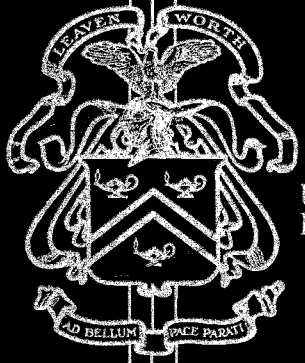
ENVISIONING FUTURE WARFARE

General Gordon R. Sullivan
and
Colonel James M. Dubik



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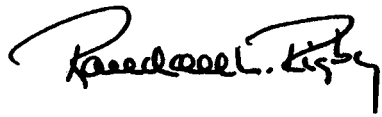
The strategic environment at the end of the 20th century is characterized by two competing trends. First, the international system has entered a period of increased instability. Second, we are witnessing the maturation of information processing technology and its subsequent impact on economics, politics, and the conduct of war. This collection of three articles by General Gordon R. Sullivan and Colonel James M. Dubik explores these trends and seeks to envision their implications on future war.

Taken together, these articles illuminate contemporary debates in military affairs. "Land Warfare in the 21st Century" establishes a vision of the strategic landscape and identifies the two broad trends of instability and technological acceleration. "Ulysses S. Grant and America's Power-Projection Army" examines the issues of organizational change in the face of technological and social evolution. And "War in the Information Age" elaborates on what the power of information processing technology might mean for the conduct of future war.

The ideas found in these three pieces are not definitive, rather they should be used as starting points for understanding subsequent Army initiatives and actions. They are important thoughts that are continuing to grow and evolve within our institutional base of knowledge. The challenge of realizing the maximum benefit from information technology has been taken up in TRADOC Pamphlet 525-5, *Force XXI Operations* (August 1994). This document forms the intellectual base of the development of the 21st-century Army. The role of the Army under conditions of international instability is elaborated in the Army white paper, *Decisive Victory: America's Power-Projection Army* (October 1994).

The trilogy of articles in *Envisioning Future Warfare* can be read as the intellectual predecessors of the Army's organizational evolution that is still being defined through the Force XXI process. These articles are by no means a certain prediction of the future, but they do articulate ideas that have been seized upon by both the Army and other institutions as indicative of the shape and outline of future battlefields. Students of the evolution of the conduct of war and of organizational change should

find this collection a useful starting point for grappling with issues related to the transformation of America's Army into a 21st-century force.



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Brigadier General, U.S. Army
Deputy Commandant

Land Warfare in the 21st Century

General Gordon R. Sullivan and Colonel James M. Dubik

Introduction

The collapse of the Soviet Union and the end of the cold war have given rise to a national debate unmatched since the end of World War II. Dramatic changes in the international system have forced policymakers to reevaluate old strategies and look for new focal points amidst the still unsettled debris of the bipolar world. At issue is the role of the United States in a new world order and its capabilities to defend and promote its national interests in a new environment where threats are both diffuse and uncertain and where conflict is inherent yet unpredictable. The degree of uncertainty in the global security environment parallels revolutionary changes in military technology and in the traditional concepts of how we employ military forces. Together, these trends require greater flexibility in U.S. military strategy and significant departures from cold war concepts of deterrence and war fighting. This paper examines their cumulative effect on land warfare of the future. Only by dealing with these questions today will we be able to make the investment and force structure decisions to best position ourselves for tomorrow.

These are times of both continuity and change, and must be understood as such. Complex changes are never complete breaks from the past;[1] evolutionary and revolutionary changes coexist, each shaping the other. This relationship between continuity and change is discussed in the introduction to A.T. Mahan's famous work, *The Influence of Sea Power Upon History*. There he tells strategists, "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."[2] Then he cautions: "It is wise to observe things that are alike, it is also wise to look for things that differ."[3]

This paper follows Mahan's advice. It is a description of the strategic landscape: how much in the realm of warfare is changing and where

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From Gordon R. Sullivan and James M. Dubik, *Land Warfare in the 21st Century* (Carlisle Barracks, PA: Strategic Studies Institute, 1993), reproduced by permission of the authors.

those changes are headed, as well as how much remains constant. The essay is developed in three steps: changes in the context within which war is fought; technological changes in the conduct of land combat; and, continuities in the nature of warfare. Change and continuity, when taken together, provide a foundation for examining 21st century warfare.

Changes in the Context Within Which War Is Fought

Warfare cannot be understood properly if viewed in isolation; international and domestic realities form its context and must be understood as well. A survey of some of the important changes in these two arenas, therefore, is the appropriate starting point for understanding how warfare is and is not changing.

International Trends: Integration and Fragmentation.

The end of the cold war has unleashed contradictory trends. On the one hand there are fledgling democracies and market economies that clamor to be incorporated in regional and global systems; the increased importance of transnational organizations, information and communication networks, and financial structures; heightened awareness of transnational problems like environmental, health, migration, and monetary issues; and the readjustment of alliances and relationships among the major industrial nations as well as among these nations and their lesser-developed neighbors. As these changes generate movement toward greater global integration, multinational organizations assume more importance as actors in foreign affairs and international relations. In turn, greater integration results in partial erosion of the traditional concept of national sovereignty. The Secretary General of the United Nations refers to this trend when he says,

> relationships among nations are increasingly shaped by the continuous interaction among entire bodies politic and economic. Such activity almost resembles a force in nature, and indeed may be just that. Political borders and geographic boundaries pose slight barriers to this process.[4]

Accompanying the movement toward global integration in some parts of the international arena, however, is a countervailing trend toward fragmentation in other parts. Ethnic and religious hostility, weapons proliferation, power struggles created by the disappearance of the Soviet Union, elimination of the fear of regional conflicts escalating

to superpower confrontation, radicalisms of a number of varieties, rising expectations of democracy and free markets coupled with the inability of governments to meet these expectations—all are forces that generate fragmentation, not integration.[5] For example, "in the three years since the cold war ended, some 4.5 million new refugees have fled their native lands to escape the civil wars and ethnic cleansing that too often have followed the collapse of communism."[6] Anyone who reads the newspaper or watches television news knows that these forces of fragmentation are as present around the world as are the forces of integration.[7]

For many, the world is growing more dangerous, albeit the dangers are different and more subtle than those of the cold war. Local and regional "bullies" are emerging following the collapse of the former Soviet Union, and they are amassing more and more military force. International arms sales make high-tech weapons available to any customer who can afford them. These sales significantly increase a third world military force's ability to fight at extended ranges with increased accuracy and lethality, thereby compounding the problems of an intervention force. A sampling of this proliferation includes China's sale of short-range theater ballistic missiles to Iran, Libya, Syria, and Pakistan; North Korea's sale of similar missiles to Iran, Libya, and Syria; the Commonwealth of Independent States' sale of T-72s to Syria, SA-16s to North Korea, submarines to Iran, and T-80s, ATGMs, and SAMs worldwide. Currently 18 countries have advanced precision guided munitions; by early in the next century, that number is expected to grow to over 40. Those who would consider threatening U.S. global interests are hard at work buying the hardware that they will need and learning their lessons from the Gulf War. Future adversaries will try to deny American forces information, prevent buildup, inflict mass casualties, and prolong the conflict.[8] They will seek to deny us the minimal cost, decisive victory that we achieved in Panama and the Gulf and which we seek to achieve elsewhere in the future.

Domestic Realities: New Threats to U.S. National Security.

As the forces of integration and fragmentation push and pull to create international challenges different from those of the cold war, our nation also faces a particularly difficult and complex set of domestic problems. The victory in the cold war did not come without costs to the United

States, and America is only now confronting some of those costs. By maintaining a primarily outward focus for the last 45 years, America and its allies defeated their main external threat—the former Soviet Union. Two new sets of threats, however, emerged during this period.[9]

The first set consists of threats to our economic security, which stem from both internal and external sources. The internal threats involve declining competitiveness and productivity, loss of jobs base—and its corresponding tax base, erosion of the manufacturing base, fiscal and trade deficit, decline of the middle class wage and standard of living, low savings and investments, the savings and loan crisis, and the eroding infrastructure, as well as others.[10] Some of the major external threats to the economic pillar of America's national security involve our reliance on foreign oil, much of which is located in areas of the world controlled or threatened by regional hegemons; our foreign debt which will top $1 trillion before 1995;[11] our loss of market share and manufacturing base to other industrial nations;[12] and political instability in areas that could offer overseas markets for U.S. goods or opportunities for expansion of U.S. companies.

To assess what these threats to American economic security entail, strategists must understand that the rules governing U.S. economic recovery have changed. The American economy will not heal merely by the actions taken at home. Domestic action is necessary, but not sufficient. "If this century has taught one lesson," says Peter Drucker, it is that,

> no part of the developed world prospers unless all do . . . it is to the self-interest of every single participant in the world economy to restore as fast as possible the economic ties that war has cut, to restore transnational confidence, and to restore the transnational flow of goods and investments.[13]

In this sense, foreign and domestic policy are two sides of the same coin; they cannot be viewed as two separate problems.

Adverse economic trends, however, are not the only dangers to American national security that gestated as we fought the cold war. During that period's extended external focus, a second set developed: threats to the nation's social cohesion. These involve "the disuniting of America"—to borrow Arthur M. Schlesinger Jr.'s term.[14] The problems of drug abuse and the resultant disregard for the rights of other citizens and disrespect for democratic values and institutions; the

growing number of Americans living below the poverty line; the decline of public education; the disintegration of the family; the disregard for the basic rules of civil behavior; the rise of crime and of welfare dependence; the acceptance of vulgarity as "the norm"—all pull people apart rather than bind them together.[15] Regardless of how one sees these issues, this much is clear: these and other problems constitute a threat to the ultimate foundation of our nation's security—an educated, civic-minded, participative polity that is the basis of a democratic government.[16]

On the surface these two sets of threats—economic and social—seem unrelated to the military or the nation's military power; they are, however, relevant in at least three ways. First, the United States must attend to the internal economic and social issues threatening the ultimate foundation of its security. Heeding these threats should not, however, push the nation to the extremes of isolationism. U.S. economic recovery, for example, requires success both within the nation and around the world. But solving internal threats will require resources. Military strategists, therefore, must expect that America will both reduce the military budget and, simultaneously, ask that its military contribute to the challenges of domestic regeneration

Second, U.S. military strategists can expect that their political leaders will seek ways in which to use the military element of national power—in conjunction with, and usually subordinate to, other elements of national power—to promote an environment conducive to political and economic stability abroad. Such uses of the military element of power follow from the fact that American economic security is tied to the world at large, a world in which the cold war's veneer of stability has been lifted, thus revealing significant unrest, fear, hatred, and jealousy. Thus the U.S. military should expect to conduct operations, usually in conjunction with allies and friends, that are aimed at creating or restoring conditions favorable to economic development and trade.

When one thinks of "military operations," the image usually includes combat forces. While such operations may be required, strategists must begin to think differently about the use of the military element of national power. Operations linked to strengthening or restoring conditions favorable to global trade, investment, and economic development may include combat operations, but not necessarily.

The United States has established markets in nations with whom it has alliances or friendships. America must maintain these economic relationships and keep the normal, free-market competition between the United States and these nations free from instability or confrontation. Here, military operations might mean continued presence in existing alliance organizations, combined exercises, refinement of common operating procedures, and continuation of exchange programs.

Many of the markets that might become available for global economic investment, development, and integration are threatened by regional instability. America—in conjunction with allies and friends, as well as global and regional organizations—must do what it can to promote the conditions in which corporations will invest, products can be sold, and economies prosper.

The important point is: domestic actions alone will not result in U.S. economic recovery; the current global economic conditions require action abroad to complement domestic policies. American military presence and operations can contribute—again, in conjunction with and usually subordinate to other elements of national power as well as regional and global organizations—to setting the conditions under which economic interests can flourish. There are no historical precedents for long-term economic prosperity absent a security umbrella that provides the stability in which economic strategies succeed.

Third, although the cold war is won, America must remain prepared to protect its global interests. Local and regional power struggles were created by the lifting of the Iron Curtain. Once restrained for fear of sparking a superpower confrontation, a variety of bullies—some known and some yet-to-emerge, some armed with advanced technology weapons and some not—await opportunities to establish or expand their power, sometimes to the detriment of U.S. national interests. When committed to prevent a crisis from developing or to resolve one that has arisen, America will expect its military to accomplish the mission assigned—*decisively* and at the least cost in American lives and resources.

Decisive use of military force does not necessarily entail total war. Rather, it means overwhelming use of the military element of national

power relative to the strategic aims, military mission, specifics of the situation, and threat conditions. While preserving the principle of proportionality, decisive force is the opposite of incrementalism or gradualism. Thus, in those crises or conflicts involving U.S. military forces, the action will be characterized by military power employed in an overwhelming way with as much precision as possible to complete the mission in the shortest time possible and—again—at the least cost in lives and resources.

In sum, American political leaders are requiring the military to *contract* in both size and budget, *contribute* to domestic recovery, *participate* in global stability operations, and *retain* its capability to produce decisive victory in whatever circumstance they are employed—all at the same time. What these four simultaneous requirements mean to military strategists is this: (a) leverage quality in terms of soldiers, units, training, and doctrine as well as technological superiority to counterbalance reductions in size, (b) maximize the benefits of maneuver and tempo used in conjunction with firepower, (c) synchronize the contributions of all the services in ways that were previously not achieved, and (d) maintain maximum flexibility and balance in force structure and capabilities.

Simply put, international and domestic realities have resulted in the paradox of declining military resources and increasing military missions, a paradox that is stressing our armed forces. The stress is significant. It requires fundamental changes in the way the nation conducts its defense affairs.

