate current doctrine as compared to the information age leadership skills identified in Part II to discover current leadership skill shortfalls. The author will also place these leadership skills derived from historical analysis into the context of the Joint Operating Environment (JOE) for the purpose of determining how these skills will answer the challenges of our anticipated dynamic combat environment.

The final step is to present those leadership skills required to lead effectively in the information age. These skills will address the nature and dynamics of information age leadership as discussed in Part II, Historical Perspective and Analysis. Additionally, these skills will demonstrate consideration for the significant factors affecting information age leadership which are also discussed in Part II. Lastly, the monograph will include a discussion on the advantages and challenges of leading in the information age. Again, the intent is to present a monograph that is both practical and applicable; one that provides leaders with skills they can use to bring clarity and control to a world saturated by information.

Definitions and Explanations

Before examining the historical aspects of this issue, some clarifications and definitions are necessary. Although leadership is defined in many ways, this monograph uses the doctrinal definition provided by the U.S. Air Force: “leadership is the art and science of influencing and directing people to accomplish the assigned mission.”⁹ This definition succinctly explains what it means to lead. Regarding the use of the word leadership, every effort will be made to ensure contextual clarity in differentiating between the concept of leadership, the act of leading, and those who lead.

The terms “information age” and “age of information” will be used interchangeably to describe our current era. The author also accepts the terms “technology revolution” and

⁹ U.S. Department of the Air Force. *Air Force Doctrine Document 1-1, Leadership and Force Development* (Washington, D.C.: Headquarters, Department of the Air Force, 18 Mar 2004), 4-5.

“information revolution” as describing the same current period. Although many writers generally use all of these terms interchangeably, fewer agree on when the information age began. Thus, the author has chosen the following definition of information age: “the period beginning around 1970 and noted for the abundant publication, consumption, and manipulation of information, especially by computers and computer networks.”¹⁰ With these definitions and explanations outlined, the monograph will proceed with the historical perspective and analysis.

Part II

HISTORICAL PERSPECTIVE AND ANALYSIS

Congressman Ike Skelton, the ranking Democrat on the House Armed Services Committee, has written an insightful essay on the value of history entitled, “Whispers of Warriors: The Importance of History to the Military Professional.” The Congressman’s article highlights the importance of Part II by reminding the reader that the, “serious study of history is essential to the development of exceptional military professionals.”¹¹ With this vision at the forefront of our thoughts, the monograph will examine the use and relevance of information to past military leaders.

As stated, the intent of this historical review is to examine how leaders received information, how they used the information, and how this affected the way they led. As such, this historical analysis is not meant as an exhaustive study, but as a general survey with a specific and deliberate focus on information and leadership. The monograph will cover six particular conflicts; each represents the technological era in which it was fought. More specifically, the author chose historical conflicts which represent the key technological eras in which the use of information differed from the previous and subsequent time periods. The eras represented are

¹⁰ As defined by Dictionary.com at <http://dictionary.reference.com/search?q=information%20age> on October 16, 2004.

¹¹ This document was presented to the School of Advanced Military Studies students of Seminar 1 by COL Bruce Reider, Seminar Leader, in September 2004. The draft document did not contain information regarding publisher or date.

antiquity, early industrial age, middle industrial age, late industrial age, and information age.¹² It is through these conflicts and their respective ages, that the author will highlight and then analyze the historical relationship between information and leadership.

Antiquity – The Peloponnesian Wars

Peloponnesus, the peninsula on which ancient Sparta was located, provides us with the origin in both name and location of the Peloponnesian Wars.¹³ It is where much of the fighting and dying, winning and losing occurred in the twenty-seven year-long string of battles between Athens and Sparta. These battles, represented collectively as the Peloponnesian Wars (431-404 BC), are situated on the opposite end of the spectrum from the information age with regard to technology and information management.

In antiquity, everything regarding the collection, handling, and use of information was based on people. These warriors of the past had virtually no means of managing information beyond the limited human ability to see, hear, remember, and communicate. With the occasional exceptions of written messages, signals (reflective, smoke, fire) and other man-made physical means of communication, every piece of information was transported by word of mouth.¹⁴ Although this method of handling information seems simplistic by today's standards of high-speed Internet and wireless communications, it should not leave the impression that the gathering, use, and need for information was limited.

According to Thucydides, the primary historian of the Peloponnesian Wars, leaders relied heavily on a people-based communication system which had multiple avenues of access to information based on the various roles of the people involved in the system. He uses a rich

¹² These eras are for the purposes of this monograph only and are used by the monograph to define specific periods that are of unique interest to this topic. They are used to designate discrete periods of time in the development of information management technology.

¹³ Thucydides, *The Landmark Thucydides, A Comprehensive Guide to the Peloponnesian War*, edited by Robert B. Stressler (New York: Simon and Schuster, 1998), 5.

¹⁴ Geoffrey Parker, ed., *The Cambridge Illustrated History of Warfare* (New York: Cambridge University Press, 2000), 29.

vocabulary to describe the diverse ways in which information was received and used, such as messenger, envoy, news, intelligence, signals, cavalry, reconnaissance, observation, letters, and beacon signals. There is even the interesting description of the intentional use of disinformation to either dissuade or confuse the enemy.¹⁵ This multi-role system was described extensively throughout Thucydides' work and provides some understanding of the tremendous value information played in the conduct of warfare. No different than today's leaders, the commanders of antiquity sought information in order to understand the enemy's size, location, and intentions.¹⁶ This human-based system of information management may seem painfully limited given its position in the pre-electric age of antiquity; however, further consideration reveals some key insights on the use of information and its impact on leadership.

Perhaps the two greatest impacts the almost exclusively people-based communication system had on leadership were time and subjectivity. Time is a non-renewable resource; in the realm of information management, the value of time is measured by what you know *and* when you know it. The leaders of antiquity certainly must have struggled with the limits imposed by time, just as modern commanders do. However, there is an additional time-related factor born out of the people-based system. Specifically, information moved very slowly. Although information may have moved relatively rapidly by sea and horseback as compared to a foot-born messenger, the undeniable physics of gravity and friction denied decision-makers rapid information transfer. This slow pace could serve or hinder a commander.

If a leader could conceal his movement or mask his intentions, he would provide his opponent with very little time to react. With such an inherently delayed communication system, unsuspecting leaders would be left with significantly limited reaction time.¹⁷ Unless carried by horse, the foot-borne news of the approaching enemy might arrive at a moment that would not

¹⁵ Thucydides, 6.

¹⁶ Ibid., 3-4.

¹⁷ Reference Xenophan, *Cyropoedia, Vol I* (Cambridge: Harvard University Press, 1960), 281-282 for an interesting account of ancient efforts to maneuver while undetected by the enemy encampment.

allow time for forces to react. Conversely, if a leader chose to send an envoy to his opponent to communicate his intention to wage war, the slow communication may actually provide more time to prepare for battle since envoys and messengers who travel by foot could take several days to notify an opposing city.¹⁸ This would allow the commander time to think, plan, and act; in short, timeliness mattered. In addition to its impact on time, subjectivity was greatly affected by the people-based system.

An information system based on word-of-mouth suffers from a lack of objectivity. Leaders did not have the luxury of an objective photograph or radar signal which could not be distorted, exaggerated or confused by human handling. Opinion, judgment, bias, deception and fear all affected the information commanders received. Thucydides expressed this when he said, “so little pains do the vulgar take in the investigation of truth, accepting readily the first story that comes to hand.”¹⁹ Thucydides highlights the need to re-check facts and establish the accuracy of a message. This inherent distrust of information, then, is nothing new. The leaders of antiquity, however, had the magnifying effect that *all* information, and therefore, the decisions based upon it, was flawed to some degree due to the people-based communication system. Although time and subjectivity would continue to vex commanders, the following section examines how Napoleon maximized the structure and efficiency of the people-based system.

Early Industrial Revolution – Napoleonic Warfare

The Napoleonic era represents the period beginning with Napoleon’s coup d’etat in 1799 and ending with his loss at Waterloo in 1815.²⁰ In this relatively brief period of time Napoleon managed to dominate virtually all of Europe. Many of the methods and weapons of warfare from

¹⁸ For example, the route between Athens and Sparta is more than 100 miles and traverses relatively rough terrain.

¹⁹ Thucydides, 1.

²⁰ Parker, 207-208.

antiquity had changed by the Napoleonic era, but little had changed in the means by which leaders communicated. Relying on essentially the same methods of a people-based communication system, Napoleon pushed information management to its “technological” limit.²¹ This point highlights the author’s rationale for including the Napoleonic era in this historical study. Concisely put, “Napoleon, it will be remembered, was able to revolutionize war by employing organizational and procedural means in order to overcome and transcend the limits imposed by the technology of the time.”²²

Although Napoleon received information from a people-based system, the sources, and the speed at which it moved, had improved. Napoleon and his planners had many books and maps at their disposal which they could use to study and understand a culture and landmass.²³ He also had newspapers, spies, agents, and many of the same roles found in the people-based system described in the age of antiquity above. Regarding speed of information movement, the system had improved measurably. Because of roads, canals, and the royal mail service, information traveled, “by Napoleon’s own estimate, about twice as fast as in Caesar’s day.”²⁴ It is in this improved speed and infrastructure that we see the catalyst for Napoleon’s greatest contributions to information management: span of control and organization.

Napoleon relied primarily on messengers who rode on horseback and carried written orders. This system, coupled with the superior infrastructure, enhanced Napoleon’s ability to exercise command and control (C2) over his forces. The improved road system allowed greater use of horses, it increased access to his forces, and it extended the range to which he could move his troops. This greater mobility of C2 assets significantly increased Napoleon’s span of control

²¹ Martin van Creveld, *Command in War* (Cambridge, Massachusetts: Harvard University Press, 1985), 60, 71.

²² Ibid., 191.

²³ Cartography, based on triangulation had significantly improved the scale and accuracy of detail in map making. See van Creveld, *Command in War*, pg. 60, for an expanded description of the advances in cartography since 1700. It is also important to note that this may very well have been the first use of objective intelligence by a commander. The information was produced by way of technical measurements, not subjective human handling. Additional details regarding intelligence collection were found on pg. 19.

²⁴ van Creveld, *Command in War*, 60.

and allowed him to enter campaigns with larger formations. These formations consisted of “an army [of] 150,000 strong organized into eight numbered corps, each containing units of all arms...” and were, “new and unprecedented.”²⁵ Through his extended span of control, Napoleon would manipulate corps formations (consisting of 20-30,000 men) in a relatively timely manner in response to his personal observations and messages. This point is significant when one considers that in an era when militaries enjoyed few technological advantages over each other, Napoleon was able to overwhelm his enemies with sheer size and maneuver.²⁶ With this greater size and mobility came the need for improved organization.

