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THE REVOLUTION IN MILITARY AFFAIRS:
PROSPECTS AND CAUTIONS

Earl H. Tilford, Jr.

June 23, 1995

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FOREWORD

The current Revolution in Military Affairs (RMA) is taking place against the background of a larger historical watershed involving the end of the Cold War and the advent of what Alvin and Heidi Toffler have termed "the Information Age." In this essay, Dr. Earl Tilford argues that RMAs are driven by more than breakthrough technologies, and that while the technological component is important, a true revolution in the way military institutions organize, equip and train for war, and in the way war is itself conducted, depends on the confluence of political, social, and technological factors.

After an overview of the dynamics of the RMA, Dr. Tilford makes the case that interservice rivalry and a reintroduction of the managerial ethos, this time under the guise of total quality management (TQM), may be the consequences of this revolution. In the final analysis, warfare is quintessentially a human endeavor. Technology and technologically sophisticated weapons are only means to an end.

The U.S. Army, along with the other services, is embracing the RMA as it downsizes and restructures itself into Force XXI. Warfare, even on the digitized battlefield, is likely to remain unpredictable, bloody, and horrific. Military professionals cannot afford to be anything other than well-prepared for whatever challenges lie ahead, be it war with an Information Age peer competitor, a force of guerrillas out of the Agrarian Age, or a band of terrorists using the latest in high-tech weaponry.

While Dr. Tilford is optimistic about the prospects for Force XXI, what follows is not an unqualified endorsement of the RMA or of the Army's transition to an Information Age force. By examining issues and problems that were attendant to previous RMAs, Dr. Tilford raises questions that ought to be asked by the Army as it moves toward Force XXI. Warfare is, the author reminds us, the most complex of human undertakings and the victors, even in the Information Age, will be those who, as in the past, are masters of the art—as well as the science—of war.

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BIOGRAPHICAL SKETCH OF THE AUTHOR

EARL H. TILFORD, JR. is Senior Research Professor and Director of Research at the Strategic Studies Institute. He earned his BA and MA in history at the University of Alabama and his Ph.D. in American and European military history at George Washington University. Dr. Tilford is the author of three books, the latest, published by Texas A&M University Press in 1993, being *Crosswinds: The Air Force's Setup in Vietnam*. He has published more than two dozen articles in scholarly and professional journals. His next book, *Eagle in the Desert: A Look Back at the Persian Gulf War* will be published by Greenwood Press later this year.

SUMMARY

A characteristic of the American way of war is our fascination with technology and the search for that technological "silver bullet" that will deliver victory quickly and with a minimum of loss of life. The current Revolution in Military Affairs (RMA) is driven by rapid technological advance fostered by the advent of the microprocessor and by decreased defense spending. It operates against the background of a historical watershed brought about by the end of the Cold War.

The RMA has been embraced by all the United States' military services; especially the Air Force and the Army. As the Army downsizes it is seeking to change itself into Force XXI; a strategic force, trained and ready, to fight and win the nation's wars in the 21st century. That we are in the midst of a true revolution in military affairs is evident. What it may mean for the Army and the nation is not so evident.

This monograph outlines where the Army is going as it seeks to define change rather than be defined by change. It also looks to the past to ask what have been the results of change during past RMAs? Accelerated interservice rivalries and over-reliance on management systems marked the last RMA, one driven by the advent of atomic weapons at the end of World War II and the relatively stable and sparse defense budgets of the 1950s. The author argues that the consequence of interservice rivalry and the institutionalization of the managerial ethos was defeat in Vietnam.

Finally, the author warns against becoming so entranced with the sophisticated technologies of the RMA that we lose both our grounding in strategic thinking and our basic warrior skills. To do so could be potentially disastrous when two peer competitor forces meet on the 21st century battlefield and, quite possibly, cancel each other out electronically. Then, it will be the side which is able to fight at the lower "gut level" of warfare that will prevail.

THE REVOLUTION IN MILITARY AFFAIRS: PROSPECTS AND CAUTIONS

Introduction.

Discussions of the Revolution in Military Affairs (RMA), the Military-Technical Revolution (MTR), and Information Age Warfare often develop along technological lines. The Department of Defense's Office of Net Assessment defines an RMA as a major change in the nature of warfare brought about by the innovative application of technologies which, combined with dramatic changes in military doctrine, and operational concepts, fundamentally alters the character and conduct of operations. What is lost in this definition and in subsequent discussions is the nature of war, which remains a complex interaction of political objectives, human emotions, cultural and ethnic factors, and military skills. In pursuit of a political objective, warfare is violence articulated through strategy which is a balance of ends, ways and means. Technology and technological innovations, while affecting the way wars are or might be fought, remain means to an end.¹

The Gulf War and the collapse of the Soviet Union, occurring as they did almost simultaneously, marked an historical watershed. Ironically, the Gulf War, with its vision of a high-tech and extremely potent U.S. military, coincided with the end of an era in which just such a force is most viable. One might postulate that the Gulf War and the fall of the Soviet Union, taken together, constitute a bookend to one end of an era of Western political and military history that is bounded at the other end by the Franco-Prussian War of 1870-71. One might then argue that the West was engaged in a second Hundred Years War between 1870 and 1989.² But the era which is dawning, the post-Cold War era, is not the end of history nor is it so radically different from all that came before that the study of the past has no relevancy.

