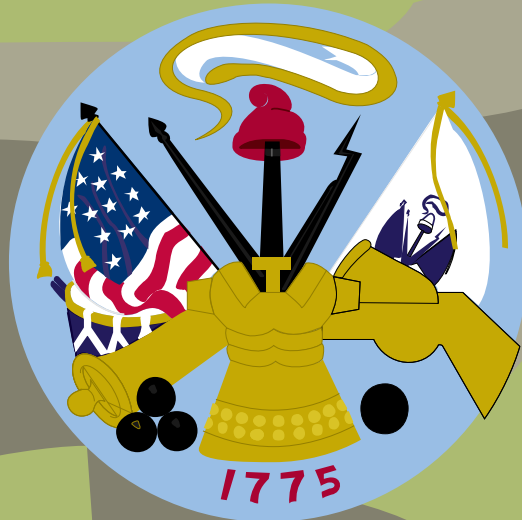


FORCE XXI OPERATIONS

TRADOC Pamphlet 525-5



A Concept
for
the Evolution of Full-Dimensional Operations
for the Strategic Army of the Early
Twenty-First Century

1 August 1994

Leading Intellectual Change

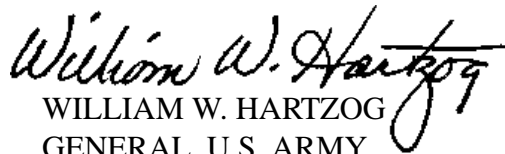


**Commanding General
United States Army Training and Doctrine Command
Fort Monroe, Virginia**

As General Sullivan and General Franks state in their forwarding letters, TRADOC Pamphlet 525-5 is a powerful first step toward Force XXI, providing focus and direction for the entire Force XXI Campaign Plan. For almost twenty-two years TRADOC has been the United States Army's architect of the future, helping it to evolve from a post-Vietnam force to one that has achieved battlefield victories in Panama and Iraq and a long record of successes in operations other than war—Somalia, Rwanda, and now in Haiti. Today TRADOC's mission as architect of the future continues but within a whole new framework. We have crossed the threshold into a new strategic era while simultaneously entering a new age, the Information Age. Though our Army has changed and grown successfully many times, at no other time has this mission been more challenging and complex.

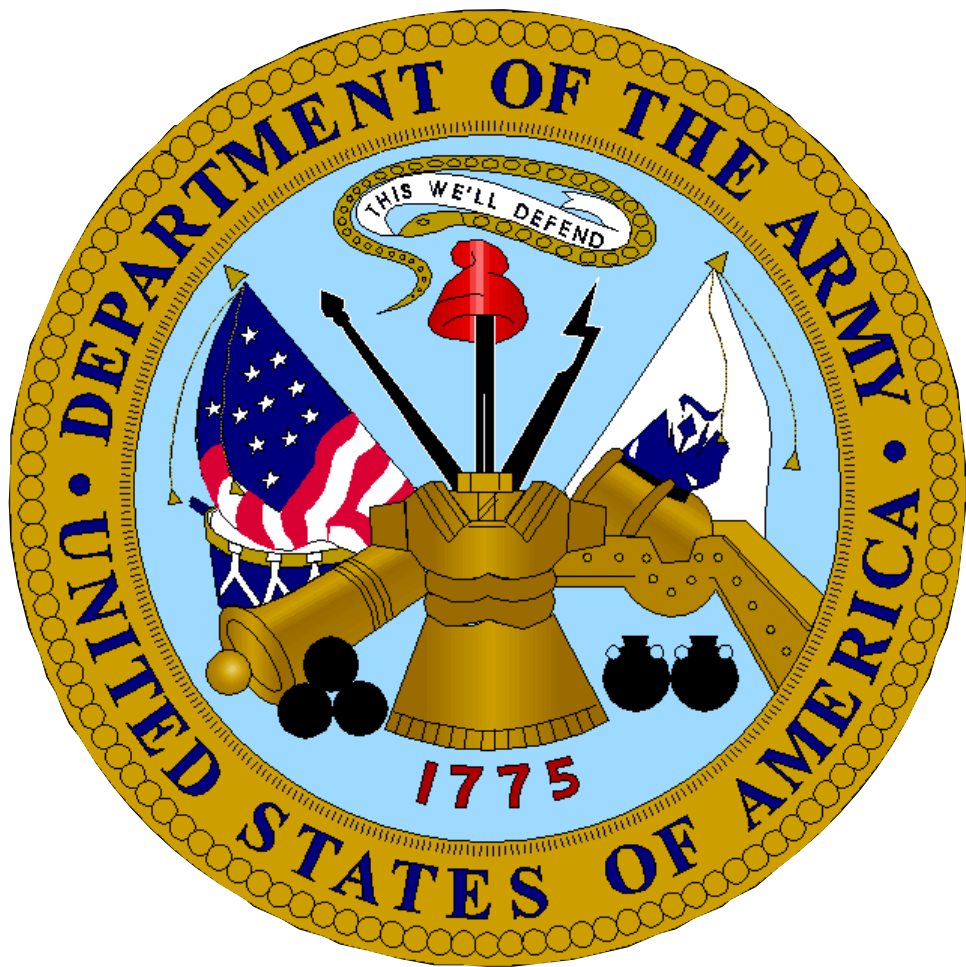
As a thinking and learning institution where physical change is led by intellectual thought, how we think about the future will dictate some of the outcome of what we think about the future. There are, in gross terms, two approaches. The first approach is characterized by standing on today's intellectual mountain top with an understanding of the present, and seeing as far as one can see—or as one can afford—and then conservatively moving forward into the future a step at a time. It is a relatively safe approach. The second approach is a bold one in which we intellectually go on a staff ride to a mountain top in the 21st Century, look around and see what we can, and then articulate that as a vision for the future. That vision then becomes a starter set of ideas and thoughts to lead us forward into the future. We've taken this second approach.

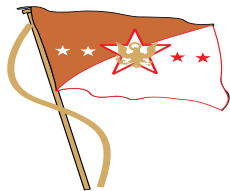
TRADOC Pam 525-5, a vision of the future, is the intellectual foundation for Force XXI. It's not doctrine, but a lighthouse, a think piece describing what might be. The thoughts and ideas in this pamphlet must be converted to hypotheses and tested through analysis and experimentation. There will certainly be a number of versions of this vision as we grow toward our future. Change is so rapid, so pervasive, and so complex that the work of crafting the Army for the next century is now everyday work for us all. We are living in and moving smartly toward the 21st Century today.


WILLIAM W. HARTZOG
GENERAL, U.S. ARMY
COMMANDING

**A Concept
for
the Evolution of Full-Dimensional Operations
for the Strategic Army of the Early
Twenty-First Century**

**-How you think about the future
frames what you think about the future
which drives what you do about the future.-**





UNITED STATES ARMY
THE CHIEF OF STAFF

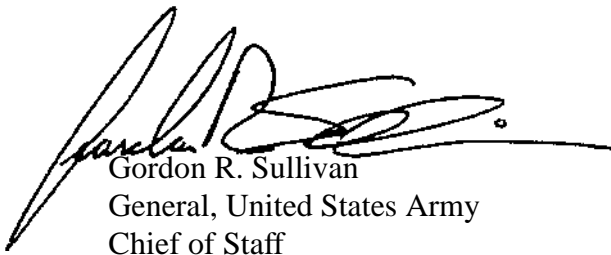
Every successful and coherent transformation of an organization begins with a clearly articulated statement about what it wants and needs to become. We have taken this fundamental principle to heart and embraced it. We know that physical change invariably has its underpinnings in imaginative and rigorous thought about the future. Over the past three years we have steadily laid the intellectual and doctrinal groundwork that prepares the way for our Army's collective journey into the Twenty-first Century. You know our work: FMs 100-1, 100-5, 100-17; JCS Pubs 1 and 3.0; and others. Now it is time to take the next - and perhaps most important - step. The publication of **TRADOC Pamphlet 525-5: Force XXI Operations**, is the first step of our doctrinal journey into the future - and what a powerful first step it is.

TRADOC has done a masterful job of causing us to think hard about how Army operations will change in the coming years. 525-5 provides us with the institutional framework for our experiments and doctrinal debates. First, they explore the impact of information systems and other emerging technologies on the operational environment of the future. Second, they give us provocative insights into the critical battle dynamics we should exploit to remain the most powerful and capable Army on earth. We know that we will make a quantum leap; 525-5 helps us to see how.

More importantly, this is a work that tells us about how the **entire Army** must change - from the foxhole to the factory - top to bottom. While the majority of the text focuses on the operational portion of the Army, do not be misled. The operational environment that 525-5 describes has clear implications for the remainder of the Army. We cannot fight the way that 525-5 envisions without changing how we organize, train, mobilize, project, and sustain the force. The responsibility for these functions all reside in the institutional, or TDA, Army. So, when you think about, analyze, and debate the merits of the text, do not forget to consider those points in the context of the larger Army of which we are all a part.

The Army needs your experience, intelligence, energy, and willingness to engage with the world of the future. Only the collective intellectual enthusiasm and curiosity of the Army at large will make our 21st Century doctrine the best it can be. We cannot grow without thinking, debating, and experimenting. TRADOC Pamphlet 525-5 is the vehicle for this healthy process. I encourage you to share your ideas with others. Expose your own ideas to rigorous analysis. Engage others in honest debate. Share the results with the Army. This doctrine will be our legacy to those who follow us. Each of us shares in the responsibility for getting it right.

Into the Twenty-first Century,



Gordon R. Sullivan
General, United States Army
Chief of Staff





**Commanding General
United States Army Training and Doctrine Command
Fort Monroe, Virginia**

PREFACE

TRADOC Pamphlet 525-5 is the conceptual basis for the Army's continuing growth toward the future. General Sullivan has stated in his forward that it is also "about how the entire Army must change." It is our Army's vision of military operations—War and Operations Other Than War—in the early 21st Century and so frames the development of doctrine, training, leader development, organizational design, materiel acquisition, and soldier programs for the implementation of Force XXI. As such, it drives the Joint Venture axis of the Chief of Staff of the Army's three axis Force XXI campaign.

The concept for Force XXI Operations is centered around quality soldiers and leaders whose full potential is more closely realized through information age technologies and by rigorous and relevant training and leader development, both in units and in our Land Warfare University. It describes an operational environment where the acquisition, processing, and rapid sharing of information revolutionizes the conduct and tempo of operations. It recognizes that we are on the threshold of a new age that demands institutions make bold adjustments in information processing and organizational structure to fully advantage the capability of information age technologies.

TRADOC Pamphlet 525-5 sets forth future full-dimensional operations for Force XXI—a strategic Army that will continue to meet our nation's national security requirements. It describes, in general terms, how the Army will operate in the future to accomplish missions in operations where control on land is essential to success.

TRADOC Pamphlet 525-5 is not doctrine, rather a document of ideas—for it is ideas that lead change for the Army. Ideas expressed in a coherent concept lead to experiments and discovery, resulting in continued mission accomplishment for our Army today and into the future.

Our Army's vision of future operations in this concept, like the dynamic nature of world events, is not static but is continually evolving. Thus, it is intended to stimulate thought, generate discussion, and provide focus for experimentation as we journey and grow towards tomorrow.

Frederick M. Franks, Jr.
General, U.S. Army

Department of the Army
Headquarters, United States
Army Training and Doctrine Command
Fort Monroe, Virginia 23651-5000

*TRADOC Pam 525-5

1 August 1994

FORCE XXI OPERATIONS

A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty-First Century

SUMMARY. This pamphlet describes the conceptual foundations for the conduct of future operations in War and OOTW involving Force XXI - the US Army of the early twenty-first century. The US Army is defined in this concept as the active Army, Army Reserve, Army National Guard, and Department of the Army civilians. This pamphlet provides TRADOC's Task Force XXI, Battle Laboratories, doctrine writers, combat developers, and trainers a vision of future conflict for the development of supporting concepts, programs, experiments, and initiatives. Finally, the concept offers implications for doctrine, training, leader development, organizations, materiel, and soldiers (DTLOMS).

The 1993 version of FM 100-5 provided the Army a short lead on the future, allowing it to move ahead in its thinking on the character of future conflict and OOTW. This TRADOC Pamphlet 525-5 represents the continuation of change, continuity, and growth, enabling the Army to continue as a relevant, strategic force capable of decisive victory into the twenty-first century.

APPLICABILITY. This pamphlet applies to all TRADOC elements, to include Headquarters (HQ) TRADOC staff, major subordinate commands, functional centers, schools, and activities.

SUGGESTED IMPROVEMENTS. Send comments and suggested improvements on DA Form 2028 through channels to Commander, HQ TRADOC, ATTN: ATDO-F, Fort Monroe, Virginia 23651-5000.

*This pamphlet supersedes TRADOC Pam 525-5, 1 August 1991.

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CHAPTER 1**LEADING CHANGE - THE CHALLENGE OF THE FUTURE**

You will be called upon in many ways in this new era to keep the peace, to relieve suffering, to help teach officers from new democracies in the ways of a democratic army, and still...to win our wars.

*President Bill Clinton
West Point, 29 May 1993*

1-1. A Dynamic World.

a. We live in a dynamic world, an era of contradictory trends shaped by two great forces, one strategic, the other technical - the advent of the Information Age. The scale and pace of recent change have made traditional means of defining future military operations inadequate. Change will continue, requiring our Army to recognize it as the only real constant.

b. In the absence of a relatively fixed, strategic environment, we are faced with a far more complex world that defies authoritative forecasts of the future. Nevertheless, various schools of thought predict what the twenty-first century will look like. One is a vision of the future devoid of major war - a century of peace. This school argues that due to an expanded number of democratic states, shared understanding - through advances in information technology, and global economic interdependence, we are entering a new era where War is no longer deemed a productive means of pursuing strategic objectives. Even if history proves this prediction correct, it will also show that the transition from the world's bloodiest century to one of relative peace was not smooth.

c. Even though in the mid-1990s no credible near-term threat to the U.S. exists, the nation's vital security interests may not go unchallenged during this period of great strategic reordering. As a result, early twenty-first century U.S. armed forces - active, reserve component, and civilian - will remain fully engaged throughout the world, meeting the nation's security needs and helping shape the future strategic environment.

d. The types of crises and conflicts we have experienced since the end of the Cold War will likely continue into the early decades of the twenty-first century. During this period, the United States Army, along with other services, civil agencies, and nations, will be called upon to defend and promote national and collective security interests throughout the world, often on short notice and often in combinations of nations and armed forces not previously experienced.

1-2. Future Challenges - Strategic and Technological.

a. United States interests will remain worldwide and will cover many dimensions of the strategic security environment. National Security Strategy (NSS) and National Military Strategy (NMS) are complementary and are founded on universal strategic pillars shared by most democratic countries. These pillars will continue to shape American foreign policy.

(1) As the basis for National Security Policy, the NSS will continue to integrate the elements of national power as they apply to the various regions of the world. It envisions strategic actions for supporting democratic growth, human rights, independent judiciary, economic cooperation and available markets, and unrestricted trade. It outlines the defensive needs of friends and allies, the forming of alliances or coalitions, the need to eclipse or limit potential sources of conflict, and the deterrence or defeat of regional aggression.

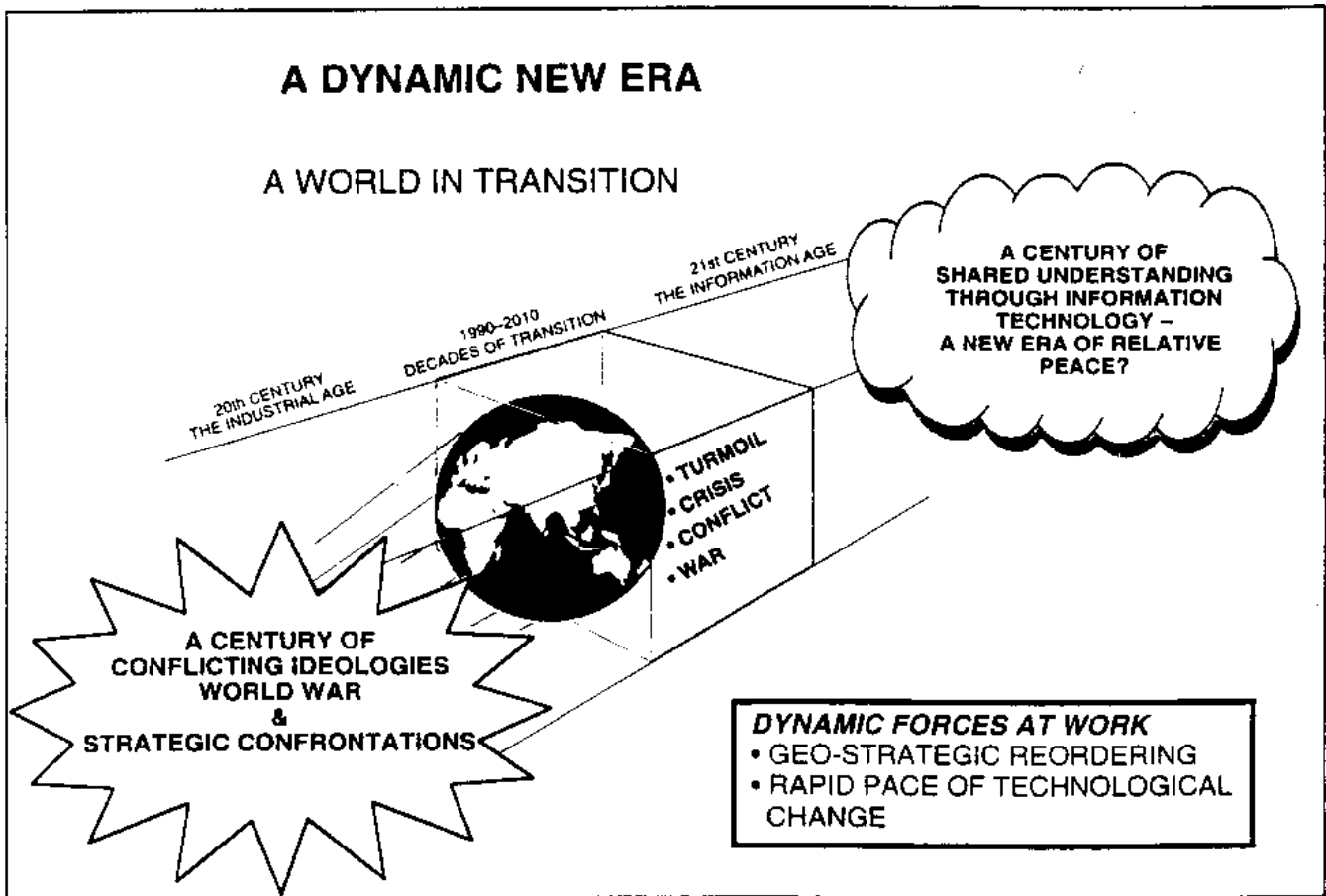


Figure 1-1. A Dynamic New Era

(2) The NMS integrates the military element of national power, in conjunction with the other elements, to achieve national security objectives and remain the basis for future DOD programs. It envisions the integration of strategic deterrence and defense, the forward presence of U.S. forces, the force projection of U.S. forces, and the reconstitution of forces as necessary. It outlines the strategic principles necessary to ensure the readiness of U.S. forces to accomplish a wide range of missions under a variety of situations. This strategy requires reserve forces more ready, more capable, more modernized, more integrated, and more available than ever before.