Two Conceptual Shifts

Before even discussing the ways in which the conduct of land warfare is changing, one must realize the extent of the shift in the paradigm used by the last three generations of U.S. strategists. The strategic paradigm of the cold war—preventing the spread of communism—does not fit the realities of today's world; to use it to solve new problems is to guarantee failure.[17] This is the first—perhaps the most important and most difficult—conceptual shift that affects the way the conduct of land combat is changing. America needs a different model by which to raise, equip, deploy, organize, educate, train, fight, coordinate, and sustain her armed forces. Containment and our "traditional" concept of deterrence—elements of America's cold war

strategic defense—require rethinking in light of current realities. The United States no longer has a negative aim—to prevent the spread of communism.[18] It has a positive aim—to promote democracy, regional stability, and economic prosperity. What some are calling "collective engagement" is coming to replace containment. Deterrence has retained some of its meaning, but "prevention" is beginning to emerge as a complementary, and possibly alternative, strategic concept. This is a significant conceptual shift from that of the cold war, but it is not the only shift required.

The second conceptual shift involves refining the understanding of how to use military force. The concept of "war" is usually understood in terms of conventional combat: the armies of one nation-state or alliance of nation-states fighting those of another. Every other act of violence, use of force, or form of hostility is categorized as "operations other than war."[19] Using these kinds of distinctions, some go so far as to draw the following kinds of categories of violence: peacetime activities with very low levels of violence, crises, conflicts, war, and war termination activities.

These kinds of categories are quite useful, for they allow a strategist to plan for the use of military force under a variety of graduated circumstances. Further, they demonstrate that not all uses of military force involve "going to war." Thus the categories provide a convenient conceptual distinction and an important political one. Politically, the United States, whether acting unilaterally or in conjunction with friends and allies, must be able to distinguish the use of military forces in "war" from other uses. As Bernard Brodie explains,

> As American citizens we expect and desire that our nation will involve itself in war only . . . for political ends that are reasonably consistent with [America's] basic political philosophy. . . . We . . . also expect that the ends for which we fight are . . . sought through the kind of war that is reasonable to fight, . . . [and has a] possibility of success. . . . [otherwise] resorting to war is simply wanton destruction of life and goods on a vast scale.[20]

The expectations that Brodie outlines remain part of the American military, social, and political psyche. When the nation wages "war," all understand that defining clear, achievable political aims; raising and sustaining the required means to attain those aims; and ensuring the support of the nation—i.e., national will, are absolutely vital to success.

Without these conditions, "resorting to war is simply wanton destruction." Thus, military doctrine appropriately codifies the distinction between "war" and "operations other than war."

As useful, convenient, and important as these categories are, however, their simplicity can be seductive. Categorizing "war" as separate from all other uses of military force may mislead the strategist, causing him to believe that the conditions required for success in the employment of military force when one is conducting "war" differ from use of military force in operations "other than war." For example, when planning for war, no serious strategist would fail to ask, "Should we have clearly stated, achievable political aims?" or "Should the nation allocate the necessary means to attain its political aims?" or "Should we have some assurance that the nation supports the war?" Yet, when debating the use of military force in "operations other than war," just such questions may *not* always arise.

As the nation begins the 21st century the strategist should take seriously Michael Howard's suggestion. "It is quite possible," Howard says,

> that war in the sense of major, organized armed conflict between highly developed societies may not recur, . . . Nevertheless violence will continue to erupt within developed societies as well as underdeveloped, creating situations of local armed conflict often indistinguishable from traditional war.[21]

Strategists must refine their understanding of how to use military force to correspond with the realities of the day. Clausewitz defined war simply as "an act of force to compel our enemy to do our will" which "springs from some political purpose."[22] "No one," he says, "starts a war—or rather no one in his senses ought to do so—without first being clear in his mind what he intends to achieve by that war and how he intends to conduct it."[23] While his definition of "war" is less applicable given today's political realities, his admonitions concerning using military force are instructive. They apply aptly to the kind of violence that Michael Howard describes as "often indistinguishable from traditional war."

One way a nation might use its military force is to compel its adversary, sometimes by resorting to or threatening violence, to do its will. Such uses are both consistent with what Clausewitz called "war" and, as Howard says, are "often indistinguishable from traditional war."

American and allied forces in Somalia, and their possible employment in Bosnia, provide two excellent examples. When a nation so uses its military forces, a contemporary Clausewitz would caution that nation *not* to begin without first being clear about its political aims and how those objectives are to be achieved. Objectives and concepts must be supported by allocating sufficient military sources and by mustering the national (or international) will to attain the political aim.

No doubt, today's global realities are different from those that Clausewitz contemplated. Contemporary strategists confront representatives of feudal lords, religious groups, ethnic groups, drug cartels, crime syndicates, even transnational corporations using force or threats of force to achieve their objectives. Furthermore, nations now use operations other than war—e.g. peacekeeping, peace-enforcement, supervising cease-fires, assisting in the maintenance of law and order, protecting the delivery of humanitarian assistance, guaranteeing rights of passage, and enforcement of sanctions—to compel adversaries to do their will. While these endeavors do not qualify as "war" in today's military-politico parlance, they are examples of acts "of force to compel our enemy to do our will" which spring "from some political purpose."

Once again, Brodie's ideas are applicable:

> Those who talk abstractly . . . [about war] find themselves matching discourse with those who speak of dead bodies, burnt villages....The euphemisms of the strategists can be counterproductive....the manipulators use jargon that the man in the front lines..... can hardly consider relevant to his conditions.[24]

As useful and necessary as the distinction between "war" and "operations other than war" is, strategists cannot allow these conceptual categories to become the kind of euphemisms to which Brodie alludes. Leaders and strategists must recognize the requirements essential to success whenever military force is employed: identifying clear, achievable political aims; planning and employing strategic measures for achieving those political aims; raising and sustaining adequate means to implement the strategic measures; and ensuring the support of the nation (or coalition).

Expanding the traditional understanding of the use of military force in war to "operations other than war" makes both politicians and military leaders uneasy, for they find it is difficult—albeit no less important—to identify clear, achievable strategic aims. There is an

emotional temptation to want to "do something" without first clearly understanding what political purpose that "something" is supposed to accomplish. Yet, as Brodie reminds us, this requirement remains paramount, else what we do is "simply wanton destruction of life and goods."

Changes in the international and domestic political systems have altered the context in which military force will be applied. Reviewing these changes is important. Changes in the conduct of land warfare result from the interaction of a multiplicity of events, conditions, policies, beliefs, and even accidents.[25] Some of the changes occur in the international and domestic arenas, others are rooted in history and technology. The changes in military technology are as dramatic as those in international politics.

Technological Changes in the Conduct of Land Warfare

Technological innovations, many of which were dramatically demonstrated in the Gulf War, are giving rise to what is being called a "military-technical revolution." This "revolution" will have a dramatic effect on the Army and land warfare through five dominant trends: lethality and dispersion; volume and precision of fire; integrative technology; mass and effects; and, invisibility and detectability.

Lethality and Dispersion.

Over time, weaponry has become more lethal and individuals and units more dispersed. Lethality and dispersion are linked.[26] Rifling, introduced in mass during the mid-19th century, extended the range and accuracy of the individual weapon and artillery piece. This development forced individuals to go to ground and disperse. As rifles and artillery became more effective, units could no longer deploy in the dense, shoulder-to-shoulder formations that marked the age of the musket.[27]

Throughout the history of land warfare, tactics, organizations, doctrine, equipment, force mix, and methods of command and control all changed in response to increasing lethality and dispersion. These changes, in turn, had a corresponding effect on training, soldiers, and leaders.[28]

The Gulf War saw an even greater increase in dispersion and improvement in the ability to deliver long-range lethal fires. Table 1

indicates that this increase can no longer be described geometrically, for the changes witnessed in the Gulf were exponential changes. MLRS, Apache, Patriot, Lance, ATACMs, Abrams, Bradley—especially in conjunction with space-based platforms, the weapons delivery and maneuver systems of other services, and equipment like the laser designator and the position guidance system—all confirm that the trend toward increased lethality at greater ranges and increased dispersion of individuals and units are still at work. Furthermore, the trend will result in changes in tactics, organization, doctrine, equipment, force mix, and methods of command—just as it did in the past.

Area occupied by deployed force 100,000 strong	Antiquity	Napoleonic Wars	U.S. Civil War	World War I	World War II	October War	Gulf War*
(square km)	1.00	20.12	25.75	248	2,750	4,000	213,200
Front (km)	6.67	8.05	8.58	14	48	57	400
Depth (km)	0.15	2.50	3.0	17	57	70	533
Men per sq km	100,000	4.790	3,883	404	36	25	2.34
Sq meters per man	10	200	257.5	2,475	27,500	40,000	426,400

*All figures except Gulf War column from COL DuPuy, *The Evolution of Weapons and Warfare*, p. 312. The area data for Gulf War came from LTG Pagonis, *Moving Mountains*; the rough number of 500,000 soldiers was used for the number deployed within this area.

Table 1. The Expanding Battlefield.

Post-industrial land forces will become more mobile, creating the requirement to communicate over greater distances, to maneuver more quickly, and to use fires from platforms of all services that are dispersed over greater distances. This trend will place a great premium on the commander's ability to make decisions quickly, the staff's requirement to synchronize the movements of greatly dispersed units, and the subordinate leader's responsibility to make on-the-spot decisions within a senior commander's intent.

Greater dispersion will also place a great premium upon unit cohesion. Long acknowledged as one of the most fundamental, if not the most essential, building blocks of fighting power,[29] unit cohesion will be much harder to sustain in widely dispersed units, but no less

required. One could build a good case, in fact, that the importance of quality soldiers and leaders and the need for excellent unit cohesion grows in parallel with the level of dispersion.

Volume and Precision of Fire.

The second trend concerns two factors: first, volume of fire (tonnage delivered in a given time) and precision. The volume of fire was low during the age of muzzle-loading individual weapons and artillery. The rate and volume of fire began to increase, however, with the introduction of breech-loading rifles, smokeless powder, magazines, belts, and other automatic loading devices. The move from muscle to machine—i.e. mechanization, motorization, and aviation—also contributed to the increased rate at which fire could be delivered. Not only could weaponry produce more lethal effects, but also produce them more frequently. "Ultimately the net effect of the progress in weapons technology," Martin van Creveld points out,

> was to increase enormously the volume of fire that could be delivered, the range at which it could be delivered, and the accuracy with which this could be done. The combination of all three factors meant that . . . the battlefield became a more deadly place than ever before.[30]

The trend in increased volume of fire culminated in an army's ability to deliver tactical nuclear weapons.

Of course, with the increase in fire volume came corresponding changes in other areas of land combat: the use of entrenchments, the development of protected spaces on the battlefield like the tank and infantry fighting vehicles, and organizational changes like the U.S. Pentomic division of the 1950s and the flexible divisional structure of the 1970s and 1980s. These evolutions affected not only weapons, equipment, organization, and tactics, but also planning factors like casualty rates, logistic resupply rates, and the balance among combat/combat support/combat service support forces.

Along with an army's ability to deliver an increased volume of fire came the rise in precision. Dragons, TOWs, laser-aimed individual weapons; precision aiming systems such as those on the Abrams and Bradley; longer range precision weapons systems like Apache, LANCE, ATACMS, and MLRS; laser designators that guide artillery rounds as well as the bombs delivered by aircraft of other services;

"brilliant" munitions now in development—all confirm the trend toward increased precision accompanying increased volume.

As was the case with the growth in the volume of fire, the rise in precision will change the weapons, equipment, organization, and tactics of 21st-century land forces. Planning factors will be as different for the armies of the 21st century compared to the 20th century as 20th century armies differed from those of the 19th.

The introduction of high-energy weapons, electro-magnetic rail gun technology, super conductivity, and other yet-to-be-identified technological improvements will continue the upward trend lines of fire, volume and precision. The greatly dispersed land forces of the 21st century will continue to increase their ability to deliver a high volume of precisely aimed fires with a very high first-round-hit probability. This ability will be increased even further when one considers the result of integrative technology.

Integrative Technology.

Integrative technology will introduce a level of precision to the overall force, not just to individual and massed fires, that has been impossible up to this point in the history of land combat. In the 21st century, the systems of land forces will become an integrated circuit that is, in turn, part of a network of combined land/air/sea/space forces. With this integration network will come improved precision at the point of battle.

Napoleon introduced a "visual telegraph," called the Chappe, as a rapid means to transmit his orders. Under the right conditions, he could communicate with his subordinates 120 miles away in about an hour. This innovation increased his ability to coordinate the actions of his subordinate forces.[31]

Modern integrative technology, however, started with the telegraph and railroad—two systems that, when joined, revolutionized warfare.[32] The telegraph moved information around the battlefield quickly. Information assisted command and control, improved unity of effort, and increased the potential for coordinated effort and agility throughout the theater of operation or of war. The railroad provided the means to realize the potential that the telegraph offered. Rail made it possible to move large numbers of troops, equipment, supplies, and weapons systems quickly. Furthermore, the management and organization of the

railroad—from the operation of loading docks to the computation of time/distance factors necessary to schedule rail use—integrated the information system of the telegraph, the delivery system of the railroad, and the command and control system of the military.[33]

First by field wire, then by the introduction of radio and aviation, the use of integrative technology expanded in scope. Each improvement widened the ground commander's ability to orchestrate all the intelligence assets, weapons systems, maneuver forces, and logistical units at his disposal. Complexity accompanied this growth, making staffs more necessary and synchronization of functions more important. Interestingly, two false beliefs accompanied each improvement: first, that some extraordinary technological advance yet to take place would result in the land commander's acquisition of "perfect, real-time" information upon which to base his decisions and direct his subordinates; second, that greater centralization in decision making would yield greater combat effectiveness at the point of battle.