Napoleon answered the need for organization through his staff, the Imperial Headquarters. The staff numbered in the thousands and was comprised of three parts, Maison, General Staff, and Administrative Headquarters. The detailed content of the headquarters is less relevant than the fact that every branch played a part in collecting, analyzing and providing information to Napoleon. His intelligence system was, “organized on a massive scale” with a multitude of missions; a sampling proves enlightening: “newspapers were systematically collected and translated, spies and agents were planted in every important city, coded messages were passed through the imperial mail system,” non-secure mail was opened and read, soldiers were placed on farms as peasant workers, “long-range strategic enemy intelligence (does the emperor of Austria intend to go to war? If so, what will the king of Prussia do?).”²⁷ Even this small sample gives tremendous insight into the depth and breadth of his sophisticated and well-organized system designed specifically to manage information. While Napoleon maximized the structure and efficiency of the people-based communication system through his superior span of control and organization, the American Civil War would usher in a new age of information management based on new technology.

²⁵ Ibid.

²⁶ James J. Schnider, *The Theory of Operational Art* (Fort Leavenworth, KS: U.S. Army Command and General Staff College, School of Advanced Military Studies, 1998) 10-12.

²⁷ van Creveld, *Command in War*, 66-67.

Middle Industrial Revolution – The American Civil War

Mid-nineteenth century American was one of constant societal and technological change. At the vanguard of these changes were the advances and innovations made through the Industrial Revolution and the accelerated desire for technology brought by the Civil War. The Industrial Revolution ushered in radical modifications in the way people lived, worked, and fought. Although the origin of the industrial Revolution pre-dates the Napolianic era, it did not gain momentum in the United States until the 18th century.²⁸ Once established, the revolution witnessed extensive mechanization of production systems and countless new inventions. Technological developments were brought about through, “steam power, mass production through the factory system, and discoveries in metallurgy, chemistry, and physics.”²⁹ These technological advances, coupled with the Civil War, made for a costly marriage that shed more American blood than any other war. Of the many advances which affected the conduct of the war, the two that factor most prominently in information management were the steam railroad and the telegraph.

Railroads had never been used before in war; however, the Civil War armies quickly demonstrated how steam locomotives could rapidly transport people, supplies, and information. One author noted, “the steam locomotive marked the greatest revolution in land transportation since the invention of the wheel.”³⁰ The steam engine, although unreliable by today’s standards, was considered more dependable than many draft animals and it did not consume fuel when not in use. Also indicative of technology’s advantage over animals, trains could be modified to meet

²⁸ There is some disagreement on the exact date and cause of the Industrial Revolution; however, a general consensus is 1750-1800. Some historians believe the revolution was the result of societal changes caused by the end of feudalism in Great Britain, as described at http://en.wikipedia.org/wiki/Industrial_Revolution on December 9, 2004.

²⁹ Larry H. Addington, *The Patterns of War Since Eighteenth Century* (Bloomington, IN: Indiana University Press, 1994), 48.

³⁰ Ibid., 48.

the specific military demands of speed, load capacity and geography.³¹ While many writers focus on the movement of personnel and supplies to the front, information was also carried at a significantly greater speed. The comparatively rapid speed of trains “put an end to local times, and led to the synchronization of clocks first on a national level, and then on a global basis.”³² While the train represents the fastest rate at which information would be *carried*; it was eclipsed, however, in speed and communications value by the telegraph.

The electric telegraph was pioneered in the late eighteenth century and had evolved into a transcontinental system in the United States by 1861.³³ Although the Civil War was not the first conflict to use the telegraph for communications, its extensive scale was unprecedented. At the conclusion of the war in 1865, the Union army’s military telegraph lines covered an amazing “15,000 miles and handled over 6 million messages.”³⁴ The telegraph also led to the creation of the U.S. Military Telegraph Corps (eventually taken over by the U.S. Army Signal Corps) and the first commissioned officer responsible for electronic communications.³⁵ Unfortunately, the telegraph was not well suited for tactical level use due to its immobility. This immobility was overshadowed by what is perhaps most significant about the electric telegraph; it represents the first time information was not *transported*. As a result, the telegraph could transmit information essentially instantaneously. There was no longer a need to wait for trains or messengers on horseback. It provided rapid, far-reaching communications to the commanders in the field. For the first time in the American military, strategic communications could be sent over hundreds of

³¹ Christopher R. Gabel, *Railroad Generalship: Foundations of Civil War Strategy* (Fort Leavenworth, KS: U.S. Army Command and General Staff College, Combat Studies Institute, 1997), 3-4.

³² Martin van Creveld, *Technology and War from 2000 B.C. to the Present* (New York: The Free Press, 1989), 157.

³³ Lewis Coe, *The Telegraph, A History of Morse’s Invention and Its Predecessors in the United States* (Jefferson, North Carolina: McFarland & Company, Inc., 1993), 15, 44.

³⁴ *Ibid.*, 61.

³⁵ Anson Stager played a pivotal role in the U.S. military’s early use of the telegraph. He was commissioned a Colonel and was eventually a brevet Brigadier General. See Irwin Lebow, *Information Highways and Byways: From the Telegraph to the 21st Century* (Piscataway, New Jersey: IEEE Press, 1995), 27.

miles from the president to his generals.³⁶ It represents the genesis of electric communication systems that are unhindered by time, geography, friction, and transportation. The steam locomotive and the telegraph played a significant role in marking the Civil War as arguably the first modern war; however, their true value lies not in their capability, but in what they represented to information management and leadership.

As significant as the train and telegraph were to the conduct of the Civil War, they merely represent the establishment of what have become dominant factors in modern information management: technology and one of its many offspring, electric communication systems. This war represents a time in American military history where commanders began to see the value in man-made devices that could help them better collect, process and send information. It improved their ability to lead because they could, for example, more rapidly gather intelligence and quickly exercise command of larger forces. It is here that we see, perhaps, the origin of modern man's fascination with technology and his desire to use electronic tools to better understand and control the battlefield.³⁷

As a final thought on the Civil War, it should be noted that this war acts as a bridge between eras. It is revealing that this monograph's emphasis on information management has shifted from people (the Peloponnesians and Napoleon) to technology (the train and telegraph). The people-based system from antiquity was still in use with many of the refinements found in the Napoleonic era, however, technology was bringing inventions into use that were slowly replacing this inefficient system with faster modern systems. For this complete transition to occur, however, we must turn to World War II.

³⁶ Coe, 51.

³⁷ The true origins of man's fascination with technology is found during the dawn of time when man first created hand-fashioned tools that could be used to make common tasks easier. Technology is simply the latest stage in man's ability to create tools to help him adapt to his environment.

Late Industrial Revolution – World War II

Since the signing of the treaty between Union and Confederate forces in the Appomattox Court House, much had changed in America by 1941. In that time, the nation witnessed the abolition of slavery, the birth of aviation, a sobering world war, woman's suffrage and a protracted economic depression. Yet, underpinning these changes and turmoil was the seemingly unstoppable force of progress driven by the industrial revolution.

The industrial revolution was in full stride on the eve of World War II with numerous new inventions that had enhanced information management. For example: the telephone, wireless radio, television, the aircraft and helicopter, sonar and radar, photography and motion pictures, encryption devices, and gasoline-powered engines. This short list contains a sampling of the new advanced weapons of warfare that were used to collect, transport, manage, process, transmit and receive information.

In the same way that Napoleonic warfare represents the zenith of the people-based C2 system, WWII represents the very best in industrial age C2. Simply put, World War II represents the pinnacle in industrial age warfare. As with the author's review of the Civil War, this monograph looks not to the people, but the technology that made the greatest impact on the way leaders received and used information. Of the many advances which affected information management, two that factor prominently in leadership were wireless communications and aircraft.

The final stage of the 1899 America's Cup sailing competition served as the unlikely stage for Guglielmo Marconi to demonstrate wireless technology.³⁸ Hired by a newspaper to transmit the race results, Marconi's historic feat was indeed the real news item of the day. The "wireless," as it was known prior to the later adopted French term "radio," would soon eclipse

³⁸ Lebow, 61, 67.

Morse's telegraph and ultimately "alter the face of the world as had no other invention before it."³⁹

By the time the Japanese bombed Pearl Harbor in 1941, wireless radio had evolved into a two-way communication device that commanders at all levels could use for C2. During the interwar years, the radio had developed into a "robust, simple to operate, and portable" device with technical improvements that opened a wide spectrum of frequencies.⁴⁰ Radio gave the military something it had always wanted: a means to communicate that could reach from any location to any other location regardless of weather, geography, distance, or movement.⁴¹

Capturing the varied capabilities of both short-wave and long-wave radio signals, the military was able to vary their means of communication to suit both tactical and strategic use.⁴² The radio was placed on virtually everything that moved from vehicles, tanks, and ships to the backs of infantrymen. Used extensively for direct military purposes such as message traffic, weather reports, and spotting artillery and naval gunfire, it also opened doors to information operations and improved morale. The impact of radio on the modern military is immeasurable; however, the development of the aircraft added an entirely new dimension to information collection.

As with the radio, the aircraft had evolved significantly by the time the first shots were fired in World War II. The Wright brothers had introduced the world to powered flight nearly forty years earlier when they launched the Wright Flyer from the dunes of Kitty Hawk, North Carolina. With the aircraft came numerous capabilities: air superiority, air defense, strategic bombing, close air support, airlift, reconnaissance and observation. It is in these last two roles that we find the greatest impact on information management.

³⁹ Ibid., 67-68.

⁴⁰ van Creveld, *Technology and War*, 191-192.

⁴¹ Ibid., 160.

⁴² Lebow, 90.

Aerial reconnaissance, to include aircrew visual reports, still photography and motion pictures, provided commanders first-hand information on weather conditions, enemy positions and capabilities, troop strength, and battle damage assessment.⁴³ To meet the growing and varied need for intelligence, the U.S. Army pressed into service no less than 17 different aircraft models. Ranging in size from the relatively small P-51 Mustang (for tactical collection) to large bomber platforms such as the B-29 Super Fortress (for strategic collection), the aircraft's inherent speed and flexibility allowed the commander to enter enemy territory with a better "picture" of the battlefield.⁴⁴

Aircraft and photography also came together to provide commanders and aircrews with better targeting through the development of photomapping. Used to create perspective and landfill identification, photomapping provided a better understanding and analysis of a specific target area.⁴⁵ As with the steam locomotive and the telegraph from the Civil War, the true value of wireless communication and aircraft in World War II lies not only in their capability, but also in the way they changed information management and leadership.

Wireless technology provided the industrial age military with rapid and mobile communications that allowed commanders to send and receive information on a scale never seen before. The commander and his units were freed from any kind of communication tether; gone forever were the days of couriers and wires. Freedom of movement was the standard and for the leadership this meant greater span of control, larger formations, and a greater opportunity to maneuver *with* his forces. Radios allowed commanders to not only quickly maneuver their units in response to the needs of the moment, but they also provided him with "live" reports from the front lines. By its design, wireless communications provided fluid information flow that was

⁴³ Roy M. Stanley II, *World War II Photo Intelligence* (New York: Charles Scribner's Sons, 1981), 29, 298, and 315.

