

## CHAPTER 11

# A STRATEGY FOR MILITARY TRANSFORMATION

The aim of the Department's transformation strategy, introduced in last year's report and updated in this chapter, is to ensure U.S. military preeminence well into the 21st century. Much about the future security environment is uncertain, such as the identity of the nation's adversaries and the precise ways in which they will threaten U.S. interests. However, some aspects of the emerging threat environment are already clear. A number of states will have the capability to threaten U.S. vital interests through coercion, cross-border aggression, or other hostile actions. Other states will face internal humanitarian crises and ethnic conflict, which may require the U.S. military to respond quickly while minimizing risks of American and noncombatant casualties. Whether in the context of major theater war or smaller-scale contingencies, future opponents are likely to threaten or use asymmetric methods such as terrorism, cyber attacks on critical computer-based networks, and weapons of mass destruction in an attempt to offset U.S. conventional superiority.

Transformed military forces are needed because the strategic environment is changing; they are possible because the technologies that are changing the civilian world are changing the military sphere as well. With innovative operational concepts and new organizational arrangements, the Department can take advantage of new information systems and other technologies that will allow U.S. forces to be more responsive, faster, more agile, more precise, and better protected. More tailored forces and increasingly precise weaponry and targeting will allow greater massing of effects with less massing of forces, thus decreasing the vulnerability of U.S. forces. In short, U.S. forces must exploit revolutionary technologies in order to protect citizens at home and project power abroad in the 21st century.

The Department is transforming its forces to meet future challenges through a strategy that integrates activities in six areas:

- Service concept development and experimentation efforts that make use of promising technologies to perform critical tasks.
- Joint concept development and experimentation to harmonize Service capabilities and develop joint solutions, ensuring that future joint force commanders have the tools needed to meet key operational challenges.
- Robust implementation processes in the Services and joint community to rapidly identify the most promising new concepts and capabilities that emerge from experimentation and put them on a fast-track toward incorporation in the force.

- Science and technology efforts focused on areas that can enhance U.S. military capabilities to meet projected challenges, with close ties between technologists, innovators, and warfighters.
- Efforts to encourage international transformation activities. The United States is most likely to operate in some future contingency as part of a coalition. While U.S. forces may differ from those of partners in significant ways, DoD must ensure interoperability in command and control and other capabilities critical for effective coalition operations.
- Exceptional people with the right skills for the 21st century and attitudes nourished in a culture that encourages bold innovation and leadership.

After describing the Department's vision for full-spectrum dominance in future warfighting capabilities, articulated in *Joint Vision 2020*, this chapter summarizes the efforts underway in each of the six areas outlined above.

## ***JOINT VISION 2020 AND FULL-SPECTRUM DOMINANCE***

*Joint Vision 2020* establishes full-spectrum dominance as the overarching objective for a transformed U.S. military. Full-spectrum dominance is the ability to defeat any adversary and control any situation across the full range of military operations, whether operating unilaterally or in combination with multinational and interagency partners. The full range of operations includes maintaining a posture of strategic deterrence. It also includes theater engagement and presence activities, conflict involving employment of strategic forces and weapons of mass destruction, major theater wars, regional conflicts, smaller-scale contingencies and those ambiguous situations residing between peace and war, such as peacekeeping and peace enforcement operations.

Full spectrum dominance implies an ability to conduct prompt, sustained, and synchronized operations with forces tailored to specific situations and possessing freedom to operate in all domains—space, sea, land, air, and information. Additionally, given the global nature of our interests and obligations, the United States must maintain the ability to rapidly project power worldwide in order to achieve full-spectrum dominance.

*Joint Vision 2020* postulates that achieving full spectrum dominance will be possible through four essential operational concepts which, enabled by information superiority and technological innovation, will yield military superiority across the complete range of potential military operations:

- Dominant maneuver is the ability to gain positional advantage with decisive speed and overwhelming operational tempo. Widely dispersed air, land, sea, amphibious, special operations and space forces, capable of scaling and massing forces and the effects of their fires, will secure a positional advantage through the application of fire and maneuver supported by information, deception, engagement, mobility and counter-mobility capabilities.
- Precision engagement is the ability to locate, monitor, discern, and track objectives or targets; select, organize, and use the correct delivery systems; precisely generate desired effects; assess results; and reengage with decisive speed and overwhelming operational tempo.

- Focused logistics is the ability to provide the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity. This will be made possible through a real-time, web-based information system providing total asset visibility as part of a common relevant operational picture, effectively linking the operator and logistician across Services and support agencies.
- Full-dimensional protection involves attaining an acceptable level of risk through the tailored selection and application of layered active and passive measures, within the domains of air, land, sea, space, and information. Full dimensional protection requires a wide range of activities, including theater missile defense and possibly limited missile defense of the United States, antiterrorism measures, emergency preparedness, and proactive engagement strategies.

Information superiority is the key enabler for all four of these operational concepts. *Joint Vision 2020* also identifies interoperability as the foundation of effective joint, multinational, and interagency operations:

- Information superiority is the ability to collect, process, and disseminate an uninterrupted flow of information, necessary for achieving the operational objectives, while exploiting or denying an adversary's ability to do the same.
- Interoperability is the ability of systems, units, or forces to exchange services with other systems, units, or forces and to use those services to enable them to operate effectively together.

*Joint Vision 2020* includes a brief projection of how potential security threats will likely evolve in the future and what strategic and operational capabilities they will demand of the U.S. However, the Department recognizes that our understanding of the challenges inherent in the future security environment will continue to mature. We must be prepared to react to unforeseen changes in the strategic environment and the adaptations of potential enemies, to take advantage of new technologies, and to account for variations in the pace of change. Therefore the process of creating the joint force of the future must remain flexible, as must the process for identifying the demands the future security environment will make on our military capabilities.

## **SERVICE CONCEPT DEVELOPMENT AND EXPERIMENTATION**

Each of the Services has concept development and experimentation activities focused on its core competencies, with activities organized to explore capability improvements in the near-, mid- and far-term. They also have established battlelabs that bring warfighters and technologists together to work on key areas of warfighting.