The end of the Cold War and the dawning of what Alvin and Heidi Toffler have termed "the Information Age" are the two powerful conditions that define the environment in which the United States Army and its sister services operate today.³ In the Information Age, one can argue that a military-technical revolution, brought about by the advent of the microprocessor and

precision-guided munitions, is fostering a revolution in military affairs. That may be so, but RMAs and rapid advances in technology are not always related. The armies of Napoleon, for instance, were part of a revolution in military affairs that derived from the social and political upheavals of the French Revolution. While the armies of the French Revolution coincided with the beginnings of the Industrial Revolution, the incorporation of the people into the war effort through the *levee en masse* was more important than anything issuing from the Industrial Revolution. Furthermore, the weapons used by the armies of 1815 were basically the same as those available in 1789 or, for that matter, in 1715. Conversely, the military-technical revolution that issued from the maturing Industrial Revolution at the beginning of the 20th century did not translate into a true RMA until after the First World War, although all the technological elements were available during the war: the railroad, machine guns, tanks, long-range and rifled artillery, rapid-fire rifles, electronic means of communication, and airplanes.⁴

Dynamics of the Current RMA.

The current RMA is driven by three primary factors: rapid technological advance compelling a shift from the Industrial Age to the Information Age; the end of the Cold War; and a decline in defense budgets. It entails a fundamental change in who, how, and, perhaps even why wars are fought. It is driven not only by new technologies but by new operational concepts, new tactics, and new organizational structures. The impact of the current confluence of social, political, economic, and technological forces on American society and the armed forces may equal—or exceed—what occurred during the 1960s and 1970s during the turmoil associated with the war in Vietnam.

The armed services, the Army and the Air Force in particular, are feeling the impact of changes compelled by this historic shift from the Industrial to the Information Age. The transition is forcing a change in the way the military services are organized, how they are supplied, how they procure weapons and how they are managed, and, most importantly, how they think and fight.

Over the past five years the armed forces have gone through

a tremendous reduction or, in military doublespeak, a *build-down*. This build-down, which actually began in 1987, now proceeds in accordance with the Bottom-Up-Review (BUR) issued by Secretary of Defense Les Aspin in October 1993. By the end of the century, the total number on active duty in the Army, Air Force, Navy and Marines will have fallen from 2,130,000 in 1989 to 1,445,000. The Army continues to decline from 18 active divisions to 10, the Air Force is dropping from 24 to 13 active fighter wings, and Navy battle force ships are declining from 567 to 346. While the Marine Corps will retain its structure of three Marine Expeditionary Forces, personnel strength will fall from 197,000 to 174,000. According to the 1995 National Military Strategy, "Nevertheless, the United States will retain formidable forces . . . pound for pound more capable through enhancements and selected modernizations."⁵ These changes have inconvenienced and caused uncertainty among professional soldiers, sailors and airmen.

The extent to which the armed forces have accepted these changes, however, has been remarkable, particularly given that the drawdowns, relocations, reorganizations and other fundamental alterations to the way they operate began immediately following a victory of immense proportions in the Gulf War; a victory which confirmed the tremendous progress made in rebuilding the services, especially the Army, after the Vietnam War. The Army is not only restructuring as it downsizes, it also is changing the very way it thinks about war. As former Army Chief of Staff General Gordon R. Sullivan stated, "We have to prepare ourselves for wars we haven't seen yet and that we don't understand. We are not just changing what we think. We are changing how we think."⁶

The Army and the RMA.

The Army is changing from a forward-deployed and Industrial Age army trained, equipped, and postured to stop a Soviet advance in Europe, to an Information Age, power projection army. The Army is drawing on the past and the present to make this transition. Historically, the Army has a tradition as a power projection force dating from the Spanish American War and the birth of the American Empire.⁷ In fact, during the Cold War, although there were significant forces deployed in Europe, the Army was still a power projection force with most of its divisions stationed in the continental United States. Although power projection is very

much a part of the new Army's past, what is different is the rapidity with which forces must be deployed, where they may be sent, and the reasons for going there. According to the National Military Strategy of 1995, "The existence of a credible power projection capability complements our overseas presence acting as a deterrent to potential adversaries."⁸ The Army is drawing on the Military Technical Revolution as it structures, equips, and trains an RMA force that will make this concept a reality. The transformation of the Army into Force XXI, a power projection army for the Information Age, will be achieved by implementing a vision built on five modernization objectives.