⁴⁴ *Ibid.*, 80, 90, 96.

⁴⁵ John F. Kreis, *Piercing the Fog* (Bolling Air Force Base, Washington, D.C.: Air Force History and Museums Program, 1996), 135-136.

unhindered by the immobility of previous communication systems. Wireless communications were invaluable to World War II commanders; this technology, combined with the aircraft, allowed the commander to see and control the battlefield in an entirely new way.

As stated, the aircraft was not a new phenomenon to the military in World War II. What was new were the scale and the various inventive roles it played in intelligence collection. Although wireless technology had significantly increased a commander's span of control and force size, photo-reconnaissance allowed him to once again see the entire battlefield. Millions of photographs were taken in World War II to help commanders understand what the enemy was doing and what his forces were doing to the enemy. Aerial photo-reconnaissance also provided something lacking in information management since antiquity: objectivity. Although HUMINT (human intelligence) was still used extensively, photo-reconnaissance provided information that had not been biased by human handling.⁴⁶ That is not to say that analysts did not misinterpret intelligence, for that certainly did occur;⁴⁷ however, a commander could look at photographs and make his own decisions without bias from other people. It was the dawn of an era when raw data and intelligence would soon take center stage in the business of information management. While World War II represents the pinnacle in industrial age warfare, it would soon be replaced by the end of the century with a new era where information and warfare were fused.

Early Information Age – Operation Allied Force

As the twentieth century was drawing to a close, the information revolution (some would say information explosion) was in overdrive. The world was witnessing the rising dawn of the information age. The global community, as it became known, was experiencing a phenomenal evolution in information, communications, and technological developments reflected in a wide

⁴⁶ Note that people were responsible for interpreting and analyzing the photos, however, the pictures in and of themselves represented pure, unbiased "facts" which could reveal a significant amount of information about the enemy.

⁴⁷ Stanley, 333-335.

spectrum of innovations: personal computers, the Internet, cellular and satellite phones, the global positioning system (GPS), cable and satellite television, and ever-smaller personal electronic devices. In the military realm, new equipment such as night vision goggles, video teleconferencing (VTC), cruise missiles, Unmanned Aerial Vehicles (UAVs), precision guided munitions (PGMs), and a full array of space-based communication and reconnaissance assets came into use. This multitude of advances came to the forefront of modern war in the historically contentious Balkans.

As a contrasting backdrop to modern war, the centuries-old ethnic and cultural conflict in the Federal Republic of Yugoslavia once again came to a head in the Kosovo province of Serbia. In March of 1998, the Yugoslav president, Slobodan Milosevic, launched a series of attacks on the Kosovar people to stem the growing insurgent movement.⁴⁸ The attacks were viewed by the world as an excessive use of force and ethnic cleansing. A year later, on March 24, 1999, The North Atlantic Treaty Organization (NATO) launched air strikes, known as Operation Allied Force (OAF), into Serbia to “halt and reverse the human rights abuses.”⁴⁹ Of the many new tools used by OAF, two stand out as significant in their impact on information management: the Command, Control, Communications, Computers, Intelligence and Information (C4I2) system, and PGMs.

C4I2 represents the massive, detailed, and complex system of systems that commanders use to lead their forces in combat. As the acronym implies, it is composed of an expansive suite of interconnected ground and space-based communications, VTCs, Secret Internet Protocol Router Network (SIPRNET), countless computers, classified electronic mail, air and space-based intelligence collection, HUMINT, Signals Intelligence (SIGINT), and Electronic Intelligence

⁴⁸ United States General Accounting Office, Report to Congressional Requesters, *Kosovo Air Operation, Need to Maintain Alliance Cohesion Resulted in Doctrinal Departures* (Washington, D.C.: General Accounting Office, 2001), 18.

⁴⁹ Benjamin S. Lambeth, *NATO's Air War for Kosovo, A Strategic and Operational Assessment*. (Santa Monica, California: RAND, 2001), xiii.

(ELINT). It served as the modern day equivalent of the commander's eyes and ears. It can be said that C4I2 also served as the commander's "boots" because he did not need to complete a terrain walk or survey the battlefield personally. In the information age, nearly everything about the combat area was brought to the commander. The C4I2 system in OAF was a powerful tool for information management of structure, but the decisions made through C4I2 were acted out with PGMs.

First generation PGMs saw initial use in the latter stages of Vietnam in the form of laser-guided bombs; however, "smart bombs" did not come into development until the advent of the microchip. Second generation PGMs continued to use lasers, but added precision guidance (typically in the form of an inertial navigation system) to continue their refinement in targeting accuracy. These weapons captured the media's attention when they seemed to come of age during Operation Desert Storm. Note that both first and second generation PGMs required clear weather to ensure accurate target acquisition and delivery.⁵⁰ By the time OAF arrived, third generation PGMs were in use; these bombs and missiles were unique not only because they "were able to strike within a few feet, and sometimes inches, of the designated aim point on a target," but also because they could be employed at "night or in bad weather."⁵¹ Once again, the technology is fascinating, but the manner in which it impacted information management and leadership is what is most remarkable.

The C4I2 system created something never seen before in warfare: the virtual war. The commander for OAF, General Wesley Clark, even stated as much when he was quoted as saying, "this is not, strictly speaking, a war."⁵² As remarkable as it sounds in light of all military history,

⁵⁰ The fascinating history of PGM development is captured concisely by <http://encyclopedia.thefreedictionary.com/Precision-guided%20munition>; provided by Farlex as accessed on October 28, 2004.

⁵¹ Wesley K. Clark, *Waging Modern War: Bosnia, Kosovo, and the Future of Combat* (New York: Public Affairs, 2001), 9-10.

⁵² Michael Ignatieff, *Virtual War, Kosovo and Beyond* (New York: Metropolitan Books, Henry Holt and Company, 2000), 3.

General Clark never stepped foot in Serbia during the 78-day air-only campaign. Everything he thought he needed to understand the country of Serbia (the nature of the conflict, the battlespace, and the actual progress of the campaign) was fed to him through the C4I2 architecture. His only excursions were to visit aircrews at Aviano Air Base, Italy, and troops in Macedonia and Albania.⁵³ Not unlike a sophisticated video game, everything General Clark and his staff understood and acted upon was conducted through information systems. The impact on leadership was to create a war that was “virtual rather than visceral.”⁵⁴ With nothing but data to collect, assess and act upon, leaders were playing a “game” comprised of ones and zeros translated into information displayed on a screen. This detached, virtual world of command took action against its foe on the battlefield through the use of PGMs.

PGMs may seem at first to be only tangentially connected to the business of information management. However, the author chose PGMs to represent a key aspect of intelligence collection and information management that became a driving force in its use: near-perfection. The accuracy designed into and expected of a PGM is remarkable. To think that a commander approved not just a target, but also a specific part of a target, represented by its geo-positional coordinates, was truly significant. In other words, not only was the OAF commander expected to attack a target, he was also expected to determine which *part* of a target to attack.⁵⁵ This expectation can be met with the current technology, but it places tremendous pressure on intelligence collection. The intelligence community must provide a level of detail that allows customized, surgical action that will destroy or damage a particular target, without any unintended consequences.

Through this historical survey from antiquity to the information age, one can see a remarkable evolution of information management. From the foot-born messenger to the VTC,

⁵³ Ibid., 102.

⁵⁴ Ibid., 60.

⁵⁵ Clark, 90-91.

the way leaders receive and use information has changed radically. Leaders can now access and act upon information at the speed of light. We also saw how this evolution changed the way commanders led their forces. The days of personally surveying the battlefield have been, in at least one instance, replaced with C4I2 and virtual war. Because of this survey, we now stand at the doorstep of understanding the nature and dynamics of information age leadership.

Nature and Dynamics of Information Age Leadership

The present is never divorced from the past. By reflecting on several key issues highlighted during the historical survey, the author will describe the nature and dynamics of information age leadership. Every era surveyed has connections to modern information management; these connections teach us the value of information and how it affects the way we lead. From antiquity the monograph detailed the value of time and impact of subjectivity; from the Napoleonic era the author highlighted the importance of C2 on span of control and the resulting need for organization. The Civil War and the industrial age taught us the value of modern technology and rapid electronic communications. World War II revealed the impact of wireless communication on fluid and rapid mobility; it also showed the mainstream use of aerial intelligence collection and its potential objectivity. Lastly, OAF, with its C4I2 systems and PGMs, demonstrated the first virtual war and the pressing need for near-perfect intelligence. Further expansion of these points will explain the nature and dynamics of information age leadership.

Time has always been important to commanders, however, gone are the days of measuring military action with a calendar; in the information age, it must now be measured by milliseconds metered out by atomic clocks. Due to the high-speed nature of modern weapons, instantaneous feedback through live video and near-perfect communications, commanders have less time to understand and react to the enemy. In this abbreviated decision cycle, commanders

have less time to *think*.⁵⁶ In the information age, time is the great limitation on what commanders can do. Rather than thinking, the information age commander can be left reacting.

The people-based system could not provide something that information age leaders can have: objectivity. The difference between subjectivity and objectivity on information management is immeasurable. A biased piece of information is probably an incorrect piece of information. Information age leaders have more un-biased data at their disposal to assist them in their understanding of the battlefield. That said, there is still a need for desired subjectivity when data is analyzed in the decision-making process.

The information age leader, with his expansive C2 structure, has significantly greater span of control. OAF, Operation Desert Storm, Operation Iraqi Freedom all witnessed commanders exercising control over multiple forces from multiple nations.⁵⁷ Additionally, not only are commanders now displaced from the battlefield, they can be located on another continent. Such span of control is truly global and one of the more remarkable and powerful features of information age leadership.

With increased span of control comes the increased need for organization. As with Napoleon, a vast array of forces requires a significant amount of intelligence collection to ensure proper and timely employment. With this need for information comes the need for an organizational apparatus that can assist the commander in making sense out of all the data. Simply put, information collection in the absence of organization leads to chaos.

The hallmark of information age leadership is technology. Essentially first introduced into American warfare during the Civil War, the U.S. military enjoyed a relative dominance in modern military technology. With that technology comes a need for educated, experienced

⁵⁶ For example, in General Clark's brief 78-day air campaign over Kosovo, he never actually knew what caused Milosovic to eventually capitulate. See Lambeth, 67-69.

⁵⁷ Indicative of this increased span of control is the number of countries that participated in the 78-day air campaign. More than 10 countries provided air support. Ivo H. Daalder and Michael E. O'Hanlon, *Winning Ugly, NATO's War to Save Kosovo* (Washington, D.C.: Brookings Institution Press, 2001), 243-246.

leaders who know how to manage and use the most current technology. The information age leader is both enabled by technology and dependent upon it. There in lies the strength and weakness of technology.