Innovative and rigorous Service and joint concept development and experimentation are central to the Department's efforts to achieve dramatic military transformation. In order to be prepared for the challenges of the future, DoD must learn systematically from real-world operations, as well as from experiments using wargames, computer-assisted simulations, and field trials that simulate future operational capabilities. History shows it has often been disastrous defeat on the battlefield that prompted a military organization to change. A vigorous program of concept development and experimentation pitting future U.S. forces against simulated skilled, determined opponents allows the Department to create the needed stimulus for

change. The opponents portrayed in these experiments must be innovative and effective. The expectation is that U.S. vulnerabilities can be discovered through such exercises and corrected before a future opponent can find and exploit such weaknesses in war.

The Services' visions that guide concept development and experimentation efforts are consistent with the *Joint Vision 2020* objective of fielded forces that are faster, more agile, more precise, better protected, more rapidly deployed, and more easily sustained. The forces envisioned:

- Are capable of rapid deployment in crisis and decisive operations in combat.
- Depend on the integration of lethal and non-lethal effects from dispersed forces.
- Are agile and can reorganize quickly in response to developing situations.
- Possess modern, responsive logistics and support systems that constantly monitor demand and supply, and a dynamic support pipeline to achieve much smaller deployed footprints.
- Exploit information technology to enable rapid, adaptive planning and operations in which deployed forces utilize the non-deployed information support structure via high-bandwidth Internet-like communications.

## **ARMY**

On October 12, 1999, the Army articulated a vision to better meet the challenges of the 21st century: "Soldiers on Point for the Nation...Persuasive in Peace, Invincible in War." The requirement to transform the Army is based in part on the requirement to respond more rapidly across the full spectrum of operations. The Army's vision is a force that combines the decisive warfighting lethality of today's mechanized forces with the strategic responsiveness of today's light forces. The strategic significance of land forces resides not only in their ability to fight and win the nation's wars, but also in providing options for shaping the global environment.

Achieving the Army's vision requires the comprehensive transformation of the entire Army—from the operational force to the institutional Army. The transformed force envisioned is an Objective Force that will be responsive, deployable, agile, versatile, lethal, survivable, and sustainable. As an objective measure of force responsiveness, the Army will have the capability to deploy a brigade anywhere in the world 96 hours after liftoff, a warfighting division in 120 hours, and five divisions in 30 days.

Over the near and mid-term, the Army Force XXI effort is committed to improving situational awareness at the operational and tactical levels by digitizing the current force. The Force XXI program includes selected recapitalization by upgrading existing heavy force systems, like the M-1 Abrams tank, the M-2 Bradley fighting vehicle, and the Apache helicopter. The first unit to field Force XXI capabilities will undergo a capstone exercise in 2001 to validate the capabilities of the digitized division. Restructured digital heavy divisions will have 25 percent fewer combat systems, but greater lethality through synchronized precision fires and maneuver enabled by greatly improved knowledge of friendly and enemy dispositions. They will also be smaller by approximately 3,000 personnel due to support force efficiencies and the reduced number of combat systems.

Force XXI work also includes experimentation with measures to improve the survivability and lethality of light forces. The Army is developing ways to increase the tactical mobility, survivability, and lethality of light forces while also digitizing their information systems. Programs are underway to improve the effectiveness and efficiency of joint command, control, communications, computers, and intelligence; to enhance contingency force operations in urbanized terrain; and to improve the capability to conduct early entry operations.

To bridge the gap between the capabilities of today's force and the Objective Force, the Army will field an Interim Force of six to eight brigades, employing interim armored vehicles and currently available off-the-shelf equipment. These Interim Brigade Combat Teams (IBCTs) will have full-spectrum capability, be deployable worldwide in 96 hours with the appropriate lift assets, and will be available for apportionment to the warfighting CINCs. Operational availability of the first of these IBCTs is dependent upon fielding the recently selected interim armored vehicle.

The Army plans to field the first units of the Objective Force in eight to ten years. The Objective Force will be equipped with future combat systems incorporating state of the art technologies and capabilities into a multi-mission system of systems—providing the National Command Authorities an increased range of options for regional engagement, crisis response and sustained land-force operations. However, the Army transformation plan is far more comprehensive than just modernization of equipment and formations. The entire Army will be transformed—from leader development programs to installations to combat formations. All aspects of the Army's doctrine, training, leaders, organization, materiel, and soldiers will be affected.

The Army's Training and Doctrine Command (TRADOC) serves as the lead agent for the transformation of the operational force and as the focal point for developing the concepts, doctrine, and leader development required to field the Interim and Objective Force. TRADOC directly supports Army Transformation at Fort Lewis, WA, with the eight Army battlelabs that operate under its direction: Space and Missile Defense, Maneuver Support, Mounted Maneuver Battlespace, Dismounted Battlespace, Air Maneuver, Battle Command, Depth and Simultaneous Attack, and Combat Service Support.

The Army organizes its longer-term analysis around the Army Transformation Wargame (ATWG) series, a follow-on effort to the Army After Next Wargames conducted in past years. Recently, the ATWG effort was modified to better support the Army's new vision by informing the Army's leadership about warfighting concepts and capabilities required for the Objective Force, focusing on the demands of the strategic and operational environments. This linkage will require a continuous improvement process over the next 30 years. The Army's first annual Army Transformation Wargame was conducted in May 2000, and investigated the design of the Objective Force, focusing on the strategic and operational levels of war. The game demonstrated the critical need for transformed strategic lift—even for the lighter Objective Force built around the future combat systems—and the pivotal role combat support and combat service support will play in the transformed Army. The ATWG effort will continue with follow-on force projection and operational wargames in the next year, all tailored to feed Army and joint concept development and experimentation.

## NAVY

The strategic vision...*From the Sea* drafted in the early 1990s shifted the Navy's focus to the littorals; *Forward... From the Sea*, adopted in 1997, defined this vision within the context of naval forces being forward-based throughout the spectrum of operations, from peacetime presence to crisis and war. The Navy's new *Maritime Concept* now provides the organizing principles for the new capabilities and concepts needed to assure access forward with combat-credible forward presence and knowledge superiority. The *Maritime Concept* exploits access to cyberspace to provide a superior knowledge-position relative to opponents, which allows U.S. forces to act with timely and decisive effect. Accordingly, the Navy is transforming to a knowledge superior networked force in order to dictate the operational tempo across a battlespace that includes sea, air, land, space and cyberspace.