The first is to reorganize and restructure the Army into the kind of force that can be deployed rapidly and then sustained in the theater. As a part of the the Army's Force XXI initiative, it is studying the way battalions, brigades, divisions, and corps should be organized as these entities evolve into the size and composition needed to succeed on Information Age battlefields.⁹ An experimental Force XXI brigade, designated EXFOR XXI, was in place early this spring at Ft. Hood, Texas. In 1996, the Army plans to stand up EXFOR XXI at the division level.¹⁰

Second, Force XXI must be able to survive on the Information Age battlefield against any foe, whether that may be a peer competitor capable of fighting in the digitized arena or an Agrarian Age or Industrial Age force, opponents which historically have proven most troublesome. Survival and sustainment will be as much elements of operational power in the future as they were in the past. Force XXI must be considered in relation to the capabilities needed across a spectrum military operations which may also include relief operations, peacekeeping, and humanitarian interventions.

Third, the Army must be modernized to win the information war. In information warfare, the objective is to deny the enemy critical knowledge while achieving and retaining the decisive advantage of battlefield awareness. The actual weapons used by Force XXI: the tanks, infantry fighting vehicles, artillery pieces, rocket launchers, helicopters, command and control vans, and support vehicles will look a lot like the Industrial Age weapons of today. But they will be much smarter, deriving their intelligence from computers and advanced technologies joined in a digitally-integrated force that, taken as an entity, will be

qualitatively superior to the Army that won a decisive victory in the Gulf War.

Fourth, the Army of the 21st century—Force XXI—must be capable of precision strike. Precision strike will blind, immobilize, and maintain the enemy at a distance while critical targets are identified, struck and destroyed. Strike has to be considered in terms of the degree of coercive capability necessary to support the execution of a given mission. Additionally, the strike function will be defined by the Army's ability to mass the effect of its instruments (troops, tanks, helicopters, artillery pieces, and rocket launchers) at the critical places and at the proper time. "Decisive victory" will be defined in terms of the objective, which may be anything from the destruction of an enemy force to the stabilization of a local situation brought about by natural disaster or ethnic and tribal conflict, curbing the excesses of intrastate conflict, or countering the more traditional forms of interstate aggression.

Finally, the modernized Information Age Army, Force XXI, must be capable of dominating and winning the maneuver battle. Through dominating maneuver, the right forces will be gotten to the right place at the right time to effect the enemy's operational and strategic collapse. The key to winning on the fluid and multidimensional battlefield of the 21st century will be *simultaneity*; the simultaneous employment of overwhelming combat power throughout the breadth and depth of the operational area to paralyze the enemy. Simultaneity is linked to surprise and the disruption of the opponent's decision cycle. The objective is, through dominating maneuver, to make the enemy incapable of responding to a rapid succession of initiatives devised to win quickly and decisively. If the Army does these things right, the result will be a smaller, highly sophisticated force, yet one able to overwhelm and defeat a foe superior in numbers.¹¹

Digitization is one key to unlocking the capabilities of Force XXI, and the digitized battlefield is becoming a reality. By integrating advanced technologies into already existing systems, the Army is upgrading its intelligence gathering and processing capabilities along with its command and control mechanisms, tanks, and fighting vehicles. As Andrew Krepinevich put it, "Establishing information dominance could well be the *sin*

qua non for effective military operations in future conflicts."¹²

Barring an unforeseen technological leap of fantastic dimensions, no single technological advance is likely to foster a revolution in military affairs—at least not by itself. Rather it is the integration of capabilities, those that exist along with new ones as they arise, that makes for an RMA. War is still a matter of ideas, emotions and will. Weapons and technology are tools. The masters of the art of war in the 21st century will be those individuals who can put capabilities together in innovative ways to achieve tactical, operational and strategic objectives. For instance, the first blow in the Gulf War was struck by nine Army Apache AH-64 attack helicopters from the 101st Airborne Division (Air Assault) led by three U.S. Air Force MH-53J Pave Low helicopters from the 1st Special Operations Wing. Just before H-Hour, the helicopters, organized as Task Force Normandy, flew a long, earth-hugging mission to blast two early warning radar sites deep inside Iraq. The MTR provided the technological advances in night-and-low-light vision devices and precise navigational capability resulting from space-based systems such as the Global Positioning System (GPS) satellites.¹³ What indicates an RMA is the operational integration that brings together the technologies available to Air Force and Army helicopters and employs them to pave the way for what was predominantly an Air Force and Navy air campaign.

Looking Back as We Look Ahead.

History is the only reliable guide mankind has to the future. Nearly a century ago, A.T. Mahan wrote, "While many of the conditions of war vary from age to age with the progress of weapons, there are certain teachings in the school of history which remain constant . . . It is wise to observe things that are alike, it is also wise to look for things that differ."¹⁴

The world is as dangerous today as it was when the Cold War began. Over the past 50 years, the major peer competitors in the RMA fostered by the advent of the atomic and nuclear era managed to avoid war with each other. Nevertheless, while the United States was ready for war at the high end of the technological spectrum, "atomic war, eyeball-to-eyeball and toe-to-toe with the Rooskies" as Maj. King Kong, the demented B-52 pilot in the movie "Dr. Strangelove" put it, some 100,000 Americans died in lower

order conflicts from Korea and Vietnam to Lebanon, Grenada, Panama and the Persian Gulf. In 1962, at the start of the U.S. commitment to the war in Vietnam, Chairman of the Joint Chiefs of Staff, Army General Lyman L. Lemnitzer claimed that forces constituted for war in Europe could just as easily fight and win against guerrillas in Indochina.¹⁵ In the Army and the Air Force, there was a general acceptance of the notion that unconventional or limited war was merely a subset of the kind of general and conventional wars for which the services were structured and equipped. If American forces could fight and prevail over Soviet or Chinese forces in conventional or nuclear war, they could certainly win any lesser order conflict quickly and with less application of more or less the same kind of force.¹⁶ In Vietnam that notion proved tragically flawed.