(3) Under these strategies, the U.S. military may have to conduct operations unilaterally to protect specific national interests. More likely, the nation will find itself leading allies in pursuit of collective interests. The unique capabilities and leadership of America's armed forces will be applied in different forms throughout the world to promote peace with freedom. As it has in the past, the Army is prepared to lead the way to achieve future national security and military objectives.

b. Doctrine is the engine that drives change within our Army. That is so because doctrine embodies our ideas, and ideas drive change. Sir Basil Liddell Hart's dictum - that the real challenge is not to put a new idea into the military mind but to put the old one out - clearly applies.¹

(1) Doctrine does not predict the future but sets in motion that which will produce conditions for success. Doctrine integrates principles and fundamentals and describes how to meet operational challenges. Therefore, one of the most critical challenges confronting today's Army is continuing development of relevant doctrine.

(2) Strategy and doctrine are interrelated. Military doctrine must be capable of executing the strategy of its time. Thus, for our Army's needs, doctrine in the present and predicted strategic environments will be much less prescriptive and much less given to precise, scientific analysis than military doctrine of the Cold War.

(3) There can be no single, prescribed, authoritative Army doctrine for this strategic period. Hence, in 1993 our Army adopted a doctrine of full-dimensional operations, stressing principles to be learned and understood, then relying on the art of battle command to apply those principles in scenarios as they occur - be they War or OOTW. This doctrine is a profound shift from the relatively deterministic and very appropriate scientific approach of the Cold War, with its focus on Central Europe, echelonment and presentation rates, and precise-force-ratio analysis. This pamphlet continues that shift, emphasizing a concept built on principles that must be translated to action in specific scenarios that cannot now be predicted with enough certainty to warrant a return to prescriptive doctrine.

¹*Thoughts on War*, 1994.

(a) America's Army will be structured to keep pace with the evolutions of its strategies and doctrine. While doing so, the Army must be fully prepared for situations of war, conflict, and peace. Major regional contingencies would normally occur in War or during major conflicts, while minor contingencies would occur during peacetime or minor-conflict situations. Regardless, the great majority of these operations center upon the control of *people and territory*. Thus, the Army is the most prepared service to deal with the variety of situations that can occur in a world of emerging regional powers.

(b) Strategic interests have increased the number and expanded the range of OOTW that the armed forces will be required to perform. At times, OOTW may exhibit characteristics of conflict and involve violent combat. When conducting such operations, the Army may find itself engaged against forces, including nonnation state armies operating outside Western convention. To deal successfully with such forces, the Army must expand its understanding of conflict beyond current Western paradigms.

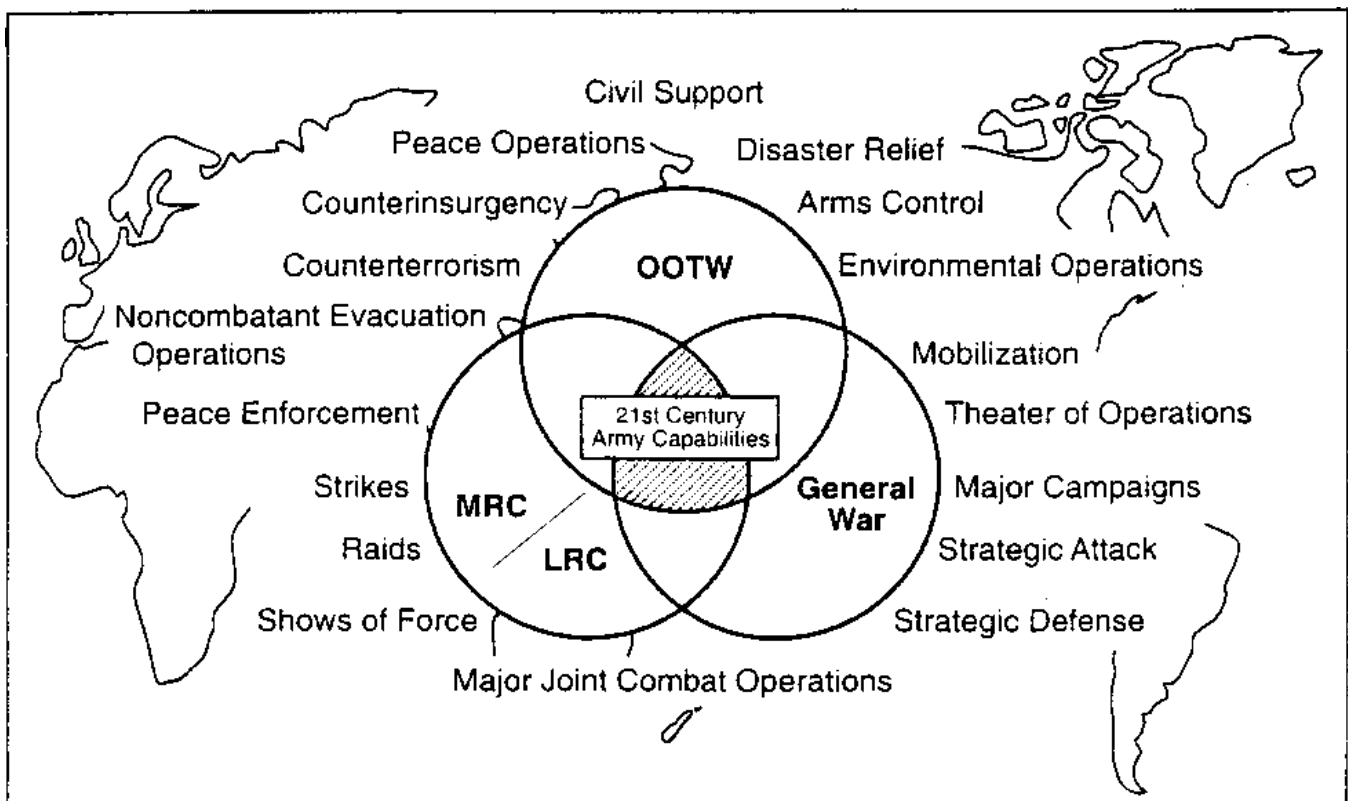


Figure 1-2. Operating Environment and Missions of U.S. Forces

c. In addition to strategic and doctrinal challenges, significant technological challenges are associated with entry into the Information Age. Many of these challenges

can be overcome through effective use of the inherent technical strengths of other services (for example, Navy and Air Force satellite technology could greatly benefit land operations).

d. We must also recognize that success on past battlefields has resulted not so much from technological advances but from innovative ways of considering and combining available and sometimes new technologies as they apply to warfighting. A number of these technologies dealt with the communication of information. For example, the telegraph led to distributed operational maneuver in the latter part of the nineteenth century. The telephone redefined the fire support paradigm, resulting in the greatly expanded role of artillery in World War I. Finally, the radio led to the coordinated air-ground, mobile, armored combat operations of World War II. Clearly, the potential military impact of emerging information technology is so great that it requires address.

e. Information technology is expected to make a thousandfold advance over the next 20 years. In fact, the pace of development is so great that it renders our current materiel management and acquisition system inadequate. Developments in information technology will revolutionize - and indeed have begun to revolutionize - how nations, organizations, and people interact. The rapid diffusion of information, enabled by these technological advances, challenges the relevance of traditional organizational and management principles. The military implications of new organizational sciences that examine internetted, non-hierarchical versus hierarchical management models are yet to be fully understood. Clearly, Information Age technology, and the management ideas it fosters, will greatly influence military operations in two areas - one evolutionary, the other revolutionary; one we understand, one with which we are just beginning to experiment. Together, they represent two phenomena at work in winning what has been described as the information war - a war that has been fought by commanders throughout history.

(1) First, future information technology will greatly increase the volume, accuracy, and speed of battlefield information available to commanders. Such technology will allow organizations to operate at levels most adversaries cannot match, while simultaneously protecting that capability.

(2) Second, future technology will require the Army to reassess time-honored means of battle command - to recognize that in the future, military operations will involve the coexistence of both hierarchical and internetted, non-hierarchical processes. Order will be less physically imposed than knowledge-imposed. Combinations of centralized and decentralized means will result in military units being able to decide and act at a tempo enemies simply cannot equal.

1-3. Summary. In summary, the Army will have to make wise use of all of its resources to meet the challenges of the future. It must recognize where bold change is necessary and where little or no change is needed. Meeting these challenges will take a long-term, sustained commitment to excellence - to develop leaders, soldiers, equipment, and organizations capable of performing the diverse missions of the future.

a. The Army must continue to leverage the capabilities and potential of the reserve components in both combat roles and logistics roles. Their expertise, especially in civilian-related skills, such as combat service support and civil affairs, allows the active component force structure the flexibility to focus more on warfighting skills. The Army in the early twenty-first century will not be able to move, supply, nor sustain itself to meet the requirements of the National Military Strategy without the reserve components. For these reasons, the RC must be integrated fully into all facets of our efforts in areas such as doctrine, training, and equipment as we prepare for the future.

b. Above all, meeting these demands will require the Army to take a long view toward the future without losing its focus on today's strategic security needs. While recognizing that the historically solidified bedrock of Army doctrine will not change greatly, the Army must ensure that the underlying concepts of operations captured in current doctrine continue to evolve. Many principles will remain, yet methods must adapt and change. Thus, at the same time, the Army must examine alternatives and explore new ideas that will ensure quick, decisive results in War and success in OOTW - at the least cost in lives and national treasure.

c. The Army will lead through change. Today's operations are shaping those of tomorrow. Patterns in the conduct of future operations are sufficiently clear to set in motion changes in land warfare doctrine - as we did in the June 1993 FM 100-5. This concept projects that momentum into the future. We know enough to act now.

CHAPTER 2

THE FUTURE STRATEGIC ENVIRONMENT

Rather than a single, focused threat, America's twenty-first century Army faces a broad range of challenges.

*General Gordon R. Sullivan
Chief of Staff, United States Army*

2-1. Trends - Elements of Instability.

a. The world's geopolitical framework will continue to undergo dramatic restructuring, accompanied by a wide array of economic, technical, societal, religious, cultural, and physical alterations. History shows that change of this scope, scale, and pace increases global tension and disorder.

(1) Balance of Power. Although nation states will continue to be the world's primary political unit, they are under attack in much of the world. Shifting and unstable power balances at the national and subnational levels in the Balkans, Middle East, and throughout Africa and Asia threaten to engage the vital interests of the major powers and tempt intervention.

(2) Nationalism. Nationalism has replaced communist ideology as the leading cause of interstate and intrastate conflict. Based on many sources of mass identity—religious, tribal, ethnic, historical, or territorial—nationalist movements are supplanting older, ideologically based identities. These movements can erode the power and legitimacy of states; in some cases, these movements are closely linked to criminal organizations. Under the guise of transnationalism, these movements may also serve as an excuse for regional strife, as one nation seeks to extend its authority over all members of its ethnic group.

(3) Rejection of the West. Much of the non-Western world is rejecting Western political and cultural values. Regimes that kept *foreign* political forms are under attack by ethnic, religious, and nationalistic groups seeking to establish or reestablish their identity. As tribal, nationalist, or religious movements replace secular regimes, instability ensues. This instability threatens not only Western interests within the state but often threatens to spill across borders.

(4) Competition. The relevance of the conventional balance-of-power theory is questionable. In its place are rivalries between states and nonstate groups for power: political, military, information - and particularly, economic. Advances in production and marketing techniques have widened the gap between rich and poor states. Control of

resources has not allowed all less-developed states to modernize and become economically competitive. Questions of access to, or control of, strategic resources, lines of communications, and markets are likely to lead to conflict. The temptation to use military force to redress perceived economic imbalances will be great.

(5) Demographics. Population growth, particularly in the less-developed world, will strain the resources and social structures of the states affected. Because much of the world's population growth occurs in areas prone to natural disasters and famine, such events can cause mass migrations of refugees.

(6) Ungovernability. The ability of a government to govern effectively is being eroded in much of the world. The global economy renders economic policies and controls ineffective; throughout the world, governments are less able to provide economic stability and security for their populace. Capitalism and the collapse of dictated economies are creating problems of distribution and structural unemployment. Immature government infrastructures in developing democracies cause expectations to be unmet and groups to turn to other outlets for hope, often leading to conflict. With this eroding security comes a rise in ungoverned groups - criminal organizations. When combined with nationalist groups, criminal groups have the potential to supplement, or even supplant, the state.

(7) Technological Acceleration. Rapid improvements in technology are disrupting established ways of doing business. Information technology is allowing businesses to reduce middle management and support staffs. Aside from the vast increase in unemployment worldwide, technology improvements enable companies and states to leapfrog some technologies. American technical superiority cannot be guaranteed. As in the past, a revolutionary advance in technology could result in reordering of economic or military power.

(8) Environmental Risks. Conditions that pose serious environmental risks may add to future instability. Natural disasters and changes in climate or environment can ruin a region's economy and send the populace across borders as refugees. Man-made crises may also cause tension. Cross-border pollution will cause tension, both within regions and between developed and less-developed nations. Additionally, questions of securing or safely controlling atomic or chemical facilities may provoke military operations designed to secure both weapons and plants on environmental as well as political grounds.

(9) Information Technology. Rapid advances will continue to be made in the way we collect, communicate, and use information. Microprocessing technology will result in a proliferation of communications and information devices, causing an unparalleled rise in cultural and political consciousness. The power of shared information and the ability to manipulate communications media will challenge the authority of long-standing institutions and the meaning of terms such as sovereignty. Information proliferation, however, may prove to be a double-edged sword. Manipulation of the media to control public opinion or awareness can be practiced by both governments and nonstate actors. Access to information involving other cultures, without a discriminating mechanism to explain them, may prove to be a significant source of friction.

b. We are in a period of great transition. The changes experienced in the few years following the end of the Cold War will likely continue. In their wake will follow crises, conflict, and war. In the early twenty-first century, the United States will face challenges of unprecedented complexity, diversity, and scope. Overt attacks on the U.S. and its strategic interests may be rare, but lower-scale operations will likely spread widely over distances and time. Few states will have the resources, or the need, to directly attack the U.S. in the near future. However, many will challenge it for control or dominance of a particular region.

2-2. Characteristics of Future Armies.

The Cold War paradigm of threat analysis is insufficient to capture the full spectrum of military capabilities that future threats may display. Consequently, the threat spectrum model (TSM) shown in Figure 2-1 arrays potential threats across a spectrum from simple to complex in scope, doctrine, organization, training, materiel, leadership, and soldiers.

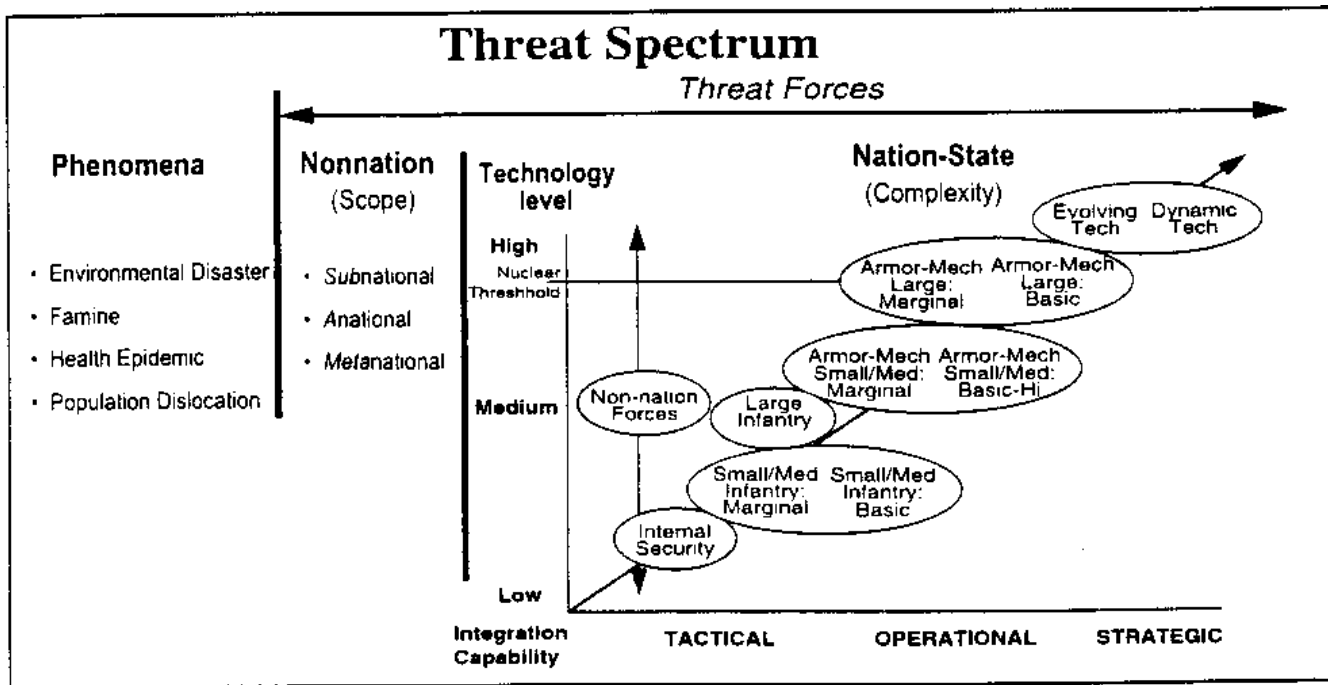


Figure 2-1. Threat Spectrum Model

a. Phenomenological Threats. Nonmilitary threats resulting from human occurrences and experiences may require a military response. These phenomena can include environmental disasters, health epidemics, famine, major population dislocations, and illegal immigration.

b. Nonnation Forces. Nonnation security threats, using modern technologies that give them niche capabilities similar to those of nation states, have become increasingly visible, challenging the traditional nation state environment. Scope differentiates the categories of nonnation threats.

(1) **Subnational.** Subnational threats include the political, racial, religious, cultural, and ethnic conflicts that challenge the defining features and authority of the nation state from within.

(2) **Anational.** Anational threats operate without regard to the authority of their nation states. Not part of the nation state, these entities have no desire to establish such a status. Regional organized crime, piracy, and terrorist activities comprise these threats.

(3) **Metanational.** Metanational threats move beyond the nation state, operating on an interregional or global scale. They include religious movements, international criminal organizations, and informal economic organizations that facilitate weapons proliferation. See Figure 2-2.

c. Internal Security Forces. In most cases, these are the small, poorly trained and equipped forces of the less-developed world, that can maintain order within a country but would be hard-pressed to defend its borders or conduct extended military operations. As with nonnation forces, most internal security forces and local criminal activity may be strongly connected.