Network-centric warfare is therefore a key organizing principle for the Navy. It does not change the underlying tenets of warfare; rather it assists commanders in rapidly making good decisions. In the future, speed of command—the ability to make timely, correct decisions inside an adversary's detection and engagement timeline—will be as important as command of the seas to achieve full-spectrum dominance across the battlespace and to conduct effects-based warfare. Additionally, new mission areas—such as projecting defense ashore with Theater Missile Defense (TMD) and precision land-attack deep into enemy territory—establish requirements for new capabilities and concepts. These are being explored and developed through an extensive concept development and experimentation program, and several complementary near-term transformation efforts that draw on newly available technologies. Most noteworthy are:

- At-Sea Battle Laboratory: A cooperative effort with the Defense Advanced Research Projects Agency designed to encourage the rapid introduction of advanced technologies to the fleet. This effort uses the Third Fleet command ship, USS Coronado, as a platform of opportunity for the installation and testing of the most promising programs.
- Information Technology-21: A communications-and-networking backbone that will support the rapid exchange of information between naval and joint platforms. This initiative complements the Navy-Marine Corps Intranet, and when both are combined with the Marine Corps Tactical Network, will provide a worldwide end-to-end communications and networking capability. New doctrine and organizations are being developed to allow the Navy to take full advantage of these changes.
- Cooperative Engagement Capability (CEC): A system that permits each shooter's combat system to view every asset in the data link as if it is that unit's own sensor. CEC addresses the requirement to achieve more effective air and missile defense. In addition, every participating unit has an identical, real-time picture of the battle space, including identification information. The first two CEC systems were delivered to the fleet in FY 1999—with the last of 81 to be delivered in FY 2007.

The Naval War College oversees the Navy's concept development and experimentation efforts. It supports Navy near and mid-term experimentation on network-centric warfare with the Navy Warfare Development Command (NWDC). The Navy's principal experimentation activities take place in the fleets themselves in the form of fleet battle experiments (FBEs), which occur while the fleet is engaged in training exercises.

These experiments, organized and coordinated through the NWDC's Maritime Battle Center, have already produced results and influenced current operations. Some of the more recent FBEs include:

- FBE-Foxtrot, Fifth Fleet, December 1999: FBE-Foxtrot investigated coordinated joint naval and land fires (including those provided by SOF and U.S. Army Apache helicopters) through an experimental Joint Fires Element. It explored time-critical targeting of a coordinated, multi-layered enemy at a naval chokepoint. The experiment also explored using distributed, collaborative planning to enhance understanding of the undersea environment and operational situation in countermine warfare. A battle management cell for defense against chemical and biological weapons was established to seek improvements in chemical/biological defense readiness and vulnerability assessment, warning and reporting of chem/bio events, and coordination of intra-theater support and initial responses to chemical/biological attacks.
- FBE-Golf, Sixth Fleet, April 2000: FBE-Golf investigated concepts allowing the Navy to enter and remain in the littorals indefinitely with the ability to provide intelligence, fires, command and control, sensor management, tracking and targeting from a single battle management cell. Key areas for experimentation included time-critical targeting, and joint and combined theater air missile defense with NATO participation in information management. As a result of the experiment, Commander, Sixth Fleet adopted a digital target folder concept that creates an integrated target environment for commanders, planners, and operators—significantly increasing the effectiveness and situational awareness of his forces.
- FBE-Hotel, Second Fleet, September 2000: FBE-Hotel, along with advanced warfighting experiments from each of the other Services, was conducted in conjunction with the U.S. Joint Forces Command (USJFCOM) Millennium Challenge Experiment in September 2000. Its focus was on future warfighting capabilities needed to achieve and maintain access in the littoral—exploring parallel operations, mine interdiction warfare, anti-submarine warfare, force protection, reconnaissance surveillance and target acquisition, stand-off warfare, and the execution of operations by the Joint Forces Maritime Component Commander with organic forces.

The Navy continues to plan and execute its fleet battle experiments. FBE-India will be conducted in multiple locations throughout the southwestern United States in the Spring of 2001 and will focus on forced entry and access for expeditionary/contingency operations.

To explore transformation requirements over the longer term, the Naval War College sponsors an annual summer Global Wargame. This game examines U.S. policy, strategy, and operational concepts in the context of global and regional trends, issues, and crises to identify requirements the future Navy commanders. The results from longer-range wargaming like the Global Wargame can suggest productive experimental goals for fleet battle experiments, and in turn are influenced by the results of FBEs. In addition to the Global Wargames at Newport, the CNO's Strategic Studies Group is also charged with evaluating longer term transformation requirements and potential innovative concepts and enabling technologies.

## MARINE CORPS

*Marine Corps Strategy 21* is the capstone strategy of the Marine Corps. It is reflected in the revised Marine Corps capstone operational concept, *Expeditionary Maneuver Warfare*, which provides an overarching framework for full-spectrum capabilities and evolved from *Operational Maneuver from the Sea*. It provides the basis for a Marine Corps organized, trained and equipped to conduct expeditionary operations in a joint and combined environment within the complex spectrum of 21st century conflict. It describes a Marine Corps of enhanced strategic agility, expanded operational reach, and improved tactical flexibility.

Twentieth century amphibious operations moved through distinct phases, pauses, and reorganizations. Twenty-first century expeditionary forces will be capable of moving directly from far offshore to objectives deep inland, uninterrupted by topography or hydrography, achieving greater surprise and complicating the adversary's defensive problem. In conjunction with the Navy, Marines will provide an early forcible-entry capability from the sea. The ability to strike critical vulnerabilities and unhinge an adversary will be achieved through the combination of the Landing Craft Air Cushion, the Advanced Amphibious Assault Vehicle, and the V-22 Osprey tilt-rotor aircraft. The new concept focuses on the full-spectrum capabilities of the Marine Corps, the employment of scalable Marine Air-Ground Task Forces (MAGTFs), to include the Marine Expeditionary Brigade, and the various means through which Marine forces integrate with joint and combined task forces. The MAGTF will be able to rapidly reorganize and reorient in response to changing tactical opportunities throughout the full spectrum of future operational environments, while able to operate flexibly from expeditionary locations at sea or ashore.

Marine Corps experimentation with the concept, *Expeditionary Maneuver Warfare*, is organized by the Marine Corps Combat Development Command (MCCDC) at Quantico, VA, and specifically by the Marine Corps Warfighting Laboratory which was created in 1995. In 1996, the Commandant created a special purpose unit to serve as the command element and training cadre for other Marine units participating in the Warfighting Laboratory's experiments.