One of the chief offspring of technology is electronic communications. If a commander cannot talk, he cannot command. The information age leader is no different, but now he is almost completely dependent upon high-speed, wireless communications. Because of the significantly greater span of control, there is virtually no fallback non-electric system for communication. Electronic communication (a role filled more and more by satellite-based systems) empowers the commander to act on every decision and allows him to respond to every problem. Once communication passed through a telegraph wire and then eventually the air, it forever liberated the military commander from much of the friction of ground-based communications.

The very nature of information age warfare is fluid and dynamic. Not only have the days of arraying forces in neat rows on a battlefield disappeared; in some cases, the battlefield itself has disappeared. OAF may come to mind due to the absence of a land component with accompanying battle lines drawn on a map; however, cyber war reflects a complete absence of a traditional battlefield. The nature of information age warfare calls for leaders that are able to work in an environment that is not easily defined by conventional, historical or doctrinal definitions.⁵⁸

World War II capitalized on the ever-growing use of aerial intelligence to prosecute the war. In the information age, leaders are conducting at least some, or in the case of OAF, all combat operation in the realms of air and space. While OAF may be an aberration, it communicates the nature and dynamics of modern warfare to the information age leader.

⁵⁸ David S. Alberts, John J. Garatka, and Frederick P. Stein, *Network Centric Warfare: Developiong and Leveraging Information Superiority*, 2d ed., revised (Washington, D.C.: DoD Command and Control Research Program, July 2002), 70-71.

Mastery of air and space are essential to ensure objective intelligence collection, secure communications, and advanced information management.

The most telling aspect of the information age is the idea of virtual war. Leaders must understand the advantages and potential pitfalls of living in a virtual world during combat. This is important for at least two reasons. First, the leader must realize that “things are not always what they seem.” Leadership in the information age must come to the digital “battlefield” with a healthy dose of skepticism and critical thinking. Secondly, a virtual war can lead commanders to divorce themselves from the reality of the death and suffering their actions bring. Computers, VTCs, and even a live UAV video feed allow commanders to objectify the intrinsic horror of war.

Perhaps the greatest burden of information age leadership is precision. Modern technology places an increased pressure on commanders because of the real or implied surgical capability of “smart” weapons. As we have already seen with OAF, in modern warfare the difference between a successful mission and a catastrophe is now measured in feet.⁵⁹

Time, objectivity, control, organization, technology, communications, fluidity/dynamic, air/space realm, virtual war, and precision describe the nature and dynamics of information age warfare and leadership. While this is not an exhaustive list, it provides key insight into the modern battlefield and the way we must lead in the age of information. Finally, to ensure complete understanding of the information age, this monograph will examine significant factors that affect leadership.

Most Significant Factors Affecting Information Age Leadership

Similar to the nature and dynamics of information age leadership, there are also many factors that affect the context within which leaders will operate. Information age leadership

⁵⁹ Clark, 91.

is affected by greater complexity, rapid technological developments, diffused information, and the implications of lingering industrial age methods and thinking. However, the author has chosen the three factors that seem to have the most significant affect on information age leadership. They form an interlocking triad that should play the most dominant role as the information age continues to evolve. These three primary factors are technology, people, and the environment.

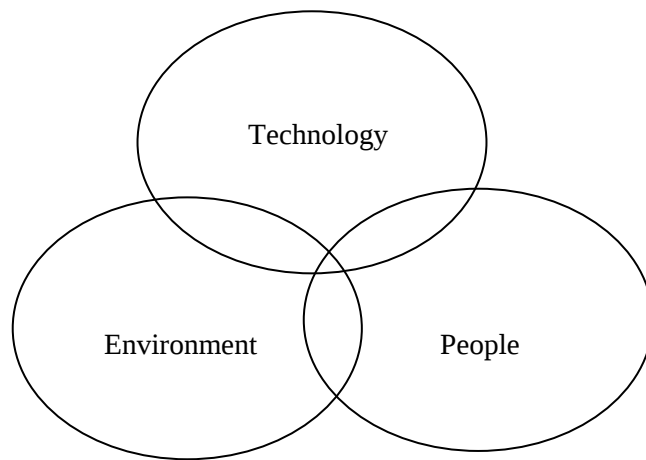


Figure 1-Most Significant Factors

Technology, people, and the environment in which they operate are interconnected and interdependent. As depicted in Figure 1, the most significant factors of the information age are separate entities that overlap one another, but they are fused by their nature and dynamics. Each factor will be examined in detail below, but some general observations are necessary. People need and develop technology. Technology helps people to do and understand more. Lastly, both technology and people exist within the dual environments of physical and virtual reality. This environment is unique to the information age and serves as one of the greater advantages and challenges of this age. Of these three factors, the capstone and defining factor of the information age is technology.

Technology

The information age is, by definition, an age of technology; there would be no information age without it.⁶⁰ As we have seen, technology is the means by which operational level leaders learn about the battlefield, assess options and take action. Without technology, the tools of the information age would not exist. The historical review of the Civil War demonstrated that technology is not new to the battlefield; however, what sets modern technology apart from the industrial age is the “unseen” technology.⁶¹ Prior to the information age, most technology was mechanistic; it was used to help dominate man’s physical work which was set by the bounds of Newtonian physics.

Information age technology is cybernetic based and operates in the “unseen” virtual world of databases and networks. Technology serves as the bridge between what is and what can be. Modern technology takes input from the physical world and creates a world unhindered by the laws of physics. It is here that commanders can plan, analyze, and create operations that may see fruition on the battlefield. As powerful as technology is, it would be useless without people to design and use it.

People

The second part of the information age triad is people. People act not only as the users of technology, but are also the creators and designers. Although computer viruses, for example, seem to take on a life of their own, they are designed by people and ultimately destroyed by anti-virus software created by people. Simply put, people act as the source of technology. However, there is another role of people that is important to information age leaders.

⁶⁰ Note that technology is defined as the application of science; defined by Dictionary.com at <http://dictionary.reference.com/search?q=technology> on December 1, 2004.

⁶¹ By “unseen” the author is referring to the servers, databases, satellites, and the myriad of other part of the C4I2 system that is never seen by the user.

People also serve as the primary limitation to technology. People can only process a certain amount of information at a limited rate. Although the human brain has yet to be replicated in its complexity and capability, it is easily outpaced by modern systems in processing speed and storage capacity. This affects information age leaders because it is a limitation to technological capability. There is another aspect of people that is important to note and that affects information age leadership: the dichotomy of analogue and digital.

Essentially all modern information management systems are digital by design, while all humans are analogue by nature. Digital systems deal in numbers, or data. Analogue systems deal in continuously variable, measurable physical qualities. Digital information exists in cyberspace, while analogue humans exist in physical space. People can manipulate numbers and data, but this data must be mentally processed to become valuable information. In this difference lies not only a part of the limitation described earlier, but also a key lesson for leaders. Leaders must ensure the information they receive is *translated* into useable, analog information. Note that digital information is discrete, while analogue information reveals a spectrum or relationship to the information around it. One is a segment, the other a continuum. Perhaps the analogy of music will prove helpful.

Music, in its original form, is analogue. When recorded by digital media, it is “translated” into “ones and zeros,” or data. In simplified terms, these “ones and zero’s” represent, respectively, the “on” and “off” status of an electric current. Each segment of digital data represents a discrete sample of the original analogue sound. Figure 2 provides a graphical representation of the translation process. The line labeled (A) represents a natural representation of an analogue sound wave. The rectangle (D) represents a discrete digital sampling of the sound, while (G) represents the delta, or “gap,” that occurs between (A) and (D). ⁶²

⁶² Perhaps the most common display of the difference between analogue and digital can be found in clocks. An analogue clock gives the viewer not only the time, but also a visual reference as to where the

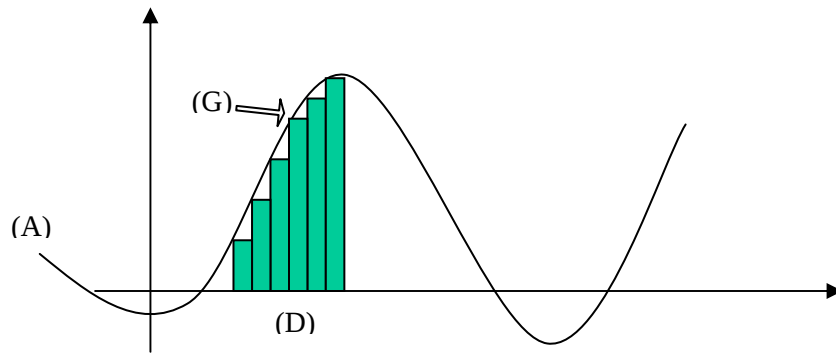


Figure 2-Example of Analog/Digital Gap

A formulaic representation would be: $A = D + G$. Note the “gap,” ($G = A - D$), that occurs between the analogue sound wave and the digital sample. That Analogue/Digital Gap (ADG), however small, represents lost information; in this case, sound is lost. Although digital music technology has advanced significantly, it will never completely replicate an analogue sound due to the occurrence of these gaps.

Similar to this example of music, humans and physical reality are analogue. When the translations from analogue to digital and back to analogue occur, either in the recording of the music or in the listening of it by an audiophile, a part of the reality is lost. It is for this reason that people are one of the most significant factors affecting information age leadership. It is in this ADG that leadership (people) must work to compensate for lost reality. Technology represents the digital or virtual reality while people represent the analogue or physical reality. Commanders must see and understand the differences that exist between these two worlds and the friction this can cause in the information age environment.

Environment

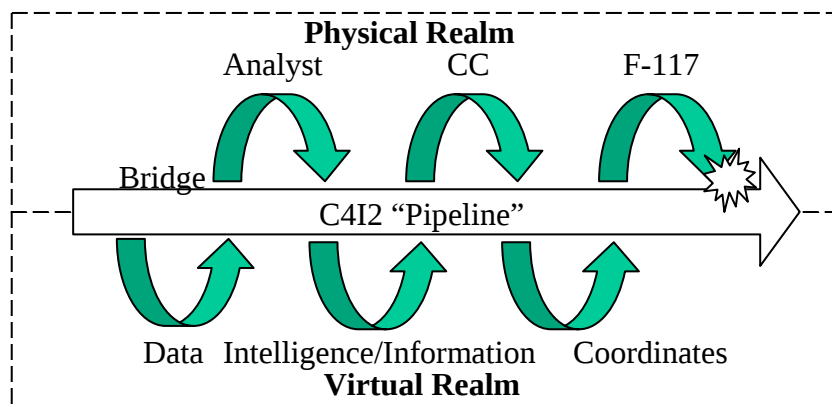
No system or people can be removed from its environment and maintain its function or identity. The environment acts not only as the third part of the information age triad, but also as

current time is in relation to another time. Digital clocks, meanwhile, provide only the discrete, current time.

the contextual foundation. As we have seen, what sets the information age environment apart from any previous age is that it actually exists in two realms: physical and virtual reality.⁶³ The physical realm is where people, the users of the systems, exist and interact with the technology. The physical realm contains the actual technology, or “hardware” of the systems. For example, commanders, their staffs, the C4I2 architecture, and the battlefield all exist in the physical realm. Conversely, the information age also exists in cyberspace.