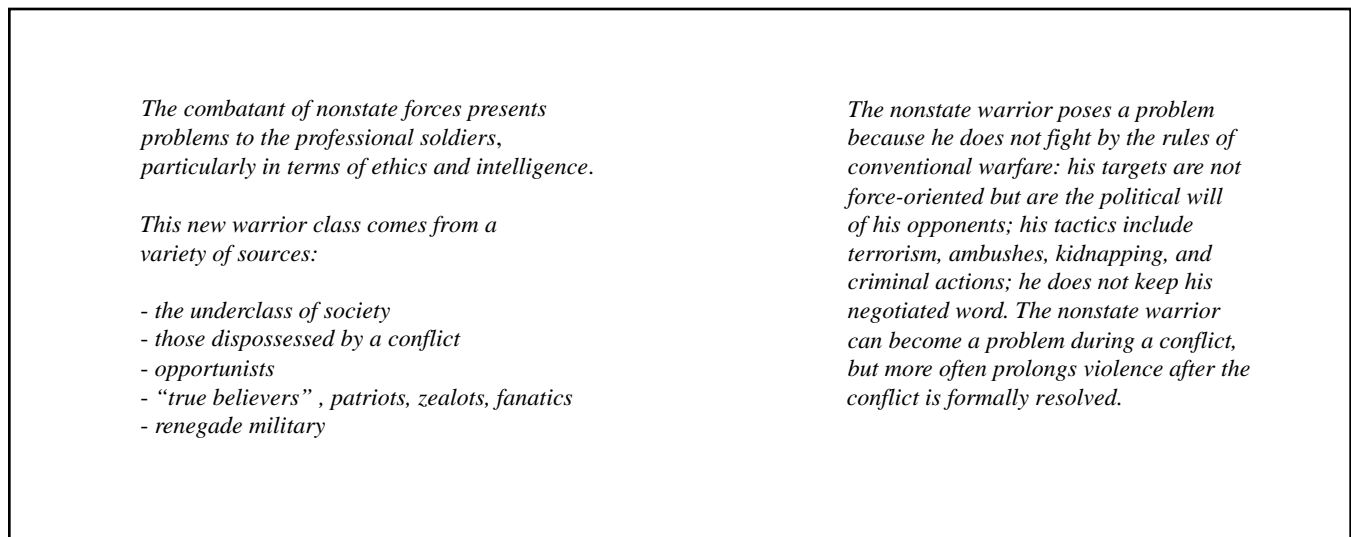


Figure 2-2. The New Warrior Class

d. Infantry-Based Armies. Comprising the majority of the less-developed world's armies, these armies have some armor but are reliant upon dismounted infantry for the bulk of their combat power. Their skills in integrating weapons technology into operations and their abilities to conduct combined arms operations are marginal-to-basic (tactical level). In many respects they resemble the armies of World War I, with more lethal weaponry.

e. Armor-Mechanized-Based Armies. Armies of most industrial nations fall into this class - those that generally mount at least 40 percent of their forces in armored vehicles. Effectiveness of weapons integration and ability to combine arms vary. These armies share several characteristics. First, they tend to modernize selected systems to match the best systems deployed by their neighbors. Second, they display generally hierarchical C³I structures. Not as technologically advanced as complex, adaptive armies, particularly in the harnessing of information technology, they compensate with numbers and weight of metal.

f. Complex, Adaptive Armies. From developed nations, these most technically and tactically advanced armies will be smaller and exceedingly expensive to equip, train, and maintain. Complex forces possess greater flexibility to seize opportunities on the battlefield as well as to adapt to dynamic situations across the continuum of War and OOTW. Future military operations conducted by these armies will involve increasingly high-technology equipment, joint/multinational forces, multidimensional maneuver, precision munitions, smart weapons platforms, and enhanced situational awareness. These operations will also be conducted under the threat of theater ballistic missile attack and other weapons of mass destruction. However, the multiplication of specialized units that allows flexibility also adds vulnerabilities. Disruption of key support elements can render a combat force ineffective or, at least, eliminate its edge over a less-advanced force.

g. Comparisons. Future conflicts may involve simultaneous operations against foes of varying capabilities. As shown in Figure 2-3, preindustrial nations and most nonnation groups cannot, or will not, invest in the weapons and technology necessary to keep pace with the best militaries in their regions. These forces range in size from irregular forces and constabularies to large, infantry-based armies. When opposed by an adversary of similar capabilities, such forces may conduct conventional, force-oriented combat. However, when faced with a large, technologically advanced army, they are likely to attempt to redefine the terms of conflict and pursue their aims through terrorism, insurgency, or partisan warfare. Such unconventional strategies focus on the population while attempting to retain freedom of action by avoiding combat with superior forces. They entail a protracted struggle in which the unconventional force seeks to exploit favorable circumstances to inflict casualties and achieve tactical successes against high-technology opponents while continuing to contest control of the population. In the case of intervention by an external power or coalition, this strategy aims to undermine the enemy's will to continue a seemingly intractable, costly conflict without the necessity of defeating his main forces on the battlefield.

h. Proliferation and Modernization. The most serious challenge to U.S. military superiority will not come from any one state or group but from a process—the proliferation of weapons and technology. Proliferation will allow potential adversaries and developing nations to improve at least parts of their armed forces relatively quickly. Threat forces will probably assess their own deficiencies using the lessons learned from the Gulf War and Somalia. Weapons modernization follows two tracks: nations that can afford to, buy state-of-the-art systems (for their region); states that cannot, upgrade current systems. Accordingly, more use will be made of strap-on technologies to upgrade existing systems. Nevertheless, because of budget restraints, military technology will likely advance at a

slower rate than commercial. Three areas of technology require emphasis: weapons of mass destruction (WMD), information operations, and space control. See Figure 2-4.

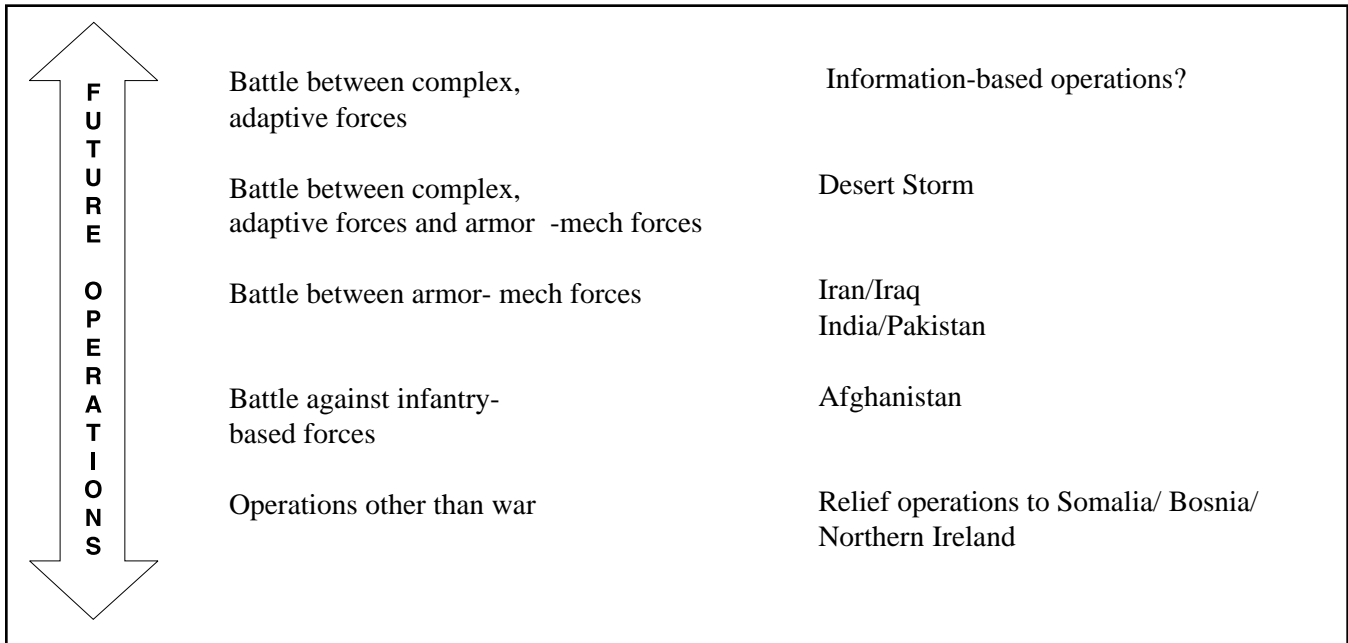


Figure 2-3. Range of Future Operations

1. *Technologies for the digital battlefield:*
 - integrated battlefield area C³I systems
 - commercial components and systems available
2. *Threats to military information systems*
3. *Jamming threats to satellites used by U.S. military*
4. *Sensor technologies*
 - image intensifiers (II)
 - thermal imaging systems (TIS)
5. *Improved passive survivability*
 - signature reduction
 - improved armor
6. *Active hit avoidance*
 - false target generators
 - integrated suites of devices
7. *Antiarmor systems*
 - artillery-delivered, high precision munitions (ADHPM)
8. *Attack helicopters*
 - extended range ATGMs
 - night capability
9. *Advanced air defense*
10. *Mines*
 - multiple sensors
 - smart mines

Figure 2-4. Key Technologies with Military Impact

(1) Weapons of Mass Destruction. The security challenge having the most serious ramifications for U.S. interests will come from the proliferation of WMD. The strategic-political effects of WMD overshadow their military utility. WMD and theater ballistic missiles (TBMs) allow an adversary to extend its operational and strategic reach. Although few potential adversaries appear willing to purchase (when available), develop, or deploy the delivery systems needed to threaten the continental U.S., such possibilities cannot be overlooked. In the future, we will face a different world threat - not of overwhelming, global nuclear war - but of states or even criminal groups with inventories of chemical, biological, or nuclear weapons and fewer inhibitions about using them.

(2) Information Operations. The increasing proliferation of information technology provides potential adversaries - whether nations, organizations, or individuals - with the capability to conduct increasingly sophisticated information operations against the U.S. Potential adversaries do not need high-technology or strictly military systems to conduct effective information warfare. The ability to manipulate, isolate, or negate portions of the electromagnetic spectrum will be a key element of future military operations. Disruption of an opponent's ability to use these systems while protecting our own will prove crucial in the future. Information operations will not be limited to times of open hostilities.

(3) Space Control. Space-based assets will provide an ever-increasing proportion of the intelligence, communications, and navigational support to the world's militaries and economies. Commercial, space-based systems already provide communications, imagery, and global location services to any paying customer. States that can afford to develop or purchase launch technology can develop antisatellite systems to negate low-flying reconnaissance satellites. States that do not have space programs can erode the relative advantage of those that do by purchasing space-produced products and services.

i. Capabilities Integration. Access to technology does not equal force modernization. Although a nation can leapfrog technologies - for example, space, nuclear weapons, ballistic missiles - improving integrative capability is more difficult. Those states that do show drastic improvements often do so through the importation of foreign military and technical advisors. Of the two, the foreign military advisor is the more important in improving a state's integrative capability. See Figure 2-5.

2-3. Future Battle.

a. Revolution in Military Affairs (RMA). Improvements in weapons technology with improvements in integrative capability increase weapons' lethality, range, and other physical factors. Innovations in technology and doctrine are the harbingers of change in warfare. Dramatic developments in both of these areas have resulted in a revolution in military affairs, sometimes referred to as a military technical revolution, which will continue into the twenty-first century. Operations Just Cause, Desert Storm, and Restore Hope epitomize this revolution and offer us a glimpse of the future. Notwithstanding these momentous changes, one aspect of human conflict remains unchanged: the paramount importance of land power as an essential element of any security strategy and the consequent requirement

to impose control over people, territory, and events. Land power equates to strategic staying power.

A term of Soviet origin, MTR describes a noticeable change in how military operations are conducted. An MTR “occurs when the application of new technologies into military systems combines with innovative operational concepts or organizational adaptation to alter fundamentally the character and conduct of military operations. “An MTR produces a dramatic improvement in military effectiveness and combat potential. What is revolutionary about an MTR is not the speed with which the changes takes place, but rather the magnitude of the change itself. Mere technological improvements do not constitute an MTR: in 1940 tanks, improved aircraft designs, and radio were available to both the French and the Germans. However, it was the Germans who adapted their organizations, procedures, and tactics to transform the trench warfare of World War I into the blitzkrieg.

Figure 2-5. Military Technical Revolution (MTR)

b. Future Battlefields. Future conflicts can run the gamut from general war to OOTW. Battle between mechanized forces will be similar to armored operations of the past three decades. However, combat involving advanced, complex, adaptive armies will take the trends of Desert Storm forward to transform the battlefield. Dominant aspects of the future conventional battlefield are battle command, extended battlespace, simultaneity, spectrum supremacy, and the rules of war.

(1) Battle Command. Command will remain a combination of art and science. Yet the art will be more necessary now than before because commanders must apply principles and design considerations and frameworks in situations and scenarios we cannot predict with any certainty - truly a different demand on commanders than the relatively prescriptive and known scenarios of the Cold War. Advances in information management and distribution will facilitate the horizontal integration of battlefield functions and aid commanders in tailoring forces and arranging them on land. New communications systems allow nonhierarchical dissemination of intelligence, targeting, and other data at all levels. This new way of managing forces will alter, if not replace, traditional, hierarchical command structures with new, internetted designs (see Figure 2-6). Accordingly, units, key nodes, and leaders will be more widely dispersed, leading to the continuation of the empty battlefield phenomenon. Because this internetted structure can diffuse command authority, new leadership and command approaches will be required of many militaries. Thus, in most modern armies, the diversity of operating environments, equipment sophistication, increased tempo, and substitution of situational knowledge for traditional physical control will place unprecedented demands on soldiers and leaders. To win on future battlefields, future leaders of all armies must be skilled in the art of military operations, capable of adjusting rapidly to the temporal and spatial variations of new battlefields.

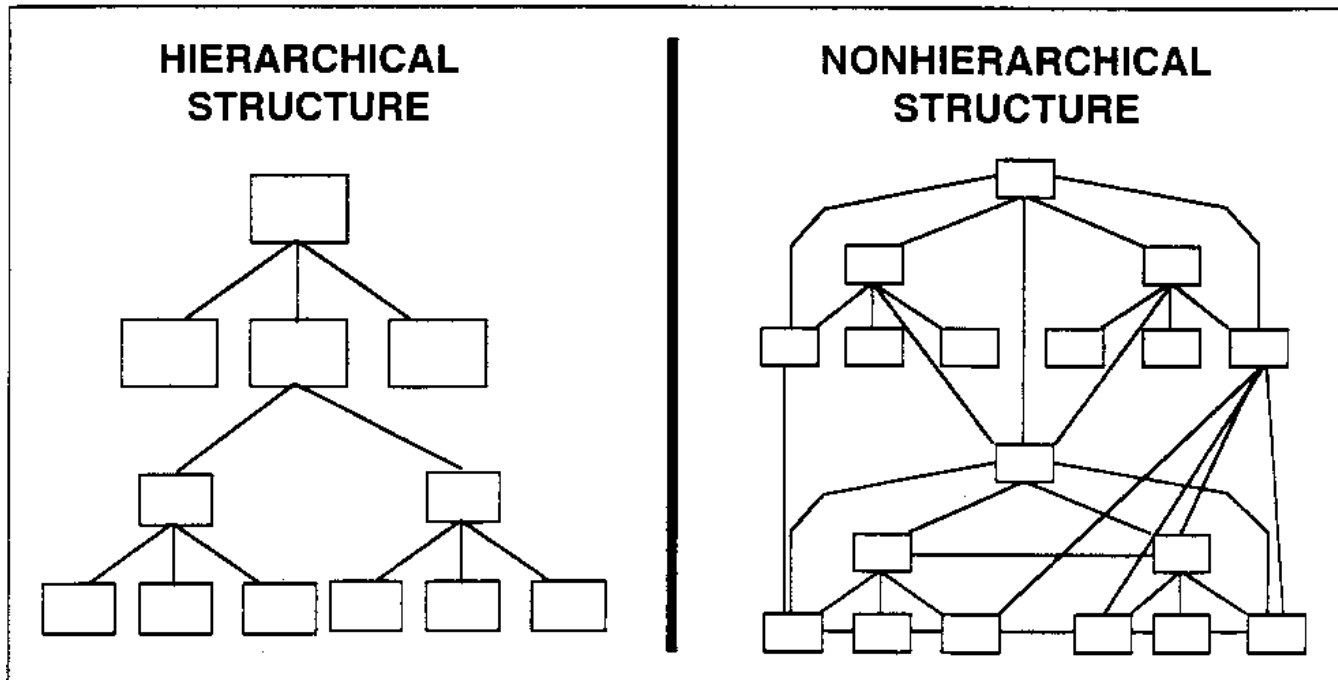


Figure 2-6. Command Information Structures

(2) **Extended Battlespace.** Looking at conventional and high-intensity warfare, recent military-technical developments point toward an increase in the depth, breadth, and height of the battlefield. This extension of the battlespace with fewer soldiers in it is an evolutionary trend in the conduct of war. The continuing ability to target the enemy, combined with rapid information processing and distribution, smart systems, and smart munitions, will accelerate this phenomenon. As armies seek to survive, formations will be more dispersed, contributing to the empty battlefield. Commanders will seek to avoid linear actions, close-in combat, stable fronts, and long operational pauses. Recent U.S. operations show that deep battle has advanced beyond the concept of attacking the enemy's follow-on forces in a sequenced approach to shape the close battle to one of simultaneous attack to stun, then rapidly defeat the enemy. Commanders may place greater emphasis on operational — and/or tactical-level raids — combined with deep strike means — to break up an enemy's formations from within. The relationship between fire and maneuver may undergo a transformation as armies with high technology place increasing emphasis on simultaneous strikes throughout the battlespace, maneuver forces may be physically massed for shorter periods of time.

(3) **Simultaneity.** The RMA may transform the familiar form and structure of military campaigns as a chain of sequentially phased operations. Advanced forces will possess the capability to achieve multiple operational objectives nearly simultaneously throughout a theater of operations. This simultaneity, coupled with the pervasive influence of near-real-time military and public communications, will blur and compress the traditional divisions between strategic, operational, and tactical levels of war. We have seen simultaneity first attempted in Grenada, followed by use in Just Cause in Panama and

Desert Storm against Iraq. During Desert Storm, no enemy force in the Kuwait theater was safe from simultaneous attack. No enemy force began to move, however, until coalition ground forces attacked. Yet the coalition massed those land forces for only a short period to gain the strategic staying-power effect.

(4) Spectrum Supremacy. Information technological advances will ensure that future operations will unfold before a global audience. Access to media will allow global or official audiences to become involved in, or react to, any and all events. Consequently, military operations, regardless of their importance, dimension, or location, will be conducted on a global stage. Tactical actions and the hardships of soldiers and civilians alike will have an increasing impact on strategic decision making and dramatically alter the concept of time—time from crisis to expected action and time for actual conduct of operations. As in the past, real-time visual images of operations, both positive or negative, will influence national will and popular support for them.

(5) Rules of War. Relative to recent history, warfare is becoming less civilized: using U.N. soldiers or foreigners as hostages, threatening to use chemical weapons, targeting heads of state, and violating territorial integrity. Recent conflicts support this trend. Actions once regarded as criminal are accepted if performed by a state or an organized nonnation force. Particularly in OOTW environments, collection of intelligence, predictions of opposing force behavior, and ability of our soldiers to assess enemy behavior and act quickly will prove to be difficult challenges.

2-4. Future Threats.

a. Assessing Conflicts. Most of the conflicts involving the U.S. Army will be OOTW or low-intensity conflicts, as few states will risk open war with the U.S. However, the specter of open war against foes fielding advanced, armor-mech-based armies must be considered. At this point, we can identify regions — not specific countries — where the conditions to facilitate or cause high-intensity conflict or overt military challenges to U.S. interests exist.

b. Assessing Military Capabilities. Relative improvement in potential threat force capabilities has two bounding principles. First, how much technology and weaponry a state can afford and integrate limits improvement. Second, knowing that states generally will arm to meet perceived regional threats, analysts can focus their analysis. The region that will require the most attention is Asia as its armies modernize from defensive or internal security models into ones capable of projecting power.

c. Assessing Nonnation Threats. A major challenge to intelligence analysis will lie in developing a reliable, verifiable methodology for measuring nonnation forces' military capabilities. This is compounded by the profusion, and mingling, of criminal as well as ethnic or subnationalist and supranationalist elements within almost every nonnation force.

2-5. Summary.