The Marine Corps Warfighting Laboratory's process for carrying out its responsibility to investigate concepts, tactics, and technologies is organized around a three-phase, five-year experimentation plan called Sea Dragon. Each phase starts with limited objective experiments, which are small-scale focused efforts that usually concentrate on tactics, techniques, technologies and procedures. These efforts serve as building blocks for the experimentation process, and culminate in a large-scale Advanced Warfighting Experiment. The phases build on information gathered in the limited objective experiments and previous phases, as well as ongoing research, such as limited technical assessments, that examine a specific technology to determine if it is useful with regard to specified future tasks. For example, limited technology assessments have been conducted on non-lethal rigid foams, a mobile counter-fire system, and an armored mortar system. Recently conducted and projected experimental phases of the five-year plan are:

- Capable Warrior, begun in 1999, and currently in process: This ongoing experiment, which began in 1999, examines whether a sea-based Marine Expeditionary Force can conduct maneuver throughout an extended littoral battlespace by employing sea-based command and control, naval supporting fires, and responsive logistics. Through 2001, it will thoroughly explore the requirements for making the concept of *Expeditionary Maneuver Warfare* a reality,



and it already included participation in Millennium Challenge 2000, the joint experiment overseen by Joint Forces Command in September 2000.

- **Coalition Warrior:** After Capable Warrior is completed in 2001, Marine Corps experimentation will continue with Coalition Warrior in 2002–2003. Coalition Warrior will examine Marine Expeditionary Force operations in the context of a future coalition and address associated interoperability issues. It will be conducted in concert with Joint Forces Command and will explore the Marine contribution to the *Joint Vision 2020* concepts of dominant maneuver and precision engagement.
- **Millennium Warrior and Cyber Warrior:** These experimental phases will be conducted in a series following the completion of Coalition Warrior. Respectively, they will examine Expeditionary Maneuver Warfare in a smaller-scale contingency and against asymmetric threats across the spectrum of conflict.

The results of the Warfighting Lab's experiments are already changing the way Marines fight. For example, valuable small-unit wisdom derived from the various field experiments has been distilled in booklets on practical tactics, techniques, and procedures called X-files. These manuals are available to Marines and soldiers who may be called upon to conduct military operations in urban terrain, whether in the context of a major theater war or during peacekeeping or humanitarian assistance operations.

The Marine Corps explores longer-term transformation challenges through a series of RMA wargames called Project Ellis. These wargames address the long-term future of amphibious assaults and expeditionary operations ashore. Conducted at the Marine Corps War College, they focus on the 2020 timeframe and are intended to aid in preparation of future Marine Corps advanced warfighting experimentation on expeditionary operations.

## **AIR FORCE**

The Air Force's new vision, *America's Air Force: Global Vigilance, Reach and Power*, is the aerospace answer to the *Joint Vision 2020* challenges and is designed to provide the nation with an integrated aerospace force. People are its foundation, aerospace is its domain, and the key to dominating this domain is the Expeditionary Aerospace Force (EAF). The core competencies needed by the EAF for such domination remain aerospace superiority, information superiority, global attack, precision engagement, rapid global mobility, and agile combat support. The Air Force views transformation as a sustained and determined effort that focuses on developing and fielding critical future capabilities, ensuring that America keeps the key asymmetric advantage of aerospace power vis-a-vis all potential adversaries.

In the place of the Cold War construct of fighter wing equivalents, the Air Force is reorganizing many of its combat forces into ten Air Expeditionary Forces (AEFs) that are versatile, tailorable, and highly responsive. Each AEF will be capable of deploying a full spectrum of air-to-air, air-to-ground, command and control, and support capabilities. This restructuring involves organizational, cultural and operational changes designed to improve management of global engagement activities and to enhance the Air Force's warfighting capability. AEFs will be able to sustain operations with a reduced forward-deployed footprint by exploiting the seamless integration of information support and weapons technologies.

In the future, the Air Force will integrate all of these efforts in an operational concept that allows the Joint Forces Air Component Commander (JFACC) to command and control forces from CONUS, while airborne, or in the regional theater. The JFACC will have the same comprehensive awareness of the ground and naval picture as the other component commanders—and vice versa. Air assets will be linked to the network in the same way that naval and ground assets are. The JFACC will understand the information infrastructure of the adversary force and political system, and will be able to update, re-task, and retarget platforms and weapons in flight.

The Air Force's efforts to produce transformed forces are supported by Air Force research laboratories, advanced concept technology demonstrations, and battlelab research and development efforts. Air Force battlelabs have the mission of rapidly identifying and proving the worth of innovative and revolutionary operational and logistics concepts with near- to mid-term applications. Battlelab insights permit the Air Force to reach investment decisions more quickly and organize, train, equip, and program more effectively. The six battlelabs are: Air Expeditionary Force, Command and Control, Force Protection, Information Warfare, Space, and Unmanned Aerial Vehicle.

Examples of successful battlelab initiatives are the Precision Targeting with Predator and the JSTARS Battlespace Imaging. These exploratory efforts had an impact on Air Force operations in Kosovo as Predator and JSTARS operators worked together with the Combined Air Operations Center to track and engage fleeting targets such as enemy surface-to-air missiles and armored combat vehicles. OPERATION ALLIED FORCE in Kosovo provided the Services with the best possible real-life laboratory for validating future operational and organizational concepts: actual armed conflict. The Air Force is following up on the many lessons learned in the crucible of combat as it continues to develop and refine its operational concepts for several critical missions.

The Air Force also experiments more broadly with global engagement capabilities in its annual large-scale Expeditionary Force Experiment (EFX). These annual events build off of a series of experiments that conclude in a two-week advanced warfighting experiment. The first of these near- and mid-term transformation efforts was conducted in September 1998.

A Joint EFX (JEFX 2000) was conducted in conjunction with JFCOM's Millennium Challenge in September 2000, and focused on exploration of the capabilities needed to provide agile combat support to expeditionary aerospace forces. Technology and process initiatives were examined to enable the Combined Forces Air Component Commander and staff to sustain and protect expeditionary aerospace forces. Exploration examined providing command and control operators with the tools necessary to fully integrate friendly forces' order of battle information into the air campaign assessment, planning, and execution process against critical mobile targets such as theater ballistic missile launchers and surface-to-air missiles.