The end of the Cold War and the dawn of the Information Age do not mark the advent of a technologically-based millennium of peace and democracy. Since the Berlin Wall came down in November and December 1989, the U.S. Army has issued over 700 Purple Hearts and two Congressional Medals of Honor. That is more Purple Hearts than were issued at any time between 1946 and 1989 except when U.S. forces were engaged in Korea and Vietnam.¹⁷

Interservice Rivalry.

The current Revolution in Military Affairs, no less than the one driven by the atomic revolution, brings with it both opportunities and challenges. In the periods between 1947 and 1950, 1954 and 1960, and from 1961 to 1965, precipitous technological change and the competition for defense appropriations drove bitter interservice rivalries. The atomic bomb and how the services adapted to its implications for strategy, force structure, weapons acquisition, and doctrine operated on the one hand. The defense budgets operated on the other. Between 1947 and 1950 and from 1954 through 1960, the competition was driven by the atomic revolution and the scarcity of defense dollars. From 1961 to 1965, interservice rivalries were the result of an expanding defense budget, a squabble over roles and missions in Vietnam, and a shift in strategy from one based on massive retaliation, which favored the Air Force and its large nuclear retaliatory forces, to one based on flexible response, which expanded the roles of the other services and their conventional, nonnuclear forces. Interservice rivalry is a

part of the current RMA as well.

In the U.S. Air Force, from before 1947, an article of faith has been that offensive strategic air power possesses the virtues necessary to obtain a complete and unambiguous victory. Strategic bombing and victory through the decisive use of air power are concepts precious to air power enthusiasts. The current international environment, however, no longer favors such a proposition. Air Force Colonel Richard Szfranski, writing in the Spring 1995 *Joint Forces Quarterly*, argues that the end of the Soviet threat may well mark the end of the Air Force's *raison d'etre* as an independent service and that, "Unless the Air Force becomes *the* space force, it may not survive beyond 2010."¹⁸ Today the competition over space is only one area in which interservice rivalry is intense.

Additionally, the Military Technical Revolution has provided the weapons that conceivably could turn the theory of strategic paralysis into reality. Theoretically, the more technologically advanced the enemy, the more susceptible the nation and its armed forces will be to the kind of attack that will result in strategic paralysis. Retired Air Force Colonel John A. Warden is the most articulate advocate of this kind of warfare. He has posited a definition of the enemy as a system of five "strategic" rings. Listed in descending importance to the proper functioning of the enemy system, these rings are as follows: leadership, organic essentials (i.e., electrical power), infrastructure, population, and fielded military forces. According to Warden, air power is uniquely qualified to bring quick and decisive victory because planes and missiles can transcend earthly barriers of distance and topography to strike at the innermost ring—leadership—to incapacitate the opponent by destroying his brain: the command and control system. If, for political or moral reasons decapitation is not possible, then air power can induce strategic paralysis by attacking the outer rings to achieve a desired level of immobility or insensibility consistent with the objective intent.¹⁹

The MTR and the integration of precision-guided munitions (PGMs) with the F-117A stealth fighter and into the B-1 and B-2 bomber fleets is to the current RMA what the wedding of the atomic bomb with the Convair B-36 intercontinental bomber was to the previous Revolution in Military Affairs. The Air Force's

dominance of the budget then was based upon the implicit contention that its long range nuclear delivery capability made it the dominant and decisive force in war. Air power enthusiasts and advocates of the air campaign as depicted by John Warden have gained impetus from the perceived "decisiveness" of air power in the Gulf War. While air power was, indeed, critical to the final outcome and pivotal to the success of the Allied forces, it was not *decisive*.

The Army, for its part, argues that historically wars are won on the ground and that it is the only service capable of prompt and sustained land combat operations. It portrays Force XXI as a technically-enhanced land combat force that can deter potential adversaries and protect U.S. interests around the globe. Land power advocates claim that only the Army has the assets and staying power to operate over the entire battlefield anywhere in the world. While successful military operations involve controlling the air, sea and land, a nation's ability to impose its will can only be assured if it is capable of controlling the land.²⁰

Currently the services, but especially the Army and the Air Force, are engaged in a spirited dialogue over roles and missions. Both services are in competition for funds in a decreasing defense budget while they are also modernizing and restructuring their forces to accommodate new technologies. For the present, however, an unfortunate result of the current RMA will be heated interservice rivalries.

Technological Backfire.