Realities on the battlefield, however, proved otherwise. The very nature of war consists of fear, fog, danger, uncertainty, deception, and friction—these are not conditions that can ever generate "perfect information."[34] Reports that a commander receives are often incomplete and incorrect. An enemy commander strives to deceive his adversary, hiding what he does as best he can; what one sees on the battlefield, therefore, must be interpreted. Interpretation faces the same impairments that we noted above in connection with obtaining information. Certainly, advanced technologies, multiple collection methods, and other means can increase the reliability of information and aid in decision making. The realities of what goes on in combat, however, will frustrate forever those searching for "perfect, real-time" information. To hope for technology that will be capable of gathering and using such information to feed a centralized military decision-making system is to hope in vain. Developing subordinate commanders who are able to make decisions on-the-spot within the intent of their higher commander—that is, decentralization not centralization—will remain vital even into the 21st century.

Withal, the search for integrative technology on today's battlefield goes on. The links between scout and attack helicopter, between JSTARS and weapons delivery platforms (air and ground), between forward ground elements and rear positioned indirect fire systems,

between tanks of an M1A2 unit—all have produced a quantum leap in the use of integrative technology. Like the leap produced by the increased volume of precision fires and greater battlefield dispersion, increased integrative technology is important in its effects. Extensive, near-real time communications among a number of intelligence gathering systems, maneuver systems, fire systems, and logistical support systems provide the ground commander with a potentially revolutionary opportunity and with monumental challenges.

The opportunity is the integration of the reconnaissance and intelligence gathering systems (technological and human) with command and control, fire delivery, and maneuver nodes. Once all are linked digitally to logistical support centers, these task forces will become combined arms task forces qualitatively different from the ones we now have. The degree of situational awareness that a commander will have under these conditions will be orders of magnitude better than he has now. It would not be too bold to claim that his perception of the battlefield will change. The computation of combat power and logistical planning factors, the determination of the proper ratio among combat, combat support, and combat service support, as well as a definition of each of the operating systems and their interrelationships—all will require rethinking. Significant further adjustments in doctrine, organization, and command and control, as well as service relationships, also will be necessary.

The digitization of the battlefield is a major leap ahead in the conduct of warfare, but not a break from the past. The limiting factor in the quest for making maximum use of integrative technology will not be the hardware, it will be human and organizational. Integrative technologies will enhance the ability of commanders and their units to fight with scarce assets. The complete use of integrative technologies will revolutionize command and staff procedures. Software will allow much of the information now transmitted by radio and synchronized on acetate and charts to be self-synchronized automatically, computer to computer. Smart command and control systems will create a common perception of the battlefield and the theater among members of a joint task force. This perception, in turn, will facilitate the rapid massing of combat assets—precise weapons systems and maneuver forces—to attain objectives decisively. Such a development will not eliminate the

necessity for staffs and commanders, but the art and science of decision making and staff synchronization will change radically.

The challenges that accompany such revolutionary advances in information gathering and use remain as before: increasingly capable integrative technology may, once again, generate the false belief that centralized decision making will result in greater combat effectiveness at the point of battle. As explained previously, however, realities of the battlefield and the nature of war demonstrate otherwise.

Using an earlier leap-ahead technology, the telegraph, Moltke knew that the flow of information would still never reach him fast enough and in enough detail to allow him to command from his headquarters. The cycle of action-reaction-counteraction on the battlefield unfolded much faster than a headquarters could gather information, process it, make a decision, then transmit that decision to those who must execute. Rather than impose new and stricter demands for information to feed a centralized decision and command system, Moltke created units and chose commanders who were able to operate under the conditions of uncertainty and succeed with less information.[35] Integrative technology will increase the tempo of action-reaction-counteraction on the post-industrial battlefield; thus it will continue to emphasize decentralized decision making and initiative at lower levels of command.

The effects of the first three trends—lethality and dispersion, volume of fire and precision, and the use of integrative technology—join in reinforcing a fourth: the trend toward the ability of smaller units to create decisive effects.

Mass and Effects.

Smaller units are able to create decisive effects in three ways.[36] The first is simply physical. The repeating rifle and machine gun, in conjunction with increasingly accurate indirect fires of artillery, began to allow fewer soldiers and smaller units to concentrate the effects of more firepower than their numbers alone would suggest. This is a natural outcome of the first two trends. The volume of deadly fire "emptied" battlefields, but those left on them were far more capable. As motorization, mechanization, aviation, and communication developed and improved, this capability increased. Ground forces not only had at their disposal more lethal weapons that could shoot more

often and more accurately, but they could employ weapons systems that were physically located at some distance from the point of battle. Furthermore, ground forces developed the capability to move across, or over, the battlefield much faster, more easily, and with more safety than had their predecessors.

The second way that smaller units can create decisive effects is organizational: mixing arms within a formation. The 19th century version of this phenomenon began with separate infantry, artillery, and cavalry divisions being combined under a single corps headquarters. Over time, mixing arms descended from corps level to combat teams—that is, mixing arms within divisions and regiments like those of the World War II era. The next development produced what came to be called combined arms teams as low as company and troop level. The development of these teams at lower levels gave commanders the opportunity to incorporate direct and indirect fires more easily. As the inclusion of the weapons systems of fixed and rotary wing aviation became a standard and essential element of the combined arms team, commanders were able to add the effects of air platforms to those of the armor, infantry, and field artillery. The result was smaller units being able to produce decisive effects.

Maneuver is the third way that smaller units can create decisive effects. Initially maneuver resulted from muscle power—the foot and horse. However, machine-powered ground systems—the rail, truck, tank, armored personnel carrier, infantry fighting vehicle, self-propelled artillery, and protected combat support and combat service support vehicles—greatly increased land maneuver. When land forces began to include machine-powered air systems—the utility, cargo, scout, and attack helicopters—the conditions were set for another leap in land maneuver. Like the score of a great symphony, each of these movements—first from muscle to machine-powered ground systems then to machine-powered air systems—began quietly and developed gradually. Each increased mobility, improved opportunities for maneuver, and resulted in greater agility. At each step, improved maneuver capability contributed to the land combat commander's ability to move over increasingly dispersed areas and converge quickly at the decisive point, thus concentrating effects of both fires and maneuver. Each move thus increased the land force commander's ability to operate at a faster tempo than before.

The history of land warfare reflects the manner in which various arms have been integrated into the combat team. Initially land combat moved from being conducted by unitary armies to being fought by combined arms, ground-based formations. The second step took place when combined arms, ground-based formations became combined arms, ground/air-based units. Land combat units are currently at this point; however, the movement is not over. The third step will take place when land combat is waged by formations consisting of combined arms, air/ground-based units. This is the direction land combat is now taking. At each step, decisive effects have resulted from ever smaller units.

This development is reinforced by the increased use of integrative technology. Recent integration of land combat units has been primarily, but not exclusively, internal. Internal integration includes the ability of members of a combined arms task force to talk and coordinate among the combat, combat support, and combat service support units of the task force. This integration was, and remains, absolutely essential. In the 21st century, however, internal integration will not be sufficient. To maximize the benefits of maneuver and tempo, increase the firepower available to a land force commander, and synchronize the contributions of all the services, land forces must be fully integrated with air and naval forces. Only then will the commander be able to leverage completely the complementary powers of the joint force.

Thus, when one includes the trend toward increased use of integrative technology, another element in the trend toward a smaller unit's capability to produce decisive effects can be postulated: the evolution of combined arms into joint arms. The result will be fully integrated joint task forces, including combined arms task forces of multiple services, that can be tailored to fit the specific set of geographic, political, and threat conditions existing in a given situation. In such fully integrated joint task forces, true qualitative change is possible—the whole of such a force will be greater than the sum of the parts. Based upon the situation, an Army brigade task force in conjunction with a Marine Expeditionary Unit, Air Force squadron, and Navy task force—fully integrated under the command and control of a joint task force headquarters—could produce the effects that required, during the World War II era, a much larger force.

In sum, these trends indicate, and the Gulf War as well as Operation JUST CAUSE corroborate, that as the size of the unit decreases, there

can be a corresponding increase in the effects it is able to produce if it is equipped with the right technology used by high-quality, well-trained and well-led troops employing proper doctrine. These trends verify that smaller or fewer units will be able to produce decisive effects because of the vast array of weaponry they have at their disposal and the speed with which they will be able to acquire targets, maneuver, employ fires, and relocate. Think of the maneuver possibilities that could be generated for ground or air commanders by very dispersed special operations forces or of the potentially decisive effects these very small forces—integrated into the forces of all services—have when equipped with secure satellite communications, laser designators, and position guidance systems. Small teams in the right place, at the right time, and linked in with the right systems have the potential to produce, or at least contribute to, decisive results.

Once again, a paradigm shift is developing. Many of the old rules of land warfare that concern the calculation of combat power have been shattered already. Individually and collectively, the implications of these moves toward compressing greater firepower in smaller unit packages will require significant adjustments in doctrine, leadership, organization, and command and control, as well as service relationships. The limiting factor will not be technological; it will be human and organizational.

Invisibility and Detectability.

The final trend helping to paint the picture of land combat in the 21st century concerns a land force's ability to hide from the enemy while being able to detect that enemy at greater ranges. In the mid-19th century, invisibility—the ability to hide from the enemy—took the form of movement at night, and the use of trenches, vegetation, and terrain to cover the deployment of troops, equipment, and supplies. Detectability was limited to line of sight—scouts, spies, and cavalry. The balloon and field glasses added range to the human eye as did the aircraft when it was first introduced, but line of sight remained primary.

Electronic intelligence gathering and countermeasures as well as electronic deception developed in the early- to mid-20th century. This added a new dimension to detectability and invisibility. Electronic means, especially when employed as part of a ground-air-space based system, also provide the ground commander the capability to detect the

enemy even beyond the horizon. Using electronic means correctly, land forces can become invisible to their enemy by appearing to be at one place while actually being at another. General Patton's "dummy" headquarters used to reinforce the Germans' belief that the invasion of Europe would occur at the Pas de Calais and to cover Patton's Third Army's deployment into France is but one of many examples of how electronic means can produce "invisibility." Mock equipment, dummy headquarters, phoney messages, feints, ruses, and other deception operations also contribute to a land force's invisibility.

Holography, virtual reality, the use of micro-electromagnetic systems, nano-technology, televideo, and other information networks have the potential to increase the land force's invisibility to the enemy. Integrating the information available from AWACS, JSTARS, and UAVs, as well as from other currently available systems and those yet to be developed, further increases the land force commander's ability to detect the enemy at extended distances. Advanced technological and human intelligence systems will continue to expand the commander's detection range, improve the resolution of the information gathered, and disseminate the data to the proper levels via near real-time, digital transfer. The battlefield will become more transparent to the commander of such a force and more opaque to his adversary.

Taken together, these trends enable one to forecast what land combat in the 21st century may be like. That forecast has two parts. First, how will political leaders use land forces? Land forces of the 21st century will be involved in preventing crises from occurring or from developing into conflicts; resolving conflicts before they spread or become war; or ending wars decisively on terms favorable to the United States and its allies.

Preventative measures will include alerts or deployment of forces before a crisis occurs; exchanges and contacts to promote confidence-building; and operations that nurture stability or defuse instability—e.g. peace enforcement, supervision of cease-fires, assisting in maintenance of law and order, protecting the delivery of humanitarian assistance, and the enforcement of sanctions.

Preventative measures also include those long-term relationships that build or sustain strong regional friendships. In many cases, the demonstrated ability and will to deploy forces that are technologically

superior and fully capable of decisive victory in a variety of conditions contribute to preventing crises from occurring or from developing into conflicts.[37] Such capability itself contains deterrent value.

While political leaders will use land forces, as well as naval and air forces, in a preventative way whenever they can, to focus solely on preventative measures would be wrong. American land forces also will be called upon to end hostilities, decisively and on terms favorable to the United States and her allies.

Second, how will land combat be conducted in the 21st century? Regardless of how land combat forces are used, they will be capable—operating as part of a joint force—of detecting the enemy at extended, over-the-horizon distances while remaining invisible to that enemy; delivering fires—also over the horizon—to facilitate maneuver; thus destroying the enemy force and disintegrating his cohesion throughout the depth of the theater or battlefield. Further, land combat forces of the 21st century will be raised, equipped, deployed, organized, and trained to achieve overwhelming success in both traditional war and those "operations other than war" that Michael Howard accurately described as "often indistinguishable from traditional war."[38]

Each of the five trends is important in its own right. The synergism they create, however, reinforces the changes occurring in the international and domestic context where wars are fought and military force is used. Together, the changes occurring in so many areas that affect the conduct of land warfare result in a crescendo of change.

The projections identified for each of the trends and the resulting forecast concerning the conduct of future warfare are not the result of Buck Rogers-type speculation or Star Wars science fiction or radical breaks with the past. Rather, they are extrapolations—sometimes linear, sometimes not—of forces that have come together, like natural forces combine into a thunderstorm. In the midst of such change, one can only begin to understand the scope of the paradigm shift required.[39] However, the details provided by the trends—lethality and dispersion, volume and precision of fires, integrative technology, mass and effects, and invisibility and detectability—and the background provided by the conceptual shifts outlined earlier—the passing of the cold war strategic paradigm and the refining of the understanding of how to use military

force—provide a forecast clear enough to begin positioning the Army for these developments.

Continuities in the Nature of Warfare

As this positioning takes place and the Army of the 21st century emerges, strategists should not be mesmerized either by the amount of change occurring or by the expectations of advanced technology. As much as the conduct of warfare will change in the future, at least three aspects will remain the same. First, the future will differ little from the past with regard to the root causes of war. People—whether political leaders of a nation-state or leaders of some other kind of organization—still fight wars as a result of fear, hatred, greed, ambition, revenge, and a host of other quite human and ever-present emotions. They still fight when they perceive that they can accomplish their objectives by resorting to force, or that they have no other alternative, or that honor or pride or principle or "the gods" demand it. In other words, they fight for what are to them fundamental reasons, even if others do not share or understand their rationale. Therefore, strategists must clearly and completely think through the use of countervailing force and its possible unintended consequences.