In summary, the character of future military operations can no longer be anticipated merely by analyzing an adversary's stage of economic development; regional or even local powers may possess the capability of employing extremely advanced military technologies. An adversary's actions will require intelligence analysis of fields extending far beyond the traditional battlefield focus. Boundaries within the spectrum of operations will become even more blurred than they are now. Current political and technical trends suggest that, as a matter of course, successful conflict prosecution and termination will depend upon multinational commitment, joint operations, and a high professional tolerance for the new forms of conflict. The days of the all-purpose doctrinal threat template are gone, just as the days of a single-prescription Army doctrine are gone.

CHAPTER 3

FUTURE LAND OPERATIONS

The circumstances of war are sensed better than they are explained.

Maurice de Saxe

3-1. Force XXI - The Strategic Army.

This chapter is in three parts. The first describes the unifying concept of Force XXI around five characteristics. The second describes changes in each of the battle dynamics consistent with those characteristics. Finally, these two parts are brought together to describe actual Force XXI Operations.

a. The future Army - Force XXI - must be prepared to face the full spectrum of operational environments described in Chapter 2. Therefore, our Army must design organizations and develop capabilities that will allow it to be rapidly tailorable, rapidly expandable, strategically deployable, and effectively employable as part of a joint and multinational team to achieve decisive results in future War and OOTW in all operational environments. Force XXI must exploit reserve component capabilities, especially in strategic mobility, sustainment at all levels, and early entry. Force XXI is defined by five characteristics: *doctrinal flexibility, strategic mobility, tailorability and modularity, joint and multinational connectivity, and the versatility to function in War and OOTW.*

(1) **Doctrinal Flexibility.** Clearly, the future strategic landscape will be varied and multifaceted and have a great potential for surprise across the operational spectrum. In addition, future adversaries may possess technology equal to or, in some cases, superior to our own. Thus, we have begun a course for doctrine in 1993 and continue with this concept based on the battle dynamics that depend on, indeed demand, that leaders have the skill to apply those principles in ways as varied as scenarios presented. At the center of this flexible doctrine are our quality leaders and soldiers. Practiced in application of principles in varied scenarios, our soldiers and leaders will be able to continually adapt tactics, techniques, procedures, and organizations to meet future requirements. We call these *Force XXI Operations*, and they are described in paragraph 3-3.

(2) **Strategic Mobility.** Strategic mobility is about being at the right place at the right time with the right capabilities. It is about a combination of anticipation, movement, and skillful prepositioning. Lethality and survivability of early entry forces will continue to be a main focus. Making forces lighter and able to reach deeper, while not sacrificing lethality and survivability, also is required. In addition, initiatives should

concentrate on those parts of mobility capable of improvement through use of new information systems, split-based operations and broadcast intelligence, or information concerning other battlefield functions. Shared knowledge will improve deployability through smaller, more precise tailoring of combat units and support requirements to accomplish the wide variety of missions expected of our force-projection Army. A force-projection Army will devote much energy toward the synergy to be gained from actual rapid movement of lethal and survivable early entry forces, increasing the ability to lift these forces by increasing strategic lift capability through investment in sealift, airlift, prepositioning, and infrastructure improvements and by measures to assist in anticipating possible commitments.

(3) Tailorability and Modularity. Aided by information technology, organizations will tend to grow *flatter* and less rigidly hierarchical. Strategic lift limitations, other service capabilities, time limits, and other factors may compel the Army to use only those forces absolutely necessary. Limits also exist on the number and types of units in the Army. These factors will demand forces that are as modular as logic allows to facilitate tailoring to meet each contingency.

(4) Joint, Multinational, and Interagency Connectivity. The Army must continue to improve its contribution to joint and interagency operations. To fully execute full-dimensional operations throughout the depth, height, width, and time of the particular battlespace demands use of other service assets. The Army is obviously dependent upon other services for strategic lift. Conversely, the Army provides many unique capabilities on land and at ports and airfields that other services cannot provide for themselves. Beyond joint connectivity, in addition to promoting interservice cooperation, Army battle command capabilities must facilitate use of various Army headquarters as efficient joint force command mechanisms. Political and military considerations require that most operations, both in War and OOTW, will be multinational and multiagency and involve nongovernmental organizations (NGOs) and private voluntary organizations (PVOs). Obviously, great divergence in capabilities will be present in all such operations. When forming coalitions, U.S. forces will likely provide certain capabilities they alone possess, such as strategic lift, battle command, strategic intelligence, and sustainment capabilities. Depending upon the location of operations and political factors, partner nations may provide greater numbers of troops to the coalition than the U.S. Liaison requirements will logically increase in quantity and complexity, to include greater need for linguistic knowledge and cultural awareness.

(5) Versatility in War and OOTW. The Nation cannot afford to maintain an *army of armies* in the early twenty-first century. The requirement to be trained and ready - to win the land battle - remains the absolute priority. Well-trained and disciplined units, provided with sufficient time and resources to train, can transition to OOTW missions as required.

b. Quality soldiers and information will be the key to fully developing these characteristics of Force XXI and will significantly impact all aspects of the Army. The main imperative guiding future operations, from full war to domestic support operations,

will be to gain information and continued accurate and timely shared perceptions of the battlespace. Soldiers and information - the centerpieces of future operations - are critical in that they permit changes in the dimensions of the battlespace and potentially dominate the battlespace through different combinations of maneuver, fires, and information operations. By mastering information, we can potentially command operations at an operational tempo no potential enemy can match. As we develop our mastery of such operations, however, we must develop the protection of these systems and procedures even more rapidly.

c. Information will allow the conduct of future full-dimensional operations by informing units — perhaps even enemy units, to convince them to surrender — of the full effect of all actions throughout the depth, height, width, and time of the battlespace. Such information will allow greater synchronization of effort, control of tempo, and control of force application.

d. Changes in the battle dynamics, especially in areas influenced by information technology, strategic mobility, and precision munitions, will enable Force XXI Operations to have the characteristics described in this chapter. Enablers, such as doctrine, leaders, soldiers, technology, and information, will give Force XXI the means to achieve a qualitative edge in operations and produce overwhelming, decisive, effects-oriented power. Overwhelming, decisive power is *not solely firepower*. For example, in OOTW, it may be food delivered to starving civilians or a demonstration of joint military capability so decisive that an adversary modifies its behavior to meet friendly goals. Regardless, U.S. force capabilities will define the battlespace, regulate tempo, ensure initiative, and promote quick, decisive operations with the minimum force necessary.

3-2. Meeting The Challenge - The Battle Dynamics.

As previously described, recent operations have given us a glimpse of the nature of future warfare. This glimpse has evolved into what we have named *battle dynamics*. These battle dynamics give us a framework to describe change and to begin our experimentation with hypotheses that predict outcomes to be confirmed in such experiments. These experiences, combined with our understanding of the evolving strategic environment and the emerging National Security Strategy, help shape our vision of early twenty-first century American military operations. Two key elements permeate all the battle dynamics. The first is that in future joint land operations, force coherence and thus application of combat power can be achieved through shared knowledge of battlefield conditions versus traditional physical control means such as graphic control measures or geographical demarkation of areas of operations. The second element is our quality soldiers and their noncommissioned and officer leaders, trained and developed through education and training in our *land warfare university*. A description of the first principle of each of the battle dynamics — operational manifestations of the Force XXI characteristics — follows.

a. Battle Command. Battle command is the art of decision-making, leading, and motivating informed soldiers and their organizations into action to accomplish missions

TRADOC Pam 525-5 at the least cost to soldiers. Characteristics of recent operations reinforce the notion that the ambiguities and complexities of future combat require even greater leadership skills and a shift in focus from the positioning of forces to the art of orchestrating the effects of those forces. With this shift, the roles of the commander and soldiers will gain even greater importance.

(1) Future battle command starts with competent commanders and noncommissioned officer leaders who have developed an intuitive sense of battle gained from study and experience. These leaders must demonstrate the ability to successfully command in a variety of missions, operational circumstances, and geographic environments. It also starts with quality soldiers at the center — soldiers with initiative, soldiers who contribute to the overall intent far in excess of their numbers because they are continuously informed. Despite advances in information technology, commanders, leaders, and soldiers will never have perfect knowledge of the operational situation surrounding them. Yet, due to the pace and complexity of future battle, commanders, more so than in the past, must accept uncertainty and not hesitate to act instead of waiting for more analysis or information. Commanders will frequently call upon intuitive skills gained from study and practice to bridge the gap and assist such actions. In addition, better informed soldiers, caused by better information distribution, will significantly add to this capability to act and to sustain the needed tempo. Yet, as they have in the past, commanders will still have to be with soldiers, to feel their pride and their pain, to listen, then to decide and act at the least cost to them.

(2) As described in Chapter 2, the ability to move information rapidly and to process it will likely change the way we command military operations. It will greatly influence force organization, command procedures, and staff systems. The Army's vision of future battle command is reflected in the *Army Battle Command System* (ABCS) concept. This system capitalizes on the power of our quality soldiers, enabled by what we now call Information-Age technology. It recognizes the inevitable coexistence of both hierarchical and nonhierarchical, or internetted, information processes. In the concept, the ABCS and software will use broadcast battlefield information, as well as information from other sources, and integrate that information, including real-time friendly and enemy situations, into a digitized image that can be displayed graphically in increasingly mobile and heads-up displays. These images will, in essence, depict a unit's actual battlespace. Collective unit images will form a battlespace framework based on shared, real-time awareness of the arrangement of forces in the battlespace, versus a rigid framework of battlefield geometry — phase lines, objectives, and battle positions. This system permits commanders at every level to share a common, relevant picture of the battlefield scaled to their level of interest and tailored to their special needs. Simultaneously, commanders at the same echelon will have a shared perspective of their position in relation to adjacent units. Maneuver, combat support (CS), and combat service support (CSS) leaders, horizontally linked by common information, will, for the first time, have a means to visualize how they will execute in harmony, integrated by a shared vision of the battlespace. Individual soldiers will be empowered for independent action because of enhanced situational awareness, digital control, and a common view of what needs to be done. See Figure 3-1.

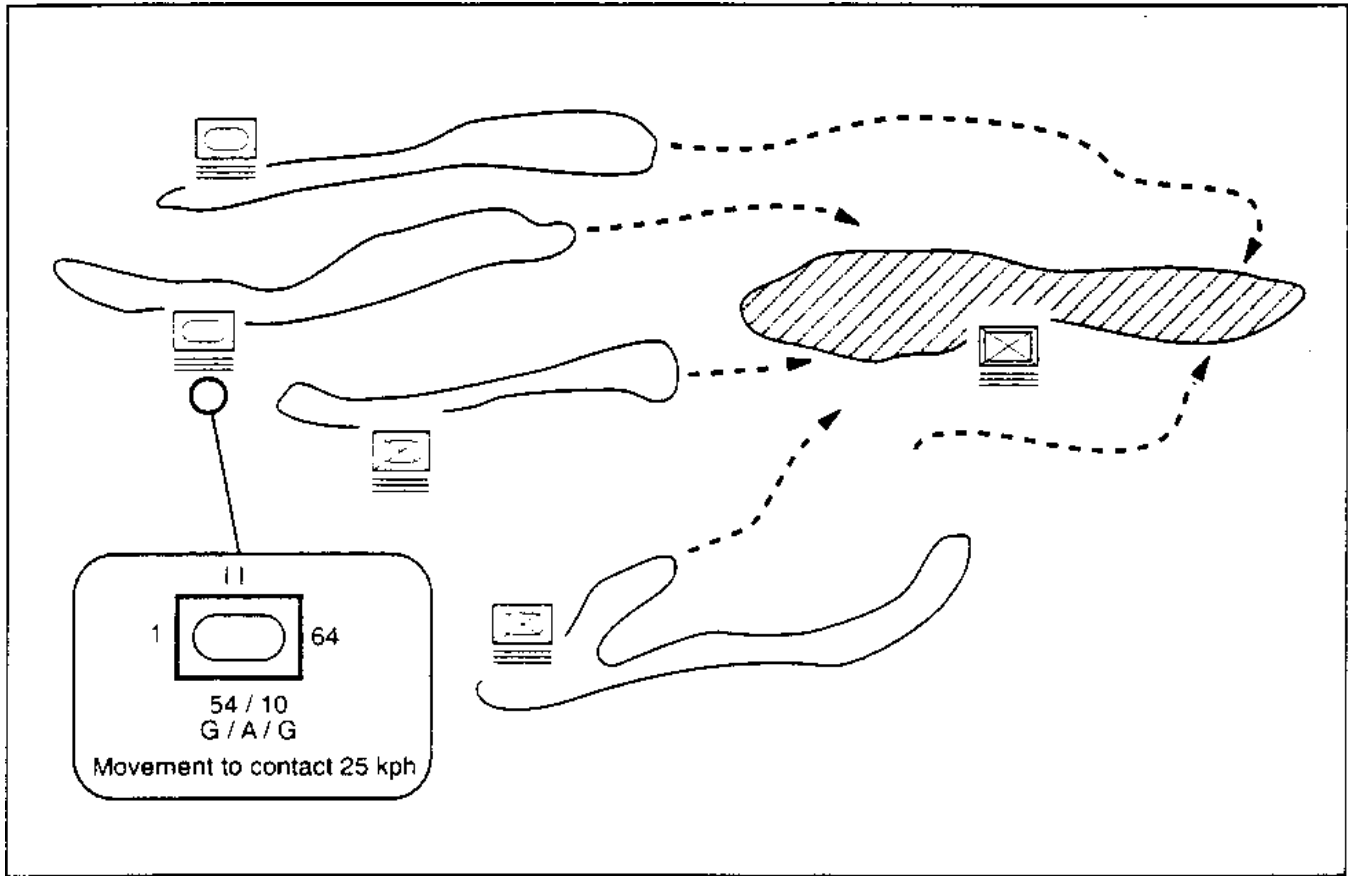


Figure 3-1. ABCS Digitized Reflection of Unit Battlespace

(3) This common picture will greatly enhance force-level dominance by enhancing situational awareness and ensuring rapid, clear communication of orders and intent, potentially reducing the confusion, fog, and friction of battle. As described earlier, the ABCS will include both hierarchical and internetted processes. For example, key force-level control orders normally associated with direct application of combat power will likely remain in the hierarchical domain. Information on services or other activities, including logistics, movement control, air defense warning, intelligence, and other areas can be readily accessed through *pull-down* information carousels (a nonhierarchical format). Some battlefield functions, fire support for example, will be exercised through both means. Above all, the future battle command system will be a commander's and soldier's system. It will be designed for command on the move. It will recognize the importance of the commander's personal presence on the battlefield, so essential to inspiring and motivating subordinates. Additionally, it will recognize the expected contribution and initiative of better-informed soldiers, capable of individual action within the overall command intent. Such shared information, where, in some cases, subordinates have as much information as commanders, changes the dynamics of leader-to-led in ways yet to be fully explored and exploited.

(4) Internetted information will greatly enhance all battle operating systems with the greatest potential payoff in intelligence, operations, and fire support functions. Rapid distribution of information such as broadcast intelligence is critical to all unit levels. Combatants can often directly coordinate their actions better through shared situational awareness than a higher headquarters can by directive command. Higher echelons will monitor lower nets, allow subordinates to fight the close fight, and concentrate on influencing the remainder of the battlespace in depth, height, width, or time.

(5) Hierarchy and structure in an organization should not be confused with process. Processes are the means by which organizations act to accomplish a task. It is possible, therefore, to have a well-structured organization that is highly agile because of processes used. One great value of such a *flatter* organization is its increased versatility. The challenge is to define *core processes*, possibly the operating systems defined in the *Blueprint of the Battlefield* (TRADOC Pam 11-9), and find the most efficient ways to accomplish the process across branch and service boundaries. See Figure 3-2.

(6) Advanced Army and joint intelligence systems that feed into ABCS will enable commanders to detect and track enemy forces throughout a given battlespace. This capability presents new challenges because information about enemy posture, position, and activity will be known earlier and in far greater detail than ever before. For example, before the ultimate intent of an enemy force can be determined, the benefits versus the risks of early attack with limited inventories of long-range precision weapons must be carefully analyzed.

(7) The existence of these advanced intelligence systems will not, however, replace soldiers. Soldiers will remain our greatest intelligence source, especially in OOTW; hence, one of the reasons for the manpower-intensive characteristics of OOTW. Information provided by soldiers must be integrated to confirm, corroborate, or deny the digitally portrayed common picture. Commanders accessing intelligence data bases will have greater access to, and place greater reliance on, the counsel of civil affairs, PSYOP, and other SOF assets. Human intelligence will often remain the only source of reliable information about the enemy, even on the highly technical battlespace of tomorrow.

(8) Friendly force situational awareness will be brought about by the digitization of each weapons platform and potentially each soldier so that commanders will know where every fighting system is in the heavy force and where every soldier is in the light force. This enhanced situational awareness will build confidence and agility into the maneuver of both mounted and dismounted elements. It will not, however, eliminate the necessity for standard drills, tactics, techniques, and procedures throughout the force.

(9) This future command system is obviously predicated upon our exercising *spectrum supremacy* — a key element of information operations. While control of the entire electromagnetic spectrum is impossible, key portions must be commanded most of the time. Our use of information as the focus of operations will be a strength but

could also easily become an Achilles' Heel. Protection of friendly information systems from myriad threats, while denying the enemy use of his systems, will be absolutely critical. In the future, full-dimensional information operations must be fully integrated into the planning, preparation, and rehearsal for every operation. Commanders must be personally involved in determining the vital role all aspects of information operations can play in the successful execution of military operations in war and OOTW.

