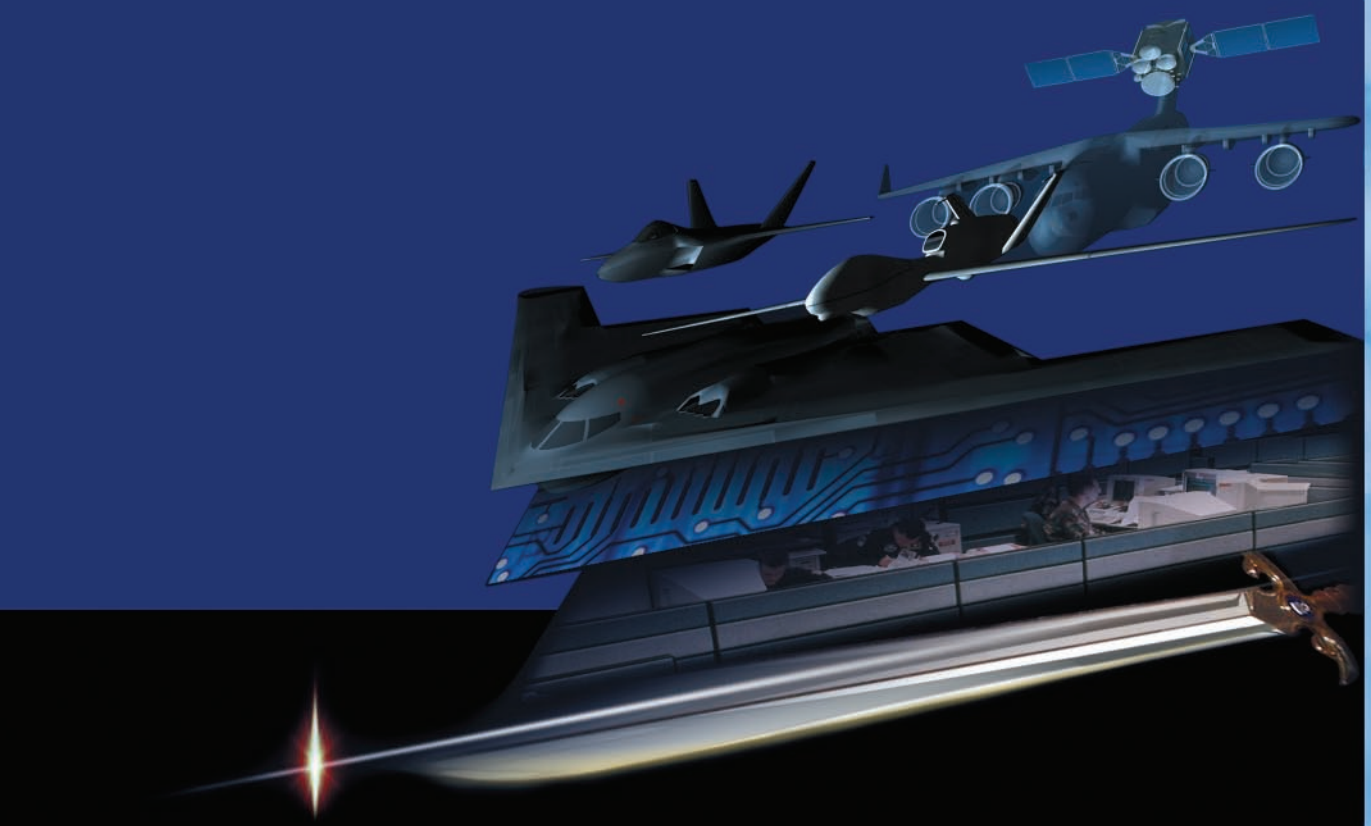
04 THE U.S. AIR FORCE TRANSFORMATION FLIGHT PLAN



The U.S. Air Force Transformation Flight Plan 2004

HQ USAF/XPXC
Future Concepts and Transformation Division

For more information, contact:
Mr. Mort Rolleston at moreton.rolleston@pentagon.af.mil
Lt Col John Pernot at john.pernot@pentagon.af.mil
Maj Tim Keeports at timothy.keeports@pentagon.af.mil

InDesign/Prepress —11CS/SCUS Media Services
Cover/Artwork—Market Vision

Foreword

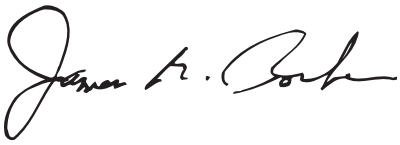
For those of us charged with protecting the United States, new national security realities have forced us to redefine our enemies as well as our concepts of defense. As we prepare to fight these new enemies, we recognize the campaigns of the future will involve all elements of our nation's might—economic, diplomatic, information, investigative, and military power—and will require us to develop new CONOPS, technologies, and organizational constructs that will enable us to address these new challenges. It is these new challenges as well as historic opportunities to exploit revolutionary technology that underscore the absolute necessity of transforming our military capabilities.

America's armed forces must be re-balanced for future operations. What we require is a capability mix consistent with pre-defined operational concepts and effects-driven methodology. Future programs must be conceived with this mix in mind. Systems or capabilities based on arguments that do not consider the emerging joint character or the asymmetric nature of warfare will find themselves obsolete, irrelevant, and candidates for elimination.

Adapting to this new era is one of our principal missions. We view it as a process by which the military achieves and maintains advantages over our potential enemies, and enables our forces to fight and win, from a major conflict to small-scale contingencies and in every phase of a campaign. To do so, it is essential that we remain focused on how we intend to shape our force so it is poised for the future, not for the century of World Wars and Cold Wars we left behind. We need to develop strategies and CONOPS appropriate for this new era and rethink our doctrinal approaches to organizing, training, and equipping.

The *U.S. Air Force Transformation Flight Plan* presents this Service's ongoing transformation to meet these new challenges.

JOHN P. JUMPER, General, USAF
Chief of Staff



DR. JAMES G. ROCHE
Secretary of the Air Force

Table of Contents

Appendices:

Executive Summary

The Purpose of the *U.S. Air Force Transformation Flight Plan*

The *U.S. Air Force Transformation Flight Plan* (or "Flight Plan") is the Air Force's transformation roadmap submission to the Office of Force Transformation (OFT) as required by the Secretary of Defense's Transformation Planning Guidance (TPG). It is a reporting document that shows how ongoing and planned Air Force transformation efforts are addressing the TPG. It does not represent new policy guidance or propose what the Air Force should do, but is instead intended to reflect decisions, information, and initiatives already made and/or approved by the Air Force capability-based planning, programming, and budgeting process. This process is described in the *United States Air Force Strategic Planning Directive for Fiscal Years 2006–2023.*

The 2004 Strategic Planning Guidance set the annual due date for the transformation roadmap, beginning with this edition, as 1 July to align it with the new Planning, Programming, and Budget Execution calendar. This third edition of the Flight Plan also updates and replaces the text from the previous 2003 version.

Providing Strategic Context: What Is Transformation? Why Transform?

There have been two separate but related transformations of the U.S. military over the past decade that will continue for the foreseeable future. **The first is the transformation from an industrial-age force to an information-age force**. Vast leaps in information technology in the areas of intelligence, surveillance, and command and control, as well as precision kinetic and non-kinetic weapons, are dramatically reshaping warfare. Before long, Joint Force Commanders will be able to select the precise targets necessary to achieve desired effects and focus on the quality, rather than the quantity, of targets attacked. They will be able to identify an adversary's key centers of gravity and relay that information to combat forces in near real-time to attack and destroy the centers of gravity in the particular sequence that will be the most devastating to the adversary. Put another way, the joint commander will swiftly defeat an adversary effort by disabling its ability to operate rather than destroying it through mass attrition—producing the effects of mass without having to mass forces (air, ground, or naval). In turn, this will require the deployment of fewer forces (which would also enhance rapid global mobility), reduce the length of the conflict, and limit collateral damage and casualties. Some refer to this as the ongoing "revolution in military affairs." In the context of air and space operations, the keys to threat avoidance and applying the right force to the right place at the right time are the closely related concepts of **parallel warfare** and **effects-based operations** (EBO).

The second ongoing transformation is that from a Cold War to a post–Cold War force. The military advantages America currently enjoys are in danger of eroding in the face of new, unique challenges in the post–Cold War security environment. The United

States must prepare for increased acts of and new forms of terrorism, attacks on its space assets, information attacks on its networks, cruise and ballistic missile attacks on its forces and territory, and attacks by chemical, biological, radiological, nuclear, or high-explosive (CBRNE)–armed adversaries. It must also cope with the unique demands of peace operations, homeland security, stability operations, urban operations, and low-intensity conflicts. To deal with this new security environment, where traditional concepts of deterrence may no longer apply, the U.S. military must be able to conduct operations effectively across the entire spectrum of conflict against a broad range of adversary capabilities.

In order to scope the efforts included in this document, the Air Force has developed a working definition of transformation that addresses both of the aforementioned realities as well as the TPG:

> *A process by which the military achieves and maintains advantage through changes in operational concepts, organization, and/or technologies that significantly improve its warfighting capabilities or ability to meet the demands of a changing security environment.*

In addition, the TPG emphasizes that transformation will shape the nature of military competition, which "ultimately means redefining standards for military success by **accomplishing military missions that were previously unimaginable or impossible except at prohibitive risk and cost**.... **Eventually such efforts will render previous ways of warfighting obsolete and change the measures of success in military operations in our favor**."

The Air Force's Transformation Strategy

To play its part in these transformations in support of the Joint Force Commander, the Air Force is pursuing the following strategy:

- Work with the other Services, Joint Staff, other Department of Defense (DoD) Agencies, and allies/coalition partners to **enhance joint and coalition warfighting.**
- Continue **aggressively** to **pursue innovation** to lay the groundwork for transformation.
- **Create flexible, agile organizations** that continually collaborate to facilitate transformation and institutionalize cultural change.
- Shift from threat- and platform-centric planning and programming to adaptive **capabilities- and effects-based planning and programming** via the new Air Force Concepts of Operations (CONOPS) and Capabilities Review and Risk Assessments (CRRAs).
- **Develop "transformational" capabilities** to enable the six operational goals of transformation from the 2001 Quadrennial Defense Review (QDR), the new Joint Operating Concepts (JOCs), Air Force Vision, and the Air Force CONOPS.

- **Break out of industrial age business processes** and embrace information age thinking.

To execute this strategy, the Air Force will capitalize on its three core competencies:

- **Developing Airmen:** The ultimate source of air and space combat capability resides in the men and women of the Air Force. The Service's first priority is to ensure they receive the precise education, training, and professional development necessary to provide them a quality edge second to none.
- **Integrating Operations:** The Air Force's inherent ability to envision, experiment, and ultimately execute the union of a myriad of platforms and people into a great synergistic whole is pivotal to maximizing air and space power in a joint warfighting environment.
- **Technology-to-Warfighting:** The Air Force matures and promotes its ability to translate vision into operational capabilities in order to prevail in conflict and avert technological surprise.

Enhancing Joint and Coalition Warfighting

As discussed in Chapter III, a critical part of transformation is maximizing the U.S. military's ability to fight jointly so that the most effective force for a given situation, regardless of what Service or combination of Services contributes that force, can be brought to bear. The Services already strongly support each other in many different areas and continue to enhance that cooperation. Coalition partners also provide key support to the Air Force. The Air Force is also working with various allied/coalition air forces to ensure they continue to be interoperable and integrated with the U.S. Air Force as it continues to transform.

The Air Force puts a premium on joint enablers. In fiscal years (FY) 2004–2009, the Air Force will spend 23 percent of its Total Obligation Authority on joint combat forces such as close air support fighters and gunships, loitering indirect fires, and advanced air-to-ground munitions and 41 percent on critical joint force enablers such as air and space command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); airlift; and tankers. The FY05 President's Budget increased investment in programs such as the C–17, Predator, Global Hawk, Space Based Radar, and the E–10A. This will result in an increased investment in the joint force.

To further enhance joint operations, the TPG directed the Joint Staff to create new JOCs that describe how the future joint force will fight across the range of military operations. The process is intended to enable DoD to identify and prioritize transformation requirements inside the defense program and is the key to the DoD's transformation strategy. As joint concepts evolve, Air Force concepts will follow suit to underpin and support them. The Air Force has been deeply engaged in JOC development and has worked hard with both Joint Forces Command (JFCOM) and the Joint Staff to shape and integrate the Air Force CONOPS, described in Chapter VI, into these documents so they will contribute to the required capabilities in those JOCs.

Innovation to Turn Transformational Ideas into Reality

Transformation demands innovative thinking and a process that can identify, examine, and turn bright ideas into reality—whether the idea is a new technology, concept, or a novel way to organize. The objective of Air Force innovation is the timely adoption and integration of new or improved technologies, capabilities, concepts, and processes into Air Force planning and acquisition activities, organizations, and operations. Air Force innovation is continuous and comprehensive over the near-, mid-, and far-term time horizons.

Key components of the innovation process in the Air Force, discussed in Chapter IV, include: the **Innovation Panel**, **Science and Technology (S&T)**, **Air Force Battlelabs**, **Advanced Technology Demonstrations**, **Advanced Concept Technology Demonstrations**, **Agile Acquisition**, **Air Force Tactical Exploitation of National Capabilities**, **Experimentation**, **Wargaming**, **Modeling and Simulation**, **Training Transformation,** and **Lessons Learned.**

Transforming Air Force Organization and Culture

Transformation is more than new hardware. Equally important, if less glamorous, are the organizational concepts that capitalize on the technological advances and allow the U.S. military to truly transform. In addition, the process of transformation begins and ends with people. Only through the effective development of Airmen and the seamless integration of their capabilities into Air Force operations can the Service optimize air and space power. To ensure its ongoing transformation, the Air Force must also modify its culture and Airmen development to be conducive to transformation and then adapt its organization to institutionalize this new culture.