The future will also be similar to the past with respect to a second important aspect of war: its nature. The nature of war, even in "operations other than war"—peacekeeping, humanitarian assistance, or enforcement of sanctions—remains a contest of wills where one group attempts to force its will on others. Ambiguity, uncertainty, fog, friction, danger, stark fear, anxiety, and chance as well as leadership, courage, comradeship, self-sacrifice, and honor—continue to describe accurately the conditions with which military forces have had to contend and will continue to contend. Death and destruction remain the coins of war's realm, and no amount of technology or euphemistic labels will alter their weight. As much as one would like to think that simple solutions are possible, the reality is that wars are messy.

Perhaps the most important constant is this: war demands both science and art from the leaders who wage it. To think that one without the other will solve the problems posed by war is to err and err seriously. The future will find predictive modelling, integrative technology, precision guidance systems, and other high technology increasingly useful—necessary, but not sufficient. The artistic side of war will

remain: creativity, intuition, leadership, motivation, decision making under conditions of limited information. These will never lose their importance, for they describe war's essence. Technology contributed greatly to victory in the Battle of Britain, for example, but technology alone cannot account for British success.

Finally, the future will resemble the past with respect to the essence of fighting power. Technology is important to the process of generating combat power, but one must not let the glitter of technology obscure other sources of fighting power. "An army's worth as a military instrument," van Creveld explains,

> equals the quality and quantity of its equipment multiplied by [its] fighting power. The latter rests on mental, intellectual, and organizational foundations; its manifestations, in one combination or another, are discipline and cohesion, morale and initiative, courage and toughness, the willingness to fight, and the readiness, if necessary, to die.[40]

The root causes of war, the nature of war, and the essence of fighting power—these are several of the immutable elements concerning war. As absolutely essential as maintaining technological superiority is, especially in helping offset reductions in size, the simple truth is that technology will not solve all the problems associated with war. Prosecuting war requires both science and art. Judgment, trust, cohesion, creativity, flexibility, and just plain guts also are absolutely necessary. Again, van Creveld is instructive,

> When the chips are down, there is no "rational" calculation in the world capable of causing the individual to lay down his life. On both the individual and collective levels, war is therefore primarily an affair of the heart. It is dominated by such irrational factors as resolution and courage, honor and duty and loyalty and sacrifice of self. When everything is said and done, none of these have anything to do with technology, whether primitive or sophisticated.[41]

Those who would seek "silver bullets" must first acknowledge that land warfare under Napoleon, Grant, Pershing, Patton, Ridgway, Westmoreland, Thurman, Stiner, Schwarzkopf, Hoar, and Powell is surprisingly similar. War is a matter of heart and will first; weaponry and technology second. Thus, while strategists must understand the role that technology plays in changing how land combat will be conducted in the 21st century, so too must they acknowledge the ways in which the nature of warfare remains constant.

Political and military strategists would also be wise to remember what General Sherman wrote of General Grant's campaign plan to end the Civil War. In April 1864, just one month prior to starting his final campaign, Grant had sent Sherman a map upon which was sketched the general plan for the 1864—65 campaign. Seeing the map, Sherman understood what was in Grant's mind. In response, he wrote: "This was as far as human foresight could penetrate."[42] Sherman knew that it would be folly to plan in detail too far into the future, for there were too many variables and too many unknowns. Grant and his subordinates would have to remain flexible, ready to react to situations and events that they had no way to predict. On one hand, Grant's overall vision remained fixed throughout the campaign. On the other hand, the specifics remained flexible.

Sherman's words provided good advice at the dawn of industrial warfare, and they are equally instructive at the dawn of post-industrial warfare. By understanding the two conceptual shifts that have and are taking place relative to the context of war, the five trends that affect the conduct of post-industrial warfare, and what remains constant among all that is changing, one can forecast how land combat may be conducted in the 21st century. Like Grant's overall campaign plan, that forecast—albeit in outline form—can act as the goal to guide near-term plans.

One should be skeptical of any military strategist who claims certainty about the future of warfare, especially those who assert that technology changes the fundamental nature of war. One should be even more skeptical of the political strategist who believes that certainty in war is possible. "For precision cannot be expected in the treatment of all subjects alike . . . ," Aristotle reminds us. "A well-schooled man is one who searches for that degree of precision in each kind of study which the nature of the subject at hand admits."[43] Good advice for political and military strategists alike.

Notes

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4. Boutros Boutros-Ghali, "Empowering the United Nations," *Foreign Affairs*, Winter 1992/93, p. 101.

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6. *U.S. News and World Report*, November 30, 1992, p. 36.

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34. Martin van Creveld, *Command in War*, Cambridge, Massachusetts: Harvard University Press, 1985, pp. 261—275; Richard Simpkin, pp. 227—255; von Clausewitz, pp. 100—121.

35. van Creveld, *Command in War*, p. 146.

36. Richard Simpkin, pp. 79—86, 93—114, 133—143. Simpkin explains his concept of "sufficient" mass on these pages. He acknowledges that the argument that smaller forces can create decisive effects is true only up to a point. That point is identified as the one at which the mass involved is insufficient to threaten the enemy force. To use this amount of mass is to err on the side of deficiency. One can also err, Simpkin points out, on the side of excess. One can employ too much mass—that is, a force so large that all of it is not usable. Between these two extremes is "sufficient mass," that amount sufficient to threaten the specific enemy force in question. Clausewitz expresses a similar notion in Chapter 14 of Book Three, "Economy of Force." Here Clausewitz maintains that a commander achieves true economy of force when "all forces are involved...[and] no part of the whole force is idle.", p. 213.

37. Gary L. Guertner, "Conventional Deterrence and U.S. Strategy," *The Washington Quarterly*, Winter 1992, pp. 141—151.

38. Howard, p. 176. None of these capabilities will obtain, however, if the nation fails to invest in advanced technologies, for the maintenance of the American military's technological edge is not a foregone conclusion. It requires constant attention, especially now when advances in technology are occurring at an exponential rate.

39. Kuhn, pp. 52—172.

40. Martin van Creveld, *Fighting Power*, Westport, Connecticut: Greenwood Press, 1982, p. 3.

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Ulysses S. Grant and America's Power-Projection Army

General Gordon R. Sullivan

We find ourselves today at the nexus of two great transformations. The first is social, economic and technological: the information age emerging from the industrial. The second, international and political: a yet-to-be defined international order replacing the bipolar Cold War system. We also find ourselves at a time of shifting national priorities and fiscal difficulty. The confluence of these transformations and changes identifies this as a period of historic transition. Practice often leads theory during such periods, for the future is too uncertain to be precisely defined or estimated. The US Civil War was fought as the industrial age began to mature—a period of historic social, economic and technological transition. We have taken counsel from the way in which General Ulysses S. Grant dealt with such a transition as we deal with ours.

On 3 May 1864, just 53 days after being placed in command of all the Union armies, Grant began what may have been the first campaign of the industrial age. Prior to this campaign, annihilation was understood as the destruction of the enemy's army accomplished via the classic Napoleonic *decisive battle*. In fact, one could argue that up to this point, the US Civil War was little more than a series of loosely connected battles, none of which had proven to be decisive. By the end of Grant's campaign, this classic understanding had been supplanted by a new understanding—a historic transformation in the conduct of war had taken place.

First, Grant expanded the understanding of "annihilation" to include destruction of the Confederacy's main armies *and* its war-making capability—infrastructure, agriculture, transportation system and manufacturing base. Second, Grant realized that he could not annihilate his enemy by a single decisive battle. It would take a campaign. Grant

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expanded the understanding of annihilation by linking battles and engagements conducted by his subordinate armies into a single, coherent campaign that encompassed the entire theater of war. In doing so, he became what we now call an "army group commander," broke the Napoleonic paradigm that had governed military thinking from the beginning of the 19th century and ushered in industrial age warfare.

While we cannot document whether Grant understood explicitly that he was at the cutting edge of military art, he was certainly aware that what had been tried before—the old paradigm, to use contemporary terms—was not working. This awareness is revealed in Grant's assessment of the situation when he assumed command: "The opposing forces stood in substantially the same relations toward each other as three years before. . . . Before this time . . . various armies had acted separately and independently of each other, giving the enemy an opportunity often of depleting one command, not pressed, to reinforce another. . . . I determined to stop this."[1] Grant had no "theory of industrial age warfare" upon which to draw, but he had good "strategic sense" and astute political instincts. Furthermore, he had a "genius" for finding a solution to a complex problem that had never been solved before, then doggedly seeing the solution carried out. He did not have a theory of industrial age warfare, but these qualities, this genius, allowed him to see clearly enough to craft a workable solution to the strategic problem for which he was responsible.

Two features of the plan are important. First, Grant identified the armies of Generals Robert E. Lee and Joseph E. Johnston's as two of his main objective points. Lee's army was important because it personified the rebellion and protected Richmond, Virginia; Johnston's, because it protected one of the major transportation hubs of the south—Atlanta, Georgia. In addition, Grant had to make sure that the two armies did not merge, for if they did the war would exceed President Abraham Lincoln's acceptable political and economical limits. His third objective point concerned resources, the war-making capability of the South. Grant's campaign would attack selected portions of the infrastructure, agriculture, transportation system, ports and manufacturing base of the Confederacy. In the words of his final report: "I . . . determined . . . to hammer continuously against the armed force of the enemy and his resources."[2] Grant knew that he must not

only destroy the main Confederate armies, but also destroy the capability of the Confederacy to raise and maintain armies.

The second important feature of Grant's plan was that he envisioned a campaign—not a battle—as the way to achieve victory. He conceived of one unified campaign throughout the depth of his theater of war, a campaign that tied together the activities of all his armies. The scope of this vision was unprecedented. He realized that "it will not be possible to unite [his subordinate armies] into two or three large ones.. .. But, generally speaking, concentration can be practically effected by Armies moving to the interior of the enemy's country."[3] This realization is vital, for it shows that Grant was not thinking of the classic battle of annihilation. Rather, his was a radically new vision: one of "practical" concentration—or concentration of effects in today's jargon. This also enabled Grant to stay focused on his strategic aim, yet accommodate both change and failure. After Sherman took Atlanta, for example, he was to move against Mobile, Alabama. When conditions changed, Grant's plan was flexible: Sherman marched to Savannah, Georgia, then north through the Carolinas. When Benjamin Franklin Butler failed to attack Richmond quickly after his movement up the James River and ended up on the defense, again Grant accommodated this development.

Grant sought not merely to exhaust the South's will to fight. His goal was annihilation, to break the military power of the rebellion and bring the Civil War to a close on Lincoln's terms. And the campaign plan that he developed was well thought out.

The importance of Grant's campaign plan cannot be overstated. In this plan are combined his strategic aim, military end-state conditions, operational objectives, identification of his main effort and the missions of each of his subordinate theater armies. This plan unified the efforts of all toward common objectives. Grant's end-state conditions and operational objectives remained constant from start to finish; his means varied as the situation directed. During the conduct of the campaign, his subordinates exercised their initiative to take advantage of opportunities unforeseen at the start of the campaign, but none ever strayed from the objectives identified in Grant's overall vision.

Since Grant never claimed to be much of a theoretician, we will never know whether he understood that his 1864 campaign was revolutionary

in nature. But Grant did know the "old way" would not work. So he applied his strategic sense, political instincts and problem-solving and leadership skills to the situation in which he found himself. He crafted a workable solution to the strategic problem before him. Theory followed practice.[4]

Change

Metaphorically speaking, we find ourselves today in a situation similar to Grant's. The social, economic, technological, international, and political transformations are challenging the Army to change the way it operates. We are meeting those challenges. We are a different Army than we were when the Wall came down. We are continuing to change. In some ways, we are on the leading edge of the revolution in military affairs. Like Grant, we are shaping the situation in which we find ourselves, doing what works given the problems we face. We are undergoing a paradigm shift and trying to look into the future to see what information age warfare is going to be like. We are not waiting for a full articulation of a theory of information age warfare. Nor can we wait; we are moving out. Practice is leading theory.

The Cold War Army was a "consequence" of a particular set of post-World War II historical and technological conditions. Initially, these conditions remained somewhat uncertain. By 1950, the set of conditions against which we would have to create our Army started to clarify. Our enemy would be the Soviet Union, its allies and its surrogates. Our war would be global and possibly nuclear, with the main theater in Europe (or at least we thought that the initial emphasis would be in the European theater), and within a well-defined alliance system. Further, we assumed a strong American economy and a relatively cohesive society. To fight this war, the Army developed a sequential operational concept: the fight would initially include forward-deployed Regular units who would be reinforced first by Continental United States-based Regular units using pre-positioned equipment then by mobilized units from the Reserve Components (RC).

For the next 40 years, we studied, in an increasingly detailed way, Soviet tactics, equipment, operational style and overall *modus operandi.* We trained "against" this enemy. We created a world-class Soviet motorized rifle regiment to fight "against" our forces at the National Training Center, Fort Irwin, California. We scripted and

rehearsed our battle plans in general defense plan battle books, terrain walks and field exercises. We "fought" the land campaign in countless exercises, simulations, workshops, and symposiums. We codified our practices and rehearsals in doctrine; developed tactics, techniques and procedures; organized and equipped our force; and prepared our logistics system and stockpiled supplies. So compelling was this vision, that RC forces were "capstoned" to plans with an implied certainty that, in retrospect, seems altogether unreal.

To be sure, there were units of the Cold War Army whose focus was what we called "low-intensity conflict," but no one can doubt that the primary focus of the US Army during the Cold War was the Soviet threat in Europe. "World War III" would have been an updated version of World War II—more "high-tech," perhaps faster paced and likely nuclear. But it would be a war generally recognizable to Generals George C. Marshall, Dwight D. Eisenhower, George S. Patton Jr., Field Marshals Sir Bernard L. Montgomery, Erwin Rommel or Zhukov. The Army—both Active Component (AC) and RC—was raised, equipped, deployed, organized, trained, educated, sustained, resourced and commanded and controlled with this war in mind.