The Air Force uses two wargame series to inform its mid- and long-term transformation efforts. The annual Global Engagement wargames explore the mid-term implications of transformed air forces. These wargames are intended to illuminate the potential capabilities of joint air and space power in the 2008 timeframe and beyond. The Aerospace Future Capabilities Wargames test alternative force structures in the long-term warfighting environment of 2020–2025. To date, the results of these Air Force wargames have underscored the imperative for fully integrating space-based capabilities into the nation's air, land, and sea operations.

## JOINT CONCEPT DEVELOPMENT AND EXPERIMENTATION

As the executive agent for joint warfighting concept development and experimentation, U.S. Joint Forces Command (USJFCOM) ensures that the joint warfighter's voice is heard and advocates joint alternatives for meeting key operational needs. Working closely with the Services to leverage their robust transformation efforts, USJFCOM is responsible for the joint concept development and experimentation that is a critical source of the ideas and innovation necessary to transform the Department's military forces.

JFCOM's concept development and experimentation plan is organized around three axes that correspond to the near-, mid-, and far-term: continuously enhancing the current force; realizing *Joint Vision 2020* capabilities; and transforming the force for the Revolution in Military Affairs. The first axis, enhancement of the current force, is aimed at the 2000–2010 time frame and focuses primarily on achieving near-term improvements to existing forces that constitute critical prerequisites for more achieving longer term transformation goals. The near-term experimentation agenda revolves around improving joint doctrine and organization, logistics, command and control, intelligence, surveillance, and reconnaissance capabilities. Particularly important near-term findings from experimentation to date highlight the need for:

- Joint Task Force Headquarters and Joint C4ISR: providing a joint headquarters organizational structure and architecture enabling fully joint operations with synchronized joint battlefield operating systems, including joint management of all intelligence, surveillance, and reconnaissance assets available and a shared real-time common, relevant operational picture between the Joint Task Force Headquarters and subordinate units.
- Focused Logistics Enabling Early Decisive Operations: using total asset visibility, distributed basing, and other concepts to provide right-sized logistics support from minimal infrastructure so as to decrease the logistics requirements per unit of combat power and enable sustainment of joint forces across extended operational distances.
- Attacking Critical and Time Sensitive Targets: using streamlined sensor-to-shooter data links and dynamic control of loitering weapons to rapidly identify, target, and engage highly mobile, long-range systems that are capable of delivering nuclear, chemical, or biological warheads and which threaten our staging and operational bases.

The second axis of JFCOM's campaign plan, realizing the *Joint Vision 2020* force, looks beyond the systems and capabilities of the current force to determine what should begin to replace them between 2010 and 2020. These concept development and experimentation efforts focus around expanding and refining JFCOM's Rapid Decisive Operations (RDO) concept. The challenge of the RDO concept is to enable U.S. forces to accomplish their operational and strategic objectives in days and weeks across global distances against a competent regional adversary. This adversary may possess numerical superiority, an ability to shape the battlespace due to having a home field advantage, advanced anti-access capabilities, a competent information operations capability, a willingness to sustain and inflict significant combatant and non-combatant casualties, and a significant ability to learn and adapt. JFCOM expects that this notional adversary will attempt to deny us access to the theater of operations and, if that fails, then attempt to draw U.S. forces into a protracted war of attrition.

The RDO concept assumes the possibility of quickly prevailing against a formidable regional adversary. Doing so will require achieving the near-term experimentation objectives identified above and by more broadly transforming joint operations from today's operational-level synchronization of the Service components' dimensional campaigns to a coherently joint campaign integrating joint tactical action across Service component lines. Through joint tactical action the total force can more effectively combine our asymmetric advantages of standoff precision engagement, highly agile close combat maneuver, and tailorable information operations to achieve maximum effect on the enemy.

To effectively synchronize tactical operations and achieve a rapid and decisive outcome for the campaign the operational level of war needs to be coherently joint. The level of knowledge and proficiency required for 21st century operations will require an operational-level headquarters that is joint by nature. Coherently joint command and control will allow us to achieve a level of effectiveness greater than that possible with today's practices. If this coherent jointness is combined with national expertise and capabilities through inter-agency coordination at the operational-level headquarters, then we will be able to execute an effects-based operation that devastates the enemy without having to conduct an extended campaign.

The RDO concept is the centerpiece of JFCOM's near- and mid-term concept development and experimentation efforts. RDO was the focus of Millennium Challenge 2000, the first major joint field experiment organized by JFCOM this past year. JFCOM successfully integrated the efforts of the four major service experiments under the direction of a joint force headquarters provided by JFCOM. This event demonstrated that we can synthesize both Service and Joint Experimentation objectives in a single, integrated event. Additionally, Millennium Challenge 2000 represented a major paradigm shift in how we structure and conduct warfighting experimentation. We are now exploring not only how well the various Service initiatives work, but more importantly, how well they work together.

Millennium Challenge 2000 had three, uniquely joint experiments imbedded in it: Precision Engagement, the Joint Deployment Process Initiative, and Information Superiority:

- **Precision Engagement Experiment:** In cooperation with U.S. Forces Korea, this experiment explored providing in-theater force commanders with the ability to reach back to powerful planning and analysis capabilities in the United States. These reach-back capabilities exceed those that could be deployed to the theater and reduce the number of personnel and amount of equipment that must be deployed, sustained, and protected.
- **Joint Deployment Process Initiative:** This experiment identified near-term actions we can take to significantly reduce the time required to conduct crisis action planning, specifically the development and validation of force requirements in a Time Phased Force Deployment Data (TPFDD), during contingency operations. This experiment identified process improvements to achieve a 72-hour TPFDD development and validation time standard for the first seven days of deployment flow during Crisis Action Planning.
- **Information Superiority:** The third joint experiment under the umbrella of Millennium Challenge 2000 explored using collaborative planning tools that reach across not only the levels of command but also across operational functions. These collaborative tools dramatically improve the speed and quality of planning and decision-making, and have great potential for transforming

our current hierarchical decision-making processes into a streamlined, compressed process that will enable us to achieve decision superiority.