Cyberspace is not plotted on a map, it is not established with boundaries, and it is not necessarily governed. The only landmarks or portals are the computers and other hardware that are used to access or process the information. These two worlds, along with the two primary players of technology and people, represent the greatest potential source of synergy or *friction* in information age warfare.

Let us look at the delivery of a PGM as an example. A target, perhaps a bridge, exists in the physical realm. A photo or live video feed of the bridge is transmitted to a commander. In order to see and consider the bridge as a prospective target, the bridge had to move from the physical realm, to the virtual (through a C4I2 system), and back to the physical realm (the commander). After consideration, the commander approves the destruction of the bridge. Again, that command travels from the physical to virtual and back to the physical world as it is executed. Figure 3 visually depicts the process described.



⁶³ John Arquilla and David Ronfeldt, *In Athena's Camp, Preparing for Conflict in the Information Age* (Santa Monica, CA: RAND, 1997), 1-3.

Figure 3-Interaction of Physical/Virtual Realms

As the raw data on the bridge moves through the C4I2 “pipeline” it evolves into intelligence and/or information. This is often with the assistance of analysts who support the commander (CC). The CC uses this information to develop an understanding of the target and to decide whether or not to attack it. Once a decision has been made to attack, coordinates for the target are passed via the C4I2 system to a strike asset. Note that information repeatedly moves between the physical to virtual realms. It is in this environment, where the movement from technology to people and back again, the ADG becomes a significant factor which affects information age leadership.⁶⁴ Again, this environmental phenomenon is unique compared to all other environments in past warfare and leadership. Therefore, information age leaders must understand this environment and the two associated factors of technology and people.

The author has examined the historical development of information management, discussed the nature and dynamics of information age leadership, and described the most significant factors affecting information age leadership. These three investigations provide the working context that leaders must understand if they are to dominate their opponents in the technology driven and people dependent environment of modern war. With this detailed context in mind we can now shift our focus to looking at the leadership skills military commanders will need to lead effectively in the information age.

Information Age Leadership Skills

As we dwell on the historical background, nature, dynamics, and significant factors affecting information age leadership, we can now peer ahead to the leadership skills that will deliver successful military operations. The author’s intent is to provide a monograph that is both

⁶⁴ Note this example is drawn from General Clark’s experience in OAF. It highlights the rapid approval process as well as the potential pitfalls still present in modern war. Following release of the PGM, a train came into view, but it was too late for the pilot to redirect the weapon. Numerous casualties were reported. See Clark, 90, for a complete account.

practical and applicable. This calls for a clear description of skills--areas a commander can use to improve his own command ability or to train his subordinates.

The leadership skills will only be described briefly here; the intent is to present a basic understanding of the necessary skills prior to examining joint and service-specific doctrine so the reader will better understand how doctrine does or does not reflect these skills. A complete and expanded description of these skills will be provided in Part IV. The skills have been listed in two very different categories: Technology Enablers and Technology Compensators. Returning to the ADG formula, the author believes there are leadership skills that maximize the use of digital information, while other leadership skills compensate for the problem of ADG. It is when these skills are combined that true information age leadership occurs.

Technology Enablers

As the name implies, there are certain skills that will maximize the use of information and technology—the hallmarks of the information age. An enabler gives fuel to the fire; it makes things better. Similarly, operational level leaders will need to act as enablers of technology and information. The proposed technology enablers described here would occur from the top down as the information age leader conducts his operation. They are: systems thinking, collaborative leadership, information as a weapon, and adaptive organization.

A system is defined as “a network of many variables in causal relationships to one another.”⁶⁵ Note that a variable can also have causal relationship with itself within a system. Some obvious systems would be the human body, the environment and the solar system. Examples from the military environment would be communications, logistics, and transportation. Each system is a collection of variables that act as both catalysts and reactors to other variables. As such, systems thinking involves considering all the possible systems as a collection of

⁶⁵ Dietrich Dörner, *The Logic of Failure*. (New York: Metropolitan Books, Henry Holt and Company, Inc., 1996), 73.

interacting systems. A commander uses systems thinking when he fully sees and understands all the variables on the battlefield, the input he must make to a system, and the anticipated ramifications of his actions. Simply, it is a comprehensive or holistic approach to the battlefield; it is the “big picture” of cause and effect on the battlefield. Similar to systems thinking, collaborative leadership acts as a type of leadership system.

In an age when there is such a massive amount of information and requisite specialization, a military commander in the information age will need to exercise more collaborative leadership. Some may say this already exists with the commander’s staff, but that is not the type of collaboration the author is referring to. Collaborative or networked leadership is a call for leaders at various levels to be virtually connected through IT so as to allow a free flow of information and planning from multiple locations on the battlefield. This leadership system can harness all the past experience of those connected to the network as well as any current or “live” information from the field.⁶⁶ To fully dominate the battlespace, collaborative leaders will need to view information as a weapon.

The information age leader can no longer think of information as an entity that exists in his database or his mind. Information must be viewed as a weapon not unlike a fighter aircraft or rifle. It is used to arm his force with the very latest information that can be used to either hinder or exploit the enemy. This description is meant to distinguish this concept from that of Information Operations (IO) and Information Warfare (IW). While these are sophisticated uses of information that are intended to dissuade or defeat the enemy, the author’s concept is more network-based (see collaborative leadership above) at the operational level. Forces, whether on the ground or in the air, will need to be digitally connected to ensure the efficient and optimized

⁶⁶ The origin of this idea for this monograph comes chiefly from David S. Alberts and Richard E. Hayes, *Power to the Edge* (Washington, D.C.: DoD Command and Control Program, June 2003).

use of information.⁶⁷ In order to harness the potentially overwhelming power of information, commanders will need an adaptive organization to manage it.

A wealth of information is worthless without an organized system to manage it. The military already has organizations designed for this purpose, but organizations must do more than provide structure and established systems for information processing. They must also adapt to the situation in a tailor-made construct that reflects the enemy's method of chosen combat. Industrial age structures will be out-dated on the battlefields of the future. Therefore, information age leaders will need to create adaptive organizations as part of their planning processes. These organizations will be established, shaped, and disbanded as the conflict evolves. With these technology enablers in mind, we may now turn our attention to the technology compensators to complete our initial understanding of proposed information age leadership skills.

Technology Compensators

Truth usually evades capture on the battlefield. It is replaced with assumption, conjecture and hope. In a similar way, the ADG formula represents a loss of truth (or at least accuracy), as relevant information is “lost in translation.” Technology compensators are skills that can potentially account for this lost truth. They are skills that set apart the acceptable information age leader from the truly remarkable. They often evade hard science and analysis, for they exist in the cognitive realm. They are: wisdom, coup d’oeil, patience, and integrity.

Wisdom is not overly prevalent in the American military lexicon. Perhaps it is associated with slow, deliberate thinking which conflicts with our mental model of a rapid, chaotic combat environment. Conversely, wisdom is the “ability to discern or judge what is true, right, or

⁶⁷ Similarly, this concept comes from the idea of a “strategic corporal” as described in David S. Alberts and Richard E. Hayes, *Power to the Edge* (Washington, D.C.: DoD Command and Control Program, June 2003), 34-35.

lasting.”⁶⁸ It represents the amalgamation of data, information and knowledge.⁶⁹ Wisdom gives birth to coup d’oeil.

Coup d’oeil springs forth from a deeper understanding of a situation. It has been defined in many ways, but the closest synonym is intuition. It is the ability of a commander to assess a large amount of information and then to, with a glance, “see” the right action to take.⁷⁰ The key ingredient to achieving this skill, perhaps, is experience or exposure. The longer a commander is exposed to the problem, the more experience he has dealing in military matters, and the more knowledge he has to draw upon to make that key decision, then the greater the opportunity for him to demonstrate coup d’oeil. A key aspect of coup d’oeil is patience.

Seemingly everything in the information age moves at the speed of light. Since the advent of the telegraph, information has moved at a speed that far exceeds human capability to process. This speed of light also seems to have set the pace at which all operations occur. It is here that patience is vital. Patience should not be viewed as the antithesis of initiative or drive. Rather, it is the calm amidst chaos and a certain coolness under fire. It is the ability to resist the temptation to act when all indicators are calling for a reaction. Patience should not be used as an excuse for hesitation. Instead, patience allows a commander to wait until the right moment to act. It is essential in the information age because information is constantly evolving; with that evolution, however, often comes a better understanding of the situation.⁷¹ Wisdom, coup d’oeil and patience are powerful technology enablers, but they can all be negated by a lack of integrity.

⁶⁸ Wisdom is defined in many ways, however, the author has chosen the definition provided by <http://dictionary.reference.com/search?q=wisdom>, as accessed on November 23, 2004.

⁶⁹ John Arquilla and David Ronfeldt, 146.

⁷⁰ William Duggan, *Napoleon’s Glance – The Secret of Strategy* (New York: Thunder’s Mouth Press, National Books, 2002), 4-5.

⁷¹ Brig. Gen. Stuart R. Boyd, “Leadership and High Technology,” in *Concepts for Air Force Leadership*, AU-24, ed. Richard Lester (Montgomery, AL: Air University Press, 2001), 228.

Knowledge is power and “power tends to corrupt and absolute power corrupts absolutely.”⁷² With pervasive knowledge must come a force to control its tremendous power. Integrity is that force. Commanders who have such a powerful means of collecting and analyzing information also have the ability to exploit it for either their own personal goals or in ways contrary to the laws of armed conflict. There is also an element of trust that comes from integrity. In the information age, a leader may not see his forces face to face, however, he will need to demonstrate integrity or he will lose their trust quickly.

This brief review of the information age leadership skills will assist in understanding the doctrinal support, if present, of these skills. This is of particular importance when considering the pivotal role doctrine plays in establishing how leaders will be taught to lead.

Part III

DOCTRINAL REVIEW AND ANALYSIS

Doctrine is a body of principles based on historical experience that we use to direct our future. It is what we use to teach and train, plan and execute. Leadership doctrine defines and establishes what leaders should do in both general and specific situations. This chapter will examine joint and service doctrine to review and analyze the guidance leaders have on how to lead in the information age. The intent is to examine what current doctrine has established about information management and leadership, and to compare this to the information age leadership skills identified in Part II. Any current leadership skill shortfalls will be identified. The author will also place these leadership skills into the context of the Joint Operating Environment (JOE) for the purpose of determining how these skills will answer the challenges of our projected future combat environment.