Although the Cold War Army fought other wars, its focus was on Europe and "the big one." Europe was the worst-case scenario for which the Army had to be prepared. All other scenarios were "lesser included" missions that we could take care of with the force structure and equipment needed for the "warfight," namely the warfight in Europe.

This was the Cold War paradigm. It fit the realities of its day. From relatively known conditions, the Army developed, then fine-tuned a set of processes—raising, equipping, deploying, organizing, training, educating, sustaining, resourcing and commanding and controlling—that built the Cold War Army. The relationship among the known conditions, the processes and the Cold War Army is essential. The kind of Army we built during the Cold War was derivative of the conditions in which we expected to use that Army and the processes we developed to build it. The Cold War Army had a considerable degree of flexibility, flexibility gained primarily through its size.

The relatively known conditions upon which the Cold War Army was built are no longer valid. Ambiguity and uncertainty are the primary characteristics of the post-Cold War transition period in which we find

ourselves today. Certainly, the Cold War had its share of ambiguity. But in today's world, the areas of uncertainty are wider and nearly unresolvable. Today, we cannot forecast with any degree of certainty the theater in which we may be employed, the political or alliance conditions under which we will fight, the sequence of operations that we will follow or where our mission will fall on the operational continuum. We do not know the tactics, equipment, operational style and overall *modus operandi* of our enemy. We can neither script nor rehearse our battle plans.

Today's basis for planning is relatively *un*known, as compared to the relative "knowns" of the Cold War. This is the essence of our Army's paradigm shift. All of the processes by which we built the Cold War Army assumed a relatively known set of variables. That fundamental planning assumption is gone.

The processes that built the Cold War Army will not produce a power-projection Army. Processes that were designed, honed and fine-tuned for 40 years against a relatively known set of variables will not work under the wider degree of nearly unresolvable uncertainty that we now are experiencing. Some will suggest a new set of "knowns" upon which, in their view, we should build the Army. Such a suggestion is seductive, for the processes that we used to build the Cold War Army will work using any set of "knowns"—for the processes designed to work from that kind of start point. If we succumb to our insatiable quest for certainty and posit some set of "knowns" so that our planning processes will work, we will have been seduced. No set of "knowns" can reflect the essential reality of our post-Cold War period of transition—uncertainty.

This uncertainty results from the two great transformations now unfolding, as well as the shifting national priorities and fiscal difficulties. It would be comforting and expedient to postulate some set of knowns from which we could derive and build America's power-projecton Army because in doing so we would be "verifying" the adaptability of our systems to the new post-Cold War environment. But it would be wrong for two reasons. First, we would not be facing reality. Whatever set of knowns one postulates would not reflect the essential reality with which we have to contend in the post-Cold War period—that we do not know against whom we will fight, where, when, how or even with whom. Strategic uncertainty and ambiguity is the

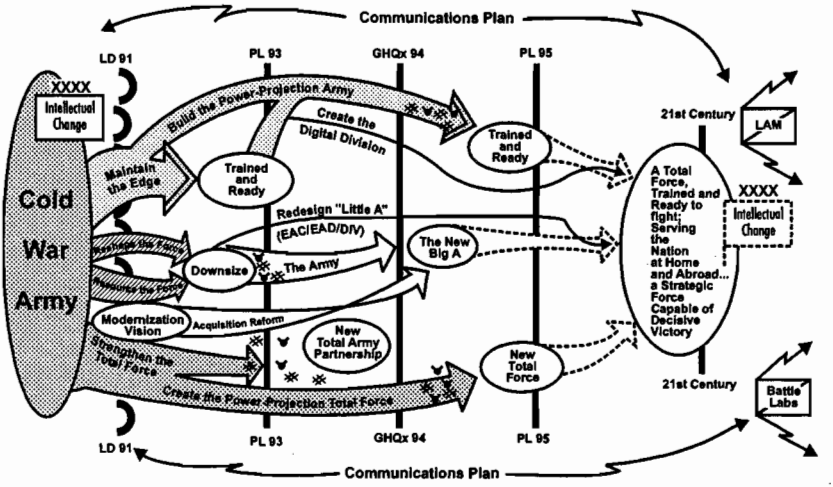
essential characteristic of our world. We must learn to deal with reality as it is, not as we want it to be. Second, in not facing reality as it is, we could prepare the Army for the wrong war. If we postulate a set of knowns and build a force optimized against that set, we risk violating Michael Howard's prime principle that during times of peace, armies cannot get "it" too badly wrong.[5] Prior to World War II, the Army had years to move from its interwar state of training and capability to that required to fight the war. Such a luxury no longer exists. "Optimizing" under extreme uncertainty such as we face today makes little strategic sense.

The fog of peace may cloud our vision of the future, but we can see clearly enough to know that our potential enemies—or potential allies for that matter—will range from "armies" of agrarian societies, religious groups, tribes, guerrilla bands or clan leaders to "industrial armies" of nation-states to "high-tech forces" of post-industrial, knowledge-based societies. Most likely, we will face a mix. We also know that we must be prepared to fight in any number of cultural, climatic and political environments. Thus, the doctrine, leadership and organization of today's power-projection Army require a degree of versatility not foreseen during the Cold War. The variety of missions, range of skills and reduced budgets demands a different, and closer, relationship among the AC and RC forces. All this is clear enough to use in our current plans and exercises. The essential reality of our post-Cold War period of transition is uncertainty, but that uncertainty is absolute.

Like Grant, we have a campaign plan. It describes how we will transform ourselves into the US Army of the 21st century. Our plan unifies the efforts of all toward common objectives. No doubt we will have to adjust as the situation develops and all leaders will have to use their initiative to take advantage of opportunities unforeseen at the start of the campaign. While our campaign plan is flexible as to how we will move toward our objectives it is fixed with respect to the objectives it identifies and the mission we will accomplish (see fig.).

Growth

The US Army is growing, but not in the sense of getting larger. Rather, in the sense of "progressive development." We are resisting the immediate tendency to find some new "set of knowns" that we can use



Campaign Plan: America's Army of the 21st Century

in place of the Cold War set, for this tendency is flawed. No set of knowns will reflect the essential reality of the day: uncertainty. All will miss the mark. This is the shift in paradigm, and what is so hard to grasp. Over the past several years, we have thought through the implications of this paradigm shift—implications which fall into at least these five areas:

First, we understand that the relative knowns forming the start point of the Cold War paradigm are actually derivative from what the nation asked its Army to do during the Cold War—contain Communism, deter war, fight and win if required. The start point for the post-Cold War paradigm, therefore, should come from the same source: what is the country asking its Army to do now? At least a partial list of these requirements can be found in "Land Warfare in the 21st Century."[6] They are:

- Help "promote an environment conducive to political and economic stability abroad"—that is, "promote the conditions in which corporations will invest, products can be sold, and economies [will] prosper." This includes doing its part to prevent the proliferation of weapons of mass destruction.

- "Contribute to domestic recovery, participate in global stability operations and retain its capability to produce decisive victory in whatever circumstances we are employed.
- "Prevent crises from occurring or from developing into conflicts; resolving conflicts before they spread or become war, or ending wars decisively on terms favorable to the United States and its allies."

Second, realize that our future wars will not look like the armies of one nation-state or group of nation-states fighting another. This understanding of war is too narrow, it always has been. But the stakes of the Cold War were so high that the variety of war was often overshadowed by the narrow understanding. This narrow view, however, is not useful in helping to identify appropriate solutions to the real problems that we face now and will face in the future.

Contending armies of nation-states do wage war, that much is accurate. But war's realm is larger. The Zionists waged war to realize their goal of an Israeli state, so did the Palestine Liberation Organization. Vladimir I. Lenin and Mao Tse-tung waged war to down established governments, as are the Shining Path in Peru and drug cartels in Colombia. Serbia and Croatia are fighting a war to exend their territory at the expense of Bosnia. Mohammed Farrah Aideed and other warlords are fighting to determine who will rule Somalia. A similar power struggle is now raging in Haiti. The examples go on.

War involves the use of violent force to compel the submission of one's opponents and to attain one's political aim. Wars can be, and in other periods of history have been, waged by states, corporations, religious groups, terrorist organizations, tribes, guerrilla bands, drug cartels, clan leaders or others. Nation-states do not have a monopoly on war making; war can be waged by a variety of entities. The realm of war is one of violence, force, dominance and submission—to compel the submission of an opponent and attain a specific political purpose. The realm of war is wide; its forms, many. We are "warfighters" in all these senses. We fight the nation's wars, not the ones we choose.

Third, resist the temptation to quantify or precisely define what in essence is unknown, and quite possibly unknowable. As we get closer to the end of the transition period we are now in, we may be able to describe some set of known threat conditions. Right now, that is not the

case. Thus, we cannot use some set of knowns as the basis for building the power-projection Army just because without such a start point, our models will not work. This is Cold War thinking. Models do not run the Army; reality does. Under conditions of relative uncertainty, we are concentrating on:

- Versatility of mind, organization and execution means that the power-projection Army requires the very best *leader development program* in the world, one that will create leaders who are comfortable with change and uncertainty. We are changing our school and training systems to ensure that our leaders can succeed under extremely ambiguous conditions. More junior leaders are finding themselves in situations where they are required to read and react to sophisticated nuances at the tactical level, and sometimes at the operational and strategic levels. The Army's leader development program will educate our current and future leaders to this new standard. Versatility also means that we must be able to build, quickly, resilient organizations.[7] A resilient organization is an organization that adapts itself to the requirements of a particular situation. Task-organized structures will be too narrow for future requirements; tasks will change as the situation develops. Resilient organizations are situation-organized. They will be able to adapt to changes in task and react to political and military nuances. Last, the Army is extending the concept of versatility to execution—the ability to succeed under any conditions. This kind of versatility comes from *excellence in the basics*.
- Excellence in the basics and quality people: As any winning coach knows, "You cannot defend against well-executed basics, and it takes good people to make a good team." America's power-projection Army is in the process of identifying what its core strategic, operational and tactical competencies are and developing an excellence in them. Without excellence in the basics, versatility is impossible. Concentration on basics will mean that we reduce the numbers of tasks on a unit's mission-essential task list (METL), not increase them. Football has six basics—run, pass, catch, block, tackle and think. Hockey has five basics—skate, pass, check, shoot and think. In this time of ambiguity and uncertainty, we are structuring our approach to training in a similar way. We will develop the ability to adapt to changes in

task and react to the political and military nuances of a particular situation by focusing on excellence in the basics and initiative in our troops and leaders. Versatility in mind (leader development) and organization (building resilient organizations) plus excellence in the basics (reduced METL) will result in versatility in execution.

All of the above, however, depends upon the *quality of the people* we bring into the Army and of the soldiers we retain. Information age warfare fought under extremely ambiguous threat, geographic and political conditions will require an unprecedented degree of discipline, quick thinking, cohesion and technical competence—all depend on quality people. The Army cannot hope to acquire these characteristics without high recruiting standards complemented by the right mix of high quality of life and tough, challenging training under realistic conditions.

- The right menu and numbers of forces include combat, combat support and combat service support; light, heavy and special operations forces (SOF); AC and RC. Uncertainty requires depth on the bench. We are going to have to build resilient organizations by mixing and matching units as the situation requires. We understand that this means that we need the right menu and number of trained and ready units from which to choose. This menu will provide the depth necessary to win regardless of the size or duration of the mission, regardless of the threat conditions and political constraints. Also, the "menu of forces" will have to be affordable. Hence, the emphasis on "America's Army" in the post-Cold War period.
- America's Army must be based on a new AC/RC partnership. Meeting the requirements of affordability, accommodating uncertainty and creating a depth of capability—all mandate a total force policy in America's power-projecton Army different from that of the Cold War Army. We have been re-crafting this new policy for several years. The "AC first, RC follow" sequence of the Cold War era no longer applies to the post-Cold War world. The reality is: the use of AC and RC simultaneously—this is happening right now. Today, soldiers of all three components, civilians and contractors are deployed around the world on operational missions.

> This pattern will continue. America's Army will grow more seamless. A power-projection Army needs connectivity to America, and a more complete integration of the components will provide that connectivity. We are building a force structure, a mobilization system and access policies that recognize these realities. This will require regulatory changes, maybe even legislative. It will also require a "paradigm shift" in thinking in both the AC and RC, a shift we are making. AC and RC forces will be mixed in ways and assigned missions previously not required.

Fourth, we must reexamine each of the processes by which we build the Army. The processes that created the Cold War Army cannot create the power-projection Army. The names of each of the processes will probably remain the same—raising, equipping, deploying, organizing, training, educating, sustaining and command and control—but how each process works and what it produces must be different. Ford does not build a Taurus on a Fairlane assembly line. We cannot build a power-projection Army with Cold War-Army processes.

The following are a few examples: the process by which we call up RC forces developed to bring the nation to total mobilization for global war must change to reflect more precise requirements associated with regional wars (understood in the broader sense) and operations other than war. Research and development, part of the equipping process, must be altered to reflect the pace of technological change. The training process is both expanding and contracting. It is expanding relative to the conditions under which the Army must be prepared to operate and contracting relative to the numbers of tasks. These changes—and many more—are going to be required to shift our Army from a Cold War total force to America's power-projection Army. We have made and are making some changes right now, but we still have a long way to go.