Technology is extremely seductive and it is easy to get caught up in the exotic potential of the RMA. But in pursuit of a new way of making war, one cannot allow technological romanticism to engender visions of a mystical silver bullet which promises to sanitize war by erasing its human dimensions. The tendency to chase silver bullets was evident in the Vietnam War. At the beginning of the war, during the advisory phase, Operation Ranch Hand was one such endeavor. This involved the aerial spraying of chemical herbicides like Agent Orange on the jungles and mangrove swamps of South Vietnam and Laos in an effort to deny cover to the enemy. The sad result was threefold. First, defoliation did not work very well and the ability of the enemy to conceal its

movements was not inhibited. Second, the ill-effects of aerial spray, not only on the people and the ecology of Indochina but also on American troops, fed the more exotic claims of the anti-war movement, especially the contention that a cruel and unusual technology had been unleashed on a peaceful and peace-loving people. Third, there is the actual medical legacy of affected veterans—American and Vietnamese.²¹

University of Rochester historian, Professor Loren Baritz, in his book *Backfire: Vietnam, The Myths That Made Us Fight, The Illusions That Helped Us Lose, The Legacy That Haunts Us Still*, argued that, "One of the major by-products of technology is faith in technology."²² In the Spring 1995 *Airpower Journal*, the authors of an article, "Weapons of Mass Protection," maintained that, "Acquiring weapons of mass protection, nonlethal, anti-lethal, and information warfare weapons, and integrating them into current force capabilities, may be the way that airpower can secure for years . . . its primacy in strategic utility."²³ The Gulf War, with the rapidity of victory and low casualty rates, may or may not be repeated in the next large-scale engagement of American forces. But whether it is or not, one can count upon the expectation of many Americans that it should be. And if the war is bloody and long rather than quick and relatively casualty-free, unless the objectives are clearly worth the cost, public support will erode quickly.

Our national fascination with technology in the 1950s transferred to Vietnam in the 1960s, where the Air Force, and to a lesser degree the Army, searched in vain for a technological silver bullet. Cluster bombs, napalm, and herbicide defoliants, and the first manifestations of the current MTR, the electronic battlefield, laser and electro-optically guided bombs, all promised much. While some delivered a good deal of destruction, in the end technologically-sophisticated weapons proved no substitute for strategy. What technology did do, however, was to enforce, compel, and solidify the military's managerial mindset. Vietnam was the best-managed war in American history; unfortunately it was also a well-managed defeat.

From PRIDE to TQM.

Resources are an integral part of the equation in affecting the RMA. The defense budget decline is not an insurmountable

barrier. Historically, revolutions in military affairs have occurred during times of both plentiful and scarce economic resources. Indeed, the last two RMAs occurred during the Great Depression and after the Korean War; both were times of constrained budgets. In some ways poverty is the father of ingenuity.

In the seminal 1992 study of the MTR conducted for the Office of Net Assessment, Andrew Krepinevich made the point that the U.S. Navy developed the concept of carrier task forces, the U.S. Marines worked out the basics of amphibious warfare, and the Army Air Corps laid the theoretical foundations for strategic bombing during the Great Depression.²⁴ In Germany, despite economic chaos and the restrictions imposed by the Versailles Treaty, by 1935 the theoretical and operational foundations for *blitzkrieg* had been established. Furthermore, as the German experience indicates, frequently the RMA is not a matter of some revolutionary technological breakthrough, but the development of doctrines and organizations that can integrate existing technologies in a new and innovative way.

Taken together, however, technology and management historically have constituted a challenging combination for the U.S. Department of Defense. The managerial ethos, engendered during World War II and institutionalized in the 1950s, took hold in the 1960s. High-tech weapons demand effective and efficient management, from initial research and development through procurement and deployment. Management depends upon bureaucracies to insure efficiency, and bureaucracies abhor the unpredictable and the uncontrollable. Therefore, managers and bureaucrats will promote the objectivity of the quantifiable at the expense of the subjectivity of the creative but unpredictable.

The Vietnam War solidified the managerial ethos making it fundamentally a part of the value systems of all the services, but especially that of the Air Force and, to only a lesser degree, that of the Army, Navy and Marines. In the Air Force the managerial approach to warfare evidenced itself in the way success was measured in Operation Commando Hunt, the aerial interdiction campaign along the Ho Chi Minh Trail from November 1968 to April 1972. The truck count, a running compilation of trucks damaged or destroyed by air power, was an effort to assess victory in terms of statistical success. The Army equivalent was

the infamous body count, whereby any ground operation in Vietnam might be evaluated in terms of the number of enemy supposedly killed or wounded. In both cases, however, statistics proved to be no substitute for strategy and what the Air Force and the Army succeeded best at was fooling themselves into thinking that they were winning the war.²⁵

The tendency to confuse efficiency with effectiveness continued after the Vietnam War and through the 1980s. Military managers devised a succession of efficiency-oriented programs with snappy acronyms like "Zero Defects" and Professional Results in Daily Efforts (PRIDE). Management by Objective (MBO) and the "Productivity Program" took root in the mid-1980s. Zero Defects, PRIDE, and MBO were management systems devised for Industrial Age military bureaucracies. The RMA is changing the military bureaucracy just as the Information Age is changing industrial and business bureaucracies. In the armed forces as well as in industry, middle management positions are disappearing as their main functions, information transfer and worker supervision decline in importance. Computers transfer a great deal of information digitally by "talking" to one another. In accordance with Total Quality Management (TQM) principles, workers are more self-regulating. Staffs and staff responsibilities are changing as bureaucratic spans of control grow while organizations become flatter and "process action teams" increase in importance.²⁶ The challenge to the military is to retain its system of values and to enforce traditional respect for rank and order while changing the hierarchial system of command.