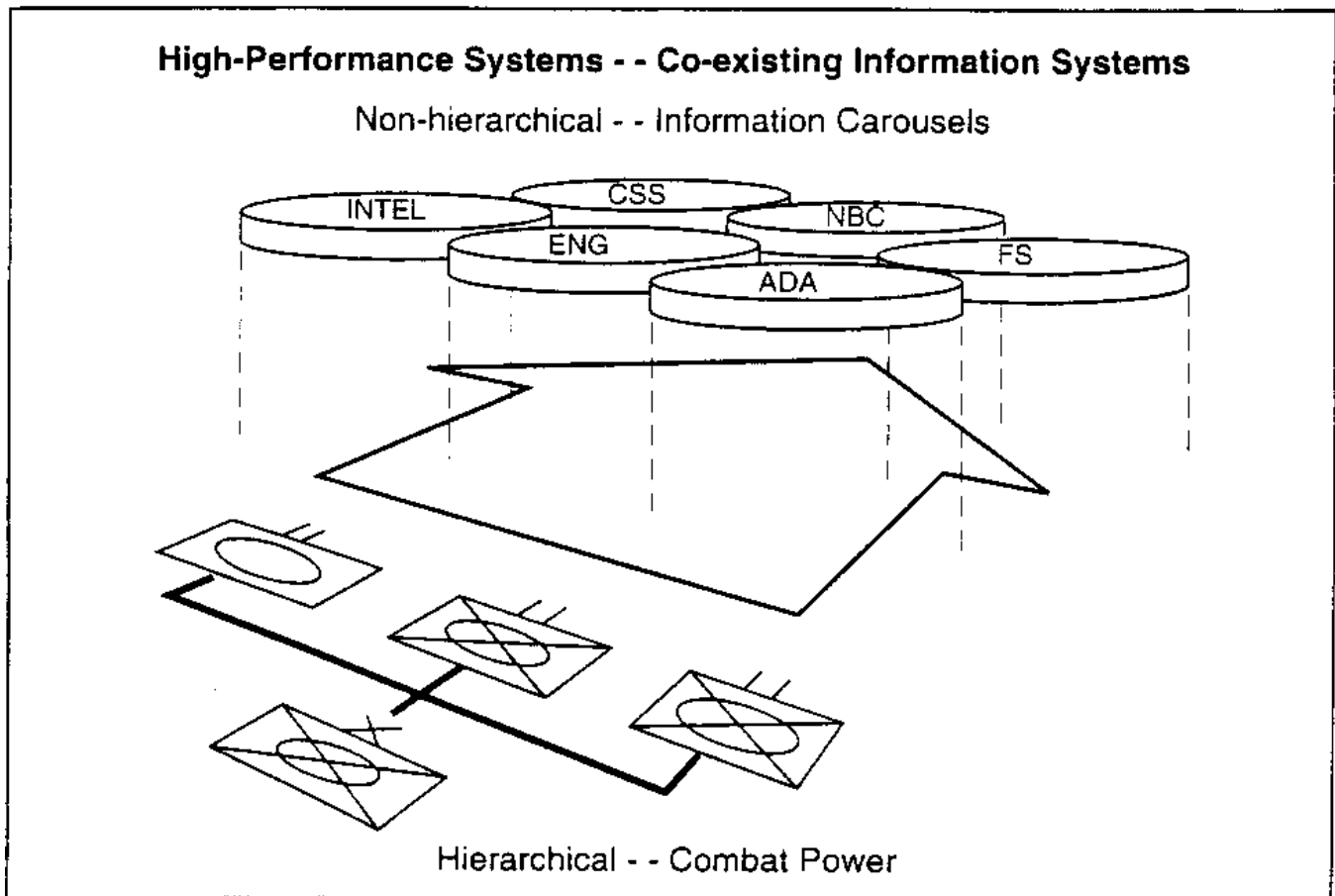


Figure 3-2. Coexistence of Hierarchical and Internetted Processes

(10) Future information technology will provide the means to collect, process, disseminate, and display information in an unparalleled manner. As stated earlier, this technology may revolutionize our approach to battle command. Yet the commander brings the requisite ability, experience, and wisdom to convert information to battlespace *knowledge*. The commander and small staff can access all desired information on a certain region, adversary, or ally. The commander or his staff will tailor the request to the immediate need and thus eliminate the slow process of combing through a broad

intelligence product prepared at higher echelons to answer all needs. This fusion of intelligence architecture is already being field tested and empowers subordinates to better use resources and coordinate efforts at the lowest tactical levels. Pull-down intelligence on demand will be the norm. While technology will be a significant aid in battle command, the constantly changing nature of battle requires the adaptability, judgment, and intuition only the human dimension - the commander - can bring. Human beings input the information, make decisions based upon it, and act upon it.

b. Battlespace. A joint concept, battlespace, is closely associated with the components of battle command. Battlespace is a concept that facilitates the type of innovative approach to warfighting required of leaders in future battles. Our forces will be able to dominate an expanded battlespace. Such domination will be judged by the ability to be more lethal and survivable and operate at a tempo greater than any enemy. We must dominate this battlespace in war with a minimum number of our own troops in it. In OOTW, however, more land forces will be required to exercise population control or exercise control over terrain. The trend in combat is toward fewer soldiers in a given battlespace; the trend in OOTW is for it to be manpower-intensive. Since battlespace is not confined by time, boundaries, graphics, countermeasures, or other physical constraints, it offers the commander a means to look at conditions beyond his traditionally defined area of operations that may affect or influence events within that area.

(1) Battlespace involves the ability to visualize the area of operations and the way that forces interact, be it in combat or in a humanitarian relief mission. The size, shape, and density of a unit's battlespace are variable and influenced by mission, enemy, troops, terrain, and time available (METT-T). The spatial expansion of the future joint battlespace will result in service-specific functional battlespaces intersecting and overlapping. This conceptual construct of battlespace will give future joint commanders a coherent vision of a fully integrated, full-dimensional battlespace and permit simultaneous engagement of targets by a greater variety of joint warfighting systems. In terms of visualizing an area of operations and how forces or other elements interact, battlespace has equal utility in OOTW.

(2) In the physical sense, battlespace is that volume determined by the maximum capabilities of a unit to acquire and engage the enemy—capabilities that will be greatly expanded by future technology. As addressed in the previous chapter, technical improvements in maneuver weapons systems, such as advanced optics, increased ranges, and digital electronics, will have a dramatic impact on tactical battlespace. Advancements in stealth, metallurgy, propulsion, and suspension technology will result in faster, lighter, more lethal, and more survivable fighting systems. Advancements in camouflage, lightweight communications devices, and soldier protection will fully leverage individual soldier capabilities.

(3) Well-equipped, future Army maneuver forces - operating at an operational tempo controlled by the commander within a given battlespace - will use an expanded array of joint weapons systems to engage enemy forces at greater distances with assured

accuracy. Based on enhanced situational awareness through ABCS, the operating tempo of these forces will be such that they will be able to outpace any adversary in both mounted and dismounted warfighting environments.

(4) Information operations influence battlespace by providing the commander the means required to better visualize the battlespace while blinding or shaping an opposing commander's vision. Battlespace then becomes a function of the commander's ability to use information provided by the command system previously described and employ his warfighting systems to achieve the necessary balance to ensure success.

(5) Expanded battlespace will also allow simultaneous engagement by a variety of joint warfighting systems available to the future task force commander. Expansion of battlespace to gain an advantage such as lethal reach over enemy forces will be essential to establishing maneuver force overmatch when maneuver alone, or disabling measures, cannot accomplish the mission. Consistent with the idea of an increasingly empty battlespace, this expansion will be achieved through dramatic improvements in manned and unmanned target-acquisition systems and precision direct- and indirect-fire capabilities. While fires are not automatically necessary to win, forces must be capable of using fires to gain the advantage.

(6) Battlespace expansion will achieve three distinct (not necessarily sequential) advantages over the enemy:

(a) By a variety of reconnaissance means, identify, disrupt, or destroy enemy forces before they can effectively engage friendly forces.

(b) Reduce friendly force vulnerability by increasing the dispersion and numbers of the friendly force. Physically mass only when absolutely necessary, but be capable of doing so rapidly and in varying combinations of combat, combat support, and combat service support.

(c) Conduct maneuver by use of both fires and rapid physical mass and dispersion of ground forces to sense and dominate a greater battlespace and achieve a staying power effect (control) only possible with land forces.

(7) Overmatches in the elements of combat power—maneuver, firepower, protection, leadership, and, ultimately, information—will prove essential to maintaining the edge against potential adversaries.

(a) Army units operating in both mounted and dismounted battlespace will enjoy maneuver force overmatch. This battlespace domination will be achieved through high-tempo, all-weather, air-land-sea continuous operations. Dismounted force mobility and maneuver improvements will be achieved by lightening the soldier's load, increasing his ability to overcome terrain and obstacle restrictions, optimizing the performance of his equipment, and improving his physiology. For mounted forces improvements will be achieved through increased mobility of platforms, lethality of

weapons, survivability of systems, and streamlining of the logistical support system necessary to maintain heavy-force, operational tempo and capabilities.

(b) Firepower of forces operating throughout the depth of battlespace will include both direct and, in the future, indirect precision fires. Both must overmatch enemy capabilities in range, target acquisition, accuracy, and lethal punch. Improved locating devices and digitized sensor-to-shooter linkages will greatly improve the accuracy and responsiveness of close fire support systems.

(c) Maneuver force protection is a critical element in maintaining dominance of battlespace. Key to force protection is finding the enemy and determining his capabilities. Future Army forces must be capable of conducting effective security operations. The use of improved reconnaissance, surveillance, and target acquisition (RSTA) sensors and unmanned vehicles will aid in this objective. Active counter-RSTA measures may include enhanced armor or ballistic protection, deception techniques, and fighting position enhancements for dismounted soldiers, weapons systems, and logistics sites. Passive force protection capabilities will include low-observable technology, improved electronic countermeasures, and multispectral camouflage. Passive protection systems and actions must also be sought to protect forces operating within a given battlespace where the use of weapons of mass destruction is likely.

c. Depth and Simultaneous Attack. The domination of extended battlespace will require agile and robust deep and simultaneous attack capabilities. As stated earlier, advances in this dynamic may drive a reassessment of the traditional relationship between fire and maneuver. Combining the concepts of deep operations and simultaneous attack using both lethal and nonlethal means creates a dynamic capability to extend the battlespace in space, time, and purpose; to reduce, if not entirely eliminate, the time and need to shape the battlespace; to facilitate full-dimensional attack of an enemy center of gravity; and to accelerate his defeat. Simply stated, depth and simultaneous attack will enable the commander to directly influence the enemy throughout the width, height, and depth of his battlespace to stun, then rapidly defeat an enemy. We saw indications of these possibilities in both Just Cause and Desert Storm. By massing the effects of long- and short-range area and precision fires, integrating information operations designed to blind, demoralize, and deafen the enemy, concurrent with rapid combined arms maneuver, ground and from the air, a larger and less agile enemy force can be quickly and decisively defeated. Although these attacks may not be simultaneous in application from the enemy's perspective, they will appear seamless and nearly simultaneous in effect.

(1) Using the ABCS to integrate battlefield information, twenty-first century commanders will have the capability to see the entire battlefield in depth, identify key targets - particularly moving and short-dwell targets - and attack with a wide choice of joint, as well as Army systems, whenever and wherever the commander desires. Depth and simultaneous attack means will vary greatly. They will include air, Army aviation and ground maneuver units, joint precision fires, psychological operations, information operations, and employment of special operations forces. These various means of attack,

and others, will be horizontally and vertically integrated by a fully digitized joint and combined arms target - acquisition, hand-off, and strike system - a component network of ABCS.

(2) Along with battle command and battlespace, successful depth and simultaneous attack increases demands on intelligence systems, to include human intelligence capabilities. Long-endurance, unmanned aerial vehicles (UAVs) - with high-resolution video, filmless cameras, and follow-on generation, forward-looking infrared radar (FLIR) technology - will be employed at the lowest tactical levels. These multipackage UAVs will be linked to a variety of other sensors and ground stations. Indeed, networks of distributed, multipurpose sensors will populate future battlefields. These sensors will locate, identify, and track enemy formations with a high degree of accuracy. Selected sensor systems, as well as UAVs, will serve as weapons platforms capable of sensing, locating, identifying, and attacking targets and afterward assessing damage. All acquisition systems, including maneuver and command platforms, will have sensor-to-shooter fusion links to direct, indirect, and joint attack assets. These future reconnaissance and active and passive target-acquisition and surveillance systems will provide commanders continuous wide-area battlefield observation at greater ranges, prevent fratricide, and provide joint battle damage assessments.

(3) A key component of depth and simultaneous attack will be measures taken to win the information war. These measures will include the establishment of electromagnetic-spectrum supremacy through nonnuclear electromagnetic pulse generators, space-based information denial systems, and computer viruses. Electronic warfare preparations will normally precede, but may take place concurrent with, ground and air operations. Command and control warfare (C²W) may replace air supremacy as the essential first step in operations. Television and other communications media provide means to defend or undermine the will of entire populations. Another method of attack will be to access the enemy battlefield computer systems and manipulate information. Through successful information operations, adversaries will be forced to exercise command through nineteenth century means, while US forces operate state-of-the-art, twenty-first century systems.

(4) Joint and multinational precision-strike actions of simultaneous attacks in-depth will be planned to achieve specific operational and tactical objectives. Success will require an absolute unity of effort among all arms and service components and a clear focus of attacks to lead to the defeat of the enemy strategic center of gravity. In essence, the joint force commander will have to both optimize and synchronize the capabilities of each service to effectively execute depth and simultaneous attack. This will require a reexamination of the current joint fire support coordination paradigm.

(5) Depth and simultaneous attack will be a key characteristic of future American military operations. These operations will redefine the current ideas of deep, close, and rear. The ultimate goal of depth and simultaneous attack is to overload the enemy's ability to cope by presenting an overwhelming number of actions throughout the depth of the battlefield. The measure of success in executing depth and simultaneous

attack will be determined by our efforts to leverage emerging technology in four general categories: *battlespace preparation*, *synchronization*, *simultaneous attack execution*, and *force protection*. Successful force protection will prove essential. Tactical and theater missile defense against enemy long-, medium-, and short-range rockets and ballistic missiles must be developed. Effective air defense against cruise missiles, UAVs, and RPVs must also be pursued, and improved measures to prevent fratricide must be developed.

(6) Depth and simultaneous attack in concept also applies to military OOTW. Whether the object is control of land or populations or rapid reestablishment of infrastructure following a natural disaster, US or combined forces must establish that control simultaneously and throughout the entire operational space. Many times sequential operations permit too much time for forces opposed to peacekeeping and cause unneeded continued suffering in disaster relief operations. Thus, OOTW must also ascribe to this concept of simultaneity.

d. Early Entry. This is one of the battle dynamics where change is most dramatic - where the relevance of the force-projection Army to the current and near future strategic environment is most notable. Army early entry forces will confront a wide range of potential missions, many of which will be joint, multinational, and interagency. Innovative combinations of forces will be required to meet the challenges associated with early entry operations. Early entry operations will be conducted by forces that are not necessarily light or heavy, but tailored to METT-T in order to create the best possible capabilities-based force to meet the needs of any given contingency. The early entry force may not be comprised solely of active component forces. It will likely have a sizeable reserve component and a civilian contingent, especially in OOTW. The aim of early entry forces must be, when possible, simultaneous application of force or control throughout the operational area. If not possible, and if forced initially into other circumstances, the aim should continue to be rapid and simultaneous application of force or control as quickly as possible.

(1) Early entry operations will occur across the wide range of military operations—peacemaking, worldwide humanitarian assistance, civil support, unconventional warfare, forcible entry, and even heavy battle. These operations may be of short duration or may be the foundations for extended, protracted operations.

(2) The actions by an early entry commander may be tactical on the ground but have strategic and international repercussions. Success in early entry will prove critical. It will establish American military credibility. As a result, worldwide media coverage and instantaneous communications can make even small-unit, early entry actions strategically significant. Failure in early entry operations will have major strategic consequences for follow-on military action or prevent action altogether.

(3) Actions during predeployment will be critical to success. The early entry commander will be able to see the battlefield, using information gathered from national

systems, HUMINT, and other sources linked directly to the tactical operations center. As part of his battlefield preparation, he will make force-tailoring decisions.

(4) Prior to deployment, the commander will train through interactive simulation and live modes. Simulation will permit units at different locations to *fight together* through a combination of *virtual, constructive and live simulations in a mission-planning rehearsal system*. Various mission planning software already exists that allows planners to look at terrain from various heights and directions and plan accordingly. Essential to this capability is the requirement to have comprehensive and updated terrain data bases, such as the Defense Mapping Agency is creating on CD-ROM. Based on multispectral imagery, accurate weather, and current intelligence information, soldiers will be able to use simulations to rehearse operations repeatedly before they are actually called upon to perform them. Information technology will provide deploying units access to the latest intelligence and information in the theater of operations to continue active involvement in planning. En route simulations capabilities will enable the force to continue training and conduct rehearsals.

(5) The Army Strategic Mobility Program (ASMP) has set goals for the deployment of forces. Early entry forces will meet these goals by using modernized air and sealift assets. The introduction of the C-17 and the new family of large, medium-speed, roll-on/roll-off ships will dramatically improve Army capabilities to meet future strategic mobility requirements. Other initiatives will result in smaller, but more lethal and survivable organizations and lighter equipment, due to advances in composite materials research. These efforts, along with the employment of prepositioning afloat equipment, the self-deployment of Army aviation assets, the prepositioning of support maintenance facilities, split-based logistics and intelligence, and the benefits of total asset visibility, will also reduce lift requirements. This rapid force projection to an objective area of an early entry force or forces is gained by synergy of deception and surprise, anticipation, rapid tailoring of forces, rapid sea and air movement, and skillful prepositioning.

(6) Early entry forces will often face an enemy that attempts to deny the buildup of overwhelming combat power and may be either close to water or far inland. The early entry force must therefore be prepared to fight its way in or, soon after arrival, expand its battlespace, take advantage of its own inherent strengths (lethality, survivability, control of operational tempo), as well as those of other services, and win quickly or rapidly establish control.

e. Combat Service Support. Rapid force projection from platforms in CONUS or forward-presence bases, extended lines of communication, and potential forcible entry into logistically bare-based areas of operations require continual evolution from 1993 doctrine. The varied demands of war and OOTW require the development of a logistics system that is versatile, deployable, and expandable. Modular units in both active and reserve components will allow rapid force logistics tailoring. This future logistics system must be as capable as the joint and multinational forces, to include the special operations forces that it will support, especially since Army CSS and CS units are usually

the major theater land force operators in war and OOTW. Creation of this new CSS system necessitates weaving the current strategic, operational, and tactical levels of logistics into a seamless continuum. This seamless concept must extend throughout the total force and take into consideration the integration and application of civilians and the reserve components.

(1) In addition to logistics power-projection missions, the Army will be increasingly called upon to perform nontraditional support missions, both foreign and domestic. Supporting these missions will require an unprecedented versatility, a resiliency not historically found in Army CSS units, and a fundamentally different approach to resourcing logistics force structure, materiel, and training.

(2) As in the past, the primary purpose of logistics will be to support mobilization, deployment, reception and movement, sustainment, reconstitution, redeployment, and demobilization of military forces across the full range of military operations. Army logistics will play a vital role in all these levels of operations - strategic, operational, and tactical. Despite proliferation of high-technology systems, the orientation of logistics will remain on soldiers.

(3) Strategic logistics will, more than ever, represent a subset of national power because it includes the nation's industrial base and its link to military forces. The strategic level will remain the purview of DOD, the individual services, and non-DOD governmental agencies, with an unprecedented level of support from the private sector. Reduced resources for DOD logistics and applications of electronic management and information systems will necessitate the formation of strategic alliances between Army logistics mechanisms and civilian industry. The civil sector will assume more responsibility for functions such as warehousing, maintenance, and materiel management than they have in the past. These forged links between the sustainment base and the Army will negate the need for Army-managed stockpiles and allow a true producer-to-foxhole sustainment system. Further, the Army will increasingly adapt, with little or no change, the successful techniques, procedures, and materiel innovations of the commercial sector to meet its logistical support requirements.

(4) Operational logistics ties tactical requirements to strategic capabilities in order to accomplish operational plans. It encompasses support required to sustain joint and/or multinational campaigns and other military activities within an area of responsibility. Military units, augmented by an expanded number of civilians, contractor personnel, and available host nation resources, will comprise the future organizational structure of elements found at this level. The primary focus of the operational logistician will be on reception, discharge, onward movement of forces, positioning of facilities, materiel management, movement control, distribution, reconstitution, and redeployment.

(a) A flexible, theater-level sustainment support activity, called the *logistics support element* (LSE), may be deployed into the operational areas to enhance Army logistical capabilities. The organization will consist of highly skilled and properly

equipped DOD/DA civilian technicians, private-sector contractors, and elements of active Army and reserve components.

(b) An objective area's infrastructure will be a major consideration in future operations. An immature, bare-based, or nonexistent, infrastructure will, more often than not, be in areas where Army logisticians will be called upon to operate. This reality will be a key factor in the development of logistics support for future operations. A concerted effort must be used to identify those missions and functions that can be satisfied by the private sector, versus military forces, when operating in these areas. The future Army cannot afford to use infantrymen as longshoremen. Capitalizing on available host nation support will be a major means of resolving support shortfalls without placing additional demands for deployment of additional logistics units. Prenegotiated host nation support agreements will be imperative.