Several key organizational transformation efforts in these areas within the Air Force, which are detailed in Chapter V:

- The **Air and Space Expeditionary Force** has been critical in transforming the Air Force from a threat-based, forward-deployed force designed to fight the Cold War to a capabilities-based force based primarily in the United States that is sufficiently flexible to conduct a wide range of operations throughout the world while accommodating the high operational tempo of today's contingency environment.
- The new **Battlefield Airmen** initiative will transform how the Air Force organizes, trains, and equips Airmen who operate outside the airbase perimeter to directly assist, control, and enable precision airpower in the forward and deep battlespace.
- U.S. Special Operations Command has created a **Combat Aviation Advisory Squadron** to assist allies in developing their airpower and associated combat support functional areas into a viable alternative to employing U.S. assets. It shapes the environment and promotes stability without the need to project a large U.S. force presence abroad. The Air Force is exploring options to significantly expand and enhance this capability.

- The Air Force is transitioning into a new **Combat Wing Organization** designed to fully develop commanders with specific functional expertise to plan and execute air and space power as part of expeditionary units.
- Through the **Future Total Force** effort, the Air Force is continuing its transformation in the way it integrates the Air National Guard, Air Force Reserve, and civilian force to produce greater combat capability more efficiently.
- The Air Force Council has embraced a new vision and construct to **transform human capital management** to ensure the right people get to the right place at the right time.
- Through the new **Total Force Development** construct, the Air Force will prepare future leaders with the right education, training and experiences to create the right mix of Active Duty, National Guard, and Reserve Airmen who understand the nature of the dynamic national security environment.
- The Under Secretary of the Air Force was recently dual-hatted as the Director, National Reconnaissance Office, the DoD Executive Agent for Space, and the Air Force Acquisition Executive for Space to **create "cradle-to-grave" leadership of all military and Intelligence Community space programs.**
- The **Warfighting Headquarters** initiative will enable the Air Force to proactively integrate with the proposed Standing Joint Task Force Headquarters while evolving to a fully joint air and space headquarters.
- The **2005 Base Realignment and Closure** process is critical to the Air Force's ability to meet future mission needs. It is also the engine that will enable the Air Force to achieve key transformational initiatives such as Future Total Force, human capital management, innovative infrastructure options, and the Warfighting Headquarters.

Transforming to a Capabilities-Based Force

The Air Force CONOPS are a major innovation for the United States Air Force. By clearly defining how the Service intends to fight, the Air Force can then focus its planning, programming, requirements, and acquisition processes on a capabilities-based framework. Through the CONOPS, the Air Force is transforming its planning process to make effects, and the capabilities needed to achieve them, the driving force for all Air Force operational, programming, and budget decisions. The objective is to improve the Air Force's ability to get the right balance of high-quality capabilities into the hands of the warfighters.

At this point, there are **six Air Force CONOPS: Global Mobility, Global Persistent Attack, Global Strike, Homeland Security, Nuclear Response, and Space & C4ISR**. Each Air Force CONOPS starts with a problem definition. These problems are missions the Air Force must accomplish in the 21st century. The CONOPS describe how the Air Force solves problems within the context of joint operations. Then, the CONOPS outline the specific effects-based capabilities needed to solve these problems. This effort integrates the warfighter's responsibility to define requirements at the start of the process. The requirements focus on capabilities instead of particular programs or weapon systems.

In order to precisely assess each CONOPS, the **CRRA** identifies and analyzes current and future capabilities, capability shortfalls, health, risks, and opportunities. The CRRA is a twofold process: each CONOPS executes a CRRA within its effects and capability purview. Then, the Integration CRRA assesses capabilities and capability shortfalls across all CONOPS. The CONOPS first identify desired warfighting effects and then identify top-level capabilities required to generate those effects. The CRRAs then identify capability gaps, overlaps, and robustness within each top-level capability. Finally, the Integrated CRRA identifies an acceptable level of risk and risk mitigation measures within each capability. This assessment helps the CONOPS Champions articulate any disconnects between required capabilities and programs. Metrics to measure the Air Force's progress towards "transformation" will be derived from this analysis.

Developing Transformational Capabilities

The Air Force of today is facing numerous challenges in achieving the QDR's critical operational goals of transformation, the required capabilities of the new JOCs, the Air Force Vision, and the Air Force CONOPS within the new security environment. Networking of air, space, and ground systems is limited. The amount and type of intelligence, surveillance, and reconnaissance (ISR) assets available for time-critical and simultaneous targeting in most cases is limited. Legacy air capabilities are vulnerable to the next generation of advanced air defense systems. Rapidly striking anywhere on the globe and conducting persistent operations is very difficult. In most cases, the only option to affect a target is to destroy it with kinetic weapons, which is not appropriate in all situations. Critical information and space systems are vulnerable to attack. The United States has a limited capability to affect adversary C4ISR and deny the advantages of space to adversaries if necessary. In most cases, forces cannot be deployed abroad in a timely manner. American territory and forces are also highly vulnerable to ballistic and cruise missile attacks. The threat from the continued proliferation of CBRNE weapons creates a continuous need to ensure that U.S. forces can survive, fight, and win in a contaminated environment. Current logistics and other combat support processes cannot keep up with the high pace of modern operations and forward logistics footprints are too large and thus vulnerable to attack.

The Air Force believes there are 16 transformational capabilities, consistent with the discussion of transformation in Chapter II as well as the initial Integration CRRA in 2003 (see Chapter VI). They represent capabilities the Air Force cannot achieve today or that must be significantly improved to enable the new JOCs (see Chapter III), DoD's transformation goals, and the Air Force Vision and CONOPS. They are listed here and grouped under the relevant Air Force distinctive capabilities from *Air Force Vision 2020* (see Chapter VII for details):

Information Superiority:

1. Seamless, joint machine-to-machine integration of all manned, unmanned, and space systems
2. Real-time picture of the battlespace
3. Predictive Battlespace Awareness

4. Ensured use of the information domain via effective information assurance and information operations
5. Denial of effective C4ISR to adversaries via effective information operations

Air and Space Superiority:

(subdivided here into three categories not in Air Force Vision)

Negating Enemy Air Defenses:

6. Penetration of advanced enemy air defenses to clear the path for follow-on joint forces
7. Effective and persistent air, space, and information operations beyond the range of enemy air defenses under adverse weather conditions

Space Superiority:

8. Protection and survivability of vital space assets
9. Negation of an adversary's access to space services

Missile Destruction in Flight:

10. Detection of ballistic and cruise missile launches and destruction of those missiles in flight

Precision Engagement:

11. Order of magnitude increase in number of targets hit per sortie
12. Achievement of specific, tailored effects on a target short of total destruction

Global Attack:

13. Rapid and precise attack of any target on the globe with persistent effects

Rapid Global Mobility:

14. Rapid establishment of air operations, an air bridge, and movement of military capability in support of operations anywhere in the world under any conditions
15. Responsive launch and operation of new space vehicles and refueling/repair/relocation of future on-orbit assets

Agile Combat Support:

16. Significantly lighter, leaner, and faster combat support to enable responsive, persistent, and effective combat operations under any conditions

These are subject to change as the annual CONOPS and CRRA processes mature and evolve.

Preliminary, unclassified "lessons learned" analyses from Operation IRAQI FREEDOM indicate that the Air Force has achieved significant advances in many of these transformational capabilities since Operation ENDURING FREEDOM. Key examples include: improved joint operations (to include the Air Component Coordination Element and Battlefield Airmen Modernization); Blue Force Tracking; unmanned aerial vehicles (UAVs); time-sensitive targeting; Expeditionary Force Modules; Embedded Contingency Response Groups; more agile logistics; greatly expanded special operations; unprecedented command and control, integration of space operations; integration of space operations at the strategic, operational, and tactical levels; and Combat Weather Teams.

The Air Force will need the assistance of and coordination with the other Services and Agencies in key areas in order to enable these transformational capabilities, which include: jointly developed communications and information systems, universal compliance with DoD net-centric processes, joint fire-control system of systems, coordinated understanding of ISR and weather requirements, coordinated information operations, joint air operations and combat air support, coordinated missile defense, coordinated counterspace efforts, minimization of lift demands, improved time-phased force and deployment data (TPFDD) development, joint training, joint operations concepts, joint exercises, joint experimentation, professional military education, standards by which all Services provide human resource services to employees, predictive sustainability awareness, integrated combat support situational awareness, homeland security, directed energy development, understanding CBRNE effects on land-based air assets, space operations, base operating support, urban operations, and codeveloping a Common Readiness Picture.

Business Transformation

Air Force business processes stem from an industrial age when America faced a security environment that was vastly different in character than the one the Air Force faces today. Although they have been incrementally reformed and modernized over the last 30 years, the underlying philosophy and basic architecture of these processes have not changed—they are labor intensive, they lack agility, flexibility, and speed. Accountability is fragmented and diluted throughout large bureaucracies that must render their collective assent to enable the accomplishment of the most mundane tasks.

The principal goal of business transformation is to fashion fast, flexible, agile, horizontally integrated operational support processes that enable fast, flexible, agile, and lethal combat forces. The key to this goal is focusing on warfighter needs and eliminating the seams that divide Air Force capabilities today. The Air Force envisions a future business environment that provides fast, predictive operational support and response through situationally aware commanders. The secondary goal of business transformation is to achieve increased efficiencies through better, simplified, integrated processes and better support tools. In addition, the Air Force seeks natural and built infrastructure sustainment to mission capabilities.

Improved efficiency of business process should deliver the following effects:

- A twenty percent shift in business operations resources (dollars and people) to combat operations and new/modern combat systems
- A work load enabling its people to conduct routine (non-crisis, non-exercise) organizational missions safely within a 40- to 50-hour work week
- A compression of average process cycle time by a factor of four (relative to current established process baselines)
- The empowerment of personnel and enrichment of job functions

In March 2004, the Secretary of the Air Force chartered the **Operations Support Modernization Program** to focus, accelerate, and prioritize the transformation of the Air Force operational support processes using a warfighter-centric vision of support. To enable the vision of rapid, predictive operational support and response through situationally aware commanders, the Air Force established the **Commander's Integrated Product Team (CIPT)**, which represents the Major Commands and Functions of the Air Force, to steer transformation. The CIPT and the **CIPT Action Group** use tools such as the **Operational Support CONOPS**, **Enterprise Architecture**, **Enterprise Process View**, and **Business Process Engineering** to establish business transformation strategies, which are reflected in the Air Force **Operational Support Flight Plan**. The CIPT coordinates its action with the Department of Defense Business Modernization Management Plan and the **Business Initiative Council**. The Air Force is also transforming how it sustains forces.

Long-Term Transformation

While the United States possesses a world-class Air Force, rigorous S&T is essential to maintain its superiority and better meet the security demands of an increasingly complex world into the future. In a broad sense, long-term Air Force S&T is focused on: (1) moving the Service's capabilities from a theater to a global focus; (2) integrating air, space, and information capabilities to take advantage of the synergy between these three domains; (3) rapidly projecting capability anywhere on the Earth and into space while still retaining the ability to be expeditionary; (4) creating effects on demand anywhere, anytime; and (5) creating a rapidly composeable environment able to accurately replicate potential battlespace anywhere in the world through the use of rapid scenario-generation tools—and providing that ability to the warfighters in a timely manner.

As described in Chapter IX, long-term Air Force S&T is exploring many exciting possibilities, including: integration of sensory data with real-time detection; networks of large arrays of sensors to create invulnerable sources of information; long-range sensors that can penetrate foliage, camouflage, non-hardened buildings, and shallow buried structures to detect, geolocate, and positively identify military targets; swarms of very small sensors to enter tunnels, look under camouflage cover, listen behind lines, electronically eavesdrop, or sniff out chemical, biological, and radiological presence or threats; nanoelectronics; nanopropulsion; molecular-level sensors; a "master caution panel" for the joint commander that would proactively tap him on the shoulder whenever a new critical situation developed in the battlespace and offer alternative courses of

action; bio, nano, and quantum information processing, storage, and retrieval; human performance enhancement; atomic-level computing that is millions of times faster than today's silicon chip computers; artificial intelligence; placement of a warning energy "spot" on any target worldwide that could be rapidly followed with varying levels of effects; a full spectrum of long-range, ground-based directed energy systems capable of producing the full spectrum of lethal and non-lethal effects; a variety of force protection systems to provide robust detection, warning, and thwart/defeat capabilities against a wide variety of air and ground threats; a safe source of fuel from water; camouflage skins; responsive space systems for rapid, cheap space-launch; and plasma dynamics that can significantly increase range and reduce time to target, aircraft time-on-target, precision airdrop, and fuel consumption.

Conclusion

The Air Force is committed to transforming and, in the process, maximizing joint combat capabilities to address a wide range of threats across the conflict spectrum. The *U.S. Air Force Transformation Flight Plan* lays out the Service's ongoing transformation efforts, which, in concert with the other Services, will help achieve the effects required by the Joint Force Commander into the foreseeable future.