It is important to note the author is looking at *leadership* doctrine; however, the author will also review doctrine covering C2 since some services do not publish specific leadership

⁷² Lord Emerich Edward Dalberg (1834-1902).

doctrine, per se. This doctrinal review will provide some indication of where the joint and service communities are in relation to the needs of information age leadership.

Joint Doctrine

The United States Joint Forces Command (USJFCOM), which authors all joint publications (JP) and joint doctrine, does not have a doctrinal publication for joint leadership.⁷³ In fact, JP 1-02, *DOD Dictionary of Military and Associated Terms*, does not list the word “leadership.” This complete absence of doctrinal guidance is a reflection of the differing views of leadership held by the services. Perhaps no definition can be chosen in the joint arena at the risk of differing with or excluding another service. This doctrinal shortcoming speaks not only to the cultural differences among the services, but also to the lack of guidance Joint Force Commanders have on leading the various components under his command. Additionally, it implies that the services are responsible for training their commanders how to lead and manage information—which will almost certainly differ among the services. Joint Publications 6-0, *Doctrine for C4 Systems Support to Joint Operations*, and JP 6-02, *Doctrine for Employment of Operational/Tactical C4 Systems*, discuss C2 in relatively specific terms, but no leadership principles are described. However, the U.S. Army provides detailed leadership doctrine.

Army Doctrine

Army leadership doctrine is perhaps the most robust and detailed of all the services. Contained in Field Manual (FM) 22-100, *Army Leadership*, the Army focuses on what a leader should “be, know and do.” The Army defines leadership as “influencing people—by providing purpose, direction, and motivation—while operating to accomplish the mission and improving the

⁷³ All publications listed at the following website are produced by USJFCOM: <http://www.dtic.mil/doctrine/jpcsystemsseriespubs.htm> as of November 23, 2004.

organization.”⁷⁴ With regard to the information age leadership skills listed in Part II, the Army’s FM 22-100 does not describe the technology enablers of systems thinking, collaborative leadership, information as a weapon, or adaptive organization. The technology compensators of wisdom, coup d’oeil, patience, and integrity are either directly or indirectly described; however, these descriptions are not given within the context of information management. FM 22-100 does provide a section on “Technology and Leadership”⁷⁵ which instructs the reader on some of the cautions and limitations of technology. Additional doctrinal guidance on information management is provided through FM 6-0, *Mission Command: Command and Control of Army Forces*.

FM 6-0 provides a wealth of detailed information on how a C2 system should function. A subsection entitled Information Management is particularly instructive. Again, the skills described previously as technology enablers and compensators are not discussed specifically; however, the Army’s model for developing situational understanding is noteworthy.⁷⁶ Their model depicts the development of data into information, followed by intelligence, and finally, a commander’s understanding. This depiction relates well to the skills of wisdom and coup d’oeil which are necessary for information age leadership, but again, the context provided does not address the needs and uniqueness of the information age. Compared to the Army, the doctrine of the United States Air Force lacks detail.

Air Force Doctrine

The Air Force’s definition of leadership is found in Air Force Doctrine Document (AFDD) 1-1, *Leadership and Force Development*; it is as follows: “the art and science of

⁷⁴ U.S. Department of the Army. FM 22-100, *Leadership: Be, Know, Do*. (Washington, D.C.: Headquarters, Department of the Army, 31 Aug 1999), 1-4.

⁷⁵ Ibid., 3-8 through 3-10.

⁷⁶ U.S. Department of the Army. FM 6-0, *Mission Command: Command and Control of Army Forces* (Washington, D.C.: Headquarters, Department of the Army, August 2003), 4-5.

influencing and directing people to accomplish the assigned mission.”⁷⁷ In both detail and scope, Air Force leadership doctrine is limited in comparison to the Army. With the exception of integrity, none of the information age leadership skills listed in Part II are described, directly or indirectly, in AFDD 1-1. Additionally, there is no direct or indirect description on how leaders are to interact with technology or manage information. For guidance on information management the reader must reference AFDD 2-8, *Command and Control*.

AFDD 2-8 provides a thorough description of the C2 environment and structure. With regard to the information age leadership skills listed in Part II, AFDD 2-8 does not list the technology enablers of systems thinking, collaborative leadership, information as a weapon, or adaptive organization. However, the technology compensators of wisdom, coup d’oeil, and patience are similarly described within the context of information management. Of particular note is the description of intuition and common sense:

“... there is no substitute for trained personnel using intuition and common sense in making the final decision. In the words of General Shaud (former Chief of Staff, Supreme Headquarters Allied Powers Europe), ‘Process is no substitute for careful thought.’ Airmen, schooled in the art of war, need good information as well as an efficient and effective process to make the best-informed decisions.”⁷⁸

It appears General Shaud understood the value of applied wisdom through patience and coup d’oeil—especially when managing information as a leader. Intuition and common sense combine to create a powerful cognitive leveraging force not unlike those described in the technology compensating leadership skills found in Part II of this monograph.

Naval Doctrine

The U.S. Navy does not provide specific doctrinal guidance on leadership. This should not be viewed as a deficiency since the Naval Doctrine Publication (NDP) 6, *Naval Command*

⁷⁷ U.S. Department of the Air Force. AFDD 1-1, *Leadership and Force Development* (Washington, D.C.: Headquarters, Department of the Air Force, 18 Mar 2004), 11.

⁷⁸ Ibid., 8.

and Control, provides a concise, but rich description of information management and leadership. Leadership is defined by the Navy as “the art of motivating people toward a common objective.”⁷⁹ With regard to the information age leadership skills listed in Part II, NDP 6 does not list the technology enablers of systems thinking, collaborative leadership, information as a weapon, or adaptive organization; however, it does describe, directly or indirectly, the technology compensators of wisdom, coup d’oeil, patience, and integrity. Additionally, these skills are described within the context of information management. Interestingly, NDP 6 uses the same model for developing situational understanding as found in the Army’s FM 6-0. Under a different title of Cognitive Hierarchy, the Navy uses the identical process in developing data into judgment and understanding:

“... by applying judgment, we transform knowledge into understanding. Judgment is a purely human skill, based on experience, expertise, and intuition. Automated information systems can play a crucial role in collecting and processing data, but they play a very limited role at present in generating understanding.”⁸⁰

The Navy clearly understands the need for rational consideration of all information as well as the unique skills of wisdom, coup d’oeil and patience when fighting in the information age. For example, the Navy’s description of coup d’oeil is instructive:

“Intuitive decision making thus replaces analysis with experience and judgment. The intuitive model credits an experienced commander with the ability to grasp the situation in its entirety, an ability sometimes called coup d’oeil. Intuitive decision making strives to find the first solution that solves the problem, rather than waiting for the ‘best’ solution.”⁸¹

⁷⁹ U.S. Department of the Navy, NDP 6, *Naval Command and Control* (Washington, D.C.: Headquarters, United States Navy, 19 May 1995), 7.

⁸⁰ Ibid., 23.

⁸¹ Ibid., 25.

The authors of NDP 6 have grasped the importance of applying “age old” leadership principles to the modern leadership challenges presented by the information age. Not surprisingly, the United States Marine Corps provides a similar approach.

Marine Corps Doctrine

Similar to the Navy, the United States Marine Corps does not publish doctrinal guidance on leadership. Also similar to the Navy, the Marines provide doctrinal guidance on information management and leadership through their Marine Corps Doctrinal Publication (MCDP) 6, *Command and Control*. Like NDP 6, MCDP 6 also provides a model for cognitive hierarchy which provides the basic framework for developing data into understanding.⁸² With regard to the information age leadership skills listed in Part II, MCDP 6 does not list the technology enablers of systems thinking, collaborative leadership, information as a weapon, or adaptive organization. The technology compensator of integrity is also not described, however, the technology compensators of wisdom, coup d’oeil, and patience are either directly or indirectly described within the context of information management. Additionally, MCDP 6 includes sections on both theoretical and practical application of leadership, information management, and decision-making in the information age.

By way of summary, joint and service doctrines address some of the issues raised by this monograph, but not all. The technology enhancers of systems thinking, collaborative leadership, information as a weapon, and adaptive organization are completely absent from doctrine. The technology compensators of coup d’oeil, wisdom, patience, and integrity are discussed in a concise, but insightful manner. However, these are concepts that have defined military leadership since antiquity. What is different, according to this monograph, is the application of these concepts in the information age. From that perspective, all doctrine lacks a strong and well-

⁸² U.S. Department of the Navy, Marine Corps Doctrinal Publication 6, *Command and Control* (Washington, D.C.: Headquarters, United States Navy, 4 October 1996), 49-51.

examined philosophy of how commanders will lead in the information age. To better understand how these leadership skills will affect our leadership in the future, we must turn our attention to the JOE.

Impact of Joint Operating Environment

USJFCOM has produced a document which attempts to describe the setting, conditions, and nature of future combat. Entitled *The Joint Operational Environment—Into The Future*, this “living document” is intended to shift the focus of the US military from that of a threat-based perspective to one that is capabilities-based.⁸³ By shifting this focus, defense planning will concentrate “less on when and where a conflict will occur and more on the broad set of capabilities U.S. military forces need to deter, deny, and defeat adversaries.”⁸⁴ This departure from a traditional framework will allow us to more rapidly adapt to the dynamic and asymmetric needs of the modern battlefield, in whatever form it may take. While it is not the intent of this monograph to replicate the JOE here, it is beneficial to state its one macro conclusion. It states, “We will not operate in a single, static, operational environment. Instead, our forces will operate in layers of operational environments, all in constant flux.”⁸⁵ With this understanding of the JOE, we can now examine its conclusions on leadership.

The technology enablers of systems thinking, collaborative leadership, information as a weapon and adaptive organization are described both directly and indirectly. An understanding of systems thinking is expected of the reader as evidenced by the use of systems concepts throughout the JOE. It is clear from the repeated discussions of knowledge systems, systems warfare, and the dynamics of system interplay that leaders of the future will need to be well versed in systems thinking.

⁸³ U.S. Joint Force Command, *The Joint Operational Environment—Into The Future* (Fort Monroe, Virginia: Headquarters, United States Joint Forces Command, 2004), 3.

⁸⁴ Ibid., 3.

⁸⁵ Ibid., 133.

The next technology enabler, collaborative leadership, is not explicitly mentioned in the JOE. In fact, leadership is given limited discussion and focuses on simply listing projected necessary leadership capabilities with little to no explanation. The JOE does list similar concepts: “creating intellectual synergy,” “mentoring,” and “creativity” as “expanded thinking capabilities” that future leaders will need to possess.⁸⁶ The next technology enabler, information as a weapon, is prevalent in the JOE.

Similar to systems thinking, information is given significant attention in the JOE. The JOE goes so far as to state, “information will be at the heart of conflict;”⁸⁷ additionally, it is presented, similar to a weapon, in the context of an entity. Similar to any other instrument of war provided to military forces as a weapon, the JOE presents information as a thing to be used and mastered. The JOE clearly views information as a pivotal weapon. The final technology enabler, adaptive organization, is key to understanding and prosecuting war in the JOE.