(5) Tactical logistics is the synchronization of all logistics activities required to sustain soldiers and their systems. Military units organic to the deployed tactical force will make up the bulk of the logistics organization at this level. However, the organization may include some support from DOD civilians and civilian contractors. The focus of the tactical logistician is on the logistics sinews of *manning, arming, fueling, fixing, moving, and sustaining the soldier and his equipment*. Tactical logistics will continue to be one of the keys to more rapid tempo of operations. Anticipation, long a goal of logisticians, can be aided by telemetry applied to both soldiers and equipment. To realize more rapid tempo, logisticians must look to increased asset visibility and means and methods to anticipate.

(a) During preparation and planning for contingency operations, the most difficult challenge for logisticians will be determining the appropriate mix of active, reserve component, DOD civilian, contractor, and host nation support elements to support the force. Modular logistical organizations will help the tactical logistician achieve the appropriate mix. But, modularity to the extreme can be dysfunctional to overall logistics force cohesion and effectiveness. An increased presence of contractors and host nation support elements will be used to minimize deficiencies in future support operations.

(b) The key to proper execution of early entry logistics operations is the phasing of these elements into the theater of operations. Commanders and planners will create support structures to meet the initial logistics needs of the deploying force. These support forces must be sufficiently flexible and robust to allow support across the full range of military operations.

f. Emergence of Force XXI. Mastery of the many changes associated with the five battle dynamics described herein —principal among them battle command— will result in the emergence of Force XXI, a twenty-first century United States Army fully prepared to meet the challenges of the future. Force XXI will be the world's preeminent joint land fighting force, and the way it fights will define the nature of post-Industrial Age warfare. See Figure 3-3.

3-3. Force XXI Operations.

a. Background.

(1) The remainder of this chapter discusses actual Force XXI Operations, attempting to envision the unifying concept and battle dynamics in actions in war and OOTW. A dynamic tension always exists between technology and doctrine and between strategy and doctrine; they shape one another.

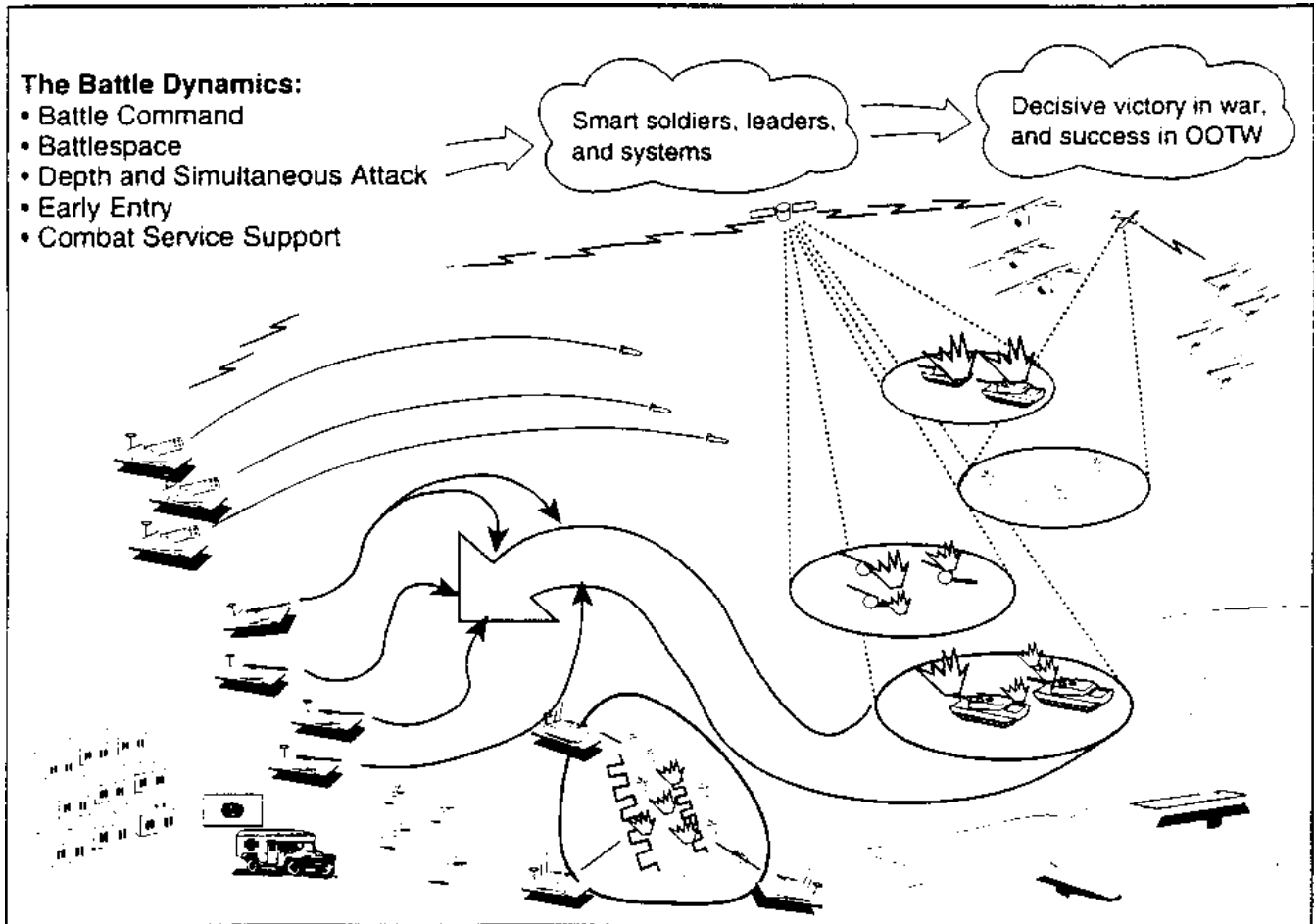


Figure 3-3. Joint Land Operations in the Information Age

(a) In the case of technology and doctrine, military future architects are aware of two historical trends. The first is that technology often is applied first to the commercial sector, followed at some later time into military use. With few exceptions, this has been the case for land warfare in the twentieth century, even if not the case in air

and naval warfare developments. Second, technology often influences much more rapidly CS and CSS than combat arms. Application of technology from the American Civil War through World War II much more rapidly changed CS and CSS doctrine than it did combat arms. Given that fact, and that the ultimate objectives of military operations do not greatly change, one can see the natural evolution of doctrine toward Force XXI Operations.

(b) The interaction between strategy and doctrine is also instructive. Given a relatively prescriptive Cold War strategy related to a single, focused threat, our doctrine developed the same way. Thus, when facing the Warsaw Pact, the U.S. Army developed the *Active Defense* (the 1976 FM 100-5) which reflected a U.S. force outnumbered and a force on the way to being technically inferior qualitatively on an armor-dominated European battlefield. Later *AirLand Battle* (FM 100-5, 1982 and 1986) was developed, still with U.S. forces being outnumbered but no longer technically inferior because of procurement of new land systems. *AirLand Battle* controlled the tempo of operations with a battlefield framework suited to Central Europe and the echeloned attack of soviet or soviet-style forces. *AirLand Battle* delineated and clarified the levels of war, emphasized close concerted operations of airpower and ground forces, balanced offense and defense, and highlighted the synchronization of close, deep and rear. Still threat-based and focused on Central European conflict, *AirLand Battle* used a relatively prescriptive, fixed framework to focus combat power. It worked.

(c) As our strategy has evolved from that relatively prescriptive era, so has our doctrine. Thus, our 1993 operations doctrine (FM 100-5) contains significant changes. Reflecting the multipolar world, recent combat, and technological advances, doctrine was developed for a force-projection Army. It is much less prescriptive, relying on principles to be applied by the art of battle command to varying strategic scenarios vice *the Cold War scenario* of Central Europe. Army operations expanded into wider joint and combined integration and also included OOTW. This capabilities- and principles-based doctrine described how to think about operations with a variety of possible battlespace frameworks, to include simultaneous rather than sequential deep and close operations. It also reflected the blurring of levels of war, the beginnings of information operations, and the mix of war and OOTW in the same theater. This introduced full-dimensional operations. See Figure 3-4.

(d) This next evolution of doctrine assumes there will not be return to the prescriptive strategic framework forged against a single threat but rather a strategy of principles to be applied in given circumstances. Thus this next evolution of doctrine will continue the evolution of full-dimensional operations into Force XXI Operations, as the increasing impact of Information Age technologies is combined with quality soldiers and leaders in the U.S. Army. Reflecting advances in weapons and information technology, this concept achieves force coherence *through shared knowledge*. With a shared common and timely perception of the battlespace, a relatively unconstrained framework - a digital framework - will organize the battlefield and control of operational tempo.

b. Characteristics.

(1) The general and seamless pattern of future knowledge-based land warfare under this joint vision will be *mission analysis and force tailoring*, *reconnaissance*, *decisive action*, and *sustained operations or recovery*. Although listed separately and sequentially, these actions will most often occur simultaneously, and, at the operational level, appear seamless. Operational activities associated with these actions include —

(a) Mission analysis and tailoring of forces for force projection to include lift and prepositioned equipment considerations.

(b) Reconnaissance and verification of operational area, to include enemy or other forces in AOR, surprise, and deception.

(c) Decisive action by simultaneous attack or control throughout the AOR by use of fires and air, naval, and land forces.

(d) Sustain operations to achieve strategic aims or recover to move to another theater.

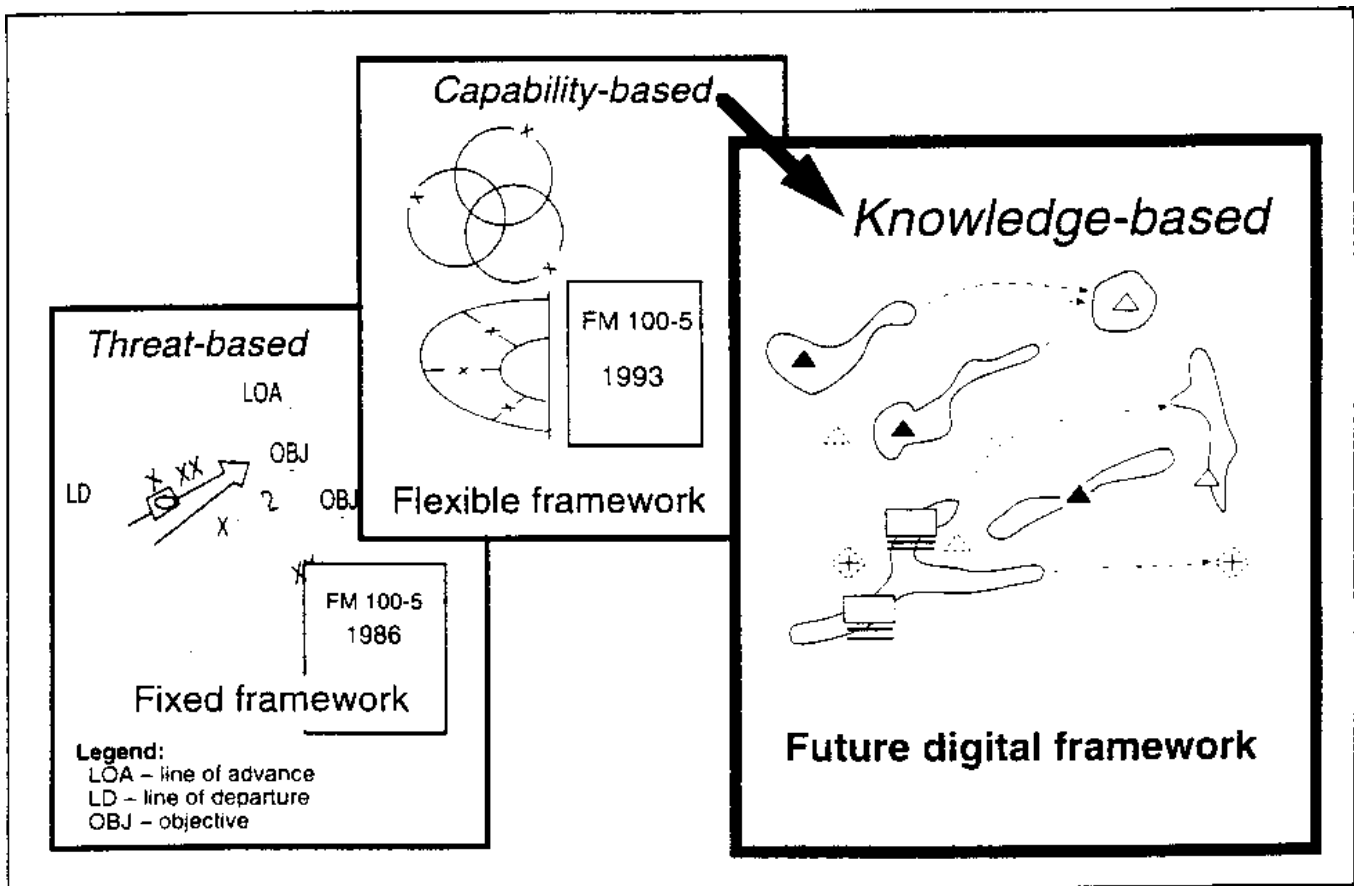


Figure 3-4. Battlefield Frameworks

(2) During the first two decades of the twenty-first century, the Army will be at the emerging edge of knowledge-based land warfare. Regardless of size, few, if any, armies will be able to equal American military capabilities. As they evolve, Force XXI Operations will prove as decisive as the *blitzkrieg* of early World War II. But, as with that warfighting concept, adversaries will seek the means to defeat these types of future operations. Therefore, the United States military must prepare for the inevitable response. One response would be to preclude these operations from ever occurring, either through nuclear deterrence, strategic psychological warfare design to influence national will, information operations, preemptive strike, or strategic and operational interdiction of critical lines of communications.

(3) In developing Force XXI capabilities, one must be mindful of vulnerabilities. The spread of ballistic missile technology, both strategic and theater, also poses a serious threat to these operations. Weapons of mass destruction delivered by a variety of methods will remain an area of high interest well into the next century. Possible threats to our information systems as well as strategic lines of communication and key nodes in the theater of operations and, obviously, to CONUS are other areas.

c. Tempo. In the global information network and where the time from *crisis exposure to action underway* and *crisis resolution* will continue to be compressed, tempo will grow in importance. In effect, when military force or forces are the principal option of choice, the hourglass will be turned over and the rate at which sand flows to the bottom will be conditioned by any number of factors. The rate of flow is conditioned by strategy, which directly affects the tempo of military operations. Thus, battlespace operations will be deliberately designed to control operational tempo, which will be affected by both external strategic factors as well as internal military factors. Tempo is more than speed; it is adjustment in rate of operations relative to battle circumstance and assessment relative to enemy capability to sense and react. Tempo is important in both war and OOTW.

(1) Better intelligence, shared among all elements and moved or retrieved rapidly on demand, will allow commanders to control and vary that tempo based on superior knowledge of friendly situation/location, enemy situation/location, and events shaping the overall battlespace. Improved logistics asset visibility will also affect tempo. In addition, possible uses of telemetry with data compiled rapidly will aid future logisticians in anticipating logistics requirements for soldiers and equipment. Victory in war will go to the force able to string together a series of tactical victories faster than the enemy can respond. *Timing* - pulses of maneuver, pulses of logistics, pulses of fire - and speed will achieve maneuver, and, if necessary, firepower dominance. Superior timing and speed, controlled by shared information, will allow commanders to physically mass forces only when necessary. Commanders with the information and capability to shape all dimensions of the battlespace can organize and control forces with the speed and timing to win. In OOTW, the same logic/methods, with much less, or no use of fires, applies. Potential offered by information operations in the future may well be the ability to *orchestrate* apparent chaos on the battlefield - overwhelmingly confusing to the enemy - with patterns understood by the US commander and coalition partners.

(2) This manner of conducting joint land operations does not rely for its existence solely upon future technologies. Force XXI Operations are possible with existing technologies; we are simply not yet sufficiently tactically adaptable nor have we changed some battle processes to take full advantage of such versatility. Yet, trends in recent operations in Somalia and Macedonia, in addition to rapid force tailoring in Just Cause and Desert Storm, indicate we have begun. Our weapons can strike anywhere in our battlespace, but we cannot fully control them or sense their effects. Intelligence systems can provide detailed images and SOF can supply critical HUMINT. Yet, the full synchronization of all this capability is not realized. Evolving information technologies will almost undoubtedly unlock the full potential of Force XXI Operations, but we must begin now to change the way we think and organize staffs, information flow, procedures, and possibly organizations. Existing and evolving information technologies will support and shape the evolution of procedures and processes. This ongoing doctrinal development will place the Army in the lead of the revolution in military affairs.

(3) Future American land combat operations - Force XXI Operations - will be deliberately designed to control - maintain, accelerate, or moderate as necessary - the pace of battlefield events. The intent is that these dynamic combat operations take place over the shortest feasible time at least cost, to both friendly forces, enemy forces and neutrals. Made possible in part by the new Army Battle Command System (ABCS) in the hands of a new generation of leaders adept in the art of command, these fast-moving operations will occur throughout the operational width, depth, and height of a given battlespace, using a wide variety of means—surface, space, sea, air, electronic, informational, psychological, and special operations.

(a) Commanding under these conditions will require voluminous information. Most importantly, it will require intelligent processing and distribution of the critical data. This is an important link in information operations between the technology and the human dimension.

(b) We must look at reducing manpower by increasing automation in areas that deal with rations, fuel, and other *housekeeping* staff functions. We must not reduce staffs solely for the sake of reducing them. The assimilation of data and information and application of judgment for key decisions will continue to require competent teams assisting commanders. Clearly, though, future automated information operations promise a capability to operate with unprecedented control in routine staff formations, allowing commanders and staff to focus on more complex, integrative tasks.

(4) Lethality and pace of future operations will result in a reliance on artificial intelligence systems, robotic systems, automated weapons, and computer-operated C² links, such as those described herein, for two key reasons. First, automated systems will provide the speed, precision, and integration in execution and reaction required on future battlespaces. Second, automated systems support the principle of minimizing friendly casualties by reducing soldier exposure. Decision-making systems for routine battlespace functions will operate in accordance with rapidly reconfigurable sets of predetermined commanders' decision-making criteria. When these decision parameters

are exceeded, this criteria can be quickly changed, such as the TACFIRE commanders' criteria capability offers now. Commanders can override automated decisions based on the concept of *command negation*. Computerized systems will be the tools by which hierarchical and internetted command processes are integrated. Computerized decision aids should reduce workload, and thus the size of staffs, by performing routine functions related to terrain management in assembly areas, road marches, routine resupply, reporting, etc. More advanced decision aids, as well as procedural changes, will be needed for terrain management and clearance of fires in combat situations.

d. Joint and Multinational Operations. Facilitated by improvements described in the battle dynamics, early twenty-first century American land operations will be fully integrated, completely joint, and, most often, multinational. In future wars or in OOTW, the connection between the three classic levels of war - strategic, operational, and tactical - will appear seamless because it will consist of full-dimensional operations throughout the width, depth, and height of a given theater of operations. The goal is that these operations be conducted under conditions where US forces, supported by our coalition partners, enjoy a qualitative technical, training, leadership, and, most importantly, information edge.

(1) Throughout the full range of military operations, under both defensive and offensive conditions, regardless of environment, future American operations will induce massive systemic shock on an enemy. These operations will be meant to force the loss or deny the enemy any opportunity to take the initiative. Full-dimensional, joint, and often multinational Force XXI Operations will systematically attack opposing force cohesion and destroy the moral will to continue the opposition.