The ongoing transformation of the Air Force will enable the Joint Force Commander to:

- Achieve decision cycle dominance to strike adversaries before they can mount an effective defense
- Deny sanctuary to adversaries
- Use smaller forces to disable an adversary rather than having to destroy it via mass attrition
- Maximize the power, lethality, and flexibility of a truly joint, global force
- Successfully neutralize mobile targets
- Integrate air, space, sea, and land systems across all Services
- Achieve Predictive Battlespace Awareness
- Deploy with significantly smaller combat support footprints
- Penetrate and defeat the next generation of advanced air defense systems to sustain air superiority into the foreseeable future
- Ensure the joint force has the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity under all conditions
- Conventionally strike targets persistently anywhere on the globe in a timely manner
- Choose among multiple kinetic and non-kinetic capabilities to achieve the desired effect
- Protect friendly information systems

- Make the enemy fight blind, deaf, and dumb by disrupting its C4ISR
- Protect space systems and deny space to adversaries, if necessary
- Rapidly deploy forces abroad
- Defend against ballistic and cruise missile attacks
- Protect resources on the ground for forces both within the United States and abroad
- Assure continuous operations in a CBRNE environment
- Significantly improve combat air support to ground forces

Air Force transformation will not only revolutionize traditional, high-intensity combat operations, but also will help enable the United States to face new irregular, catastrophic, and disruptive challenges in the post–Cold War security environment summarized in Chapter II. For example:

- Rapid global attack, rapid global mobility, persistent ISR, standoff, ballistic and cruise missile defense, information operations, stealthy air defense penetration capabilities, force protection, and CBRNE detection, defeat, and decontamination capabilities will counter various disruptive and irregular anti-access and area-denial strategies by adversaries.
- Information operations capabilities will protect critical C4ISR systems and networks against adversary attacks and counter adversary psychological operation campaigns
- Space superiority capabilities will protect critical space assets against growing adversary threats to them.
- Information superiority capabilities will counter advanced dispersal and deception techniques and enable the tracking of targets under the cover of night, in adverse weather, and underground.
- Information superiority, non-lethal weapons, loitering munitions, special operations, agile combat support, and rapid global mobility capabilities will greatly enhance urban operations, peace operations, and stability operations.
- Rapid global attack, loitering munitions, information superiority, and rapid global mobility capabilities will be essential in the ongoing global war on terrorism.
- Predictive Battlespace Awareness; ballistic and cruise missile defense; force protection; emergency response programs; and CBRNE detection, defeat, and decontamination capabilities as well as the efforts associated with the Homeland Security CONOPS will greatly enhance the protection of U.S. forces from new technologies available to adversaries and the U.S. homeland against potentially catastrophic attacks.
- Predictive Battlespace Awareness capabilities will significantly mitigate the unpredictability of threats in the new security environment.
- Information superiority, rapid global mobility, agile combat support, and rapid global attack capabilities will significantly mitigate the greatly reduced access to forward bases.

- Information superiority capabilities as well as future non-lethal gunships, special operations transports that can penetrate advanced air defenses, the Tactical Unmanned Aerial Vehicle Initiative, and the new Battlefield Airmen initiative will significantly enhance special operations.

In addition to developing capabilities, the Air Force has robust strategic planning, innovation, and long-term S&T processes in place to support the development of these transformational capabilities. It is creating flexible, agile organizations to facilitate transformation, institutionalize cultural change, and enable the Air Force to more effectively operate in the post-Cold War security environment. The Air Force is transforming the way it educates, trains, and offers experience to its Airmen so they understand the nature of the changing security environment and are encouraged to think "outside the box." It is continuing the transformation of how it integrates the Air National Guard, Air Force Reserve, and civilian force with its Active Duty force. The Air Force is continuing to transform into a capabilities-based force through the Air Force CONOPS and the CRRA. It is working with the Joint Staff, OSD, and the other Services and Agencies to improve joint warfighting and develop new joint concepts. The Air Force is also working to ensure that its business processes and operations are efficient, flexible, and agile to support the needs of the warfighter in this rapidly changing environment.

The Air Force excels at providing air and space capabilities to the joint warfighter, while enhancing the capabilities of soldiers, sailors, and marines. The diversity and flexibility of Air Force efforts and capabilities through CONOPS, technology, and organizational structure provide unparalleled value to the Nation and make the whole team better. DoD must integrate the existing capabilities of the Services in a way that is most efficient and effective to address the rapidly changing security environment. The Air Force will continue to work with the rest of DoD to keep transformation focused to provide the capabilities required for the Nation in the 21st century.

I. Introduction

"Transformation is not a term; it is a philosophy—a predisposition to exploring adaptations of existing and new systems, doctrine, and organizations. It has been part of the Air Force for decades. Transformation is not outlining new programs or things to buy. Rather, it is an approach to developing capabilities and exploring new concepts of operation that allow us to be truly relevant in the era in which we find ourselves, and for years to come."

–Dr. James Roche, Secretary of the Air Force

To support United States (U.S.) national security, the Services must maintain broad and sustained advantages over potential adversaries by providing joint commanders with the most effective solutions to conduct a broad spectrum of joint operations. The capabilities necessary to achieve this have, of course, changed through time, requiring the military to constantly adapt and "transform." The Air Force, like all the Services, has contributed significantly to the U.S. military's transformation through the years. Examples of past transformational technology breakthroughs in air and space power include jet aircraft, supersonic flight, missiles, nuclear weapons, spacecraft, long-range airpower, and precision-guided munitions. Throughout its history, the Air Force has also gone through numerous significant organizational and conceptual changes to maximize the effectiveness of these new capabilities. This ongoing transformation of the U.S. military continues today.

Purpose of the *U.S. Air Force Transformation Flight Plan*

The *U.S. Air Force Transformation Flight Plan* (or "Flight Plan") is the Air Force's transformation roadmap submission to the Office of Force Transformation (OFT) as required by the Secretary of Defense's Transformation Planning Guidance (TPG). It is a reporting document that shows how ongoing and planned Air Force transformation efforts are addressing the TPG. It does not represent new policy guidance or propose what the Air Force should do, but is instead intended to reflect decisions, information, and initiatives already made and/or approved by the Air Force capability-based planning, programming, and budgeting process. This process is described in the *United States Air Force Strategic Planning Directive for Fiscal Years 2006–2023*. The 2004 Strategic Planning Guidance set the annual due date for the transformation roadmap, beginning with this edition, as 1 July to align it with the new Planning, Programming, and Budget Execution calendar. This third edition of the Flight Plan also updates and replaces the text from the 2003 version.

The Flight Plan serves as the Air Force's transformation roadmap. These transformation roadmaps, which are required of all the Services and Joint Forces Command (which also incorporates efforts by Department of Defense (DoD) agencies), are a key part of how the Office of the Secretary of Defense (OSD) intends to implement the transformation strategy outlined in the TPG. The broad outline of this implementation, according to the TPG and OFT, is to:

- **Develop new joint operating concepts (JOCs)** and associated linking integrated architectures that depict how the joint force of the future is to fight to meet the objectives of the six operational goals of transformation from the 2001 QDR with enough detail to permit identification and prioritization of transformation requirements inside the defense program.
- **Have Services and Joint Forces Command (JFCOM) prepare transformation roadmaps** to specify how their transformation efforts will enable or significantly improve the capability requirements of the JOCs. Per OFT direction, the transformation roadmaps are not intended to discuss all Service and joint efforts that will enable the capability requirements of the JOCs, but instead focus on transformation efforts only.
- **Initiate rapid research, development, testing, and evaluation programs** to facilitate execution of these roadmaps and stimulate alternative ways to better achieve desired capabilities.
- **Evaluate and interpret progress** toward implementation of all aspects of this transformation strategy and recommend modifications and revisions where necessary through the Strategic Planning Guidance. More specifically, the TPG requires the following evaluations:
    - **Strategic Transformation Appraisal:** OFT assesses the Service and joint transformation roadmaps, DoD research and development efforts, "lessons learned" from recent operations, and other sources in order to assist the Secretary of Defense in measuring progress towards implementing transformation. Recommendations from this Appraisal are forwarded for consideration in the Strategic Planning Guidance, which impacts future Program Objective Memorandum (POM) development. The initial Appraisal, based on the 2003 transformation roadmaps, was completed in April 2004.
    - **Program/Budget Review Output Report:** OSD Program Analysis and Evaluation summarizes the transformational elements of the defense program and evaluates the transformational value of the Service programs in light of the transformation roadmaps and the implementation of transformational initiatives. It provides inputs to the Strategic Transformation Appraisal. The initial Report is scheduled to be completed later in 2004 based on the 2004 transformation roadmaps.

In support of this strategy implementation, the Flight Plan addresses specific TPG requirements (reproduced in Appendix A). In addition, it also conforms to additional guidance from OFT to remain a broad, strategic-level planning document that lays out a general plan with a rough schedule.

In addition to addressing OSD guidance, this version of the Flight Plan updates, corrects, and replaces the information presented in the previous November 2003 edition. New sections in this version include:

- Helping U.S. allies and potential coalition partners to transform (Chapter III)
- Lessons Learned (Chapter IV)
- Battlefield Airmen (Chapter V)
- Global Persistent Attack Concept of Operations (CONOPS), which replaces the Global Response CONOPS, whose requirements have been combined with the Global Strike CONOPS (Chapter VI)
- Various new business transformation organizations, processes, and efforts (Chapter VIII)
- A new appendix showing how Air Force transformation efforts are enabling or significantly improving the capability requirements of those JOCs that have been vetted through the Services and the Joint Staff by the time this document was submitted to OFT (Appendix D)

The Flight Plan Outline

The body of the Flight Plan is a broad, strategic-level overview of the ongoing transformation of the Air Force, organized around the Service's transformation strategy to:

- Work with the other Services, Joint Staff, and other DoD Agencies to enhance joint warfighting
- Continue to aggressively pursue innovation to lay the groundwork for transformation
- Create flexible, agile organizations that continually collaborate to facilitate transformation and institutionalize cultural change
- Shift from threat- and platform-centric planning and programming to adaptive capabilities- and effects-based planning and programming via the new Air Force CONOPS and the Capabilities Review and Risk Assessments (CRRAs)
- Develop "transformational" capabilities to enable the 2001 Quadrennial Defense Review's (QDR's) six critical operational goals of transformation, JOCs, Air Force Vision, and the Air Force CONOPS
- Break out of industrial age business processes and embrace information age thinking

Most of the information required by the TPG regarding details of Air Force efforts in specified areas and how Air Force transformation is addressing OSD guidance is included in the appendices.

More specifically:

- **Chapter I** presents the purpose, requirement for, and outline of the Flight Plan, how it fits into DoD's transformation strategy, and broadly outlines the Air Force's transformation strategy.
- **Chapter II** provides the broad strategic context by presenting the Air Force's conceptual view of the ongoing transformation of the U.S. military and why it is necessary. Its purpose is to scope the content of this document and transformation writ large for the Air Force.
- **Chapter III** summarizes ongoing efforts to enhance joint and coalition warfighting—a critical piece of transformation.
- **Chapter IV** discusses the innovation processes currently in place in the Air Force to ensure transformational ideas become reality, including details on Service experimentation required by the TPG.
- **Chapter V** discusses current Service-wide organizational transformation to enhance Air Force capability significantly and institutionalize a culture conducive to transformation.
- **Chapter VI** presents the Air Force's CONOPS, which are at the heart of the Service's transformation to capabilities-based planning.
- **Chapter VII** provides a preliminary look at the transformational capabilities the Air Force is pursuing in order to make the QDR's six critical operational goals of transformation, TPG, the new JOCs, the Air Force CONOPS, and the Air Force Vision a reality. It also outlines significant gains in these capabilities achieved during Operation IRAQI FREEDOM as well as what the Air Force needs from the other Services and DoD agencies to enable these capabilities.
- **Chapter VIII** lays out the Air Force's broad goals and strategy to transform its business practices.
- **Chapter IX** briefly describes the "long-term challenges" that guide long-term Air Force science and technology efforts and offers a glimpse into a few truly "revolutionary" concepts and capabilities the Air Force is exploring over the next fifty years.
- **Chapter X** summarizes important points about Air Force transformation.

In addition, four **appendices** describe:

A. The TPG guidance governing the scope and content of the Flight Plan.

B. Most of the detailed information required by the TPG regarding Service efforts in the area of information superiority, especially interoperability, intelligence, and information operations.

C. How ongoing Air Force transformation strongly supports the six "operational goals of transformation" from the 2001 QDR.

D. How ongoing Air Force transformation supports the required capabilities of the new JOCs that have been vetted through the Services and Joint Staff by the time this document was submitted to OFT.

II. Providing Strategic Context: What is Transformation?

"Transformation is thinking through the challenges of this era, adapting our forces and people to them, and then operating our services as efficiently as possible using these new realities as the barometer to gauge our success."

—Dr. James Roche, Secretary of the Air Force

"Transformation is the leveraging of our technological superiority to create an asymmetric advantage and to combat asymmetric vulnerabilities."

—General John Jumper, Chief of Staff of the Air Force

While transformational activities have occurred throughout military history, the term "transformation" in its current context is quite new and means different things to different people. Broad, vague, and/or conflicting definitions have not only resulted in confusion, but have also led to widespread misunderstandings about the military's transformation efforts. This chapter presents the Air Force's conceptual view of the ongoing transformation of the U.S. military and why it is necessary, which helps to scope the content of this document.

Most discussions that attempt to describe transformation appear to fall into two general schools of thought. The first links transformation exclusively with the so-called "revolution in military affairs" (RMA) or transforming from an "industrial age" force to an "information age" force. The second views transformation more broadly in the context of transforming from a Cold War force to a post-Cold War force. This chapter briefly describes these two perspectives and the Air Force concept of transformation, which takes both into account.

Transformation as a "Revolution in Military Affairs"

A "revolution in military affairs" is widely described as a dramatic increase in combat capability that changes the rules of the game and renders the status quo obsolete. RMAs combine new revolutionary technology with organizational and conceptual changes that maximize the effectiveness and potential of that technology. RMAs are not necessarily dependent on or driven by changes in the security environment. Instead, new technological advances primarily drive them. The RMA school of thought tends to have a very focused view of what actually is "transformational," as it directly pertains to the new revolutionary technology driving the RMA and associated concepts and organizational changes.