If TQM is to the Information Age what PRIDE and MBO were to the Industrial Age, there is reason to be cautious as the Army and the other services transform their structures. The Department of Defense has adopted total quality management concepts with an enthusiasm that perhaps exceeds that accorded to earlier systems. Throughout the services, officers and non-commissioned officers have accepted the contentions made by W. Edwards Deming that TQM is largely responsible for the post-war Japanese economic recovery.²⁷ After almost total destruction of Japan's industrial base by bombing in World War II, the Japanese auto industry rose like Phoenix from the ashes to achieve phenomenal success. The program has been oversold to the military by people who forget that Japan had the advantage of rebuilding its industrial base and structuring it to incorporate the latest technologies. It

also ignores the unique characteristics of Japanese culture and society that facilitated rapid adaptation to the Industrial and Information revolutions over the past 120 years.

Parts of the military that resemble civilian industry could profit from a businesslike culture; acquisitions and finance in particular. But TQM may be as threatening to military culture as Zero Defects, PRIDE, and MBO were earlier. War is, and in the information age is liable to remain, a bloody, horrific, and passionate undertaking. The bottom line is always victory, and that sometimes comes at an exorbitant price in human suffering and resources. The Defense Department's general managers, and the services' manager generals, did not serve the nation well when they took the world's premier Industrial Age military to war (and defeat) in Vietnam. In the RMA we must ensure against raising up a generation of leadership composed of techno-wonk managers.²⁸

The RMA, Force XXI and the Future.

Reservations aside, the American military, especially the Army and the Air Force, are embracing the RMA. As the services move into the Tofflerian Third Wave as Information Age militaries, they are preparing to fight other Information Age, Third Wave armed forces. Just as it was necessary for the Air Force, Army, Navy and Marines to be prepared to fight their Soviet counterparts during the Cold War, it may be just as prudent to prepare for the most potent possible future threat. But will being able to fight in the Third Wave also ensure that the armed forces will be able to fight effectively against First and Second Wave foes? Historically, the record has not been good.

Since World War II, U.S. military failures have come at the hands of opponents who had little or no air or sea forces and whose ground forces were composed largely of light infantry. During the Korean War, and on those occasions during the Vietnam War when the enemy was good enough to confront American forces conventionally, they were almost always drubbed. First and Second Wave forces, however, often prevailed over first-class Industrial Age forces when they employed a combination of unconventional strategy and tactics with a willingness to sustain higher casualty rates. Defense analyst Dr. Jeffrey Record, in a paper delivered at the Army War College, made the point that American forces were stalemated in Korea, defeated in Vietnam, and

humiliated in Lebanon and Somalia when their opponents took the strategic initiative and forced the kind of fight where high firepower and air power could be used effectively.²⁹ The French experience in Indochina and the Soviet experience in Afghanistan were similar. Even in the Information Age, the dialectic is at work. There may well be another Mao Tse Tung or another Vo Nguyen Giap capable of developing a counterstrategy or devising a tactical solution that may reduce or even eliminate any Third Wave force's supposed advantage in Information Age warfare. Given the inevitability that this will occur, any strategy that may be developed during the RMA that does not anticipate and plan for these counterstrategies will not serve the nation well.

Then there is what Krepinevich described as the "dreadnought factor." What if the United States is not the nation that makes the next dramatic technological leap? What if someone else takes that giant step that renders everything else irrelevant? As the future unfolds it may be easier to do that than in the past, especially if the breakthrough involves harnessing the mind to an already available, off-the-shelf technology. What if one, two, or ten exceedingly bright and innovative techno-wonks figure out how to electronically "blow up" the New York Stock Exchange or the Federal Reserve System? What would be an appropriate response?³⁰

There is danger here in cultural myopia. The atomic bomb may have been invented in the United States, but it might not have been if Albert Einstein and others had remained in Germany. We must keep in mind that we are raising up a generation of Americans dependent on hand-held calculators to do their basic math.

Finally, the possibility of the rise of a peer force competitor cannot be discounted. Despite political instability and economic chaos, Russia is still moving ahead in its military modernization programs. Despite the loss of the Ukraine, it is rich in natural resources and its population has produced an abundance of premier physicists. The collapse of the Soviet Union will be more likely to affect Russia's ability to engage in the RMA than it will to continue its participation in the MTR. If Russia reconstructs itself politically, especially in the form of a military dictatorship, its participation in the RMA could bring it to peer status with the United States relatively quickly.³¹ Currently, other than Russia, the only nations that can

participate even partially in the RMA are France, Germany, the United Kingdom, Israel, and Japan. They are friendly.