(2) As previously stated, future wars fought and OOTW conducted by the United States will involve the simultaneous and full-dimensional application of all elements of military power. Future operations will capitalize on the concentration of joint and combined arms effects, combined when necessary with the actual physical massing of forces. These effects will be directed toward the precision attack of critical information management nodes, key strategic assets, and enemy fighting formations. Future operations will make information operations the initial focus of operations, much like the attainment of air superiority is now. Effective information operations will make battlespace transparent to us and opaque to our opponents.

(3) The spatially extended *pulse of lethal and nonlethal striking power* - a glimpse of which was offered in Operations Just Cause and Desert Storm - will overwhelm enemy commanders' capacity to react. When viewed from the receiving end, once unleashed, early twenty-first century American military operations will appear as one seamless, fully synchronized, and multifaceted strike, involving all elements of American and coalition military power.

(4) Army forces will work extensively with forces of other nations in conducting future OOTW such as peacekeeping, nation building, and relief operations. These

operations will highlight the significant technical mismatch between the Force XXI Army and coalition partners.

(a) Planning for each such operation must take these capability differentials into account immediately and make necessary adjustments in force composition.

(b) American soldiers will be able to work more effectively than in the past due to improved Army liaison and language capabilities; expanded training, exercise, and professional education programs; and exchanges with foreign armies. The number and variety of Army foreign language linguists will need to increase. Greater use of automated translation software for written communications will also be employed.

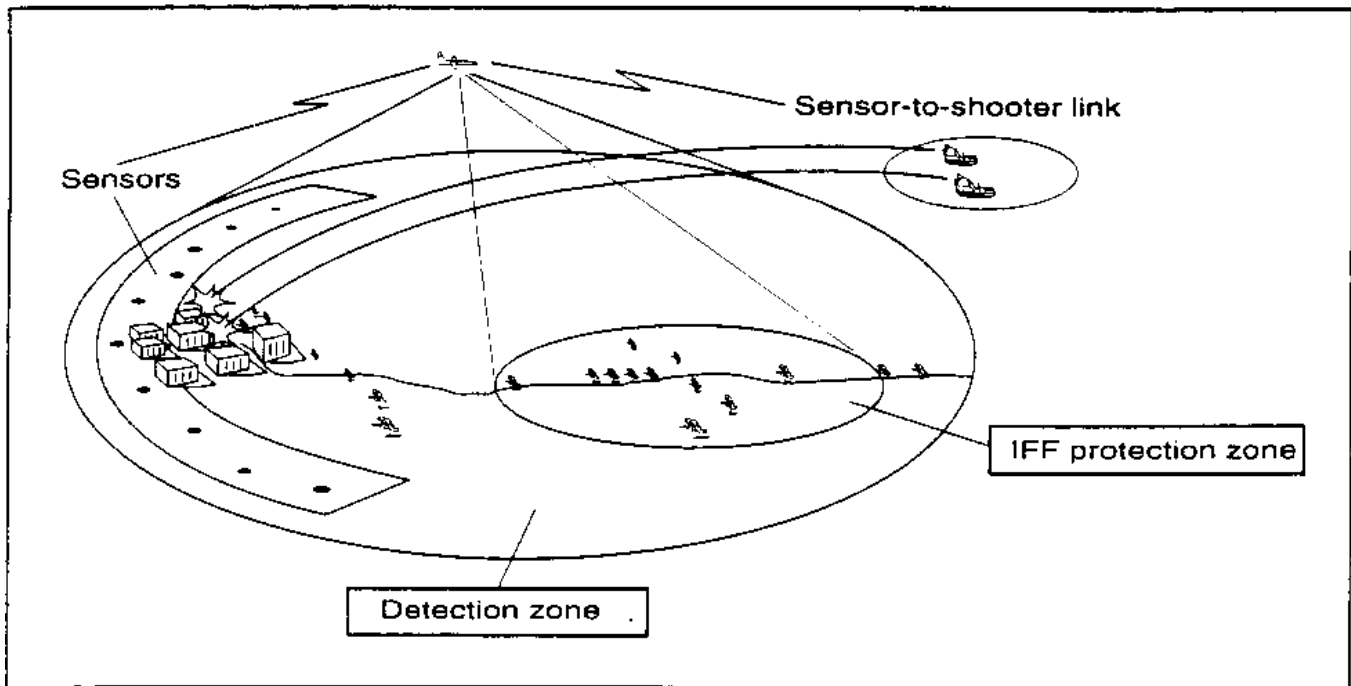
(c) In the area of liaison, expanded training and professional education - aided by CD-ROM-based *liaison packages* - must improve liaison team understanding of partner-army organization, equipment, and doctrine or civil agency procedures. OOTW will require liaison with myriad military and civilian partners. Combat will require liaison teams with significant technical capabilities to ensure full sharing of information necessary to fully utilize each participant's capabilities.

e. Control. Land forces are uniquely capable of control of populations and land areas as strategic objectives direct. Land forces bring staying power and commitment to a conflict or OOTW situation - unmistakable in its communication of intent to adversaries. In a strategic environment without a single pervasive threat, the utility of land forces for control to gain strategic aims increases. Control is an end state. It is the aim of an operation and will often dictate tempo; combinations of joint, combined, and interagency forces; and sequential or simultaneous combinations of characteristics of Force XXI Operations. More hazardous than missions of humanitarian assistance and disaster relief will be missions that may at times resemble or require elements of combat operations, including unconventional operations, peace enforcement, stability operations, and conflict containment. The Army must be able to perform these types of missions as well as those involved in more conventional, traditional conflicts to gain control of land or populations. Desert Storm required destruction of the Iraqi Army in the Kuwaiti theater of operations (KTO) to regain control of Kuwait. Provide Comfort required control of an area and population to accomplish humanitarian operations.

(1) Expanded unconventional operations - strikes and raids - conducted during times of conflict will challenge the Army's Special Forces and Rangers, who will continue to form the bulk of the nation's special operations forces.

(2) Other Army forces, primarily light, but occasionally heavy, will be called upon to conduct civil disturbance, counterdrug, peacekeeping, and more hazardous peace-enforcement and counterinsurgency operations. As recent events have shown, the American people are logically less prone to accept casualties in these operations than they are during war.

(3) Survival technologies that assist and protect United States forces conducting operations, especially in constrained environments such as jungle and urban areas and in OOTW situations, will greatly increase the effectiveness of United States Army forces. Many of the technologies discussed herein apply directly to survival in these types of operations, including improved UAVs, sensors, and robotics. See Figure 3-5.



This figure depicts remote sensors and long-endurance, multicapable RPVs to support counterdrug operations in a jungle environment. The platoon leader-controlled RPV establishes an IFF protective zone over the platoon, which is surrounded by a larger detection zone. The RPV uses TV, FLIR, and sensor relays to determine enemy activity in the objective area. It also has a direct sensor-to-shooter link to fire support.

Figure 3-5. Operations with Long-Endurance, Multicapable, Remotely Piloted Vehicles

(4) The Army will also study the development and employment of nonlethal, noncrippling, temporarily disabling weapons and high-technology, crowd-dispersal systems for operating in OOTW environments and urban or village environments where civilian losses and risk of collateral damage are significant.

(5) Technology offers much, but American soldiers of the future, as in the past, will be called upon to be flexible and versatile. They will be counted upon to display mental agility and *American ingenuity* as they seek alternative methods - often low-technology - to cope with the circumstances that surround them. For example, jamming communication may require beating oil drums to interfere with *jungle telegraphs* - a

primitive but effective means of communicating during recent operations involving a third-world adversary.

3-4. Summary.

In summary, this vision of the future goes far beyond materiel solutions to future challenges. Indeed, this vision places far greater demands upon soldiers and leaders than any previous operational vision did. It is a concept with five clear characteristics that gain operational capabilities through five battle dynamics. These operational capabilities then translate into actual Force XXI Operations that in the projected future strategic environment will have clear tactical patterns, emphasize tempo, be joint and multinational, and usually have control as their aim. Knowledge-based operations call for great change in doctrine, training, leader development, organizations, materiel, and soldiers. But throughout these changes, the nature of land combat demands that the Army maintain its soldier focus. Simply stated, our future Army will continue to recognize the soldier as its greatest capability and build our future operational concept around quality soldiers and leaders.

CHAPTER 4

IMPLICATIONS

Our object ought to be to have a good army rather than a large one.

*George Washington
15 September 1770*

4-1. Concept to Reality.

The implications of moving from concept to reality to describe how the Force XXI Army will operate on future battlefields are tremendous, especially given the unpredictable, rapidly changing world environment. The most variable framework in which to address the implications of this future concept is in terms of their impact on TRADOC domains: doctrine, training, leader development, organizations, materiel, and soldiers (DTLOMS).

a. Doctrine. Our Army will continue to be a doctrinally based institution. Our Army also has recently changed itself to become a learning organization better suited to the wide variety of requirements for service to nation in a much different strategic environment. Thus, while doctrine will remain the primary means of embodying the Army's ideas on how to think about land operations, a hallmark of American doctrine will be its versatility and adaptability. Consequently, future doctrine will be increasingly influenced by a number of factors, among them changing strategy, developments in human sciences, and information technologies. Information Age technology will have a profound impact on both the doctrinal process and, of course, doctrine itself. For example, the doctrinal implications arising from the command system described in this concept are so great that it will take years for them to be fully understood, let alone developed.

(1) Doctrine will continue to provide a holistic basis for the Army to incorporate new ideas, technologies, and organizational designs. It will also provide the philosophical underpinnings for initiatives designed to help leaders become the adaptive, creative problem-solvers required for future military operations.

(2) The Army's baseline work in evolving a twenty-first century doctrine was the creation of the 1993 version of FM 100-5. That doctrine was designed to address the much broader range of missions facing the Army today. It began our change, shedding our Cold War thinking that was so necessary to victory then, but in need of expansion now. It must serve as a catalyst for change, explaining that change in a language that all soldiers and leaders can fully understand. The major thrust in future doctrine development will be living doctrine based on a fluid, strategic environment, lessons

learned from ongoing operations, emergence of new warfighting technologies, and results of simulations and battle lab experimentation.

(3) Simulations and experiments through battle laboratories will continue to serve changing requirements of emerging doctrine, helping Force XXI conduct the critical, doctrinally focused front-end analyses required for new materiel and force design initiatives. As Force XXI refines new ideas and concepts, their doctrinal relevance will be quickly captured in manuals and ultimately through CD ROM-type (compact disk read-only memory) technology - communicated throughout the Army. Key to this timeliness will be electronic staffing whereby Army learning and combat training centers, major commands, doctrine developers, operational planners, and subject-matter experts will form an internetted system for the development of relevant doctrine.

(4) Versatility will be a key characteristic of future doctrine. With the advent of wider roles and missions in the future, Force XXI will have to interface with other services, foreign forces, government, and even nongovernment agencies in doctrine development. The critical importance of developing doctrine for multinational operations - tailored for traditional allies and even likely coalition partners will require command emphasis. The expanding scope and unpredictable nature of future military operations make doctrinal initiatives along these lines essential for success in war and OOTW.

(5) The greatest intellectual challenge confronting the Army today is maintaining its doctrinal relevance. This concept addresses how Force XXI will fight future wars that are the historical descendants of the past: World War II, Korea, and even Desert Storm. The Army, the Nation, and its other armed forces must resolve how to use all elements of national power under other conditions - those in which we will operate more frequently, such as recent operations in Somalia and the current situation in the Balkans.

(6) Doctrine will remain the engine of change for Force XXI - America's twenty-first century Army. Doctrine will drive change in training, equipment, and organizational requirements because it will reflect a sound, proven conceptual foundation for growth. Progressive, timely, relevant, realistic, and flexible doctrine will prove critical to success on future battlefields and noncombat areas of operation.

b. Training. Training in support of future full-dimensional operations will cause the Force XXI to realign the three pillars - institutional, unit, and self-development - of the Army training system. The integration of those three training strategies will yield more fully a seamless future training strategy for every soldier and unit. The future training strategy will continue to be task-based trained to a standard under varying conditions. All training executed in the institution and in the unit or by the individual soldier will directly contribute improved soldier, leader, and unit mission readiness.

(1) Several trends and factors will influence what Force XXI trains, how it trains, when it trains and where. Although the downward trend in the size of the force

will stabilize toward the end of the century, the Army, as well as the other services, will be smaller than the one that served our Nation well through the early 1990s. The world continues to be an unstable and dangerous place facing various threats with a wide range of military, economic, and technological capabilities. DOD will continue to focus on maintaining its technological advantage over these varying threats. Many scenarios in which soldiers will be employed cover the full range of military operations, but virtually all will involve joint operations and most, particularly in OOTW, will be combined. Environmental constraints and reduced training funds will further limit large-scale field exercises.

(2) This smaller, more lethal, more flexible Army must ensure that what it trains will contribute to the wider variety of missions in which it might be employed. It is essential that new soldiers at all levels be instilled with the warrior ethos. That part of institutional training must remain constant. We will examine and modify the current mix of institutional and unit training. This will impact the total Army and result in modified mobilization training strategies. The smaller force will have fewer individual specialties for both officers and enlisted soldiers. Training in the various levels of joint operations will occur earlier in a soldier's career. Units will continue to concentrate their training on mission-essential task lists (METL); however, elements of that will change to meet diverse future combat and OOTW scenarios. Regional orientation will not be possible for active component units but it will be for early deploying reserve component units.

(3) Major changes will occur in how Force XXI is able to train. This will lead to the merging of individual, unit and self-development parts into the seamless Army training system. For a variety of reasons, the number of installations on which traditional institutional training takes place will decrease as will the number of installations on which major (battalion level and above) field exercises will occur. However, these installations will be internetted and interconnected to facilitate both individual and collective training at all levels. Individual skill training refreshers and sustainment will be available to each soldier. Data bases will be available to the soldier routinely to address lessons learned from previous operations, worldwide political and demographic information, or expert individual specialty training requirements. It will be a classroom without walls. The capability to interconnect virtual live and constructive simulations for unit training across the full range of military operations will be necessary and must be embedded in our equipment. Distributed interactive simulations will tie geographically dispersed units together for training and actual mission rehearsal. This capability will be required to be joint and often combined. However, the essence of land combat is control achieved by operations on a variety of terrain. Thus, for units at battalion and below where teamwork skills are rapidly perishable, especially for the higher tempo Force XXI operations, continuous field environment training, especially at combat training centers, is essential. This is so because it is in our combat training centers that soldiers, leaders, and units experience a realistic, tough battle scenario that requires synchronized execution at all levels. This must continue.

(4) The result of all these factors of change is an Army training system that is a seamless integration of individual, unit, and self-development training that focuses on essential tasks throughout the soldier's career. Yet our Nation's land warfare and OOTW readiness will continue to require a sustained commitment to excellence in training in units and in our *land warfare university*.

c. Leader Development. The Army's future leaders will be fundamentally competent and have the necessary intuitive sense of operational units and soldiers. Force XXI will have a higher leader-to-led ratio. Leaders will have a keen awareness of the world and know the role of military force in that world. Future leaders will have a broader understanding of war and the art of command. For example, in their professional development, they will be exposed to ideas on military art and science that go beyond traditional models and the views of primarily Western theorists.

(1) Future leaders must understand the changing nature of the legitimacy of command authority. While position and rank, along with accumulated and demonstrated wisdom and judgment, will still provide command authority, authority gained heretofore by possession of more information will change. Leaders must exploit the potential to be found in military organizations that are flatter, internetted, and where quality soldiers with expanded and timely information are able to reach their full potential for initiative and action within the overall intent when given that opportunity.

(2) Future Army leaders must be able to fully exploit the opportunities that command systems, such as the one described herein, provide. They cannot use these systems to second-guess or interfere with the command prerogatives of subordinate commanders. They must have such intuitive skills as vision, innovation, adaptability, and creativity and the ability to simplify complexities and clarify ambiguities - all while operating under stress.

(3) Leaders will be schooled in joint and multinational operations and skilled in synchronizing and harmonizing all aspects of combat and noncombat operations. Future leaders will have a higher level of doctrine-based skills, knowledge, attitudes, and experience to apply the battlefield operating systems to a wider range of complex contingency missions. In fact, the complex nature of future operations may require leaders of greater experience and rank commanding at lower levels than ever before. Regardless of experience or rank, all future leaders will be called upon to make rapid, doctrinally sound decisions as they plan and execute missions in more diverse, high-pressure operational environments. Tactical-level leaders, for example, must be prepared to make decisions, such as those involving rules of engagement and others that may have major strategic consequence, under the scrutiny of the international media.

(4) The Army's leader development initiatives will provide steady development of individuals who demonstrate potential for mastering the art of command. Institutions and commanders will train and develop leaders who are intuitive, agile-minded, innovative, and disciplined. Leaders will be schooled and skilled in the following:

(a) Planning and executing independent operations within the commander's intent - characterized by showing versatility and initiative, taking calculated risks, and exploiting opportunities.

(b) Developing and using detailed, understandable, flexible operations plans - characterized by communicating the intent orally, visually, and in writing while providing purpose, direction, and motivation.

(c) Combining and using technology with a human dimension - characterized by tactical and technical competence and consistent building of cohesive teams.

(5) Leaders will be trained and developed under conditions that approximate projected operational environments and will encounter conditions that frequently change and become progressively more difficult.

(6) Performance standards will include requirements for leaders to —

(a) Rapidly grasp changes in situations and conditions.

(b) Exercise initiative by independently planning.

(c) Execute doctrine-based actions (within the commander's intent) that maintain a steady focus on accomplishing the assigned operational mission.

d. Organizations. The future Army will be smaller, yet have new, expanded, and diverse missions in an unpredictable, rapidly changing world environment. These factors mandate change to the way we organize. First, it is essential that we be able to rapidly tailor organizations for operations. Second, we must organize around information processing and dissemination. Third, leader-to-led ratio must change and be flexible for specific missions. Likewise, staffs may not be constant in size, but be tailorable to the mission. Fourth, we must organize around the division as the major tactical formation with the capability to tailor it for specific mission purposes. Fifth, combat support and combat service support must be modular, then capable of task-organizing for the mission. Future organizational design will capitalize on the full range of mission capabilities available in the Total Force structure, leading to the success that is essential for knowledge-based operation. These Force XXI units led by innovative commanders more than likely will be modular in design, allowing the rapid tailoring of units to operate within any potential contingency situation in joint and multinational operations. Based on these factors, experimentation in organizational design, along with technological advances, materiel, and supporting operational concepts, will be essential to evaluate and refine the future concepts of the type described herein. For example, objectives such as sensor-to-shooter links will drive changes in our approach to fire support and, in turn, the organizations that provide and coordinate fires. The logistics demands of future force-projection operations call for a reassessment of existing combat and combat

support structures as well as a determination of the relevance or utility of some branches/corps.

(1) All Army forces must be rapidly deployable, highly survivable, lethal, agile, mobile, modular in design, and equipped to respond to the full range of military operations. Forces must be designed to enable rapid but flexible transition from War to OOTW or vice versa. The commander must be given the assets to include flexible, versatile organizations to dominate battlespace. Commanders must have the capability to rapidly assemble, deploy, and employ a force with the required mix of capabilities. They must be provided the assets to dominate battlespace.

(2) As mentioned earlier, digitization of the battlefield and other advances in information technology will result in smaller staffs and highly mobile command posts at all levels of command. Even though staffs will be generally smaller, new information technologies will allow them to perform more functions. Organizations at lower levels will be able to perform joint and multiservice functions previously conducted at much higher levels. In essence, functions at all organizational levels must be reevaluated.

(3) Given advances in direct- and indirect-fire capabilities, versatile organizations must be designed to optimize the mix between these capabilities and exploit enhanced target-acquisition capabilities.