Proponents of the RMA view of transformation assert that vast leaps in information technology in the areas of intelligence and surveillance, command and control, as well as precision kinetic and non-kinetic weapons are dramatically reshaping warfare. Before long, joint commanders will be able to select the precise targets necessary to achieve desired effects and focus on the quality, rather than the quantity, of targets attacked. They will be able to identify an adversary's key centers of gravity and relay that information to combat forces in near real-time to attack and destroy the centers of gravity in the particular sequence that will be the most devastating to the adversary. Put another way, the joint commander will swiftly defeat an adversary effort by disabling its ability to operate rather than destroying it through mass attrition—producing the effects of mass without having to mass forces (air, ground, or naval). In turn, this will require the deployment of fewer forces (which would also enhance rapid global mobility), reduce the length of the conflict, and limit collateral damage and casualties. In addition, in seeing the entire battlespace through advanced command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities, a commander will be able to identify threats and communicate that information to forces in time to avoid them.

In the context of air and space operations, the keys to threat avoidance and applying the right force to the right place at the right time are the closely related concepts of parallel warfare and effects-based operations (EBO). **Parallel warfare** refers to the simultaneous attack of carefully selected targets to achieve specific effects, as opposed to attacking targets in a more sequential fashion with the goal of destroying everything on a target list. Until the Gulf War, there were three primary obstacles that made parallel warfare problematic: (1) the requirement for mass to compensate for the lack of precise weaponry, (2) the high number of assets necessary to suppress enemy air defenses, and (3) the absence of an operational-level concept focusing principally on effects to achieve control over an opponent rather than total destruction. The introduction of low-observable "stealthy" platforms, precision weapons, and information operations, matched with the new EBO concept of operations, has overcome these obstacles and has made parallel warfare possible.

While parallel warfare is a manifestation of the ongoing RMA, **EBO** is a critical enabler. The central idea of EBO is to design campaign actions based on desired national security outcomes rather than merely attacking targets to destroy adversary forces. The goal is to understand the effect that is desired in the battlespace and then create that effect

more efficiently and effectively. EBO may enable striking fewer targets, using fewer weapons, avoiding enemy threats, mitigating the consequences of enemy action, and limiting the potential for collateral damage and civilian casualties that might occur from a more traditional air campaign. EBO also focuses on combining and coordinating all elements of national power, military and non-military, to achieve its goals by influencing the will and perception of the adversary's decision-makers. EBO requires systems-based intelligence analysis that reveals what an adversary relies on to exert influence and conduct operations and the ability to get that intelligence and all other relevant information to the right place at the right time. It also requires the ability to precisely conduct operations in the right order, with a wide range of tools, to include non-lethal weapons and information operations. While the tenets of EBO can be applied in every medium of warfare, the relative advantages of air and space power—speed, range, maneuver, flexibility, precision, perspective, and lethality—fit seamlessly in this strategic construct.

However, current limitations in both technology and organizational structure prevent the military from achieving the full potential of parallel warfare and EBO. Overcoming these limitations through non-lethal weapons; information operations; miniature munitions; counter-chemical, biological, radiological, nuclear, and high explosive (C-CBRNE); and space-based systems is a key goal of the ongoing RMA.

Transforming from a Cold War Force to a post–Cold War Force

Another school of thought views transformation more broadly in the context of changing the U.S. military from a Cold War force primarily designed to defend against a Warsaw Pact invasion of Western Europe and deter nuclear attack through the threat of overwhelming nuclear retaliation to a force prepared to meet the broad array of new challenges from a multitude of potential adversaries. For this school, many transformational efforts that would enable the United States to deal with the new security environment may not be "revolutionary" or "transformational" as described by the RMA school. Put another way, instead of equating transformation with an RMA, this school of thought would consider the RMA to be a subset or category of transformation.

In addition, this perspective often contends that the RMA only would enable the U.S. military to fight traditional militaries during conventional conflicts in a far more effective way while it ignores many new non-traditional or non-conventional threats, against which the RMA would have a limited impact. This new security environment has many new challenges that require the U.S. military to "transform" (the new Strategic Planning Guidance bins most of them under irregular, catastrophic, and disruptive challenges):

- **Asymmetric strategies by adversaries:** Most traditional nation states learned from the Gulf War that it would probably be fruitless to take on the United States in a conventional war. Instead, they can be expected to plan a wide array of "asymmetric" strategies to challenge and disrupt the United States:
    - Various unconventional anti-access strategies to deter any U.S. response in the first place—to include cruise and ballistic missiles and weapons of mass destruction.

- Information operations, especially network attack and psychological operations (PSYOP), terrorism, and counter-space.
- To fight not to win but rather fight not to lose in an attempt to outlast American and allied political will.
- Advanced dispersal and deception techniques that will only become more sophisticated in the future. These include hardened facilities, deception and masking (mock-ups and camouflage), urban operations, and frequent movements under the cover of night and adverse weather.

- **Non-state adversaries:** Many of America's future adversaries probably will not be traditional nation-state militaries using conventional forces. Instead, they will likely be non-nation-states such as terrorists, drug lords, insurgents, or guerilla groups. The United States must develop new concepts of deterrence for these "irregular" adversaries, for whom traditional concepts of deterrence do not apply.
- **Increased peace operations:** The need to maintain stability in failed states has greatly increased—prompting the increased demand for peace operations, which require an array of "non-conventional" capabilities.
- **New technologies available to adversaries:** Potential adversaries are also exploiting rapidly advancing "breakthrough capabilities" that could be used to usurp and disrupt American power. Key examples include deep strike and intelligence, surveillance, and reconnaissance (ISR); whose costs are declining overall; making them more accessible. The proliferation of chemical, biological, radiological, nuclear, and high explosive (CBRNE) weapons has also made their technology and techniques more accessible and enable adversaries to achieve catastrophic effects on the United States. In addition, rapid advances in biotechnology, nanotechnology, genomics, and other advanced sciences will produce a host of potential threats in the future.
- **The diminished protection of geographic distance:** As the 11 September 2001 terrorist attacks in New York and Washington graphically illustrated, the United States homeland is under significantly increased threat. Addressing such potentially catastrophic threats will require major changes both within the military and within the civilian population of the United States itself. Defending against these new threats will require greater time and perseverance than most Americans are used to enduring. Units and capabilities with primary warfighting missions could be dual-tasked to support homeland security (HLS) missions, thereby adding some level of risk to DoD's ability to conduct deployed combat operations successfully. The ability of U.S. forces to deploy in the face of homeland attacks is an additional concern. DoD's role in HLS must also be carefully weighed against existing national laws and policies limiting DoD's participation in domestic law enforcement and intelligence gathering.
- **Unpredictable threats:** Overall, the threats the United States faces today are somewhat unpredictable in both substance and location. America must be prepared to cope with a wide range of threats across the entire spectrum of conflict.

- **Reduced access to forward bases:** Future conflicts can occur without advance notice or in regions with limited or no access. The United States will require the ability to immediately bring organic capabilities to respond to crisis and to successfully conduct operations.
- **Changing nature of coalition operations:** During the Cold War era, U.S. defense planners counted on the capabilities provided by formal alliance partners in most circumstances. While those formal alliances will remain critical to future planning, recent operations have shown that the number, composition, and *ad hoc* nature of future alliances are more uncertain. Also in contrast to the Cold War, allied contributions may be, with significant exceptions, better measured in terms of political support and access to facilities than in combat capabilities.

To deal with this new security environment, the United States must refine its capabilities from a force designed only to fight high-intensity conventional battles to a force prepared to face a wide range of future contingencies across the spectrum of conflict.

Defining Transformation

Both of these views of transformation make valid points and are not mutually exclusive. Whether they constitute an actual revolution or not, rapid advances in technology are enabling significant increases in military capability that will continue to profoundly change the conduct of conventional warfare. At the same time, the security environment is dramatically different since the fall of the Soviet Union, and the U.S. military must adapt in ways beyond the scope of the ongoing RMA to address a broad and rapidly growing array of non-conventional threats.

The TPG provides this definition of transformation: *"Transformation is a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people, and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world."*

The TPG adds that *"shaping the nature of military competition ultimately means redefining standards for military success by* ***accomplishing military missions that were previously unimaginable or impossible except at prohibitive risk and cost.*** *The U.S. military understands current standards for success because it trains to exacting standards in the most realistic fashion possible. From this baseline, we can compare and assess new operating concepts that employ new organizational constructs, capabilities, and doctrine for achieving military objectives and determine whether they are sufficiently transformational to merit major investments.* ***Eventually such efforts will render previous ways of warfighting obsolete and change the measures of success in military operations in our favor.***"

The DoD goal of transformation, according to the TPG, is to produce military forces capable of the following types of operations by the end of the decade:

- Standing joint force headquarters will conduct effects-based, adaptive planning in response to contingencies, with the objective of defeating enemy threats using networked, modular forces capable of distributed, seamlessly joint and combined operations.

- U.S. forces will defeat the most potent of enemy anti-access and area-denial capabilities through a combination of more robust contamination avoidance measures, mobile basing, and priority time-critical counterforce targeting.
- U.S. forces will leverage asymmetric advantages to the fullest extent possible, drawing upon unparalleled C4ISR capabilities that provide joint common relevant operational situational awareness of the battlespace, rapid and robust sensor-to-shooter targeting, reachback, and other necessary prerequisites for network centric warfare.
- Combined arms forces armed with superior situational awareness will maneuver more easily around the battlefield and force the enemy to mass where precision engagement capabilities may be used to maximum effect.

To more directly scope its transformation efforts, the Air Force developed the following working definition of combat transformation that addresses both perspectives on transformation discussed earlier while remaining consistent with the TPG's definition and guidance:

> *A process by which the military achieves and maintains advantage through changes in operational concepts, organization, and/or technologies that significantly improve its warfighting capabilities or ability to meet the demands of a changing security environment.*

Several clarifications of the Air Force's view of combat transformation are important:

First, true transformation is not the result of a one-time improvement, but of sustained and determined effort across a broad range of areas. Each area has a starting and ending point and is at a different stage of development, but is focused on contributing to and improving the whole. The Flight Plan provides a "snapshot in time" of these areas.

Second, the Air Force believes that meaningful transformation requires integrating its expanding capabilities with those of the other Services and non-military elements of national power. Air Force transformation cannot occur in a vacuum (see Chapter III for more discussion).

Third, transformation is not just new "gee-whiz" technologies. New, revolutionary technologies won't significantly improve military capabilities if they are squandered serving obsolete concepts of operation or organized poorly. In addition, it is also true that transformation does not always require new systems. Legacy systems can be used in new ways to create transformational effects. Therefore, transformation usually combines new or existing technology with some or all of the following to create transformational *effects:*

- Adapting existing capabilities and using them in new ways
- Changes in how the military is organized that increase its effectiveness
- Changes in military doctrine and CONOPS, to include training, tactics, techniques, and procedures that determine force deployment or determine the way forces are led or interact with each other to produce transformational effects

Fourth, it may not be possible, necessary, or desirable to transform the entire U.S. military at once. Historically, transformations involve less than the entire force. Attempting to transform the entire force at once may be risky if the assumptions about the future threat turn out to be incorrect. The wrong type of force, totally incapable of meeting actual threats, may be the result. In addition, so-called "legacy" forces remain very relevant in effectively addressing the future security environment.

Fifth, transformation should not be achieved at the expense of conducting current vital operations in support of the DoD Defense Strategy, maintaining adequate readiness and infrastructure, conducting critical recapitalization, and attracting and retaining quality personnel. There must be a careful balance between these requirements, which compete for limited resources. While ongoing and planned transformation efforts within the Air Force are significantly improving DoD's ability to achieve this strategy and to do so with smaller forces, it is critical that the Air Force (and other Services) maintain significant "legacy" forces in order to execute the Defense Strategy effectively and provide critical capabilities that will remain relevant into the foreseeable future.

The Air Force must also transform while continuing on or moving to a recovery path in critical areas affecting its people, including morale and quality of life. Transformation is not possible without:

- Recruiting, training, educating, and retaining a diverse mix of people who exhibit the broad skills, intelligence, and personal qualities consistent with the core values of the Air Force needed to respond to the dynamic challenges of the 21st century.
- Ensuring an adequate quality of life that effectively sustains Air Force members and their families.

Sixth, not all change is transformation. Distinguishing between transformational and non-transformational efforts, however, is difficult and at the heart of the debate over defining transformation. Transformational efforts, whether they are programs, concepts, or organizational adaptation, should result in significant improvements in warfighting capabilities or the ability to address new threats. Not all efforts achieve that.

Unfortunately, there is no one quantitative metric or framework that allows us to say, "Above this line, a program, concept, or organizational change is transformational and below this line, it is not." Is a technology that gives the military five times more capability in a certain area transformational and one that provides four times more capability not transformational? This even assumes that transformational capabilities are quantifiable at all. Such metrics assume that transformation only comprises significant improvements in existing capability. This ignores the fact that many transformational efforts are geared to adapting to a post–Cold War security environment, which does not always require improvements in the same existing capability, but may require different, altogether new types of capabilities that are not comparable to the status quo. In the end, determining what is transformational comes down to qualitative judgment calls by informed senior leadership based on a set of agreed upon standards.

The Air Force prefers focusing on transformational *capabilities* and *effects* rather than transformational programs or technologies because a new technology or program often

must be combined with a new concept of operation and/or organizational change to produce a "transformational" effect or capability. For example, at the beginning of World War II, the French had more and better tanks than the Germans. However, the Germans combined their tanks with a new concept and organization (*blitzkrieg*) and other new systems (such as the dive-bomber) to produce a transformational effect that revolutionized warfare at that time.

To determine what to include in the Flight Plan, the Air Force first developed a list of capabilities consistent with the definition and discussion of transformation in this chapter it believes are necessary to achieve the TPG, the six critical operational goals of transformation from the 2001 QDR (known as the "QDR-6"), Air Force CONOPS, and the Air Force Vision. The Air Force then identified those key new programs, ACTDs/ATDs, and future system concepts being explored through S&T and/or experimentation efforts that will/would likely enable those transformational capabilities when combined with new CONOPS and/or organizational changes. However, it must be emphasized that these lists are subject to change as the Air Force CONOPS evolve and/or if future CRRAs derive a different answer (see Chapter VI).