It takes more than technology to become a full participant in the RMA.³² The national and military culture have to be accommodating to change and decentralized execution. For instance, while Japanese business culture may be able to operate under TQM principles, the Chinese might find it culturally more difficult to accept and employ. The technological barriers to full participation are themselves significant, and only a handful of countries have the necessary advanced data-processing systems, space-based sensors, and access to usable stealth technologies—to name a few required basics.³³ Not many nations possess the right combination of culture, wealth, and access to technologies. And military cultures may be more resistant to change than the societies which support them.

But the number of those nations that can participate in the MTR in a limited way is much larger and the list is growing. Today some 20 nations can produce precision-guided munitions. That number may well double within a decade. And the pace of technological evolution is likely to increase, with the possibility of a dramatic breakthrough on the part of someone other than ourselves.

If and when an Information Age force meets a peer competitor, contesting forces could cancel each other out at the electronic level early on. Alternatively, one side may electronically zap its opponent in the cyberwar equivalent of a Pearl Harbor. What then would be the alternatives?

If both sides cancel one another out, the alternatives are twofold. First, a war of attrition might develop, perhaps resembling what happened on the Western Front in World War I. Then the two sides are likely to fight to exhaustion, especially if the leadership on both sides has been so focused on Information Age warfare that they have forgotten—or never learned—basic military strategy or the operational art extant in the 1980s and 1990s. The second alternative would be to fight a Second Wave or even First Wave kind of war. The side which can fight at that lower level, at the Industrial Age or Agrarian Age level where superior strategy, innovative tactics, and human courage and determination are the critical—often decisive—

factors, will win. The danger is that in the current RMA we may be neglecting the warrior skills and relinquishing the kind of military culture that would be needed to pursue warfare at the gut level.

If one peer competitor gains an immediate advantage by establishing cyberspace dominance and Information Age superiority over the other, there again will be two alternatives. First, surrender is always an available solution. Second, if the victimized forces are able to fight at the lower level, and if they can take the offensive, they may well win. There is no reason to believe that in the Information Age victory will not accrue—as it has in the past—to the side which develops the superior strategy and which has the greater capacity for enduring suffering. Historically, that has not always been the side which has possessed the edge in technology and weaponry.

In conclusion, strategic thinkers in all the services need to address the nature of war in the Information Age. The U.S. Army, and the military in general, still view war as combat—the clash of forces to establish superiority on land, in the air, or at sea. War in the future may well be waged in any one or all three of these arenas but it may also be fought across the spectrum to include economic warfare, ecological warfare, and terrorism. Clashing titans on the battlefield may be the exception rather than the rule, with future war dominated instead by wire-heads on the Internet. That brings us back to the central question of strategy: how do we balance ends, ways and means in the Information Age?

ENDNOTES

1. General Gordon R. Sullivan and Lieutenant Colonel James M. Dubik, *Land Warfare in the 21st Century*, Carlisle Barracks, PA: Strategic Studies Institute, February 1993, pp. 22-24.

2. A similar argument is made by John Lukacs in *The End of the Twentieth Century and the End of the Modern Age*, New York: Ticknor and Fields, 1993, pp. 4-9. Lukacs, however, claims that the 20th century lasted only 75 years, from 1914 to 1989. I would suggest that World War I was the inevitable result of the Franco-Prussian War, much as World War II was historically determined by the First World War and the Versailles Treaty.

3. See Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century*, Boston: Little, Brown and Company, 1993, pp. 15-17.

4. See Richard A. Preston and Sidney F. Wise, *Men in Arms: A History of Warfare and its Interrelationships with Western Society*, 4th edition. New York: Holt, Rinehart and Winston, 1979, pp. 238-250; and Andrew F. Krepinevich, "The Military-Technical Revolution: A Preliminary Assessment," Office of Net Assessment unpublished manuscript, July 1992, pp. 2-5.

5. *National Military Strategy of the United States of America: A Strategy of Warfare and Its Interrelationships with Western Society*, Washington: U.S. Government Printing Office, February 1995, p. 17. Hereafter referred to as *National Military Strategy*, 1995.

6. Sullivan quoted in David Wood "Unlikely Radical Inspires Army to Do More With Less," *Sunday Patriot News*, Harrisburg, Pennsylvania, April 2, 1995, p. A-12.

7. Allan R. Millet and Peter Maslowski, *For the Common Defense: A Military History of the United States of America*, New York: The Free Press, 1984, pp. 273-289 and 299-325.

8. *National Military Strategy*, 1995, p. 2.

9. See The Honorable Togo D. West, Jr., and General Gordon R. Sullivan, *A Statement on the Posture of the United States Army, Fiscal Year 1996*, Washington: U. S. Government Printing Office, April 1995, p. 55; and Sullivan and Dubik, *War in the Information Age*, p. 19.

10. General Gordon R. Sullivan, "America's Army: Strategic Force for Today and Tomorrow," *Defense 95*, Washington: U.S. Government Printing Office, April 1995, p. 14; and conversation with Professor Doug Lovelace, Strategic Studies Institute, May 3, 1995.