(4) Organizational design must maximize the use of technologies that will allow functions to be performed on a remote stationary location. Organizational designers will use technological advances to decrease the size of units while expanding lethality, survivability, and deployability. Home or remote stationary capabilities will reduce deployability requirements, provide for continuity of operations, and reduce personnel requirements through versatile/multiple use of stationary assets.

(5) A smaller Army will require augmentation of nonmilitary personnel to perform some functions. Organizations must be trained and manned for augmentation and support by DA/DOD civilians and civilian contractors.

(6) Logistics organizations must be modular, tailorable, and flexible to sustain future Army operations. Organizational design must facilitate operations in a split-based or offset configuration and employ Information Age technologies to produce the optimum seamless soldier and weapon support system.

(7) The success of Force XXI operations will depend on spectrum supremacy. As a result, future organizational design must consider increased use of electronic and directed-energy warfare. More activity in the electromagnetic spectrum will result in new staff functions and possibly organizations to manage those operations.

(8) Future operations will be joint, often combined, and frequently interagency or with nongovernment organizations. A structure should exist at the appropriate level

to properly coordinate staff actions among agencies, services, and coalitions, instead of organizing *ad hoc* to accomplish the missions.

(9) The likely propensity for many OOTW and the current makeup of the active component and reserve components should be reviewed. Although we envision achieving success in OOTW through training, the possibility of tailoring forces based on unique requirements of OOTW should be explored.

e. Materiel. A force-projection Army must be versatile, lethal, deployable, sustainable, and capable of victory in our Nation's Wars and OOTW. It must be responsive to meet the challenges of full-dimensional operations.

(1) The materiel requirements to support this emerging warfighting concept are both revolutionary and evolutionary. The future materiel capabilities described herein will be driven by leveraging technologies that are horizontally integrated into weapons systems and platforms.

(2) The effects of a smaller Army will demand use of highly technical systems that will increase battlefield tempo, lethality, and survivability. Materiel enhancements, upgrades, research, and development must focus on the capabilities to meet the following:

(a) The force-projection Army must be able to quickly project lethal and survivable combat power - across the range of military operations - around the globe. Essential tenets to execute this requirement will drive new and improved strategic lift and sustainment capabilities. The ability to develop or stage prepositioned equipment (afloat and land-based) in configurations to support early entry and follow-on forces will prove critical. Emphasis must be on designing, developing, and procuring weapons systems, platforms, support equipment, and sustaining equipment that is light, durable, and multipurpose, with significantly smaller footprint - weight and cube - to meet mobility requirements. Embedded technologies will increase the availability, reliability, and maintainability of systems that support extended logistical lines.

(b) Improved intelligence and advanced information systems, along with high-technology weapons, will greatly expand the battlespace of future maneuver formations. The use of deep-precision strike weapons, sensors, brilliant munitions, and smart weapons will allow combat forces to apply overwhelming firepower within their battlespace.

(c) Future battlefield capabilities required to enhance survivability and protection include —

1. Low observables.
2. Lightweight armor packages .

3. Munitions that are insensitive to detonation.
4. Multipurpose sensors.
5. Combat-vehicle-mounted contamination avoidance detectors.
6. Soldier protection suits with support systems.

7. Active protection systems able to provide joint defenses of selected tactical platforms/C³ nodes against direct and indirect fires, as well as area defenses against a wide range of munitions, especially weapons of mass destruction. As described, the empty battlefield phenomena will continue. The nature of highly dispersed future battle requires an integrated soldier system that provides personal communications, navigation, location-monitoring, protection, and digital linkages to supporting weapons systems.

(d) Split-based operations, total asset visibility, telemetry to allow anticipation of requirements, containerization, automation, and assured communications will provide flexible, prompt, and efficient sustainment on future battlefields. Increases in system reliability and modular packaging of repair parts and other classes of supplies will be based upon METT-T. The development of a capability for remotely operated, teleoperated, and autonomous robotic ground vehicles to perform a variety of missions will increase force sustainment. These operations include acquisition, refueling, rearming, supply distribution, materials handling, environmental sensing, and route planning.

(e) Future operations will rely greatly upon space-based intelligence and communications system. Satellites backed up by wide-band terrestrial means will be significant, providing a capability to pass greatly increased quantities of data. Requirements also exist to possess electronic warfare protection features, antisatellite capabilities, and amplified electronic warfare attack and protection systems. The future battlefield will require the capability to assess enemy strength, location, and movement over wide areas; to communicate with and coordinate forces over great distances; to accurately position friendly ground forces; and to acquire the targets and guide weapons to those targets far beyond the forward trace of troops of a routine operation. Space systems will provide surveillance, communications, weather environmental contamination and terrain data, and positioning and targeting capabilities that will give tactical commanders at all levels a comprehensive knowledge of the battlefield.

(f) Future research and development efforts will enable the following capabilities:

1. Microelectronics and related technologies must be pursued for signal acquisition, communication, computation, and processing. Control of nanoscale processes will significantly reduce the size and increase the capabilities of future computers, enabling increasingly sophisticated computer capabilities at lower

echelons of employment. The capabilities of these technologies establish the limits of performance for smart weapons, future fire control systems, warning receivers, electronic operations, and intelligence collection materiel.

2. Brilliant systems are the trend, not brilliant munitions. These systems will be capable of indirectly firing, discriminating between friendly and enemy targets, and seeking and destroying prioritized enemy targets autonomously. Systems must be as smart as our soldiers if we are to realize the full potential of quality soldiers on Force XXI operations. These systems require a full understanding of the complex interaction of targets, sensors, processing hardware, architectures, and algorithms. As stated in the concept, artificial intelligence can be applied to significantly improve Army battlefield management, intelligence analysis and data support, autonomous weapons and vehicles, prognostics and diagnostics for equipment maintenance, real-time diagnoses of soldiers' physical conditions, troop training, and logistical inventory control.

3. Advance propulsion technology is required to enhance the range of future munitions. Advanced vehicle propulsion will provide enhanced vehicle mobility and will significantly reduce energy consumption.

4. Robotic capabilities are required to reduce hazards to personnel; perform rapid, accurate manipulations; and perform tasks impossible for humans. A coordinated variety of unmanned aerial vehicles and robotics will significantly leverage the deployed force.

5. Tactical power sources based upon vastly improved battery/energy storage technologies and microminiature power generation will significantly increase the duration, dependability, and economy of power sources.

6. Molecular engineering will enable stronger, lighter advanced materials for a wide range of systems applications. Bioproduction and biomolecular engineering will provide the force with enhanced detection and protection from chemical and biological agents.

(g) Continuous advancements in technology will provide not only *leap-ahead materiel* to support execution of knowledge-based operations but serve to maintain the economic development of the Nation's industrial base. The execution of knowledge-based operations will require considerable attention to maintain the Army's technological edge on the future battlefield. The defense industrial base is undergoing significant downsizing. Refocusing the industrial base planning process will be necessary to change from a near-term and midterm broad approach to one that examines the feasibility and producibility of essential warfighting technologies. This will require concentration of efforts on preserving the few and unique strategic technologies and production processes that are most vital to the warfighting requirements of Force XXI, for example, microelectronics, robotics, advanced propulsion, and molecular engineering. To meet and hopefully preserve industry's capability to provide the necessary advanced technologies and materiel developments necessary to conduct operations as described in this concept

will depend solely upon a joint effort between the Army, industry, and academia to identify essential technologies against required warfighting capabilities.

f. Soldiers. Quality soldiers, trained and led by competent and caring leaders, will remain key to success on future battlefields. Soldiers in the twenty-first century will be faced with a wide variety of challenges in preparing for and executing missions in full-dimensional operations. They will be trained on selected critical individual tasks in initial entry training to ensure they are immediately deployable upon joining their first unit. They will be familiar with the wide variety of tasks expected of them and the equipment they will use. This concept seeks to empower and develop the untapped potential of our quality soldiers. The battlefield contribution of individual quality soldiers will continue to increase and, indeed, is at the root of knowledge-based operations.

(1) Increased flexibility and adaptability will be required at all levels. Force XXI will also increase the demand for soldiers with a second language. Training and leader development will focus on preparing junior officer and noncommissioned officer leaders for vastly increased responsibility at a much lower rank and earlier in their careers than is the case today.

(2) Soldiers will be exposed to a wide diversity of operations in different geographical environments, often on short notice. Soldiers' equipment will be designed for these realities. Individuals will be equipped with personal protection systems and communications and weapons systems that will allow them to respond instantly to the chain of command and to rapidly changing situations. Human science will greatly improve soldier training and education as well as individual physical and mental readiness in preparation for the rigors of the high-tempo, high-technology operations described herein.

g. Integration.

(1) Momentous changes in the global environment, National Security Strategy, scope of military operations, and force structure, coupled with the rapid pace of technology, will have a profound impact on development and promulgation of future Army required capabilities. The Army must consider these changes as well as the impact of joint and multinational/interagency existing or required capabilities on the integration and prioritization of the Army's DTLOMS requirements.

(2) The Army must design new or exploit existing processes and fix responsibility for ensuring horizontal and vertical integration of DTLOMS requirements, which will ensure the fielding of capabilities that allow it to perform its diverse and growing mission responsibilities.

4-2. Summary.

a. The next several decades will continue to present both challenges and opportunities for the Army in service to the Nation. Our Army will remain a strategic

force capable of decisive victory. While surrounded by a storm of global, geostrategic, economic, and societal changes, the Army is experiencing a revolution in military affairs. This revolution demands a broader understanding of the future world, conflict, and the role played by military force and forces. Recognizing the wide variety of potential adversaries Force XXI may be called upon to fight, the scope of military operations it must be able to conduct, and the different political and geographic environments in which it will serve requires our expanding understanding of war. On one hand, Force XXI must be prepared to conduct quick, decisive, highly sophisticated operations; while on the other, it must be ready to execute limited, often protracted operations against low-technology enemies.

b. With this challenge comes the recognition that in order to remain relevant to the world as it is - and how we think it may evolve - the Army must continue the process of change, continuity, and growth it has experienced in recent years. Our Army since 1989 has evolved to become a learning organization. This idea allows our Army to assimilate growth much more rapidly even while conducting current operations. Force XXI is a concept for a learning organization. It calls for major philosophical, theoretical, materiel, and organizational changes - from how we think about war, to how we fight and lead on future battlefields and succeed in OOTW. The idea, for example, of achieving force coherence on future battlefields through shared knowledge versus physical means such as formations, matrixes, or often restrictive battlefield geometry is a bold departure from the past, yet clearly within the capabilities of our Army as a learning organization to put into practice. The total Army must also adapt to having an increasing number of its operational capabilities in other components of the force, which will increase the demands on our civilians and our citizen soldiers.

c. Mastering the challenges of growth is never easy. Force XXI Operations call for frank assessments on where we are as an army and where we need to go - tough decisions. They will continue to require a long-term sustained commitment to excellence to develop the leaders, soldiers, equipment, and organizations capable of executing the types of operations described herein. The Army has met similar challenges in the past and will master those of the future. As it has for the latter half of the twentieth century, our Army will move into the twenty-first century as the world's preeminent land fighting force.

d. Core values, ethics, doctrinal bedrock, and moral principles will remain as the glue that binds the Army together. Its proud history gives it the strength of conviction and purpose - change, continuity, and growth.

GLOSSARY

ABCS	Army Battle Command System.
alliance	the result of formal agreements between two or more nations for broad, long term objectives. Alliances are technically combined organizations
Army Battle Command System	migration of all fielded and developmental Army C ² systems into one fully integrated and interoperable system with seamless connectivity from the NCA to the foxhole
ASMP	Army Strategic Mobility Program
battle command	the art of decision making, leading, and motivating soldiers and their organizations into action to accomplish missions: includes visualizing current state and future state, then formulating concepts of operations to get from one to another at least cost; also includes assigning missions, prioritizing and allocating resources, selecting the critical time and place to act, and knowing how and when to make adjustments during the fight
battle dynamics	five major interrelated dynamics that define significant areas of change from current operations to Force XXI Operations; dynamics are battle command, battlespace, depth and simultaneous attack, early entry, and combat service support
battlespace	components of this space are determined by the maximum capabilities of friendly and enemy forces to acquire and dominate each other by fires and maneuver and in the electromagnetic spectrum
Blueprint of the Battlefield	(TRADOC Pam 11-9, 10 May 91) - a comprehensive, hierarchical listing of Army functions performed in support of the battlefield and their definitions; collectively includes three blueprints - one for each level of war: strategic, operational, and tactical
broadcast intelligence	capability to rapidly “pull down” or broadcast accurate/real-time intelligence (all levels, even national level) to the lowest possible tactical level, precluding the layered procedural intelligence flow of information

C²	command and control
C²W	command and control warfare
C³I	command, control, communications, and intelligence
C⁴I	command, control, communications, computers and intelligence
coalition	an ad hoc agreement between two or more nations for a common action
combat service support	the essential logistics functions, activities, and tasks necessary to sustain all elements of an operating force in an area of operations
combined operation	an operation conducted by forces of two or more allied nations acting together to accomplish a single mission
command and control warfare	the integrated use of operations security, military deception, psychological operations, electronic warfare, and physical destruction mutually supported by intelligence to deny information to, to influence, or to degrade adversary C ² capabilities while protecting friendly C ² capabilities against such actions; C ² W applies across the full range of military operations and all levels of war
conflict	the period characterized by confrontation and the need to engage in hostilities other than to secure objectives
core processes	the essential functions an organization must perform to accomplish its primary task
depth and simultaneous attack	the simultaneous application of combat power against an enemy throughout the depth and breadth of the battlefield; objective goes beyond defeating the enemy; objective is to accelerate enemy defeat
directed energy	a highly directional beam of concentrated electromagnetic energy; types of directed systems with highest potential are, laser, radio frequency, and particle beam

doctrine	fundamental principles by which military forces guide their actions in support of national objectives; doctrine is authoritative but requires judgement in application
early entry operations	operations involving the initial deploying forces; they occur whenever the missions require the projection of U.S. forces from CONUS or elsewhere
EMP	electromagnetic pulse
electromagnetic pulse generators	a device used to generate electromagnetic radiation; the resulting electric and magnetic field may couple with electrical/electronic systems to produce damaging current and voltage surges
electronic warfare	military actions that include: electronic attack - the use of either electromagnetic or directed energy to degrade, neutralize, or destroy an enemy's combat capability; electronic protection - those actions taken to protect personnel, facilities, and equipment from friendly or enemy employment of electronic warfare; electronic warfare support - those actions tasked by an operational commander to search for, intercept, identify, and locate sources of radiated electromagnetic energy for the purpose of immediate threat recognition
empty battlefield	describes the perception that a soldier is virtually alone on the battlefield; describes the changed appearance of the battlefield when soldiers begin dispersing and seeking cover in response to increasing lethality of weapon systems
environmental operations	the use of environmental services (various combinations of scientific, technical and advisory activities) required to acquire, produce, and supply information on the past, present, and future states of space, atmospheric, oceanographic, and terrestrial surroundings for use in military planning and decision-making processes or to modify those surroundings to enhance military operations

force projection	the movement of military forces from CONUS or a theater in response to requirements of war or operations other than war; force-projection operations extend from mobilization and deployment of forces, to redeployment to CONUS or home theater, to subsequent demobilization
full-dimensional operations	the application of all capabilities available to an Army commander to accomplish his mission decisively and at the least cost across the full range of possible operations
hierarchical	arranged in the standard military organization of units; characterized by a vertical hierarchy of information flow and decision making
host nation support	civil and/or military assistance rendered by a nation to a foreign forces within its territory during peacetime, times of crisis, emergencies, or war; assistance provided during war based upon agreement mutually concluded between nations
HNS	host nation support
Information Age	the future time period when social, cultural, and economic patterns will reflect the decentralized, nonhierarchical flow of information; contrast this to the more centralized, hierarchical social, cultural, and economic patterns that reflect the Industrial Age's mechanization of production systems
information carousels	visualization of future system where commanders/ units can continually access/update a common data base of relevant information (for example, logistics, intelligence, movement)
information operations	continuous combined arms operations that enable, enhance, and protect the commander's decision cycle and execution while influencing an opponent's; operations are accomplished through effective intelligence, command and control, and command and control warfare operations, supported by all available friendly information systems; battle command information operations are conducted across the full range of military operations

information warfare	actions taken to preserve the integrity of one's own information system from exploitation, to corrupt or destroy an adversary's information system, and, in the process, to achieve an information advantage in the application of force
interagency	in this context, military operations conducted in conjunction with nonmilitary organizations: agencies of the U.S. Government, NGOs, and/or PVOs (also multiagency)
land warfare university	a comprehensive and rigorous Army education system for training and leader development; it encompasses all TRADOC education and training programs, institutions and systems; it is not only an Army-sponsored university but is also multiservice and multinational, supporting a wide variety of joint and international education programs; includes individual, unit, and institutional education and training
LSE	logistics support element
modularity	a force design methodology that establishes a means to provide interchangeable, expandable, and tailorable force elements
MTR	military technical revolution
multinational operations	a collective term to describe military actions conducted by forces of two or more nations typically organized within the structure of a coalition or alliance
NGO	nongovernment organization
niche capability	capability of a force to acquire selected, modern, sophisticated technology that could dominate the battlefield or battlespace, for example, a nuclear weapon or sophisticated air defense system
noncombat operations	military operations other than war

nongovernment organization	professional associations, foundations, multinational businesses, or other groups with an interest in improving the quality of life of people
nonhierarchical	arranged in a nonstandard military organization of units; characterized by a horizontal flow of information and decision making
OOTW	operations other than war
operations other than war	military activities during peacetime and conflict that do not necessarily involve armed clashes between two organized forces
peace building	post-conflict actions, predominately diplomatic, that strengthen and rebuild civil infrastructure and institutions in order to avoid a relapse into conflict
peace enforcement	the application of military force or the threat of its use normally pursuant to international authorization to compel compliance with generally accepted resolutions or sanctions to maintain or restore peace and support diplomatic efforts to reach a long-term political settlement; primary purpose is restoration of peace under conditions broadly defined by the international community
peacekeeping	neutral military or paramilitary operations undertaken with the consent of all major belligerents; designed to monitor and facilitate implementation of an existing truce and support diplomatic efforts to reach a long-term political settlement
peacemaking	a process of diplomacy, mediation, negotiation, or other forms of peaceful settlement that arranges ends to disputes and resolve issues that led to conflict
peace operations	umbrella term that encompasses three types of activities: activities with a predominantly diplomatic lead (preventive diplomacy, peace building) and two complementary military activities—peacekeeping and peacemaking
PGM	precision-guided missile/munitions

precision-guided missile/ munitions	a munition capable of locating, identifying, and maneuvering to engage a point target with an accuracy sufficient to yield a high probability of destruction
PVO	private voluntary organization
RMA	revolution in military affairs
RSTA	reconnaissance, surveillance, target acquisition
situational awareness	ability to have accurate and real-time information of friendly, enemy, neutral, and noncombatant locations; a common, relevant picture of the battlefield scaled to specific level of interest and special needs
spectrum supremacy	control over the required portions of the electromagnetic spectrum to enable the conduct of Force XXI Operations
spectrum of threats	arrayed potential threats across a spectrum from simple to complex in scope, doctrine, organization, training, materiel, leadership, and soldiers
strap-on technologies	available technologies used to upgrade/enhance existing weapon systems
tailorability	capability to determine the right mix and sequencing of units with sufficient combat power to accomplish the mission and sustain the force, based on METT-T, analysis, and other criteria such as available lift, pre-positioned assets and host nation support
TSM	threat spectrum model

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