Seventh, transformation requires new levels of cooperation and collaboration between historically isolated communities or "tribes" within the Air Force. The speed and agility with which the Air Force must react to emerging threats means that the Service can no longer afford to sequentially move the development of new capabilities from one function to the next. The Air Force must work in parallel and constant collaboration to move promising technologies from the lab to the warfighter as quickly and efficiently as possible.

Eighth, it is important to stress that transformation is not only about changing the way the military fights. The term is also applied to changing how the military does business (see Chapter VIII) and how it works with other instruments of national power and America's allies.

III. Enhancing Joint and Coalition Warfighting

"The foundation of our success [in Iraq] can be found in two simple concepts: teamwork and trust. This was a truly joint and coalition warfighting effort from planning to execution. Air, ground, maritime, and space forces working together—at the same time for the same objective—not merely staying out of each other's way—but orchestrated to produce a decisive outcome."

–Dr. James Roche, Secretary of the Air Force

"It's going to get better when we understand that the buzz words of this decade [are] integration [and] persistence….We've got to learn to think in terms of integration [so that we] end up with a cursor over the target, and we are indifferent to how we got there."

–General John P. Jumper, Chief of Staff, United States Air Force

Transformation must be a joint effort if it is to succeed. The teaming of all DoD assets in ways the adversary cannot imagine and to which it has no response is a key cornerstone of the U.S. military's advantage. The biggest imperative is to continue to "close the seams" among the Services to provide the joint commander the most effective capabilities for a given situation, regardless of which Service or combination of Services contributes those capabilities. This chapter briefly describes how today's air and space forces support ground and naval forces, and vice-versa, as well as some key initiatives between the Air Force and the other Services to improve joint operations. It then discusses the development of new joint concepts and outlines how the Air Force is building its concepts to support them.

The Air Force and the Joint/Combined Team

The Air Force puts a premium on joint enablers. In fiscal years (FY) 2004–2009, the Air Force will spend 23 percent of its Total Obligation Authority on joint combat forces such as close air support fighters and gunships, loitering indirect fires, and advanced air-to-ground munitions. It will also spend 41 percent on critical joint force enablers such as air and space C4ISR, airlift, and tankers.

Critical support capabilities that cross Service lines greatly enhance the effectiveness of the joint team as a whole. For example, air and space power help create the conditions for rapid deployment and survivable engagement of ground forces:

- Air power provides air superiority to prevent air attacks on ground forces, lines of supply, and logistics sites.
- Air power prevents an adversary from massing armored forces, which are the most dangerous threat to dispersed ground forces.
- Air power delays, disrupts, and destroys follow-on forces.
- Air and space assets provide persistent, adverse-weather fire support to light forces using new through-weather precision weapons. This allows ground forces to lighten-up and improve responsiveness by reducing pressure for early deployment or organic deep strike assets.
- Air power strikes enemy long-range strike systems threatening ports and airfields to permit the accelerated delivery of ground forces.
- Air Force air and space C4ISR capabilities provide situational awareness, battlespace communications, and precision targeting capability, and are the primary source for critical weather and environmental information for the warfighter.
- Mobility Air Force provides rapid insertion and sustainment of ground forces.

Ground forces, in turn, provide critical support to air power (and the Air Force specifically):

- Ground forces can compel enemy ground units to mass, thus providing lucrative targets for air strikes.
- Ground forces provide accurate targeting data on mobile ground forces, enabling more lethal air strikes.
- Ground forces protect key areas supporting Air Force fighters, mobility, and ISR assets.
- Ground forces provide long-range fires to increase theater firepower and confront adversaries with multiple threats.
- Ground forces take and hold ground.
- The Army provides significant logistics support to the Air Force.
- The Army provides theater ground-based air defense through surface-to-air missiles (SAMs) and Patriot missile defense.
- The Army provides support for consequence management activities that may occur on an airbase.

Air Force and naval forces are mutually reinforcing and enhance each other's effectiveness while allowing each to focus on its individual strengths:

- Land-based air can deploy to provide presence in areas where naval forces are not available.
- The Air Force can assist the Navy in countering maritime anti-access threats. For example, bombers can "take down" large shore-based target complexes to allow naval forces to focus on other vital missions, strike mobile anti-ship cruise missile launchers to reduce the threat to the fleet, and allow aircraft carriers to deploy closer and increase sortie rates or deliver mines to bottle up enemy fleets on shore.
- The Air Force can enhance the survivability of naval air power by taking down airfields with "mass precision" and/or degrading enemy SAM threats.
- The Air Force greatly augments naval precision strike capabilities by adding tremendous punch to on-scene naval forces and providing, among other capabilities, stealth assets and penetrating weapons delivery against hard and deeply buried targets. This enables the joint commander to combine air and naval power to conduct continuous strikes around the clock across the breadth of the theater.
- Air Force refueling systems increase the range and on-station times of naval aircraft.
- Air Force ISR systems provide broad theater situational awareness to naval forces.
- Air Force space assets provide situational awareness, precision targeting, weather, and environmental information and support inter/intratheater communications.

Naval forces support both air power in general and the Air Force specifically in the following ways:

- Naval forces provide air forces with an enhanced ISR picture via maritime ISR assets.
- Carrier-based air power supports Air Force bomber operations and protects ISR orbits prior to achieving forward bases in theater.
- Naval electronic warfare and jamming assets greatly enhance Air Force survivability
- Sea-based theater missile defense protects Air Force theater bases.
- Tomahawk Land-Attack Missiles executing Suppression of Enemy Air Defense (SEAD) missions enhance survivability of Air Force systems.
- Combined naval and air systems complicate enemy air defenses by diversifying the method, time, and geographic space of U.S. strikes.
- The Coast Guard and Navy protect vital Air Force space assets associated with the Eastern and Western Ranges and associated facilities.
- Naval forces support sea launch operations and sealift requirements.
- Naval forces protect sea lines of communication essential to Air Force in-theater logistics operations.

Coalition forces support the U.S. Air Force in numerous ways. Some examples include:

- Providing complementary and/or redundant combat capabilities as a force enhancement or to decrease the requirement for Air Force resources.
- Providing overflight, landing rights, enroute support, and base usage allowing Air Force access to the fight.
- Leveraging technological advances by partner nations to increase coalition combat effectiveness through cooperative development programs.

The Air Force has been working closely with the other Services and U.S. Allies to further improve joint and coalition warfighting in various areas. Some examples include:

- **Air Component Coordination Element (ACCE).** During Operation IRAQI FREEDOM (OIF), an ACCE team was located within each component's force headquarters (land, maritime, and special operations) to allow the air component to better integrate air and space power with the operations of the other components.
- **Army-Air Force discussions on improving cooperation.** The Air Force believes its future is closely tied to the future of American land forces and wants to demonstrate its strong commitment to air-to-ground support. The Air Force intends to fully integrate with all land forces and develop evolving joint air-ground doctrine, tactics, techniques, and procedures. The Air Force and Army are working to improve air support to ground forces in a number of forums: Air Force Task Force Enduring Look, Air Force Doctrine Symposium III, Center for Army Lessons Learned and Air War College Lessons Learned, Joint Combat Air Support Executive Steering Committee, the Combat Air Support Summit, and the Army-Air Force Warfighter Talks. As a result, various actions were agreed upon to resolve these issues:
    - Update Joint Pub 3-09.3, "Joint Tactics, Techniques, and Procedures for Close Air Support"
    - Validate the time-phased force and deployment data (TPFDD) to include associated units
    - Provide Army Tactical Missile System fire support to the Joint Force Air Combat Commander
    - Provide greater support to special operations forces (SOF)
    - Develop a Joint Air Liaison Element concept
    - Improve liaison office manning, training, and teamwork
    - Install common, interoperable software
    - Develop a joint simulator requirement for combat air support
    - Strengthen joint training
    - Have Battalion Air Liaison Officers attend the Army Battle Staff Course
    - Identify command and control integration and training improvements

- **Army–Air Force Transformation Symposium.** In addition, the two Services recently held an Army–Air Force Transformation Symposium to jointly address the close-air support issue as well as urban operations and forcible entry over strategic distances.
- **Warfighter Talks.** The Air Force also holds regular senior-level Warfighter Talks with each of the other Services to improve joint operations.
- **Joint base protection efforts.** The Air Force is coordinating its Integrated Base Defense and Force Protection effort with OSD's Project Guardian, of which the Army is the Executive Agent.
- **Joint CBRNE Working Group.** The Air Force and the Marine Corps created this group to determine innovative solutions to common C-CBRNE operational requirements. In addition, the Air Force and Navy have shared knowledge and mitigation strategies against CBRNE effects when the Navy's air assets are land-based.
- The **Improved Data Modem** will provide critical Joint Surveillance Target Attack Radar System (JSTARS) data to Army Apache attack helicopter gunships, which will dramatically reduce the kill chain timeline for air-to-ground targeting. The JSTARS mission crew will be able to provide moving ground target indicator data directly into the cockpits of over 500 Apaches as well as the Air and Space Operations Center over satellite communications radio.
- The **Joint Unmanned Combat Air System Office** was stood up on 1 October 2003 to address Air Force and Navy unmanned combat aerial vehicle (UCAV) issues. This joint office will create standards that will allow UCAVs to be built along common lines with the hope of decreasing costs while retaining interoperability.
- **Joint command and control.** As also discussed in the Joint Transformation Roadmap, the Navy, Marines, and Air Force are collaborating to synchronize development of FORCEnet and the Command and Control Constellation.
- **Joint wargames.** Air Force participation in OSD, Joint Staff, and other Service and joint wargames explores the potential synergy of emerging joint concepts. Please see Chapter IV for details.
- **Joint space operations.**
  - The Air Force's **Joint Warfighting Space** initiative will provide the Joint Force Commander with a dedicated, on-call, rapid reaction, networked space capability that is integrated with other existing National Security Space systems.
  - The Air Force has increased the unity of effort with the National Reconnaissance Office to bring a joint perspective to its role as the DoD's Executive Agent for Space.
  - The Air Force has fostered enhanced civil-military integration between Air Force Space Command, the Intelligence Community as well as the Civil Space Community.
- **Joint special operations.** As recent operations have powerfully demonstrated, SOF are playing a much larger role in the types of operations the United States must

conduct in the current and future security environment. During OIF, 1,400 SOF operators working with airpower paralyzed eleven Iraqi divisions. Not only did they virtually "hold terrain" with a minimal footprint, but they also ensured that the Third Infantry Division's drive to Baghdad was significantly easier than it would have been had those Iraqi divisions moved south. In addition, U.S. forces created a unique command relationship in the counter-SCUD part of operations in Iraq in which the Combined Force Air Component Commander was the supported commander and the Special Operations Task Force commander provided the human sensors to identify targets, control attacks, and assess results. Key to their success was the fact that these special operations were very joint in nature.

- **Joint urban operations.** The Air Force recently conducted a two-part forum to explore air power's role in future joint urban operations. The forum formed the basis for the ongoing development of a new Air Force urban operations concept of operation. The Air Force is also participating in the ongoing development of the new Joint Urban Operations Enabling Concept.
- **Security cooperation strategy.** The Air Force Security Cooperation Strategy is consolidating Air Force security cooperation goals and objectives and guiding the Air Force.
- **Helping U.S. allies and potential coalition partners to transform.** As the Air Force continues to transform its capabilities, it risks leaving behind the air forces of key allies and potential coalition partners. This capabilities gap increases the difficulty of conducting future coalition air operations, as it may undermine interoperability and integration. To alleviate this, the Air Force has sought opportunities to help transform our allies. Examples include:
  - **Italy:** The Italian Air Force has developed a "Transformation Plan" through 2020 that includes developing a new expeditionary force structure focusing on network centric operations. The U.S. Air Force is assisting in developing both force structure and capabilities to match identified requirements. The Italian Air Force's advancements with the F–16 Air Defense variants and as a Joint Strike Fighter Level II partner support the U.S. Air Force's Air and Space Superiority and Global Strike transformational capabilities, while its acquisition of the C–130J and KC–767 supports the U.S. Air Force's Global Mobility requirements. The Italian Air Force is also simultaneously improving the capabilities of its ISR constellation through acquisition of Predator systems, Link–16, and a potential Airborne Warning and Control System to improve ISR and interoperability.
  - **Poland:** The U.S. Air Force is assisting the Polish Air Force in its transformation from a Warsaw Pact orientation to a North Atlantic Treaty Organization (NATO) ally and coalition partner. The Air Force Transformation Initiative, the air component of the Defense Transformation Initiative agreement between the Secretary of Defense and the Polish Minister of National Defense, is using the recent sale of 48 F–16s to Poland as the springboard for a strategic campaign of military-to-military events between the U.S. and Polish Air Forces designed to transform both line units and headquarters. The U.S. Air Force has also offered the Polish Air Force a program for five C–130K aircraft (previously owned by the United Kingdom) and all associated upgrades and logistics support.

If accepted, this program will provide a critical tactical airlift capability Poland was not previously able to provide itself or other NATO partners.

- **Turkey:** Turkey has committed to acquiring four advanced Airborne Early Warning and Control aircraft, and the U.S. Air Force is ensuring it will be interoperable with U.S. and NATO Airborne Warning and Control System capabilities to support NATO and coalition air operations. Similarly, the U.S. Air Force is initiating an effort to modernize Turkey's F–16 program to full U.S. and NATO compatibility, to include participation in the U.S. Air Force Common Configuration Improvement Program.
- **United Kingdom:** The U.S. Air Force is assisting with the transformation of the United Kingdom's Royal Air Force as it progresses from being interoperable with U.S. forces to becoming increasingly integrated with U.S. forces. Instead of maintaining the capability to fight large, nation-on-nation wars alone, the United Kingdom will fight such a war only in partnership with the United States. With U.S. Air Force assistance, the Royal Air Force is exploring expanding the range of capabilities of its four C–17 airlifters (to include the provision of Night Vision Devices), installing Large Aircraft Infrared Countermeasures, and potentially increasing the size of the fleet. The Royal Air Force has also established the requirement for a national long-range, all-weather theater surveillance and target acquisition system known as the Airborne Stand-Off Radar. The U.S. Air Force is ensuring interoperability between JSTARS and the Airborne Stand-Off Radar in alignment with the Information Superiority transformational capabilities in Chapter VII.