Fifth, we need to encourage intellectual vitality. Times of great change require new ways of thinking, deciding and acting. The revised US Army Field Manual 100-5, *Operations*, Louisiana Maneuvers, battle labs, creative scenarios at our CTCs and a host of other ongoing programs all are helping to create the sense of intellectual vitality that permeates our Army, but we have to do more. We must continue to tap the intellectual resources of our Army. We must continue reading, studying, discussing and debating what the future holds for the Army and how we might best prepare for that future. We cannot break from

our values, for they are the heart and soul of our profession. But neither can we be held captive by "what worked before." The future will be fundamentally different from the past in ways we have not yet begun to understand. Martin Blumenson said of Patton during the interwar years, "He pondered and acted on new ideas and innovations in procedures, techniques and equipment, in the hope of advancing his profession and the well-being of his troops."[8] Our challenge is to come to grips with the future. We must all become professional thinkers.

The many ways in which the Army has already changed as well as those now under consideration are all examples of growth. We are changing, but we are neither throwing the proverbial "baby out with the bathwater" nor changing for change's sake. We have recognized the shift in paradigm from the Cold War Army to America's power-projection Army. And we are acting upon that recognition. We are positioning America's Army for the 21st century right now.

We have no "theory of information warfare" upon which to rely, but we understand what is going on. We have new doctrine and a campaign plan—and we are using them and the Louisiana Maneuver process as our guide. Like the great campaigns of history, we are prepared to adapt as we move, but we are moving out and we will continue to do so. This is nothing new to our Army.

Early in the century, Elihu Root, Lieutenant General John M. Schofield and General Francis A. March created the professional Army. Just prior to World War II, Marshall and Lieutenant General Lesley J. McNair crafted the modern, mass Army. Following the Vietnam War, Generals Creighton Abrams and William E. DePuy began building the Army that triumphed in the Gulf. We are building America's power-projection Army in this tradition.

The two great transformations, as well as our shifting national priorities and fiscal difficulties provide the reason to move the Army into the 21st century. The campaign plan is our map; growth is our direction; continuity, our compass. America's Army is the most competent army in the world today, and we are changing to make sure that we remain so in the future.

Notes

1. Ulysses S. Grant, *Personal Memoirs of U.S. Grant*, ed. E. B. Long (New York: Da Capa Press, Inc., 1971), 364—65 and 419.

2. Grant, "Report of Lieutenant General Ulysses S. Grant, US Army Commanding Armies of the United States, Including Operations March 1864—May 1865," *Dwight D. Eisenhower: the Professional Soldier and the Study of History*, ed. Richard M. Swain (Fort Leavenworth, KS: US Army Command and General Staff College, 1990), 27.

3. David L. Wilson, *The Papers of Ulysses S. Grant*, Vol. 10 (Carbondale, IL: Southern Illinois University Press, 1982), 245—46.

4. See Peter F. Drucker, *Post Capitalist Society* (New York: Harper Business, 1993), especially 78, 113—14 and 183 for examples of practice leading theory in the case of "pension fund capitalism" and "knowledge as an economic resource."

5. Michael Howard, "Military Science in an Age of Peace," *Journal of the Royal United Services Institute for Defence Studies* (March 1974).

6. GEN Gordon R. Sullivan and LTC James M. Dubik, *Land Warfare in the 21st Century* (Carlisle Barracks, PA: Strategic Studies Institute, 1993), 6—8 and 24.

7. Margaret J. Wheatley, *Leadership and the New Science: Learning About Organization from an Orderly Universe* (San Francisco, CA: Berrett-Koehler Publishers, Inc., 1992), 18—23.

8. Martin Blumenson, *The Patton Papers* (Boston: Houghton-Mifflin Company, 1972), 19.

War in the Information Age

General Gordon R. Sullivan and Colonel James M. Dubik

Just as the industrial age changed military forces, so will the information age. Industrial nations furnished their militaries with "tools" very different from those that an agrarian nation provided. Information-based nations will equip and organize their armies differently than their industrial counterparts did. Whether the technological changes cause the organizational and conceptual, or vice versa, is not the issue. This is the issue: the dawning of the information age will fundamentally change the conduct of warfare—just as the industrial age did a century and a half ago.[1] It is happening now.

Prior to industrialism, James Schneider explains, the "strategy of a single point was the dominant military paradigm," and Napoleon's decisive battle was the model.[2] But the period 1860—1939, during which industrialization was driving toward maturity, brought a new paradigm.

The Industrial Age

The military objectives required to ensure victory during the industrial age expanded. They included not only the enemy army—the main objective point for Napoleon and other armies prior to industrialization—but also the enemy's war-making capability and resources: infrastructure, manufacturing base, and raw materials. An army could not achieve these expanded objectives in one decisive battle. Thus, over time, distributive campaigns replaced the Napoleonic strategy of a single point and decisive battle. A campaign—a sequence of battles, engagements, and major operations conducted over time, throughout a specified geographic area and linked together into a synchronized whole—replaced the notion of a single decisive battle. Finally, to conduct these kind of campaigns, whether offensive or defensive, required large, dispersed armies that could be coordinated to common effect.

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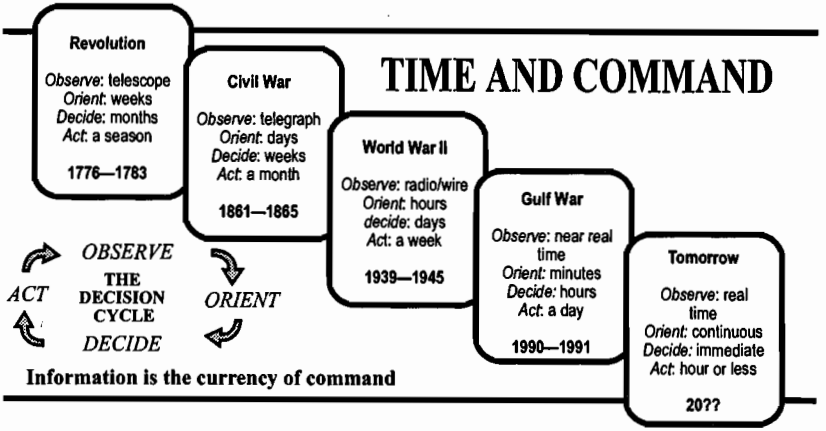


Figure 1

The commanders of these armies needed a different set of skills than their predecessors. By Napoleon's time, armies were no longer unitary. They were subdivided into divisions and corps. As forces grew in size, armies and army groups emerged. The military became a profession; specialization took effect, and the staff system evolved.[3] A military education system emerged in industrial nations to ensure that officers had the conceptual, technical and organizational skills necessary to synchronize the efforts of the disparate parts of their military machines.[4] The concept of time itself changed (see fig. 1).

Mixed in with the development of the new set of conceptual, technical and organizational skills came an explosion of technical innovations. The rifled musket, smokeless powder, the rifle and the machine gun; breech loading and belt loading; processed food; steam, then gasoline-powered engines; indirect artillery fire; the railroad and the telegraph; mechanization and motorization; and a host of other inventions all affected the range and lethality of weapons as well as the overall conduct of warfare. Other innovations such as administrative and accounting procedures, preprinted forms, maps, the technical means to coordinate large numbers, accurate portable clocks, the telescope and many other nonmilitary inventions also took effect. Front and rear were unified first by rail and ship, then by air. This unification allowed for the continuous flow of personnel, units and supplies. Thus, large, geographically separate formations—controlled by a professional and ever-growing staff—could act as one unified force and

"grind on" toward victory despite casualties in personnel or materiel.[5] The ultimate result: war, conducted and sustained over years in the multiple theaters of two world wars, then a half-century global "cold" war.

Technical advances affected the conceptual and organizational, and vice versa. An advance or change in one impacted upon the others. What is clear, however, is that the industrial age had a dominant method of conducting war, and this method differed from that of the agrarian.

Thus, industrial armies were fundamentally different from their agrarian predecessors.[6] The whole approach to war changed. For industrial armies, "objectives" were distributive: enemy forces, as well as infrastructure, manufacturing base and resources. Industrial armies had to be raised, equipped, trained, educated and organized to conduct sequential, distributive operations throughout the depth of a theater, or multiple theaters, and to sustain such activities over time. Industrial armies needed continuous logistics and mobilization, from rear to front and back; centralized communication; large, bureaucratically organized staffs; and large, durable formations.

Both world wars epitomized industrialism. In World War II, the United States became a "war machine" capable of continuous, long-run production and mass output of arms, men, units and equipment. Forrest Pogue describes the plan for victory as one in which the United States would "create air superiority, strengthen naval forces, create industrial production sufficient to arm the defenders of the Western Hemisphere, outfit task forces for operations in the Atlantic and in the European theaters, and furnish weapons and supplies for friendly powers wherever they might be."[7] Three characteristics of the World War II model are:

- An industrial base and a training base.
- Long runs of mass-produced equipment, people and units to be mass distributed from the base to the front and returned from the front to the base if needed.
- Sequential campaigns and operations—the "ever-forward-moving front line" moving east from the English Channel, west from Russia or north toward Japan.

This was also the model that continued beyond the world wars. It was the model with which America and its allies won the Cold War. It is how our Army has been raised, equipped, deployed, organized, trained, educated, sustained, resourced and commanded and controlled for well over 50 years.

It is the model that mirrored the three central governing concepts of the industrial age:

The Machine as a Model. Machines are mechanical systems. They consist of standardized, interchangeable parts, each with a single, special function. The parts fit together into a synchronized whole. When the machine is turned on, it works automatically, grinding out its product—each like the other. Using this model, work was simplified to the point where almost anyone could be trained to perform repetitive tasks effectively. Taylorism, the method of factory management first developed and advocated by Frederick W. Taylor, dominated management theory. The idea that there was "one best way" produced workers who were permitted only to do one, single thing. Work became rote; management, rigid; and outcomes predictable.[8]

The "military machine" and the "wheels of business" are just two of many machine metaphors applied to life in the industrial age. And what controlled these machine-like organizations? A "grinding bureaucracy" whose defining characteristic was routine and was composed of standardized, interchangeable parts (people), each with a specific function (specialties) that, when put together (departments), would automatically grind out its product (integration and control) using a "scientific" approach (system analysis).[9]

Paced, Sequential, Continuous, Long-Run Production. Machines run at a preset, regular, "conveyer-belt" pace. If one increases or decreases the pace beyond the machine's set parameters, one risks breaking the machine or producing imperfect goods. Machines of the industrial age, and the organizations modeled after them, worked in sequence. Henry Ford's famous assembly line became the model not only for manufacturing but also for government, business and most other organizations. Business processes were sequential. Concept development, design, production, marketing, sales—each followed the other, but only after a centralized decision approved movement from one "department" to another. Bureaucracies perfected the assembly line

approach. Industrial age machines and organizations were efficient because they ran continuously, producing the same product. Retooling a manufacturing line to produce a different product was a major operation that often included closing down part of a plant for weeks or months.

Mass Output. Perhaps the most recognizable characteristic of the industrial age was mass: mass production, mass media, mass markets, mass advertizing, mass consumption, mass education, mass distribution, mass movements and mass religions.[10] "A lot of like things": this is what machines—whether corporate, political, economic or social-welfare or military—produce best and cheapest. This is what they are "good at." In sum, this is what industrialism is all about.

These governing concepts provided the context within which we lived our social, political, economic, and private lives. Within "industrialized" nations, new political architectures emerged, sometimes from debate, often from conflict, occasionally from civil war. The story of one age replacing another is a story of tension, chaos and an associated nontrivial potential for violence. Change is unsettling, especially when so much changes; when fundamental values and structures are challenged; and when the future is so uncertain.[11]

But the dominance of the industrial model is over; the industrial age is passing. The information age has been colliding with the institutions of the industrial age for two decades. The result will not be the complete elimination of industrial structures and institutions, but the information age is coming to dominate the industrial. The transformation from an industrial to an informational society will be as profound as the shift from an agricultural society to an industrial one.[12]

The Information Age

The information age—as the industrial age did before it—will affect social, political and corporate structures, as well as most other public institutions and organizations. And it will alter our private lives too.

The entire economy of some nations already is beginning to take on a new structure—more diverse, easily tailored, decentralized, faster paced and complex. A new set of principles and new governing concepts are beginning to take shape.[13] The details remain partially

obscured, but the outline is clear. The governing concepts of the information age are taking the following shape.

The Network as a Model. Industrialism employed Sir Isaac Newton's perspective: "In the machine model, . . . things can be taken apart . . . then put back together without significant loss."[14] Replacing this perspective, however, is a more holistic one in which relationships among the parts gain importance. In a network, processes—the web of relationships that enhance the flow of information among the parts of an organization, factory or corporation—determine the organization's ability to be effective and competitive in the information age. Responsibilities will remain hierarchical, but the efficacy of hierarchical organizations will diminish as information-sharing networks become the norm.[15] This requires that organizations develop "a sophisticated information network that gathers precise and exhaustive data on markets and customers' needs, combining it with the newest design methods and computer-integrated production process, and then operating this system with an integrated network that includes not only highly skilled employees of the company but also suppliers, distributors, retailers and even customers."[16] Successful networks require high-quality, sophisticated workers and managers.

Workers in an information age corporation are not "standardized, interchangeable parts" with little to contribute other than their single, specialized function along an assembly line or in a bureaucracy. Rather, workers are becoming—and in successful organizations, they already have become—contributors, collaborators, communicators and members of teams. Training and education of workers—as well as worker longevity, loyalty and trust—are absolutely paramount in information age corporations. Quality is key as never before.

In a corporation organized as a network, middle management positions disappear as two of their main functions—information transfer and worker supervision—dissipate. Computers "talking" to themselves by digital transfer of information, and empowered workers becoming more self-regulated, are making much of middle management obsolete. Staffs, as they have developed during the industrial age are changing dramatically. Bureaucracies will not vanish, but they will be organized around information, not functions. Spans of control will grow larger; organizations, "flatter"; and "process action teams," more prevalent.[17]

Leaders will guide by vision and policy, not by procedure-based rules. Decision making under these conditions will also change. Most decisions will be decentralized. Of those that remain centralized, many will be made in a participative way; fewer will be made by a single leader or manager. Successful corporations will become adaptive, constantly learning and "self-renewing" in response to external realities, internal changes and market conditions.[18] But however decisions are made, successful organizations will have to speed through the decision cycle faster than their competitors. Speed—which is emerging as perhaps the dominant mark of the information age—is one of the most important advantages of the network over the machine.