Adaptive organization is an integral part of the operational environment where, “continually changing coalitions, alliances, partnerships, and new actors (both national and transnational) will constantly appear and disappear from the scene.”⁸⁸ Additionally, information age leadership should expect, “noncontiguous, non-linear enemy actions within the tactical and operational battlespace (which) will force rapid changes in organization for combat.”⁸⁹

The technology compensators of coup d’oeil, wisdom, patience, and integrity are not directly or indirectly described in the JOE. This is not remarkable considering the JOE is dealing with the battlefield environment while the technology compensators deal with the human environment and are designed to offset the potential pitfalls of the information age environment.

A brief summary is appropriate here. The monograph previously described the history, nature, dynamics, and significant factors affecting information age leadership. From this

⁸⁶ Ibid., 157.

⁸⁷ Ibid., 63.

⁸⁸ Ibid., 74.

⁸⁹ Ibid., 117.

analysis, the author determined eight information age leadership skills, which were segregated into two unique camps of technology enablers and compensators. As such, doctrine tended to discuss the technology compensators of coup d'oeil, wisdom, patience, and integrity, while the JOE discussed, directly or indirectly, all four technology enablers: systems thinking, collaborative leadership, information as a weapon, and adaptive organization. In Part IV of this monograph, *Toward Omniscience*, the author will combine all that has been presented into an extended description of the information age leadership skills.

Part IV

TOWARD OMNISCIENCE

How to Lead in the Information Age

As previously discussed, omniscience represents the pinnacle of knowledge and understanding. Additionally, not only does it communicate the idea of knowing everything instantly, it also communicates a deep understanding of motives, objectives and desires. It means more than understanding the facts as they unfold; omniscience reflects a complete knowledge of what, when, where, who, and *why*. Although true omniscience extends beyond human and technological capabilities, militarily leaders must be equipped with the right skills as we move *toward* omniscience.

This section will bring together all that has been examined and discussed in the previous three sections as the monograph expands on the eight information age leadership skills briefly described in Part II. The monograph will explain the relevance each has in the history, nature, dynamics, and doctrine of information management and leadership to provide the reader with a better understanding of how to lead in the information age.

Systems Thinking

Virtually everything is part of a system. Nearly everything interacts either with other systems or with its own sub-systems. The military is no different; obvious co-systems are the political, economic, and information systems. As one system takes an action, it affects numerous possible other systems.⁹⁰ The historical and JOE reviews revealed how the military system is ever expanding and evolving. Information age leaders will need to use developing technology to achieve a deeper understanding of how targeted systems will interact with one another. He will also have to master the system of systems that exist on the modern battlefield and in cyberspace. Systems thinking, combined with sophisticated network-based planning models, will allow the information age leader to see beyond the traditional boundaries of the battlefield and into the next level of understanding and span of control.⁹¹ In short, he will be able to see not only what he must do, but also what the intended and unintended consequences will be.

Systems thinking is a technology enabler because it pushes information management and intelligence collection to search, evaluate, and construct systems that the commander can then study as part of his mission analysis. Systems thinking at the human level can only present the idea that interactive systems exist. Only information age technology is capable of the data mining necessary for comprehensive systems construction. Leaders who are well trained in this method of thinking can either pull intelligence or push requests for information to ensure the proper system models are constructed. Systems thinking is also a step towards omniscience, greater span of control and time compression because not only does the commander know what he plans to do, he can now have an even greater understanding of how the enemy will react. Systems thinking is a key cognitive skill which will push information management to new levels, but it is in

⁹⁰ Peter M. Senge, *The Fifth Discipline: How to Lead Organizational Change* (New York: Doubleday/Currency, 1990), 73-78.

⁹¹ Ibid., 73.

collaborative leadership that modern leaders will be able to harness all the knowledge found in a system.

Collaborative Leadership

Everyone is familiar with the adage, “too many cooks spoil the soup.” The message is that having too many people in charge can lead to chaos. That is not the intent of collaborative leadership. It is not intended to replace a commander with a committee or a leader with lemmings. The intent of collaborative leadership, rather, is to provide a source of collective input and experience from virtually every commander on the battlefield. Current and future technology will allow commanders and subordinate commanders to “meet” in cyberspace and share their collective insight and experience of the battlefield. As the monograph has recorded, wireless communications allow commanders to communicate with and control their deployed forces; however, this computer-based oracle will allow not only the commander to receive input, but for peer commanders to benefit from that same knowledge as well.

Collaborative leadership would harness virtual reality technology to create a communication system which could replicate a planning cell or staff meeting. Commanders would not have to leave the field to achieve the benefit of meeting with a superior, or perhaps more importantly, peer commander. This method of leadership acts as an enabler because it allows people to collectively develop data into information and then into understanding. This network can then add their experience and systems thinking to develop greater understanding of the enemy and the appropriate course of action.⁹² Collaborative leadership also assists the commander with one of the more overwhelming aspects of information age warfare: data saturation.

⁹² David S. Alberts et al., *Understanding Information Age Warfare* (Washington, D.C.: DoD Command and Control Research Program, August 2001), 185-191.

The C4I2 system has access to a multitude of information sources and intelligence outlets. Additionally, the staggering volume of information produced by a command staff can overwhelm any commander. It is here that collaborative leadership makes a difference. As was shown in the factors that affect information age leadership, people provide one of the key limitations to technology. This is also true in battle command because humans must understand a problem before they can execute a solution. In collaborative leadership, several down-range leaders or staff members would work in unison with an advanced intelligence and communications system to provide a superior perspective to the commander.⁹³ The next technology enabler is the idea of information as a weapon.

Information as a Weapon

Information Operations (IO) and Information Warfare (IW) constitute the use of information as a supporting effort, or perhaps even a main effort, of an operation. IO is not new, but leaders in the information age need to take the next step in the evolution of thought and begin to view information as an actual weapon that can be issued to troops and employed on the battlefield. Information is not to be collected and hoarded by the commander and his staff as they craft the next course of action for an operation. Instead, information age leaders need to view information as a “thing” that can be used against the enemy by his forces that are engaged. Information can be used to attack the enemy in cyberspace or on the streets, but what is most important is that it is used at the lowest levels for direct interaction with a target populace.⁹⁴

As with Napoleon, information can be used to ensure the proper movement of forces on the battlefield, at the right time and to the right location. Information, now, runs much deeper. For example, leaders might need to make sure that a medical unit, tasked to provide support at a clinic, knows when an insurgent arrives for medical care. Should he be taken into custody or

⁹³ Ibid., 271.

⁹⁴ David S. Alberts and Richard E. Hayes, *Power to the Edge* (Washington, D.C.: DoD Command and Control Program, June 2003), 34-35.

treated with the utmost care? Which form of treatment will have the most positive impact for the operation? Answers to these kinds of questions make information the key leveraging power on the battlefield. This kind of information will enable and even embolden warfighters at the lowest levels. As powerful as information is, only leadership can provide their personnel with the information tools they need.

Information age leaders carry the responsibility to ensure their personnel have the latest personal data distribution devices that will allow the kind of real-time, relevant data discussed above. Information can no longer be used just to provide well-planned command; it must also be pushed to the deepest levels to allow for precision execution.⁹⁵ PGMs should no longer represent a deadly precise weapon from above; precision can also come from boots on the ground. If information is the leveraging power on the battlefield, then adaptive organizations are the executors of this information.

Adaptive Organization

Organization is key to survival in a chaotic environment. For example, when a young child is separated from her family on a busy street, she panics until reunited with her parents. That family represents the organization the child belongs to and feels safe within. Similarly, conventional military organizations will continue to provide this kind of stability in peacetime. In combat, however, commanders must be willing to execute adaptive organization skills to ensure the right force structure for the given task. Specifically, information age leaders must look at each operation and consider not only *which* organization, but also *what kind* of organization is best suited to accomplish the mission.⁹⁶ Additionally, this adaptive style in organizational structure must be prepared to change in the midst of battle. It is here that leadership makes a pivotal difference. Not only has technology and wireless communications allowed organizations

⁹⁵ Ibid., 247-248.

⁹⁶ David S. Alberts et al., *Understanding Information Age Warfare*, 223-226.

to grow and achieve greater mobility, the information age will also see organization become more fluid, and, perhaps more dynamic in their structure. Adaptive organization also brings a level of precision to the conflict. No longer will leaders wrestle with a force that is too large or poorly matched to the mission. He will exercise adaptive organizational skills to ensure the proper size and mixture of forces required for the mission.⁹⁷ We can now combine these technology enablers with the following technology compensators to achieve a balanced approach to information age leadership.

Technology compensators act as the final filter before execution of a command. They are entirely human based and within the realm of the leader's mind. These skills represent the summary of his experience, knowledge, thoughts, character and motives. While they cannot be measured or attacked, they can be shared and understood by every member of a unit. It is these traits that transform an officer into a great military leader.

Wisdom

Wisdom can be described as a gift because it is a skill that is unique and difficult to acquire; it is purchased with time and maturity. Wisdom is not intelligence or quick wittedness; it is not tactical mastery or deep historical knowledge. While coup d'oeil represents the essence of intuition, wisdom represents the pinnacle of rational thought.⁹⁸ The C4I2 system can assist the commander in turning data into knowledge and maybe even understanding; however, it is wisdom that helps the leader rationally consider a problem and then know what he should do. Wisdom prevents the information age leaders from letting the information do the thinking for him.

Wisdom serves the information age leader as a technology compensator because it represents the human thought that is critical to completing the ADG formula. As gaps occur

⁹⁷ Brig. Gen. Huba Wass de Czege, "Optimizing Future Battle Command Technologies," in *Military Review* (Fort Leavenworth, KS: U.S. Army Combined Arms Center, Mar/Apr, 1998), 5.

⁹⁸ As defined by Dictionary.com at <http://dictionary.reference.com/search?q=wisdom> on December 1, 2004.

between reality and the digital world, only rational thought can compensate for these deficiencies. Perhaps advances in technology will significantly reduce this gap, but rational thought will still be a requirement for intelligent use of military power. Closely related to wisdom is the intuitive skill of coup d'oeil.

Coup d'oeil

Outside of the context of the information age, coup d'oeil is well understood by any student of military leadership. However, the information age represents a unique application of this apparently timeless quality of command. This monograph has described how the information age environment exists in both the physical and virtual realms. This duality represents a challenge to leaders as they attempt to “see” the right action they must take when he may not actually see anything.

Coup d'oeil compensates for technology because it helps the leader to see what C4I2 cannot see. As sophisticated as technology has become, it cannot replicate the intuitive nature of man. Coup d'oeil is that ability to see what no other person or system can. It represents the culmination of years of experiences and study in the art and science of war; it springs forth from deeply understanding how the enemy's leadership thinks, how they tend to operate, and what motivates them.⁹⁹ Although we use advanced technology to out maneuver or out gun an enemy, ultimately it takes a human to out think a human.