Working with other joint force elements, Air Force capabilities enable and accelerate joint force power projection operations in the new security environment. The mobility and swiftness, stealth, precision, and range of the Air Force, working with the dramatically enhanced capabilities of the Army, Navy, and Marines, have already paid huge dividends in recent operations. The Air Force is committed to expanding its contributions to the joint fight by fully integrating with land forces, delivering operational space support to the combatant commanders, expanding its sensing portfolio and global mobility capabilities, reorganizing the numbered Air Forces, and preserving its long-range strike capability.

New Joint Concepts

To further enhance joint operations, the TPG has directed the Joint Staff to develop new joint concepts to translate strategic guidance into the capabilities required by the joint force in 2015. This effort entails several different categories of joint concepts:

- The **Joint Operations Concept** (or JOpsC) is the overarching concept document that sets the overarching framework for development of joint capabilities within the JOCs.
- **Joint Operating Concepts** (or JOCs) articulate how a Joint Force Commander will plan, prepare, deploy, employ, sustain, and redeploy a joint force specified within the range of military operations. They guide the development and integration of Joint Functional Concepts and Service concepts to describe joint capability as well

as experimentation. There are currently four JOCs: Major Combat Operations, Stability Operations, Strategic Deterrence, and Homeland Security.

- **Joint Functional Concepts** (or JFCs) integrate a set of related joint capabilities required to accomplish tasks across the range of military operations. They derive specific context from the JOCs and promote common attributes in sufficient detail to conduct experimentation and measure effectiveness. There are currently five JFCs: Battlespace Awareness, Command and Control, Force Application, Focused Logistics, and Protection.
- **Joint Integrating Concepts** (or JICs) focus on a single operation from the range of military operations or a single domain to provide detailed required capability descriptions, identify essential tasks with measures of performance and effectiveness, inform Service concept development and joint experimentation, and link concepts to investment decisions. There are currently three JICs under development (Joint Forcible Entry Operations, Joint Undersea Superiority and Seabasing) with several more to be added each year through a formal selection process.

Appendix D briefly describes each JOC that has been vetted through the Services and the Joint Staff by the time this document was submitted to OFT and shows how the Air Force transformation efforts highlighted in this document will enable or significantly improve the capabilities required by those JOCs.

The Air Force recently provided its Major Combat Operations (MCO) future joint warfighting perspective in JFCOM's *Pinnacle Impact '03* discovery experiment. The Air Force concept, Decisive Coercive Operations, goes beyond the current Air Force CONOPS to the 2018 timeframe and integrates joint capabilities as defined in the JOpsC. The concept rests firmly on coercion theory and attempts to prevent conflict by using decision superiority, assured access, persistent dominance, and the Warfighting Headquarters (see Chapter V) to favorably influence regional, state, and non-state actors. If conflict erupts, the concept uses mechanisms to quickly engage and bring order before events spin totally out of control. Unlike many other Service concepts, Decisive Coercive Operations is a joint approach that incorporates not only military force, but also all instruments of power to influence decisions and bring compliance.

As noted in Chapter IV, the Air Force is co-sponsoring one of its Title 10 wargames with JFCOM and is featuring the lead JOC—Major Combat Operations—as the first of six game objectives. Insights and observations from this game regarding the "soundness" of the MCO concept should help identify if there is enough detail in that warfighting construct to permit identification and prioritization of transformation requirements both inside the Air Force and the defense program. The other three JOCs have also been discussed and assessed.

As joint concepts are developed, Air Force concepts will follow suit to underpin and support them. The Air Force has been deeply engaged in the JOC development. It has worked hard with both JFCOM and the Joint Staff to shape and integrate the Air Force CONOPS, described in Chapter VI, into the JOCs and ensure the Air Force CONOPS will contribute to the required capabilities in those JOCs.

IV. Innovation: Turning Transformational Ideas into Reality

"It is our strength that we unlock the intellectual potential that resides in those who can think across the dimensions of air and space, of manned and unmanned. If we can do this, it is true transformation."

–General John Jumper, Chief of Staff, United States Air Force

Transformation demands innovative thinking and processes that can identify, examine, and turn bright ideas into reality—whether it is a new technology, concept, or a new way to organize. This is a key part of the Air Force core competency of turning vision into tools for the warfighter. The purpose of Air Force innovation is to rapidly assess and implement new ideas, concepts, and technologies to field the best capabilities to the warfighter while also improving the associated doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF). Air Force innovation must be continuous and comprehensive as the Service moves into the future.

Sources of Air Force innovation are numerous and come from senior leadership all the way down to junior Airmen. They come from within the Air Staff, the Secretariat, MAJCOMs, operational units, support organizations, professional military education, academia, S&T research, and the entire defense community. Specific programs often come from lessons learned following combat operations, where a certain capability or effect was crucial but not available.

Before discussing the specific details of Air Force transformation in the remainder of the Flight Plan, this chapter briefly discusses the processes the Service uses to conceive and examine new ideas and turn them into reality.

The Innovation Panel

It is essential that an advocate champion a bright idea, whether a management or operational concept or a new system, to ensure transformation occurs. The Innovation Panel performs this role by supporting the corporate resource allocation process within defined Air Force mission and mission support areas. Its portfolio is a subset of program elements, programs, and activities such as battlelabs and S&T that drive, enable, or enhance Air Force innovation.

Science and Technology Development

The **Air Force Research Laboratory and product centers** support the innovation process with emerging technologies. The laboratory works closely with operators and strategic planners to link research activities with the Air Force's distinctive capabilities and future CONOPS. Six long-term challenges have been identified to focus Air Force efforts. The challenges are: finding and tracking, command and control, controlled effects, sanctuary, rapid air and space response, and effective air and space persistence. S&T development will also identify solutions that improve or enhance the Service's ability to provide Agile Combat Support to the warfighter, such as reducing the deployment footprint and improving asset visibility and logistics command and control. Long-term S&T efforts are outlined in more detail in Chapter IX. The Air Force also maintains a close working relationship with various laboratories, civilian industry, and government agencies.

Air Force Battlelabs

The battlelab's mission is to rapidly identify and prove the worth of innovative ideas that improve the ability of the Air Force to execute its distinctive capabilities and joint warfighting. The overarching objective of battlelabs is to generate high pay-off initiatives with minimum cost and investment. Their output includes operations and logistics concepts whose worth has been proven, creating opportunities for the Air Force to impact organization, doctrine, training, requirements, or acquisitions. Battlelabs focus on near-term solutions (two to four years) to operational issues. The battlelabs are aimed at Air Force distinctive capabilities, both institutionally and operationally. Leveraging ongoing training and exercise investments, the battlelabs have a direct need for awareness and insight into all of the Air Force Warfare Center's activities. In addition, battlelabs identify ideas by interacting with Active, Guard, and Reserve forces; foreign military services; other operational and research agencies; and industry involved in operations, training, research, testing, acquisition, and logistics. The battlelab's ability to freely interact with these agencies is critical to achieving its mission. The battlelabs draw upon the expertise and resources of other Air Force organizations to rapidly generate, lend, or lease technical capabilities needed to demonstrate and measure the worth of promising operational concepts.

Advanced Technology Demonstrations (ATDs)

ATDs typically are integrated demonstrations conducted to demonstrate the feasibility and maturity of an emerging technology for both Service and joint use. They provide a relatively low-cost approach for assessing technical risks and uncertainties associated with critical technologies prior to incorporating these technologies into a system entering the formal acquisition process. ATDs are selected by the Applied Technology Council consisting of the commander of the laboratory, commander of the product center, and the vice commander of the client MAJCOM. This selection process ensures the ATDs are focused on solutions that will facilitate a MAJCOM in achieving its mission. ATDs are managed and executed by the Air Force Research Laboratory.

Advanced Concept Technology Demonstrations (ACTDs)

ACTDs are designed to respond quickly to an urgent joint or Service military need. They employ available technologies, which frequently have been successfully demonstrated in an ATD. Under ACTDs, systems are designed, fabricated, and then demonstrated in realistic combat exercises to gain an understanding of the military utility of the system, to support development of the associated CONOPS, and to place a limited but demonstrated capability into the hands of the warfighter at the conclusion of the ACTD without jeopardizing the warfighter's safety or effectiveness. The Air Force leads several current ACTDs likely to play a significant role in providing transformational capabilities.

Agile Acquisition

Developing and fielding weapon systems in today's dynamic threat environment with rapidly evolving technologies demand changes to the process the Air Force uses to acquire those systems. Agile Acquisition is changing the way the Air Force delivers capability to the warfighter with two basic goals: to decrease acquisition cycle time and increase credibility in executing programs. The bottom line is to achieve effects on the battlefield with today's technology today rather than with yesterday's technology tomorrow. Achieving this aim requires collaboration among all the stakeholders in the acquisition process, to include the warfighter, funding, engineering, test, S&T, program management, industry, contracting, sustainment, and others.

The Air Force and DoD began this transformation with complete revisions to the directives governing acquisition. The governing principles include encouraging innovation and flexibility, permitting greater judgment in the employment of acquisition principles, focusing on outcomes vice processes, and empowering program managers to use the system versus being hampered by over-regulation. Development and delivery of integrated capabilities require the flexibility to use innovative approaches such as spiral development or evolutionary acquisition where capabilities are developed or delivered to the field incrementally. The warfighter gets products delivered quickly, and the acquisition team has the opportunity to infuse emerging technology into the system.

Ongoing efforts in Agile Acquisition include continuing the development of a collaborative requirements process, a seamless verification process, and a focused technology process. First, a collaborative requirements process will demand that the warfighter, acquirer, and tester work as one team at the outset and throughout the development or a weapon system. It is imperative to begin with a CONOPS (which will evolve) and then define requirements, with the engineers and scientists helping the team understand the risks and the cost drivers of the current and/or evolving technology. Second, a seamless verification process will necessitate the merger of developmental and operational tests into complementary, synergistic activities. Third, a focused technology process will target limited science and technology resources on programs that directly support warfighter capability needs. Collaboration with the science and technology community will bring more mature technologies into programs, adding to capabilities and avoiding delays.

In addition, the **Warfighter Rapid Acquisition Program** continues to serve as a means of accelerating the development and fielding of successfully demonstrated initiatives resulting from innovation. This program competitively selects proposals and provides funding for up to two years to cover the time between project selection and when sponsor funding may be obtained in the subsequent POM submission.

To ensure Agile Acquisition concepts are incorporated in all programs across the Air Force, the Program Executive Officers (PEO) were vested with the accountability for all acquisition programs and with the resources to execute the programs. Previously, these officers were in Washington, DC, while the programs were largely executed at product and logistics centers. The commanders at the product and logistics centers owned the resources in the program offices and oversaw smaller acquisition programs. Now, the PEO/Aircraft; PEO/Command, Control, and Combat Support; PEO/Space; and the PEO/Weapons are dual-hatted as both PEO and the Product Center Commander. The PEOs oversee all acquisition programs at the product and logistics centers, leaving the logistics center commanders free to focus on the sustainment of weapon systems.

Credibility is the key to Agile Acquisition. A collaborative approach between warfighters and acquirers in continuously performing risk management will be essential. Both the acquisition and requirements communities recognize the need to continually engage in expectations management so that users and acquirers will remain in sync on all cost, schedule, and performance issues and program surprises will be reduced. Eventually, risks will drive cost, schedule, and performance tradeoffs. Collaboration is essential to trade off non-critical elements in the program and buy down risk.

Air Force Tactical Exploitation of National Capabilities (TENCAP)

The Air Force TENCAP mission is to increase warfighter awareness and tactical use of national and other space systems through rapid prototyping and assisting in the identification and definition of possible warfighter application of emerging technologies and concepts. Air Force TENCAP is a non-traditional acquisition program that rapidly prototypes projects, validates proofs of concepts, and demonstrates capabilities and transitions them to the warfighter or to an appropriate System Program Office for further development and fielding within the operating forces. Air Force TENCAP also influences the development of emerging technologies for tactical users by providing inputs into the capabilities and development cycle of national, military, commercial, and civil space systems. Air Force TENCAP executes this portion of the charter through coordination and participation in the development process for future systems with laboratories and agencies. A final mission area is the education and training of operational forces in emerging technologies and concepts developed by Air Force TENCAP. A critical need exists to properly educate the provider on required warfighter capabilities, as well as the environment of the operational user. Air Force TENCAP executes this portion of the charter by participating in combat or contingency operations, exercises, and project demonstrations worldwide.

Experimentation

Air Force experimentation is a discovery process that facilitates achieving the Air Force Vision; identifies innovative and revolutionary operations and logistics concepts; evaluates the concepts and associated capabilities; and provides feedback through the operational innovation process and into the Air Force Corporate Structure.

The remainder of this section addresses TPG guidance for the Service transformation roadmaps to describe how Service experimentation programs meet the TPG experimentation criteria (in bold below) and support OSD priorities for experimentation.

Scientific method and its role in U.S. armed forces achieving competitive advantages: The Air Force uses the scientific method in its experimentation process, using the research question of whether the technology or process has operational utility to warrant fielding.