The main joint experimentation effort for FY 2001–2004 will also focus on refining and assessing the Rapid Decisive Operations concept and its relationship to the core competency work being conducted by the Services. Upcoming near-term experimentation includes Unified Vision 2001, which will refine the command and control construct for the RDO concept as well as exploring the value of including an inter-agency component in a joint task force. Unified Vision 2001 will also enable the follow-on major joint field experiment Millennium Challenge 2002. This will examine what is required to conduct a rapid, decisive operation against a challenging regional threat in 2005–2010. Just as Unified Vision 2001 will enable Millennium Challenge 2002, so Unified Vision 2003 will enable Olympic Challenge 2004. The culminating major joint integrating field experiment on the second axis, Olympic Challenge 2004, will portray a likely 2015 scenario and will be a cornerstone for the concept development and experimentation effort to implement *Joint Vision 2020*. The goal of the Millennium Challenge 2002 and Millennium Challenge 2002 is to produce actionable recommendations for the Department on immediate requirements for beginning the process of realizing *Joint Vision 2020* force capabilities.

In its two years as executive agent for concept development and experimentation JFCOM has built an impressive experimentation support structure. In addition to including Service experiments as integral parts of larger, joint, experimentation events, JFCOM is also expanding its efforts to include inter-agency and multinational participation in concept development and experimentation. JFCOM is also a member of the Alliance of All Service Battle Laboratories. Composed of representatives from the four Services' battle laboratories and Joint Forces Command's Joint Warfighting Experimentation Battle Laboratory, the Alliance members developed and endorsed a charter to facilitate their experimentation activities on a collaborative basis. When the members exchanged information concerning individual and collective experimentation programs and proposed more than 20 topics for potential future collaborative experimentation.

In addition to cooperation and collaboration with the Services, JFCOM ensures the widest possible participation by other combatant commands. Joint experimentation efforts include functional and geographic commands from the very outset. For example, in addition to its work with U.S. Forces Korea on precision engagement during Millennium Challenge 2000, Joint Forces Command continues to support and leverage U.S. Pacific Command (USPACOM) experimentation on a Joint Mission Force. Several of the joint intelligence, surveillance, reconnaissance, and command and control initiatives under development by JFCOM are included in the Joint Mission Force experimentation series. USPACOM's experiments will continue to complement the work of Joint Forces Command by providing valuable insights into the operational application of advanced technologies to near-term, real-world warfighting challenges. Additionally, the multi-national dimension of U.S. PACOM's experimentation program will provide valuable insights into issues that must be resolved to ensure that emerging warfighting concepts are feasible within a coalition environment.

JFCOM also works closely with the Department's science and technology community. For example, JFCOM evaluates the potential of all active Advanced Concept Technology Demonstrations (ACTDs) for inclusion in ongoing concept development and experimentation activities. ACTDs are an effective program for rapidly assessing the military utility of emerging technologies. A pre-acquisition activity, the

ACTD process provides the warfighter an opportunity to assess a new capability and determine its military utility before major procurement decisions are made. The program seeks to facilitate rapid modernization of our military capability by introducing new technologies into the force structure within two to three years from inception of each program. By employing leading-edge concepts and facilitating application of mature advanced technologies, the ACTD program helps to identify problem areas, develops innovative solutions and provides new operational capabilities that will make a difference to the warfighter. Joint Forces Command evaluates the potential of all active ACTDs for inclusion in ongoing concept development. During FY 2000, Joint Forces Command sponsored eleven ACTDs that were in various stages of development, including Joint Logistics, Global Hawk UAV, Theater Air Missile Defense Interoperability, Battlefield Awareness and Data Dissemination, and Joint Theater Logistics.

The third axis of JFCOM's joint concept development and experimentation effort is focused on 2020 and beyond, and considers those concepts and technologies that have the potential to effect revolutionary transformation of the joint force. To support this third axis of experimentation, Joint Forces Command has established an Innovation and Transformation Center that has partnered with key components of the defense science and technology community, the Department of Energy, selected industries, and the academic community to begin an exploration of highly advanced technologies and concepts. In 2000, this body began its work at an initial session at the Johns Hopkins Applied Physics Laboratory, in the area of future robotic systems and the possibilities for autonomous operations. In 2001, the effort will continue with consideration of the trends and possibilities in nano-technologies, bio-centric operations, and alternative energy sources.

## **RAPID IMPLEMENTATION**

The Department is pursuing new processes for committing resources to key emerging capabilities and promising operational concepts within the defense budget faster than the normal programming and budgeting process would allow. One such effort is the Army's Warfighter Rapid Acquisition Program (WRAP), a fund of approximately \$50 million per year used to rapidly procure relatively low-cost but high-leverage systems that performed well in experimentation, such as the Rifle-Launched Entry Munition. The WRAP effort has reduced acquisition cycle time for systems procured by an average of 12 months. The Army has used this account to implement results from its Force XXI advanced warfighting experimentation and, more recently, to defray some costs associated with converting initial brigades to the new medium weight design. The Marine Corps and the Air Force are establishing similar rapid acquisition programs, starting in fiscal year 2001 and 2002, respectively. In the future, the Department will consider whether such a rapid acquisition program is needed to rapidly implement new capabilities emerging from joint concept development and experimentation efforts.

Although the Department can take advantage of breakthrough technologies through rapid acquisition programs, it largely exploits science and technology advances through its normal acquisition processes. The concept development, experimentation, requirements and planning, programming, and budgeting system work in conjunction with the Department's acquisition programs, which are overseen by the Defense Acquisition Board. After the requirements system has generated a validated mission need, a typical major acquisition program proceeds through a series of milestone decisions until the system is fielded and operational. Throughout this process the Department continually coordinates major acquisition programs with the requirements process to ensure mission needs are being met and that, subject to

affordability and technical risk constraints, the best technology possible is integrated into the program. This process can be highly responsive to transformation requirements, as recently demonstrated by the rapid evaluation and approval of the Army's interim armored vehicle. Other leading edge programs with unique capabilities required by the warfighter also have moved rapidly through this process. The Predator and Global Hawk Unmanned Aerial Vehicles, for example, moved quickly from ACTD to the field as their value became evident both through testing and in combat during Operation Allied Force.

Transformation requires rapid implementation of doctrinal and organizational changes as well as material solutions. To ensure that the full range of recommendations from joint experimentation can be rapidly implemented, the Joint Staff intends to develop a transformation campaign plan. The plan will provide transformation guidance that outlines a strategy for the U.S. armed forces to achieve the *Joint Vision 2020* goal of full-spectrum dominance through an integrated plan institutionalizing joint task force operational capabilities as a national core competency similar to Service core competencies. It will clearly specify the roles and responsibilities of the joint staff directorates, Services, and CINCs in achieving and implementing *Joint Vision 2020*. It will reflect recent work by the Joint Staff to reform the Joint Requirements Oversight Council and the Requirements Generation System to better capture requirements that evolve from joint experimentation and assessment activities and integrate them into synchronized joint warfighting capabilities.