The intent of including coup d'oeil as an information age leadership skill is to re-focus commanders on the primacy of the human capacity to think deeply and dominate an opponent. Information age leaders may be tempted to lean too heavily on the cornucopia of modern weapons at his disposal while neglecting his greatest weapon: his mind. While intuition and rational thought are closely related, they are dependent on patience.

⁹⁹ Duggan, 4-5.

Patience

The information age leader should not be a slave to the high-speed tempo of modern warfare. Speed is an undeniable part of the environment and skilled leaders can leverage it to their advantage; however, it is also easy to become captured by the pace of operations while losing the benefit of pause, consideration, and patience. Patience is a technology compensator because it buffers the high-speed pace with deliberate, methodical thinking. If a leader does not have adequate time to completely consider his actions, he will rely instead on his training and experience. This environment of action/reaction is more prevalent at the tactical level of war. For the operational level and higher, however, commanders are not usually faced with as high a degree of rapid decisions and actions.

At the operational level, a rash or reactionary decision will impact numerous personnel and assets. It could change the entire make-up of the battlefield and lead to what is called the garland effect.¹⁰⁰ In the garland effect, a commander reacts so quickly that he does not allow the systems to respond entirely to his actions. The reader may recognize this same dynamic when trying to set the right temperature for a shower. Another example is the tendency of an automobile driver to overcorrect when avoiding something in the road. The overcorrection is then overcorrected resulting in a complete loss of control of the vehicle. Patience negates this dynamic by waiting for a reaction and then considering possible actions.¹⁰¹ Patience will be a premium in the information age as commanders will be tempted to react to what his C4I2 system is telling him about the enemy. The final, and most important, technology compensator is integrity.

¹⁰⁰ Dorner, 133.

¹⁰¹ Boyd, 228.

Integrity

Integrity represents many aspects of command. It instills trust in subordinates while fostering confidence in superiors. Integrity captures all that is right in leadership while a lack of integrity can lead immediately to failed missions, weakened security, and lost lives. This is no different in the information age, but there are some additional issues. The power of information can be abused for either well-intended purposes or selfish gain. Commanders will have to insure their C4I2 systems remain secure while also keeping themselves and subordinates from abusing such dominate knowledge.

Moving toward omniscience can bring confidence, but it can also foster foolish pride. Pride leads to overconfidence which leads to faulty thinking and failure. Integrity negates this path to ruin by buttressing the commander with a focus on truth, selfless interests, and the mission. Not unlike weapons or money, information represents power. Commanders will have to develop a culture that focuses on an appropriate and necessary use of information to achieve mission objectives—and nothing more.

Advantages to Leading in the Information Age

The information age dominates everything in our military from the way we communicate, receive info, procure new equipment, and fight. We cannot reverse its progress. That is good news to those who understand and embrace the benefits of this modern era. Although many advantages have already been described as part of the leadership skills, three remain that warrant specific description: speed, dominance, and peace.

Speed

The military unit that can execute an operation at a rate that exceeds the enemy's capability to respond will reap a benefit of additional time to plan and execute their subsequent operation; therefore, speed produces time. Current and future technology, harnessed by

leadership, will bring a new level of high-speed mission execution. Adversaries will simply not be able to react in time to superior decision cycles fueled by advanced C4I2 grounded in systems thinking. This speed of observation and execution will provide time to commanders who can leverage even more advantage on the battlefield. With more time, comes better thinking and better plans. The dividend of time multiplies with each round of action/counteraction and can eventually lead to victory. Speed not only produces time, it implies dominance.

Dominance

Dominance is the primary result of everything this monograph has described. Introduced initially at Dominant Battlespace Knowledge (DBK), the monograph now takes the next logical step to conclude that DBK can result in actual physical dominance over the entire battlefield. The objective is to paralyze the enemy with the complete knowledge of everything he thinks and does.¹⁰² A military force that knows every member of an enemy's military, to include where they live, who they are related to, or even their favorite food, achieves a level of dominance where surrender may be the only option remaining. An enemy who knows we know everything will be forced to either surrender or engage in hope and fantasy. These are not viable options for any commander, but they could spell the greatest potential benefit of the information age: peace.

Peace

The dream of most rational people is a world that does not know war. This monograph will not suggest that a time is coming when technology will eliminate war, but one cannot help but to believe that it may significantly reduce it. By moving toward omniscience, armed forces will not be able to out smart or out maneuver one another. Virtually all options become fruitless if they are known and understood by the opposing force. Assuming the United States maintains

¹⁰² Although this is still a theoretical concept, Johnson and Libicki, *Dominant Battlespace Knowledge*, 39-41, provides some insightful implications.

its military dominance, it could eventually achieve this peace dividend through information age technology and leadership. As we appreciate these advantages, we must also understand the challenges information age leaders will face.

Challenges to Leading in the Information Age

This monograph would be remiss if it did not describe some of the challenges industrial age leaders will face as they seek to establish a new command paradigm. This short list is by no means exhaustive, yet it does represent those factors that will, perhaps, present the greatest challenge to information age leadership. They are: industrial age thinking, sensory overload, and micromanagement.

Industrial Age Thinking

The laws of Newtonian physics currently bind the physical world; therefore, it will struggle to evolve out of the industrial age. The industrial age is grounded in mastering machines, no matter how advanced, that operate in the material world. This is not to be viewed as a problem necessarily, it must simply be understood as more and more leaders progress through the ranks who have been raised in the information age.¹⁰³ Future leaders will need to be aware of the benefits and hindrances of industrial age thinking. Information age leaders may develop an Achilles heel if they do not ground themselves in the simple physics of the real world; likewise, leaders will also need to move past the industrial age in order to fully capitalize on all that has been described in this monograph. The monograph will now look at the greatest potential problem facing information age leadership: sensory overload.

¹⁰³ Perhaps the best example of information age thinking is found in the hierarchical command structure. See Alberts, Garstka, and Stein, *Network Centric Warfare*, 124-125, for a comparison of command structure models of the industrial age to those of the information age.

Sensory Overload

Too much information, even if entirely accurate and relevant, can completely negate the value of the information. Put another way, too much information leads to incapacitation. Information age leaders need to caution themselves to this possibility. Sensory overload represents our human limitation to process information. Increased volume overwhelms not only our ability to consume, but also our ability to process and understand. As technology continues to evolve, this human limitation will be removed more and more by autonomous machines. This will not however, remove the need for human leadership. Perhaps on the opposite end of the leadership spectrum from sensory overload is micromanagement.¹⁰⁴

Micromanagement

Contrary to sensory overload, an information age micromanager believes he does not have *enough* information. Worse yet, he believes he knows better than those actually tasked to execute his commands. As such, it is important to realize that as we move toward omniscience we cannot move toward omnipotence. Information age technology allows commanders to digitally “look over the shoulder” of nearly every person under his command. From live UAV video to intercepted electronic mail, commanders have the ability to monitor every action taken on and off the battlefield. This presents the tremendous temptation to second-guess a subordinate or even intervene directly in the execution of a mission. Operational level information age leaders are not platoon leaders--but they can be lured into that role with the aid of live video and real-time communications. This is an abuse of technology which can short-circuit the command structure and the professional development of everyone involved.¹⁰⁵

¹⁰⁴ Boyd, 228-9.

¹⁰⁵ Ibid., 229.

Part V

CONCLUSIONS

It appears a time is rapidly approaching when information will play *the* dominant role in military operations. The United States armed forces will need leaders that are equipped with the skills and experience that will propel them to success in this future arena. Although the military is constantly developing and fielding new technology, it needs to field new leadership skills to match the power and capabilities of these new information technologies. The information age leadership skills described in this monograph are designed to meet that need.

Several conclusions can be made in light of the research and thoughts described above. Perhaps the most undeniable is the fact that technology will continue to develop and evolve. This evolution is seen throughout the history of mankind and shows absolutely no sign of waning.¹⁰⁶ It is also true that as technology has evolved, the conduct of war has changed with it. This interdependent relationship has created advantages for leaders and militaries equipping themselves with the very latest technological developments. As much as technology changes, the nature of mankind has not.

People will always be analog “machines.” In our currently unaltered state, man is very limited in certain aspects compared to his technological creations. This may be an obvious conclusion, but it is necessary to understand that man serves the diametrically opposed positions of both creator and limiter of technology. While some autonomous machines, such as the Patriot missile system, are designed to make their own decisions and execute them, they are presently in the minority of modern weapon systems. At the tactical level this will undoubtedly be less so as more advances are made in artificial intelligence; however, man currently serves, and hopefully will always serve, as the primary source for command decision and execution at the operational

¹⁰⁶ Moore’s Law states the number of circuits on a chip will double each year. Although this pace has slowed, it reveals the aggressive pace of development. See Lebow, 164-165, for additional details.

level. Resultantly, man will need to ensure that his analogue system is properly served by digital systems that are designed to accurately translate data into human-friendly information. These first two conclusions direct to the third conclusion.

The third conclusion is the necessity of leaders to understand the information age triad of technology, people, and environment. This triad brings into focus a unique world where both physical and virtual realities are fused. Any seams between these worlds will create “fog and friction” during combat. Commanders must be aware of and provide solutions to negate the potential problems caused by ADG. Information age leadership is an essential part of the solution.

Technology enablers and compensators will ensure leaders both master the latest high-tech tools while also capitalizing on the most essential human assets. The technology enablers of systems thinking, collaborative leadership, information as a weapon, and adaptive organization are needed to help commanders understand how technology and information management can be fully utilized. This conclusion is foundational to understanding that technology, no matter how powerful, still needs human guidance for maximum use and development. The companion conclusion is that we also need leadership skills that are technology compensators.

The most sophisticated C4I2 systems cannot execute wisdom, coup d’oeil, patience, or integrity. It is here that the advantage of a human perspective is most evident. We must conclude that not only can the most advanced warfighting systems not replicate these skills, they are all the more important as the power of information continues to expand at a phenomenal rate. The final conclusion is the most telling and applicable to the modern warfighter.

Although the JOE reflects a need for most of the technology enablers and much of doctrine describing the technology compensators, they still lack comprehensive guidance for information age leaders. This monograph briefly records what has already passed historically and attempts to project what will be needed in the future. Doctrine is the only vehicle that will provide leaders the direction they need as they chart a new course into the information age.

Currently, the JOE and doctrine do not present a detailed, comprehensive description of the nature, dynamics, and environment of the information age and the leadership skills required to dominate this era. With that vacancy comes a corresponding lack of leadership training competency. Deficiencies in these areas will ultimately result in failed missions and a weakened military position. So it is here that we reach the crux of this monograph: the United States armed forces must develop new leadership doctrine that reflects the skills needed to dominate adversaries in the information age. For we must never forget ... everything comes down to leadership.

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