Experimentation in exercises and operations and considerations for design, data collection, analysis, and sharing results: The incentive for participation in capability-based experimentation is the possibility of securing funding to actually field the capability and, thus, significantly improve warfighting. The focus on experimentation is on near- to mid-term solutions to operational issues and a look at a larger solution scope than the battlelabs. The Air Force conducts a variety of events and activities to investigate future operational concepts and desired operational capabilities. It also participates in large-scale field exercises and in both small- and large-scale field experiments, such as Joint Expeditionary Force Experiment (JEFX). Prototyping of capabilities occurs in limited objective experiments or in a series of spirals leading up to the main event.

Experimenting with virtual capabilities and threats to explore mid- and far-term transformational possibilities and experimentation with aggressive threats that include asymmetric capabilities, the possibility of technological breakthroughs, and span a variety of environments: As part of JEFX experiments, live-fly execution is conducted to validate the operational usefulness of experimental capabilities in a realistic environment. The Air Force leverages existing live-fly infrastructure at Nellis Air Force Base, Nevada, to execute the experiments in an efficient and safe manner and to combine live-fly, virtual, and constructive forces in an operationally realistic environment. JEFX applies air and space power in new and innovative ways to enhance Air Force distinctive capabilities and assess the operational utility of new concepts and capabilities. Virtual simulations such as Airborne Laser, F–35, and other futuristic capabilities can be part of JEFX modeling and simulation architecture, as required, to support desired scenarios.

The use of red teams operating at the tactical, operational, and strategic levels: Futuristic threats such as advanced SAMs and space and information operations (IO) capabilities, including red teaming, are incorporated into modeling and simulation and scenarios to explore and define future requirements.

Institute procedures and establish repositories for capturing and sharing lessons learned: After each JEFX, the Air Force Experimentation Office publishes a JEFX Final

Report and Final Briefing that captures the experiment lessons learned. Significant lessons learned are submitted to the Office of Air Force Lessons Learned through the Air Force Center for Knowledge Sharing and Lessons Learned in the Joint Universal Lessons Learned System format. The capabilities that perform successfully compete for JEFX Transition Funding and Warfighter Rapid Acquisition Program monies to get these capabilities out to the warfighter. For instance, the Master Air Attack Plan Toolkit participated in JEFX 02, was fielded, and aided the Air and Space Operations Center during Operation ENDURING FREEDOM. Experimentation also supports requirements, acquisition, training and education programs, and the strategic planning process. Experimentation results, or findings, consist of the best "value added" recommendations for changes in DOTMLPF required to achieve the Air Force Vision. Experimentation results illuminate and underpin corporate Air Force modernization decisions. The Air Force experimentation effort also leverages concepts and analyses from unified command, joint, DoD, Agency, coalition, and private sector experimentation and exercise programs for its planned, completed, and future events. For example, the Air Force experimented with its concept of Global Strike for the first time in JFCOM's Millennium Challenge 2002.

JEFX 04 will assess new operational concepts, processes, and technologies that fill capability gaps in the Air Force CONOPS and seams identified in Operating Enduring Freedom and Operation ENDURING FREEDOM. Focus areas for JEFX 04 are the three defining attributes of battle management command and control: network-centric infrastructure, Predictive Battlespace Awareness, and EBO. In addition, JEFX 04 will explore new operational processes and systems architectures to enhance Combined Forces Air Component Command—Combined Force Land Component Command synchronization and Coalition integration.

Advanced Process and Technology Experiment (APTX) 05 is a smaller-scale Limited Objective experiment that will address capability gaps in the Global Mobility CONOPS. Focus areas will include: Network Centric Operations for an Integrated and Responsive Air and Space Mobility System, Global Mobility CONOPS integration into the Deliberate Joint Planning Process and Data Passing and Fusion of Airfield Data from Multiple Sources to Facilitate Airfield Seizure and Base Opening. APTX 05 will explore closing the gaps to obtain some of the capabilities listed in the Global Mobility CONOPS using the network centric structure of the Constellation Net. JEFX 06 plans to build on the progress of JEFX 04 and APTX 05 with a Global Strike and Persistent Global Attack scenario.

Wargaming

Air Force wargames explore emerging and future operational concepts, capabilities, and doctrine to evaluate the Service's strategic plan and vision and refine the Air Force Capabilities Investment Strategy in order to determine how air and space power can better support the joint commander and integrate with the other Services.

In addition to conducting its own wargames, the Air Force also participates in other Service, OSD, and joint wargames, which provide excellent forums to highlight Air Force transformation initiatives and examine how modern air and space power contribute to

joint operations. Similarly, Air Force participation in OSD, Joint Staff, and other joint wargames explores the potential synergy of emerging joint concepts. Examples of Air Force participation in OSD/joint games include **Pinnacle Impact**, which is sponsored by JFCOM; the OSD **Transformation Wargame** series; and several other JFCOM wargaming events. Finally, there are several interagency efforts at varying classification levels that further augment and integrate the unclassified games. Wargame scenarios, concepts, and capabilities are conducted in future timeframes.

In support of a more coherent joint force, the Air Force has entered into a co-sponsorship with JFCOM for the latest iteration of its Global Engagement series of war games. Not only has the name of the game changed to reflect joint partnership—Global Engagement VII is now **Unified Engagement 04**—but also the game's objectives have been structured to feature the MCO JOC as the lead objective, with the other five game objectives (three of which are Air Force specific) supporting the exploration of the MCO. The exploration and refinement of Air Force concepts will both integrate into and inform the MCO JOC. It sets the example for "jointness" in other Title 10 war games. The Air Force has embraced this opportunity to influence the development of warfighting concepts and has worked hard to accommodate both Service specific and JFCOM objectives. This partnership is reflected in all aspects of the game: design, objectives, player participation, analysis, and post-game reporting.

The Air Force utilizes the **Futures Capabilities Game** to explore potentially transformational concepts more than 15 years beyond the current POM year. Set approximately a decade beyond Unified Engagement, the Futures Capabilities Game explores alternative futures and force structures to support strategic planning. The Futures Capabilities Game works within the context of the Administration's guidance and strategy to determine the Air Force capabilities most useful to the future joint force commander. Proponents of new concepts, capabilities, and emerging doctrine include these innovations in these war games to explore their future potential and raise their visibility.

Both Unified Engagement and the Futures Capabilities Game incorporate all six operational goals of transformation from the QDR in their play. Both games are played in a joint warfighting context using game players from OSD, the other Services, joint organizations, and coalition partners.

Space wargames bring together leaders and planners from the Services, the intelligence community, commercial space providers, and departments, agencies, and offices to explore the in-depth integration of space into the joint fight. These wargames explore space warfare issues in detail. They examine mission partner equities; generate insights for Air Force Space Command, Headquarters Air Force, and DoD transformation; and provide cadre- building by bringing together the best strategic and operational minds to focus on the future of space power.

The Air Force also participates in the **Focused Logistics Wargame**, which facilitates assessments of new technology, current and proposed joint logistics doctrine, and current and new Desired Operational Capabilities required to meet Joint Vision 2020 focused logistics challenges. The game's objective is to conduct joint logistics capability

assessments over the full spectrum of operations and to debate and resolve issues affecting future combat support capabilities.

To ensure that wargame players and other interested parties are on the "same sheet of music," the Air Force maintains the "Air Force Toolbox," a web-based database outlining the characteristics and capabilities of both current and future Air Force systems and system concepts. The Air Force is also exploring ways to strengthen the linkages between wargaming and Air Force/joint experimentation.

Modeling and Simulation (M&S)

The Air Force is working in conjunction with Joint Forces Command and the other Services to continue to improve modeling and simulation abilities to best serve the joint commander. The increased sophistication and robustness of modeling and simulation is enabling the creation of trade space for transformation in a low threat, yet realistic environment. The key for this to continue will be the definition and development of the **M&S Foundation** elements that allow for rapid scenario generation for various theatres of operations. Such scenario generation will allow for mission rehearsal, new capabilities testing, and course of action development. Creating the M&S Foundation will allow DoD to train tailored forces for any scenario imaginable.

In addition, the Air Force is using the DoD concept of **Advanced Distributed Simulation** as a tool to create an integrated Air and Space Warfighting M&S architecture that includes a totally interoperable joint synthetic environment. The Air Force M&S architecture will support analysis, acquisition, and training by linking together many types of simulations, from aggregate and detailed computer models, to pilots in live aircraft and simulators, to hardware components.

The joint synthetic environment will be a vehicle to develop future forces, concepts, systems, and doctrine where Air Force roles and missions will be appropriately and accurately represented. The Air Force integrated M&S system will be manned and supported by experts and will represent the joint environment. It will also be affordable and efficient through reusable simulations with plug-and-play modules that have interoperability with joint, Service, and civilian environments.

Training Transformation

Training is integral to Air Force core competencies and the critical enabler for military capabilities. The Air Force is engaged with the other Services, unified commands, and OSD in developing and implementing a training transformation plan. The TPG calls for capabilities designed to prepare individuals, units, and staffs for the new combat environment and to provide enabling tools and processes to carry out missions. As such, the Air Force supports the creation of a **Joint National Training Capability**, which will provide an environment for realistic joint exercises against aggressive, free-playing opposing forces with credible feedback. The objective is to train as the Air Force will fight and increase the joint context of exercises through live, virtual, distributed, and constructive environments. This involves not only modernizing the integration of space and information operations in training ranges, but also planning for their sustainment to

meet future test and training missions while implementing environmentally sound use and management to ensure long-term availability. Future training will also likely include an increased emphasis on close air support, special operations forces, urban operations, joint/coalition command and control, and sensor training.

Distributed Mission Operations is the cornerstone for Air Force training transformation supporting the DoD Strategic Plan for Training Transformation and supports Service level and Joint National Training Capability objectives. The objective is to train the way we intend to fight, enabling Air Force warfighters to maintain combat readiness and conduct mission rehearsal in an environment as operationally realistic as possible.

Distributed Mission Operations will provide complete integration of live, virtual, and constructive systems for training, mission rehearsal, and operations support in a theater of war environment—a capability not fully provided by current programs—and will enhance the kill chain by allowing the sensor-shooter links training time that is currently not available as a result of the Low Density/High Demand realities of the C4ISR assets. The realism achieved by this capability will further augment the commander's desire to "be inside the opponent's decision loop" and improve combat effectiveness.

Future military operations will be effects based, rely on increased warfighter use of integrated on-demand sensor information, required more responsive time critical targeting, incorporate a growing arsenal of precision weapons, and utilize expanded non-kinetic options, including information operations. The complexity of anticipated missions with this operational environment places a premium on adaptive planning and on readiness to conduct sustained and integrated operations within minimal theater-based logistics while delivering increased lethality, maneuverability, and survivability. These challenges necessitate a training revolution. Distributed Mission Operations, as the cornerstone for Air Force training transformation, will deliver it.

Central to the capabilities described above is the inherent need for Air Force personnel to possess the capacity to think and operate in a joint context. Towards that end, the Air Force will serve as a core partner in the implementation of a **Joint Knowledge Development and Distribution Capability** to ensure appropriate education and training resources are available to achieve desired effects in joint operations. This capability will also dramatically enhance the joint warfighter's ability to leverage knowledge and transform it into combat power.

The linkage between relational objectives within training transformation is the **Joint Assessment and Enabling Capability,** which will provide essential enabling tools and processes to support assessment processes for measuring the degree to which training improves joint force readiness, both individually and collectively.

Lessons Learned

The standup of a permanent **Office of Air Force Lessons Learned** is, in itself, a lesson learned. Historically, the Air Force stood up temporary task forces to track and exploit information gathered during major contingencies. Once the report was completed, the task force disbanded, the book was put on the shelf, and the lessons were left to be fixed

or forgotten as Action Officers left. Although the Air Force used a task force to collect lessons on recent operations in Iraq and Afghanistan, senior leadership recognized the immense transformational benefits to be gained by acting decisively on those lessons. As such, the Air Force created a permanent office of lessons learned to collect, analyze, track, and disseminate information and issues related to Air Force lessons learned until they are fixed or a conscious decision is made not to fix them.

Solutions to these lessons learned span the full spectrum of Air Force operations, including DOTMLPF. The Office of Air Force Lessons Learned will develop and provide the Service with the tools, techniques, and procedures needed to collect information on Air Force operations, exercises, training, and contingencies, and distill and vet them into actionable Lessons Learned. The Office also will provide direct input to the CRRA (discussed in Chapter VI) and POM processes to ensure lessons learned requiring material and programmatic solutions will be evaluated at the proper level and time to ensure lasting transformational change. This permanent Office will also provide the Air Force a direct and permanent conduit to JFCOM's joint lessons learned function.

V. Transforming Air Force Culture and Organization

New aircraft, advanced weapons, and an endless variety of technologically advanced gadgets gain a great deal of attention, but they are by no means the beginning or the end of the transformation effort. Equally important, if less glamorous, are the organizational concepts that capitalize on the technological advances and allow the Air Force to transform. In addition, the process of transformation begins and ends with people. One of the Air Force's primary core competencies, Developing Airmen, is defined by its senior leadership as the heart of combat capability. Only through the effective development of Airmen and the seamless integration of their capabilities into Air Force operations can the Service optimize air and space power. To ensure its ongoing transformation, the Air Force must also modify its culture and the processes by which it develops Airmen to be conducive to transformation and then adapt its organization to institutionalize this new culture. This chapter describes key organizational transformation efforts within the Air Force in these areas.

Air and Space Expeditionary Force (AEF)

Despite a thirty percent reduction in manpower over the past twelve years, the Air Force has faced an exponential increase in worldwide tasking. This has required significant changes in the way the Air Force trains, organizes, and deploys to support Joint Force Commander requirements. The AEF has been critical in transforming the Air Force from a threat-based, forward-deployed force designed to fight the Cold War to a capabilities-based force based primarily in the United States that is sufficiently flexible to conduct a wide range of operations throughout the world while accommodating the high operational tempo of today's contingency environment. It has also been essential in creating a mindset that embraces the unique characteristics of air and space power: range, speed, flexibility, and precision.