11. See General Gordon R. Sullivan and Lieutenant Colonel Anthony M. Coroaalles, *The Army in the Information Age*, Carlisle Barracks, PA: Strategic Studies Institute, March 1995, pp. 7-8

and pp. 12-13; and West and Sullivan, *The Army Posture Statement, 1996*, p. 57.

12. Krepinevich, "The Military-Technical Revolution," p. 22.

13. *Final Report to Congress: Conduct of the Persian Gulf War*, Washington: U.S. Government Printing Office, 1992, p. 115.

14. A.T. Mahan, *The Influence of Seapower Upon History*, 12th edition, Boston: Little, Brown and Company, 1980, p. 2.

15. JCSM-33-62, Memorandum for the Secretary of Defense, 13 January 1962, Subject: The Strategic Importance of the Southeast Asian Mainland," in *The Pentagon Papers: The Defense Department History of the United States Decisionmaking on Vietnam*, Vol. 2, Senator Mike Gravel edition, Boston: Beacon Press, 1971, pp. 663-666.

16. The Army and the Air Force were never truly committed to the counter-guerrilla or, as it was known after 1961, "counterinsurgency" effort in Vietnam. The leadership in both services seemed convinced that once regular forces were committed, the war could be won. See John F. Loosbrook, "What Kind of War?" *Air Force Magazine*, November 1956, pp. 44-49; and Lieutenant Colonel Charles E. Trumbo, Jr., Director of Plans, 2d Air Division, interview with Joseph W. Grainger, Ton Son Nhut Air Base, Vietnam, July 13, 1963, Interview No. 271, USAF Oral History Program, U.S. Air Force Historical Research Center, Maxwell Air Force Base, AL.

17. Sullivan, *Defense 95*, p. 8.

18. Colonel Richard Szfranski, *Joint Forces Quarterly*, Spring 1995, p. 79, emphasis in original.

19. See Colonel John A. Warden, III, "The Enemy as a System," *Airpower Journal*, Spring 1995, p. 43; and Major David S. Fadok, "John Boyd and John Warden: Air Power's Quest for Strategic Paralysis," Maxwell AFB, AL: Air University Press, February 1995, p. 2.

20. "Report of the Secretary of the Army," in William J. Perry, *Annual Report to the President and Congress*, Washington:

U.S. Government Printing Office, February 1995, p. 279.

21. William A. Buckingham, Jr., *Operation Ranch Hand: The Air Force and Herbicides in Southeast Asia, 1961-1971*, Washington, DC: Office of Air Force History, pp. 183-185.

22. Loren Baritz, *Backfire: Vietnam, The Myths That Made Us Fight, The Illusions That Helped Us Lose, The Legacy That Haunts Us Still*, New York: William Morrow and Company, 1984, p. 32.

23. Chris Morris, Janet Morris, and Thomas Baines, "Weapons of Mass Protection: Nonlethality, Information Warfare, and Airpower in the Age of Chaos," *Airpower Journal*, Spring 1995, p. 16.

24. Krepinevich, "The Military-Technical Revolution," p. 34.

25. See Raphael Littauer and Norman Uphoff, editors, *The Air War in Indochina*, Revised Edition, Cornell War Study Group, Boston: Beacon Press, 1971, pp. 67-75; and *USAF Operations in Laos: January 1, 1970-June 30, 1971*, Honolulu: Headquarters Pacific Air Forces (PACAF), May 31, 1972, pp. 25-27, in USAF Historical Research Center, Maxwell AFB, AL, K717.0432.6.

26. Sullivan and Dubik, *War in the Information Age*, p. 8.

27. Too much credit may be given to TQM and not enough to Curtis LeMay. Japanese heavy industry, totally destroyed during the war, was rebuilt by American largess and that rebuilding had the advantage of beginning at a higher level of technological sophistication. In that regard, the bombs of XXth Air Force had as much to do with the post-war Japanese recovery as W. Edwards Deming.

28. Dennis M. Drew, "Air Force Should Pull the Plug on its TQM," *Air Force Times*, September 26, 1994, p. 2.

29. See Larry E. Cable, *Unholy Grail: The U.S. and the Wars in Vietnam, 1965-68*, London: Routledge, 1991, pp. 33-35; and Jeffrey Record, *Ready for What and Modernized Against Whom?*, Carlisle Barracks, PA: Strategic Studies Institute, April 1995, p. 7.

30. I want to acknowledge the ideas and thoughts of my colleagues Dr. Steven Metz and Dr. William Johnsen. They are on the cutting edge of thinking in this area. I am grateful to their patience and generosity in sharing many of the ideas expressed throughout this portion of the paper.

31. "The Defense Technology Gap," unpublished speech by Senator Joseph Lieberman, March 3, 1995.

32. It is difficult to say for sure that only "modern" and technically-advanced nations can participate in the MTR and RMA. Germany, in the throws of political and economic chaos, and limited by the Versailles Treaty, would not have been a logical candidate to bring together the elements of an RMA by laying the foundations for *blitzkrieg* in the 1920s and early 1930s.

33. Krepinevich, "The Military-Technical Revolution," p. 40.

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