## **SCIENCE AND TECHNOLOGY**

Developing new technologies that enable the development of revolutionary military capabilities is a key element of the Department's transformation strategy. New information systems, married with technological advances in other key areas including stealth platforms, unmanned vehicles, and smart submunitions, are essential to the Department's efforts to exploit the RMA.

### **PURSUING THE CRITICAL ENABLER: INFORMATION SUPERIORITY**

Creating and leveraging information superiority is central to making the warfighting concepts embodied in *Joint Vision 2020* a reality. The key steps required to achieve information superiority are addressed in the following goals:

- Ensure the defense intelligence capabilities necessary for information superiority by modernizing collection systems, creating collaborative work environments, and creating progressive production procedures.
- Implement effective defensive programs for establishing information assurance and critical infrastructure protection.
- Build a seamless and coherent global information grid providing the underpinnings for the DoD infrastructure, taking an enterprise view of DoD networking, computing, interoperability and information assurance, and leveraging commercial technology.
- Promote electronic business/electronic commerce and business process change throughout DoD.

- Create and maintain reusable knowledge bases; attract, train, and retain a highly skilled workforce; develop core business processes that capitalize on these assets.
- Strengthen the Department's information operations, security, and counterintelligence posture. Implement a paradigm focused on active security.
- Plan and implement joint and combined end-to-end C3ISR and space integration.
- Foster development of an advanced technology plan for information superiority.

## **LINKING SCIENCE AND TECHNOLOGY DEVELOPMENT TO WARFIGHTING**

The Department maintains a strong science and technology (S&T) program to provide options for responding to a full range of military challenges both today and into the uncertain future. Technological superiority continues to be one of the foundations of our National Military Strategy and a key characteristic of our armed forces. Through the Department's investment in S&T, we develop the foundation necessary for the Department's modernization effort, discover new technologies that produce revolutionary capabilities, and provide a hedge against future uncertainty. Tomorrow's military capabilities depend in part on today's investment in enabling technologies that can be integrated into new or existing systems and employed using new operational concepts.

The Department has a mature S&T strategic planning process for improving the S&T community's responsiveness to their warfighting and acquisition customers. Rapid advances in several key technology areas are creating options for significant increases in warfighting and support capabilities. Four publications—the new *Defense Science and Technology Strategy 2000* and its supporting *Basic Research Plan*, *Defense Technology Area Plan*, and *Joint Warfighting Science and Technology Plan*—lay out the Department's S&T vision, strategic plan, and objectives for defense planners, programmers, and those who develop defense S&T. The *Basic Research Plan* presents the Department's objectives and investment strategy for DoD-sponsored basic research performed by universities, industry, and Service laboratories. The plan presents the Department's investment in ten basic research technical disciplines. The *Defense Technology Area Plan* looks across Service and defense agency investments and describes the Department's applied research and advanced technology development programs.

The *Joint Warfighting Science and Technology Plan* takes a joint perspective, looking horizontally across the Services and defense agencies to ensure that DoD S&T programs address priority future joint warfighting capabilities. Published annually, this plan identifies 12 Joint Warfighting Capabilities Objectives (JWCOs) associated with critical capabilities needed for U.S. forces to maintain a dominant warfighting advantage. These objectives, developed by the Joint Staff in collaboration with the Office of the Secretary of Defense and the S&T executives of each Service, are focused on supporting the operational concepts of *Joint Vision 2020*.

The Department's investment in S&T is executed through a partnership among our defense agencies, Service laboratories, universities, industry, and international partners. In developing the Department's S&T program, we have developed five interdisciplinary areas that are intended to allow the Department to more fully benefit from emerging capabilities. These five focus areas are: Chemical & Biological Defense, Hardened & Deeply Buried Targets, Smart Sensor Web, Cognitive Readiness, and Information Assurance.



Partnering with industry is an integral component of several technology programs. The Dual Use Science and Technology Program (DUS&T) partners with industry to develop technologies having military and commercial applications. The Commercial Operations and Support Savings Initiative (COSSI) uses technologies already developed by industry to lower the operating and support costs of legacy weapon systems. Both DUS&T and COSSI use the Other Transaction Authority provided by Congress which makes it easier for companies unfamiliar with defense contracting to work with DoD. Title III of the Defense Production Act provides financial incentives that help industry establish or expand production capacity for critical technologies, and the MANTECH program promotes affordability by transferring military developed manufacturing processes to the commercial sector. DoD uses Cooperative Research and Development Agreements to provide a way for commercial firms to take advantage of the expertise residing at DoD labs.

A strong S&T program will provide the solid foundation for modernization that is critical to the successful transformation of the U.S. military. Keeping the S&T program focused on near-term and revolutionary warfighting capabilities requires continuing vision, cooperation among all participants, and robust resourcing to meet the challenges of the 21st century. In peace, technological superiority is a key element of deterrence. In crisis, it provides a wide spectrum of options to the National Command Authorities and commanders in chief, while increasing confidence among U.S. allies. In war, it provides an edge that enhances combat effectiveness, reduces casualties, and minimizes equipment loss. Since today's force is dramatically smaller than that at the end of the Cold War, developing affordable military technology and ensuring its rapid transition to the warfighter are critical defense objectives.

## **INTERNATIONAL ACTIVITIES**

Coalition building is an important part of the shaping element of the National Military Strategy. U.S. forces must plan, train, and prepare to respond to the full spectrum of crises in coalition with the forces of other nations. As the Department transforms U.S. capabilities via new technologies and operational concepts, careful design and collaboration will be needed to preserve our combined operations capabilities.

NATO launched its Defense Capabilities Initiative at the Washington Summit in April 1999. This includes both a NATO-centered and a nation-centered concept development and experimentation program. The NATO-centered effort will examine ways to enable a brigade-sized headquarters to exercise effective command and control over a division-sized force, using advanced information technologies and a flatter organizational structure. Under the nation-centered portion of NATO concept development and experimentation, experiments sponsored by one or more allies will be opened for broader participation by other NATO states, helping to ensure that the Alliance works together to move into the future.