*Near-Simultaneous, Continuous, Short-Run Production.*The preset, regular, "conveyer-belt" pace of the machine age is over. Only fast-paced, adaptive organizations will succeed in this new era of competition. Today, competition comes not only from traditional adversaries in traditional sectors, but also from disintegrating barriers to previously insulated and protected markets. Few corporations can now predict from where their next "peer" competitor will come. Competition now arises unexpectedly, from anywhere.[19]

To deal with this degree of uncertainty, information age corporations seek "to compress product development time, to shrink the interval between the identification of the need for a new product and the beginning of its manufacture."[20] Again, the time between observed need, through decision, to action, will get shorter and shorter. Thus, speed in identifying, then meeting new market needs grows in importance. The inflexible machines and stiff bureaucratic processes of the industrial era justified their expense through mass, but the speed of an information age corporation will turn this industrial world inside out.

Information age corporations beat their competition by compressing time; expanding market share, productivity and profitability; eliminating the "assembly line" mentality; and reengineering overly bureaucratized organization. These are keys to success in the information age. The most basic and common feature of a reengineered business is the adoption of the network as their organization model instead of the assembly line attitude. In a network organization, "many formerly distinct jobs or tasks are integrated and compressed into one."[21]

Mass-Customized Products, Precisely Targeted, Near-Instantaneous Distribution. Advertising and marketing were the tools to convince the customers to accept mass-produced products. Low prices and sheer abundance helped make this acceptance complete. But "demassification" is becoming more common, with the niche market replacing the mass market.[22] Corporations are able to customize a specific product or service in response to particular customer requirements. Cost-effective, near-instantaneous, mass-customized products and services are now available. Custom design, instant delivery, a product or service adapted to the customer, not vice versa—these are the hallmarks of the information age business.[23]

Information age production machines can reset themselves, thus allowing continuous-flow, fully customized production. Mass production will continue to have a place in industry, albeit a smaller one. In the information age, profitability will not result from mass but from precision: first, in identifying the needs of a particular market segment; second, in developing and producing a product or service customized to that specific segment; and third, in delivering that product or service—all faster than one's competitor.[24] Constant innovation and speed will become two important ways to retain one's competitive advantage.

As the information age develops, corporations will not simply spend money on new technology and then use it in old ways. They will not simply ask how they can do things faster and better. These are actions that already will have been taken in the early stages of the information age.[25] Rather, corporations will ask, "Why do some things at all?" Success will come to the corporations that can exploit the full potential of computer technology within new organizations and develop new attitudes toward workers and work processes, new ways of operating and new management concepts—*as* these new technologies, organizations and concepts are developed. That is, success will come to those who "unlearn" the rules of the industrial age and adopt the new practices of the information age the fastest.

Information age principles and governing concepts will provide the framework within which we will live our social, political, economic and private lives. In *The Power Game*, for example, Hedrick Smith describes how the pace and demassification of the information age have already changed our political processes.[26] In *Reinventing Government*,

David Osborne and Ted Gaebler suggest ways in which government can deal with this new political landscape.[27] In *Changing Fortunes*, Paul Volcker and Toyoo Gyohten describe similar changes, required for similar reasons, in the world monetary system.[28] And in "*The Tales They Tell in Cyber-space Are A Whole Other Story*," Jon Katz describes how information age technology is changing and will continue to change the publishing world and the movie industry.[29] Changing also are our understanding of national sovereignty, the international order, threats to our nation's security, the nature of economic competition, the requirements to succeed in that competitive environment, America's role in the global community and many other long-held beliefs. We live in a time of transition between the industrial and information ages. It is a time of confusion, uncertainty and change—at times, chaos. Success will come to those organizations that lead their sectors under these near-chaotic conditions.

Ultimately, the information age will come to dominate, but vestiges of the industrial and the agrarian ages will remain. While some parts of the world become information based, others will remain industrial or agrarian. Still others will be in between. Even within nations, all three "ages" may coexist. Ours will be a world characterized by variety, increased complexity and uncertainty.[30] Our requirement: adapt.

With respect to change, some like to compare today's Army to its Cold War self. In the spring of 1990, we had nearly 6,100 soldiers operationally deployed in 45 countries.[31] Now, we have 21,500 soldiers in over 70 countries—about a 300-percent increase in operational tempo. During this same period, we reduced the size of the Army—active, national guard, reserve and civilian—from 2 million to 1.5 million, a 25-percent reduction; shrank our force structure from five to four corps, 18 active divisions to 12, and 10 national guard divisions to eight; returned nearly 150,000 soldiers to the United States from bases overseas; and cut our budget by about 40 percent (see fig. 2). About half of all Department of Defense base closings and personnel reductions accomplished so far have come from the Cold War Army. But the real story of America's Army is not in how it compares to the past, but in how it is transforming for the future.

This transformation—from a Cold War total force to America's Army of the 21st century, Force XXI—is growth, certainly not in the sense of getting larger but in the sense of "progressive development."

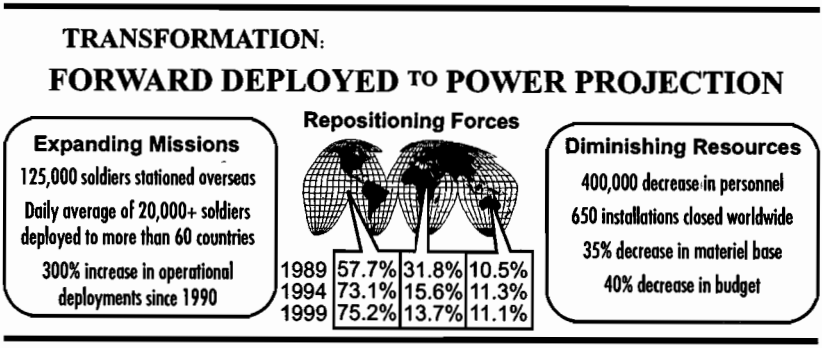


Figure 2

Such transformation is not new to the Army; we have "reinvented" ourselves before.[32] But we have tended to follow society's lead. Today we are helping to lead America into the information age. We understand the enormity of the tasks before us now. Thus, we understand the imperative to let intellectual change lead physical change. Over the past several years, we have fostered an intellectual debate within the Army to help come to grips with the transformation we have undergone and are undergoing. We are positioning the Army for the information age.[33]

The future will find that the concept of "war" is expanding in at least two ways. First, we will no longer be able to understand war simply as the armies of one nation-state or group of nation-states fighting one another. Somalia again demonstrates that this understanding is too narrow—it always has been. Nation-states do not have a monopoly on warmaking; a variety of entities can wage war and have done so in other periods of history—corporations, religious groups, terrorist organizations, tribes, guerrilla bands, drug cartels or other crime syndicates, clans and others. Further, agrarian age enemies can buy and employ information age weaponry. Information age technology will bring variety to the military sphere as it is bringing it to the economic sphere. The net result is a blurring of the distinction between "war" and "operations other than war."[34] Military "competitors" will arise unexpectedly, and the conditions for decisive victory will differ with each use of military force. Unlike during the Cold War, we do not have the luxury of focusing primarily upon one set of threat, geographic, and alliance conditions.

The second way in which the concept of war is expanding concerns conventional combat. The information age will change the scope of war as compared to the industrial age, just as the industrial did relative to the agrarian. Agrarian states cannot regenerate their warmaking capability; therefore, an armed force has only to defeat an agrarian state's army, or navy in some cases, to achieve victory. Victory against an industrial state, however, requires that an armed force be prepared not only to destroy sufficient portions of the enemy forces, but also infrastructure, resources, and manufacturing base—that is, destruction of warmaking capability. Victory over an information-based state goes one step further. It will entail not only sufficient destruction of the armed forces and physical warmaking capability, but also dominance of its information system.

Thus, variety and ambiguity are characteristics of the information age—variety and ambiguity in the kind of enemy we might face, the kind of war we might fight, the requirements of victory and the conditions under which America will use its Army. Joint forces; coalitions, sometimes ad hoc; interagency operations; precise rules of engagement, executed under the eye of near-instantaneous, global media; perhaps unreasonable expectations concerning casualties; decreased time between observed "crisis" and "troops on the ground," as well as between arrival in-country and mission completion—all will make each use of military force unique. Information age "tools"—speed, customization and precision—have already arrived on the battlefield. Only high-quality soldiers, leaders, staffs and organizations that can use customization, precision, and information to their advantage will succeed in this environment. The military requirements of the information age are upon us today.

The kind of army that can use information age "tools" and succeed under these conditions differs from the mass-production army of the industrial age. Successful information age businesses and corporations have had to unlearn industrial practices and apply new principles and concepts to their organizations, processes, and operations. We, too, have come to this realization. Certainly, the application in the military will not be exactly the same as that in the corporate world, for the two cultures are fundamentally distinct. Recognizing this essential distinction is important. We must also acknowledge, however, that the

governing concepts of the information age will change army organizations, processes and operations—as well as the conduct of war.

Distributive campaigns that developed during the industrial age will fade. Emerging in their stead will be simultaneous operations resulting in the near-instantaneous paralysis and destruction of enemy forces, warmaking capability and information network throughout the depth of a theater.

Information age armies will develop a shared situational awareness based on common, up-to-date, near-complete friendly and enemy information distributed among all elements of a task force. First, operational and tactical forces will know where their enemies are and are not—whether those enemies are "agrarian" enemies like Somalian war lords or Haitian strong men, "industrial" enemies like those in North Korea or yet-to-emerge information age peers. Of course, this "knowledge" will never be absolute, and it is folly to assume it ever will become "perfect." It will be, however, of an order of magnitude better than that achieved even during the Gulf War. Second, information age armies will know where their own forces are, much more accurately than before—and deny this critical information to the enemy. Last, this enemy and friendly information will be distributed among the forces of all dimensions—land, sea, air and space—to create a common perception of the battlefield among the commanders and staffs of information age armies. This shared situation awareness, coupled with the ability to conduct continuous operations day and night, is what will allow information age armies to observe, decide, and act faster, more precisely and more decisively than their enemies. Speed and precision are becoming the dominant requirements of the battlefield.

Speed and precision result from maneuver platforms, fire support and sustainment systems, and command and control platforms that are linked digitally. In information age armies, these will be organized as part of a joint network that includes the platforms and systems of sea, air and space forces. Future war is joint war; the whole of such a force is greater than the sum of its parts.

Direct fire will be redefined in the information age—armies will be able to shoot or move "directly" against enemies and targets even though they may be thousands to tens of thousands of kilometers

away.[35] Finally, all of these capabilities will be exercised under the watchful eye of independent, global, instantaneous transmitting media.

America's information age Army must be able to use these capabilities to defeat a variety of enemies—agrarian, industrial or informational. Therefore, we must be prepared to destroy or control *armies*—whether conventional forces of nation-states or those of feudal lords, religious groups, drug cartels, ethnic groups, crime syndicates, transnational corporations or other entities that may emerge in the information age of the 21st century. Of course, we must still contend with the factors of *infrastructure, production base* and *information grid*—again, whether in agrarian, industrial or information societies. The military sector will come to reflect the variety of the information age social, economic, political and private sectors.

Information age armies will differ from those of the industrial age. First, they will be more flexible and versatile. They will also tend to be smaller, yet more capable—*but only* if they are equipped with the modern technology, are well-trained and led, use up-to-date doctrine and are organizations that "fit" their technology and doctrine.

History suggests, however, that no peacetime army has ever gotten all this exactly right. As Michael Howard points out, in times of peace all armies will be wrong; successful armies are those that are not too badly wrong. And in time of war, successful armies are those which can adjust quickly.[36] Therefore, strategic common sense dictates that optimizing a force in peacetime entails significant risk; some "redundancy" and "insurance" must remain.

Second, information age armies will differ from those of the industrial age in the processes used to create and sustain information age capabilities. For example, force structures that can exploit and maximize speed and precision will replace industrial age force designs. Information age forces will not be attrition based—force allocation "rules," as well as personnel and equipment replacement or loss factors, will change. Also an acquisition process able to keep a pace closer to the rate of technological innovation and production will replace the current industrial age process. Decision-making processes will also change. They will include a mix of artificial and human intelligence and become much less a sequential process and more a simultaneous one.

This very short list of examples contains only a sampling of how fundamentally different information age armies will be as compared to their predecessors. The industrial model of mass mobilization, production, employment and logistics is passing. This model is being replaced by one of versatility, speed and precision. This new model will affect all levels of war—strategic, operational and tactical—in ways we are only beginning to understand.

The new information age model will also affect the use of military force. The variety of conditions under which America will employ its information age Army, especially in light of near-instantaneous global media coverage, will require very close strategic-, operational- and tactical-level coordination. Currently, this requirement is understood when the nation conducts what all clearly recognize as war. To some, this requirement is less clear in those cases involving employment that we now label operations other than war.

The information age will not allow us the luxury of this artificial distinction. Any use of America's information age Army in a situation in which one or more of the parties are using violence to compel others to do their will requires that we approach the situation as war and forge very strong civil-military and interagency links.

While much will change in the conduct of war in the information age, the nature of war will change little. Information age war will *not* be remote, bloodless, sterile or risk free. Information age war, in all its variety, will remain war. Death and destruction will remain the coins of war's realm. And the values of these coins will not diminish, regardless of how much advanced technology is available to an information age army. Nor will information age war be without uncertainty or ambiguity, for there will remain thinking, deceptive, cunning enemies about whom we will never be able to have complete knowledge.

Even in the information age, the human heart and will govern action in war. Some person, as a member of a group, must still rush, drive, sail or fly forward in the face of possible death or maiming. Courage, selflessness, comradeship and leadership are *not* diminished by changing technology, organizations or concepts. And as long as human beings produce, distribute, finance, sell and use their goods on land,

soldiers and armies will remain the ultimate guarantee that a nation's vital interests and security can be protected or advanced.

Finally, the root causes of war will remain constant. People still start wars, whether they are political leaders of nation-states or leaders of some other organization. And they start them as a result of fear, hatred, greed, ambition, revenge or a host of other quite human emotions and rationales. People will fight when they perceive that they can accomplish their objectives by resorting to force, or that they have no other alternative, or that honor, pride, principle or "the gods" demand it. People, therefore, will be needed to end wars. There is no purely technological solution to war, because war, in the final analysis, can never be divorced from its human dimension. Although the conduct of information age war will change substantially, the nature of war remains relatively constant.

The information age is not fully upon us. Some of the ideas described above are still nascent; others, however, are clearly visible and developing quickly. Industrialism's governing concepts have been fading for the past 20 years. It may take a decade or two more for industrialism to pass, but the pace of technical innovation in the information age is fast. So is the growing understanding of the kinds of organizations and processes that will succeed in the ambiguous, diverse and ever-accelerating conditions of the information age.

Implications and Conclusions

We are neither idealizing the information age nor ignoring the obstacles that lie before us as we transform America's Army. We are well along an ambitious journey, but resources are limited. We are balancing our dollars among funding current operations; resourcing the recruiting and retention of quality people; and paying for training, leader development and base operations, as well as those programs involved in moving America's Army into the information age.

We understand this challenge. We understand, too, that there is no "time-out" from our requirements to be trained and ready, to succeed at whatever the nation asks of us and to provide a quality life for our soldiers and civilians. But we are moving out, and have been. We are forecasting as accurately as possible the military requirements of the information age, then making anticipatory policy and program decisions so as to position America's Army to meet these requirements.

We are developing a menu of forces and capabilities within America's Army that will provide today's and tomorrow's National Command Authorities and commanders in chief what they need. We are digitizing the battlefield right now. We are in a process of upgrading intelligence, maneuver, fire support, sustainment and command and control platforms with advanced technologies that can gather, sort and distribute information among themselves. These technological insertions and upgrades will allow our task forces to observe, decide and act faster and more precisely than before. We will be able to mass effects—of fire support or maneuver forces—from dispersed locations, nearly simultaneously.

We are building the information age requirements of speed and precision into America's Army today. This is the lethal, digitized force that gives meaning to the newly added operational tenet of "versatility."

We have identified units to experiment with information age technologies, organizations and processes. We are adding depth to our force by building a seamless Army, leveraging the unique capabilities of our active, national guard and reserve forces, as well as our civilian work force. We are creating versatile leaders and organizations able to succeed in ambiguous, hyper-diverse conditions—under the eye of the media and within the established rules of engagement. We are reengineering our major subordinate commands. And we are remaining steadfast in our belief that all of this rests upon acquiring and retaining quality people and providing them and their families a quality life.

We will continue our doctrinal adaptation to the developing information age. The next edition of US Army Field Manual (FM) 100-5, *Operations*, will capture the variety of the information age, describe the seductively flawed distinction between war and operations other than war, and flesh out the principles governing the conduct of warfare in the information age. FM 101-5, *Staff Organization and Operations,* will adjust the decision-making processes and describe staff functions, duties and relationships for a digitized force. Other doctrinal manuals will follow suit.

The organizations of our battalions, brigades, divisions and corps will evolve over time to a size and composition that will provide the versatility needed to succeed on a variety of information age battlefields. That evolution will result also from finding the mix of

soldiers, leaders, skills, functions and equipment that will optimize information age technologies. The organization of the institutional Army will also change. Throughout the industrial period, and culminating during the Cold War, we created and refined a set of policies, programs, procedures and models upon which we based our personnel, mobilization, training, education, equipment, sustainment, deployment, employment, and command and control processes. We then built a set of organizations around these processes and created industrial-style bureaucracies to run these processes. Appropriate for their time, these processes—as well as the organizations and bureaucracies we built to run them—are quickly becoming outmoded by the accelerating pace and variety of the information age. They are changing now and will continue to change.

Four basic forms of information will be the core upon which America's information age Army processes and organizations will be built:

- Content information—simple inventory information about the quantity, location and types of items.
- Form information—descriptions of the shape and composition of objects.
- Behavior information—three-dimensional simulation that will predict behavior of at least physical objects, ultimately being able to "wargame" courses of action.
- Action information—information that instantly converts to action.[37]

Leveraging these forms of information will allow Army organizations to maintain quality, increase "productivity" and effectiveness, even while reducing in size—similar to civilian corporations of the information age.

New training strategies are also emerging. Hands-on, performance-oriented training will remain valid, useful, and essential. So will range firing and field exercises. Practicing under stressful, realistic field conditions will never go out of style, nor should it. But more and more, a variety of simulations and other computer-assisted programs will precede or follow hands-on and field practice. The limited training option of the industrial age—live or rudimentary,

constructed simulation—are already passing. The information age will give commanders a much more robust and sophisticated set of options: live operations and constructed simulations, as well as interactive, virtual-reality simulated exercises. These kinds of simulations do not replace live operations; they will allow us to do more.

Simulations, often distributed, and sometimes virtual, will form an essential part of the information age training strategy. Simulations will intensify individual, leader and collective training. Soldiers, leaders and organizations can be "immersed," repetitively and to increasing degrees of difficulty, in a variety of simulated scenarios and virtual-reality situations.[38] This immersion will provide preparatory, remedial and reinforcement training—all excellent augmentations to the kind of hands-on field training essential to producing a trained and ready army. When incorporated with distributive technologies, a training strategy of this kind will enhance not only the readiness and proficiency of the active force, but also that of the national guard and reserve forces. We are testing these kinds of training strategies in our Army today.

The materiel of the early stages of the information age may look much like what we have now. But the tanks, infantry fighting vehicles, artillery pieces, rocket launchers, helicopters, command and control, engineer and logistical support vehicles and trucks will be "smarter." They will gain their "smarts" through computers, other advanced technologies and from internetting. Further, they will be linked to similar systems of other services. The joint, digitally integrated force that results will need supply, maintenance and service systems different from those that supported the mass army of the industrial age. Thus, we will have to alter the rule by which combat, combat support and combat service support are "associated" in our current Total Army Analysis models. We will also have to alter the support planning factors in our logistic manuals and wargames. Otherwise, we will produce a gap between operational potential and sustainment capability. As the information age progresses and inventions not yet conceived become reality—as was the case during the industrial period—we must be ready for whatever will follow our current set of maneuver, fire support, logistics and command vehicles.

Last, our leader development program will shift to accommodate the new conceptual, technical and organizational skills required of information age officers and noncommissioned officers. Using more

information, coming faster; making decisions at a faster rate; executing over increasing distances in decreasing time and under more diverse conditions; orchestrating the maneuver and fire systems of all services; and creating and maintaining cohesion among more dispersed units—all under the watchful eye of near-instantaneous media coverage, leaders of America's information age Army will "think differently" than those of the industrial age. At first, this difference will be only one of degree. As the information age matures, however, the difference will be one of kind.

The Army's institutional response to the demands of the information age is Force XXI, a structured effort to redesign the Army—units, processes and organizations—from those of the industrial age to those of the information age. Force XXI, a process that applies to warfighting, Title X responsibilities, and to all components—will enable America's Army to protect and defend the nation and provide decisive victory in the information age.

Change of the magnitude we are attempting is not easy. Nor is it uniformly embraced. Yet we Americans are fortunate to have as one of our cultural characteristics a pragmatic attitude: "If it is better and makes sense, let's get on with it." We must continue to capitalize on this attitude in America's Army.

Ours is a time of rapid change. As such, it is not only a time of uncertainty, it is also a time of opportunity. Success in the information age will go to those who have the courage to challenge themselves, who constantly innovate, learn and adapt as they go. Positioning America's Army today so that it will succeed in the information age is a historic task. Our use of digital information and the network of systems that will connect America's Army of the 21st century will help us to make our Army better able to serve the nation, just as the use of assembly lines and industrial processes did in the past.

While we know that the conduct of war is changing, we realize that war will not become "remote" or "bloodless." We also know that the nature of war is not changing. We know, too, that none of us has a clear picture of the future. No one conception of what the information age will bring is entirely complete and correct. But the foregoing description, drawn from a number of diverse sources, is an accurate enough forecast for the purposes of action. We need not wait any longer,

and we have not waited. We are moving America's Army toward the 21st century now.

There is no "final objective" in the classic sense, no decisive battle or unconditional surrender. Ours is a journey into the future, and we are moving out with confidence.

Notes

1. That different cultures have distinct ways to make war, even distinct concepts of what war is, is a major theme in John Keegan, *A History of Warfare* (New York: Alfred A. Knopf, 1993), 386—92.

2. James J. Schneider, "*Vulcan's Anvil: The American Civil War and the Emergence of Operational Art*," unpublished paper, School of Advanced Military Studies, Fort Leavenworth, Kansas, 16 June 1991, 1.

3. Martin van Creveld, *Command in War* (Cambridge, MA: Harvard University Press, 1985), 103—88 and *Technology and War* (New York: The Free Press 1989), 137—49; T. N. Dupuy, *A Genius for War* (Fairfax, VA: Hero Books, 1984), 44—69.

4. Schneider, 9—10.

5. J. F. C. Fuller, *The Conduct of War: 1789—1961* (New York: Da Capo Press, 1961), 86—94; Van Creveld, *Technology and War*, 111—23 and 153—66; and Schneider, 2—9.

6. This article limits its discussion to armies. This should not be taken to mean that the overall argument of the paper does not apply equally to navies and air forces—it does. Applying the argument to navies and air forces, however, lies beyond the scope of this paper.

7. Forrest C. Pogue, *George C. Marshall: Ordeal and Hope, 1939—1942* (New York: Viking Press, 1965), 139—65; quoted, 157; see also Russell F. Weigley, *Eisenhower's Lieutenants* (Bloomington, IN: Indiana University Press, 1981), 2—7.

8. William H. Davidow and Michael S. Malone, *The Virtual Corporation*, 28, 162—167 and 244—45.

9. Davidow and Malone, 166—67.

10. Alvin and Heidi Toffler, *War and Anti-War*, 19.

11. For one interpretation of the unsettling nature of periods of transition, see John Lukacs, *The End of the Twentieth Century and the End of the Modern Age* (New York: Ticknor and Fields, 1993), 282.

12. John Naisbitt, *Megatrends*, 9.

13. For other ways of looking at the principles and "governing concepts" of the information age corporation, see Don Tapscott and Art Caston, "Seven Key Drivers of the New Business Environment," *Paradigm Shift*, 6—10; Alvin Toffler, "The Corporate Identity Crisis," *The Third Wave*, 226—43; Davidow and Malone, "A New Kind of Business," *The Virtual Corporation*, 1—19; or Peter Drucker, "Labor, Capital, and Their Future," and "The Productivity of the New Work Force," *Post-Capitalist Society*, 68—96.

14. Margaret J. Wheatley, *Leadership and the New Science* (San Francisco: Berrett-Koehler Publishers, 1992), 8—9 and 25—45.

15. Naisbitt, 211—29.

16. Davidow and Malone, 6, 139—61 and 217—38; Michael Hammer and James Champy, *Reengineering the Corporation*, 50—101; Alvin Toffler, *Powershift*, 180—89.

17. Drucker, *Post-Capitalist Society*, 68—74, especially 83—109 and *The New Realities*, 207—31; Davidow and Malone, 167—74 and 184—216; Alvin Toffler, *Powershift*, 204—32; and Tapscott and Caston, 10—13.

18. Wheatley, 75—99; Alvin Toffler, *Powershift*, 190—203.

19. Tapscott and Caston, 4—5.

20. Davidow and Malone, 89.

21. Hammer and Champy, 51.

22. Alvin Toffler, *The Third Wave*, 155—207 and 349—61.

23. Davidow and Malone, 3—7, 24, 42, 49, 107, 137, 141, 157—58, 162, 219 and 222.

24. Alvin Toffler, *The Third Wave*, 184; Davidow and Malone, 219—21, 223—29, and 235—38.

25. Naisbitt, 19—25. The author describes the three stages of technology: first, application of technology in ways least threatening to existing organizational norms; second, using technology to improve what we already have; and third, new directions. He then goes on to argue that we are now in this last stage of technological innovation—the most threatening, yet most productive and innovative stage.

26. Hedrick Smith, *The Power Game*, 20—57, 119—57, and 333—450.

27. David Osborne and Ted Gaebler, *Reinventing Government* (New York: Addison-Wesley Publishing Company, Inc., 1992), especially xv—24 and 311—31.

28. Paul Volcker and Toyoo Gyohten, *Changing Fortunes* (New York: Time Books, 1992), 3—17, 59—100, and 287—310.

29. Jon Katz, "*The Tales They Tell in Cyber-space Are a Whole Other Story*," New York Times (23 January 1994):Section 2: 1 and 50.

30. Alvin and Heidi Toffler, *War and Anti-War*, 18—25; Davidow and Malone, 12.

31. This number excludes those soldiers permanently stationed overseas.

32. Alvin and Heidi Toffler, *War and Anti-War*, 9—12 and 44—56

33. General Gordon R. Sullivan and Lieutenant Colonel James M. Dubik, *Land Warfare in the 21st Century* (Carlisle Barracks, PA: Strategic Studies Institute, 1993).

34. Van Creveld, *The Transformation of War* (New York: The Free Press, 1991), 192—227; Alvin and Heidi Toffler, *War and Anti-War*, 81—85.

35. For a more complete description of the technological changes and trends already at work in land combat, see Sullivan and Dubik, *Land Warfare in the 21st Century*, especially 12—25.

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