In addition, the United States Joint Forces Command established an integrated program to include allies, coalition partners, and friends in joint experimentation activities. JFCOM now has a Multinational Concept Development and Experimentation Center within its Joint Warfighting Experimentation Battle Laboratory. The purpose is to bring allied perspectives into the concept development process, thus facilitating our future ability to operate effectively within a coalition. The approach is two-fold: first, to work with willing partners to ensure the future forces of each nation will be capable of operating together; second, to ensure that future U.S. forces are capable of operating in an ad hoc coalition of partners with varying capabilities. National liaison officers from Australia and Germany are assigned to the Joint Warfighting

Experimentation Battle Laboratory, and liaison officers assigned to other initiatives within Joint Forces Command routinely participate in experimentation activities. Joint Forces Command is coordinating with selected allies for international participation in Millennium Challenge 2002 and Olympic Challenge 2004 and their supporting and enabling events, Unified Vision 2001 and Unified Vision 2003.

Each of the Services also has incorporated a program to improve force compatibility and interoperability with selected allied militaries in their concept development and experimentation programs. The Army continues to expand its multinational interoperability through a variety of bilateral and multilateral fora. The Navy has been very active in assessing strategic sealift concepts with the United Kingdom and command, control, communications, computers, and intelligence interoperability with other high-tech navies. The Marine Corps involved the Dutch, British, and Australian marines extensively in its series of Sea Dragon experiments. For its part, the Air Force has been working with the air forces of the United Kingdom and Australia in the Navigation Warfare ACTD and has invited airmen from the United Kingdom, Australia, and Canada to participate in its Joint Expeditionary Force experiments and Global Engagement wargames.

## **EXCEPTIONAL PEOPLE**

The Department of Defense must recruit, train, and retain people with the broad skills and good judgment needed to pursue dynamic change in the 21st century. Having the right kinds of imaginative, highly motivated military and civilian personnel, at all levels, is an essential prerequisite for achieving success in the Department's ongoing military transformation. The Department is targeting its efforts at three critical populations—young people with needed skills and attitudes, innovators, and current leaders. Each of these populations must be cultivated via slightly different strategies.

### **YOUNG PEOPLE WITH NEEDED SKILLS AND ATTITUDES**

Young people with essential technical skills and broad leadership abilities must be recruited, promoted, and retained. Advanced technology and new operational concepts cannot be fully exploited unless the Department has highly qualified and motivated enlisted personnel and officers who not only can operate these high-tech systems, but can also lead effectively in the highly complex environment of the future.

### **INNOVATORS**

The Department is seeking to create an environment conducive to bold innovation. For one of the largest bureaucracies in the world, this is a daunting challenge. A vital part of the Department's transformation effort is encouraging real debate and the competition of ideas. DoD needs to make sure that the bureaucracy does not smother good ideas before they have a chance to develop and then compete effectively on their merits. DoD's concept development and experimentation programs must be open to new, sometimes radically different ideas from all sources, both from within and outside the Department of Defense.

As an example of recent efforts in this regard, the Department has completely reinvented the market research program associated with military recruiting and created a chief marketing officer position to oversee marketing efforts and synchronize them with the Services. The Department has expanded its market research to include those individuals who influence the decisions young people make—parents,

teachers, counselors, and coaches. Armed with these results, the Department is designing improved communications strategies. DoD has established a web-site specifically designed to appeal to adults and serve as the primary initial reference source for parents. The Department also intends to augment this advertising campaign with other communications strategies that will emphasize the importance of military service and its opportunities to adult influencers.

The Department needs to assure that key participants and leaders in technology development, concept development, and experimentation are connected to the core operational and support communities. Service experimentation programs are relatively young. As time passes, the Department must ensure that people involved in these activities have good opportunities for promotion and selection to key command positions.

### **THE ROLE OF SENIOR LEADERS**

Senior DoD leaders—including the Secretary and Deputy Secretary of Defense, key members of the Office of the Secretary of Defense staff, and the Chairman of the Joint Chiefs of Staff, as well as the leadership of the Services—will guide the Department’s efforts to establish an environment that encourages innovation and change. The history of successful military innovation shows clearly that senior leaders must directly support a transformation effort to ensure that it receives necessary funding support and talented personnel. These leaders must help foster a culture that actively encourages innovative concept development and true experimentation in a realistic, challenging environment, with thorough vulnerability analysis and red teaming that simulates dedicated and capable adversaries. Moreover, senior leaders must be fully prepared to discover that some apparently promising new concepts and capability combinations will fail to achieve the desired results. Finally, senior leaders, both today and in the future, must also explain clearly to the public why DoD’s military transformation effort is essential, and must work closely with Congress in order to pursue significant changes in the way U.S. forces are organized, trained, and equipped.

### **CONCLUSION**

The Department of Defense must transform its forces to remain dominant—indeed, to remain relevant—in the dynamic and highly uncertain security environment of the 21st century. During the past year, the Department has made significant strides toward realizing its vision of transformed military forces capable of full-spectrum dominance in the 2020 timeframe. The Department is transforming its forces to meet 21st century challenges through a clear strategy that integrates activities in six areas: Service concept development and experimentation; joint concept development and experimentation; rapid implementation processes; science and technology efforts; international transformation activities; and recruiting, training, and retaining exceptional people.

Each of the six elements of the Department’s transformation strategy is essential. Science and technology development is critical, but absent innovative concept and new organizational arrangements discovered through Service and joint concept development and experimentation, new technologies will not produce fundamentally new concepts for conducting military operations. Similarly, revolutionary ideas developed through concept development and experimentation will mean little unless effectively implemented by U.S. forces. Future military success also requires that the United States involve key allies and partners to ensure that it is able to operate effectively in future coalition operations. Recruiting, retaining, training, and

enabling innovators and future leaders are the necessary prerequisites for success in each of the other elements of the Department's transformation strategy.

Numerous challenges remain, but already exciting new concepts emerging from the efforts of both the joint and service communities give us a window into the future of the joint force. From concept development and experimentation to quickly integrating new systems and technologies into our forces, the Department is systematically building a process that will deliver the lighter, leaner, more agile, and more lethal force that this century's security environment demands. This force will not just be technologically superior to the opposition, it will be doctrinally and organizationally superior as well, giving it the ability to secure our interests and achieve our policy goals with less risk to our forces, to our allies, and to our homeland. The Department has moved far down the transformation path and is committed to this direction for the future as well.