AEF rotational forces and forward permanent-based forces underpin the Air Force policy for providing global AEF presence. Scheduled and deployed in pairs, the AEF is the operational mechanism through which the Air Force allocates available forces to meet the combatant commander requirements for rotational forces. The AEF divides most Air Force Combat Air Forces and Expeditionary Combat Support resources evenly across five AEF pairs (for a total of ten AEFs). Each of the AEF pairs also includes associated Mobility Air Forces and Low Density/High Demand resources. In addition to the forces assigned to a particular AEF, the AEF calls upon enabling forces such as stealth, space, information operations, ISR, on-call bomber elements, and other Low Density/High Demand assets to provide combatant commanders with tailored forces possessing the capabilities required to execute the mission. Each AEF pair represents the Air Force capability to maintain a sustainable rotation of forces.

The AEF employs a 20-month cycle during which two AEFs are designated as lead for a 120-day "eligibility" period. During this period, the two AEFs are either deployed or on alert for daily, worldwide expeditionary tasking. The remaining eight AEFs are simultaneously engaged in maintaining readiness (e.g., training, or preparatory spin-up) and available to meet increased requirements.

When called upon, forces in the AEF pairs are organized in AEF task forces (AETFs) and presented to combatant commanders. Permanently forward deployed Air Forces in Korea are an example of a standing AETF (AETF 07). Forces for this AETF are postured in and sourced from the 10 AEF structure. Future AETF requirements, when activated, will be sourced from the alert AEF pair.

While Air Force combat forces cycle through deployment vulnerability periods, they sustain wartime readiness throughout the 20-month training and preparation cycle. The AEF cycle thus precludes the need for "tiered" readiness by allowing Air Force combat forces to remain current and capable for any contingency or operational plan. The first AEF cycle began on 1 October 1999 and lasted through 30 November 2000.

While ensuring necessary Air Force support for the Joint Force Commander, AEF cycles allow the Air Force and the Joint Force Commander a more predictable and stable environment in which to train, re-fit, and equip. In addition, AEF scheduling makes it more feasible for the Air Reserve Component forces to bring their essential contributions to bear by allowing them to plan absences from their civilian employment. This is a critical advantage of the AEF, as Air Reserve Component forces comprise nearly half of the forces assigned to AEFs and contribute the majority of forces for some mission areas.

Battlefield Airmen

The spectacular achievements of Airmen on the battlefield have been the key to applying transformational technologies and concepts through their "eyes on target" assessments for both counterland and global mobility missions. In addition to the Battlefield Airmen Modernization program, the Battlefield Airmen project will consolidate combat controllers, pararescuemen, combat weather, and Tactical Air Control Parties (and perhaps others) into a family of warfare specializations under a common organizational and training structure. This family of warfare specializations will strengthen the combat power these Airmen bring to the fight and provide for career-based, tailored Force Development.

Combat Aviation Advisory Squadrons

Theater strategies aimed at shaping the battlefield prior to the onset of crisis or war will be increasingly important as future battlefields become multinational with nontraditional coalition partners. U.S. Special Operations Command created a combat aviation advisory squadron to assist allies develop their airpower and associated combat support functional areas into a viable alternative to employing U.S. assets. Combat Aviation Advisors play a major forward presence and engagement role by shaping foreign aviation forces capabilities to develop their own internal defense capabilities and integrate them as key team players for coalition operations. They also assist U.S. combatant commanders

and civilian agencies in planning and integrating foreign aviation forces into theater campaign plans, contingencies, and other joint and multinational activities. These enhanced organic, regional airpower capabilities will add stability and thereby shape the environment and promote stability without the need to project a large U.S. force presence abroad. They also may provide U.S. access to bases if a crisis develops in the region. The Air Force is exploring options to significantly expand and enhance this initiative.

Combat Wing Organization

Based on lessons gleaned from expeditionary operations over recent decades, the Air Force created the Combat Wing Organization. The new wing organization allows commanders to fully develop within specific functional areas to plan and execute air and space power as part of expeditionary units, while also giving maintenance and support personnel focused career progression.

The new Combat Wing Organization establishes the Operations, Maintenance, Mission Support and Medical Groups. One of the key changes is the re-establishment of the Maintenance Group to focus effective use of maintenance resources. Another change is the Mission Support Group, which merges former support and logistics readiness groups and contracting and aerial port squadrons, as applicable. Within this group, the Air Force will hone expeditionary skills; to include personnel and logistics readiness, force protection, communications, contracting actions, bare base preparation, munitions and fuels site planning, and contingency beddown; and work with the joint system for load planning and deployment. Currently, all of these aspects exist in skill sets that no Air Force officer has in total. The new expeditionary support discipline will address this deficiency and provide Air Force officers the expertise in all aspects of commanding expeditionary operation to include organizing and operating in peacetime the way AEFs operate in theater. With this reorganization, each wing will now have one individual responsible for the full range of deployment and employment tasks - the Mission Support Group Commander.

This restructuring will retain the Operations Group. However, group commanders will become more active in the operational level of war. Squadron commanders will be role models for operators in the wings, ready to lead the first exercise and combat missions. Similarly, the Air Force will establish a maintenance group responsible for base-level weapons system maintenance and sortie-production rates. Like their operator counterparts, maintenance squadron and group commanders will be role models for all wing maintainers. As part of on-going medical transformation efforts, the Air Force will also develop options for consideration to enhance health service support.

Future Total Force (FTF)

The Air Reserve Components are critical partners in air and space operations. For example, 20 percent of AEF packages are comprised of citizen Airmen. Members of the Guard and Reserve fly 100 percent of Operation Noble Eagle Continental United States (CONUS) steady state fighter alert requirements, 66 percent of the tanker alert requirement and a significant portion of the command and control and airlift

requirement. The Air National Guard flies nearly half of all Air Force theater airlift missions, 43 percent of tanker missions, and 32 percent of fighter missions, while the Air Force Reserve flies 30 percent of all Air Force strategic airlift missions, 28 percent of rescue missions, and 23 percent of theater airlift missions.

Since the Guard, Reserve, and Active Duty seamlessly form integrated operational wings in combat, the Air Force is exploring this type of integration at home through FTF organizational constructs. Such integration allows the Air Force to include the Air Reserve Component in new weapons systems and emerging mission areas such as ISR and space to ensure they remain relevant as their legacy systems are retired. Furthermore, utilizing Guard members and Reservists in future weapons systems allows the Air Force to substantially increase crew ratios, which will maximize output of these high performance aircraft. Integration will also relieve stress on the Active Duty force and provide a cost-effective force multiplier. Finally, it will leverage the high experience levels of Air Reserve Component personnel and enhance retention of Airmen who have decided to leave active service, saving countless dollars in training expenses.

As of 30 September 2003, there were 18,631 Air Force Reservists assigned to associate units, including 59 Reserve Associate units, and 13,276 reservists serving in integrated roles as Individual Mobilization Augmentees and Active-Guard-Reserve. The creation of the Active and Guard "blended" unit, the 116th Air Control Wing at Robins Air Force Base, Georgia, was a truly transformational step taking integration to the next level. The 116th's involvement in Operation ENDURING FREEDOM was highly successful, with an initial deployment of over 730 personnel. Integrating at the 116th is just the first step.

The Air Force will, per the *Air Force Strategic Planning Directive for Fiscal Years 2006–2023,* develop options to better leverage all Air Force capabilities and expand Associate Unit programs and "Blended Wing" initiatives.

Human Capital Management Transformation

Underpinning the Service's new Total Force Development construct, the Air Force has embraced a new Personnel Vision and strategic plan to transform human capital management. The strategy integrates people with technology by defining required human capabilities and developing the right competencies in Airmen to meet mission requirements. Facilitated through organizational alignment, business process transformation and reengineered delivery systems, the manpower, personnel, and training communities are optimizing how the Air Force puts the right people in the right place at the right time with the most effective use of resources.

In the spring of 2003, the Air Force conducted three personnel vision and goal development sessions involving senior leaders of the manpower, personnel, and training community along with Reserve and Guard representatives. These discussions centered on the imperative to transform the Air Force personnel system to be agile and responsive to changing requirements while efficiently serving all Airmen. It was clear the personnel community needed to shift thinking from how to meet a given threat to thinking in terms of developing capabilities for warfighters. What emerged from these sessions were a new Personnel Vision and a Personnel Strategic Plan to achieve that vision.

The new Vision succinctly states the role of personnel professionals: Right People, Right Place, Right Time—America's Airmen Creating The World's Best Air Force. By renewing, developing, and sustaining the right people and having them at the right place ready to perform at the right time, Airmen create the world's greatest air and space power. This vision necessarily drives a new set of goals focused on a transformed view of the traditional personnel lifecycle, which forms the centerpiece of the new Personnel Strategic Plan.

The new Personnel Strategic Plan supports the President's Management Agenda, incorporates feedback from a recent General Accounting Office report, and is directly linked to the new Air Force core competencies. Accordingly, the effects-based strategy focuses on mission outcomes and required capabilities while optimizing the Air Force's return on investment in its people. This strategy also moves us from a regulatory-based construct to a performance-based construct where the measures of merit are successful mission outcomes. The new strategic goals focus on the effects of the personnel community's mission:

- **Define:** Implement a capabilities-based requirements system that meets surge requirements and optimizes force mix (Active Duty, Air Reserve Component, civilian, and contractors) to produce a flexible and responsive force.
- **Renew:** Maintain a diverse, agile workforce that leverages synergy between Active Duty, Reserve, and civilian components, as well as private industry to meet requirements and sustain capabilities.
- **Develop:** Synchronize training, education, and experience to continuously create innovative, flexible, and capable Airmen to successfully employ air and space power
- **Sustain:** Sustain required force capabilities through focused investment in Airmen and their families.
- **Synchronize:** Implement a robust strategic planning construct, understand Air Force investment in people, and link programming and legislative development to the plan.
- **Deliver:** Transform customer service by delivering a leaner, more cost-effective, customer-focused personnel services to support the Air Expeditionary Force.

Innovative Infrastructure Transformation

"The BRAC 2005 process is critical to the Air Force's ability to successfully meet our future mission needs. We must not only reduce the budgetary demands from excess infrastructure, but also ensure that the resulting infrastructure can effectively support projected missions as well as provide maximum flexibility and efficiency for the future."

–Dr. James Roche, Secretary of the Air Force

A key way the Air Force will transform its industrial age infrastructure into an information age force is through the Congressionally mandated Base Realignment and Closure (BRAC). This process uses carefully formulated data collection and analysis to determine the military value of an installation, which is then compared against existing installation capability to determine excesses and deficits. Foremost in DoD and Air Force analysis is military value or the ability to successfully meet mission needs while maximizing future flexibility and efficiency.

BRAC 2005 goals are to:

- Maximize warfighting capability efficiently
- Transform the Air Force by realigning infrastructure to meet future defense strategy
- Eliminate excess physical capability to maximize operational capability
- Capitalize on opportunities for joint activity

In support of the 2005 BRAC and the upcoming QDR, the Air Force, as directed by new *Air Force Strategic Planning Directive for Fiscal Years 2006–2023*, will:

- Identify current force structure capability to support Defense Strategy requirements
- Define Service force structure projections for the mid- and far-term in terms of the Air and Space Expeditionary Force
- Identify alternative force structure concepts and technologies to optimize potential investments
- Develop a long-term (through 2020) Air Force overseas posture plan to address:
    - Regional trends affecting U.S. military access
    - New concepts for regional presence
    - Capabilities required to support forward deterrence and swiftly defeat operations in each of the four critical regions
    - Potential options for future changes to the Air Force's overseas posture

The BRAC 2005 process provides a once-in-a-generation opportunity to propel Air Force transformation forward. BRAC can do this by taking a holistic look at future force structure and the organizations and infrastructure needed to most effectively use it. The scope of BRAC is such that the Air Force can combine organizational changes such as optimum squadron sizes and FTF with synergistic joint basing and force structure realignments to truly leap forward in an enduring and transformational way. Examples include:

- Using a 20-year perspective and 2025 force structure to shape Air Force infrastructure (previous BRACs only had a 6-year perspective within the current FYDP).
- Transforming the operational effectiveness of new and legacy weapon systems by revamping the sizes and manning of operational squadrons.

- Exploring and using transformational organizational structures (such as associate, active associate, sponsored reserve, and operationally integrated squadrons) to further enhance the total force effectiveness of Air Force operations.
- Exploring and using transformational organizational arrangements that better enable the Air Force to execute the Air and Space Expeditionary Force concept.
- Employing new warfighting headquarters constructs to better support regional combatant commanders.

National Security Space Transformation

Following the direction of the Commission to Assess United States National Security Space Management and Organization (more commonly known as the Space Commission), the Air Force, OSD, other Services, and the National Reconnaissance Office began transforming how National Security Space is managed and organized. These sweeping changes include career force development, acquisition, operations, budgeting, and planning at the national, DoD, and Air Force levels. The Under Secretary of the Air Force has been designated as the DoD Executive Agent for Space with broad responsibilities for developing and transforming National Security Space capabilities. The Space and Missile Systems Center has also been realigned under Air Force Space Command to enhance space professional development and provide "cradle-to-grave" management of space systems. The Air Force acquisition of space systems is now conducted under National Security Space guidance rather than Air Force guidance. In addition, the Secretary of the Air Force approved the Air Force Space Professional Strategy to establish and sustain a cadre of space professionals. The strategy outlines new and enhanced education and training opportunities and addresses methods to build a team of scientists, engineers, program managers, and operators skilled and knowledgeable in developing, acquiring, applying, sustaining, and integrating space capabilities.

Total Force Development

Preparing Airmen for leadership is essential to transforming the Air Force and can only be accomplished through an integrated and deliberate approach to leadership development. In addition, the Air Force is a much smaller force than in the past, but yet is experiencing a very high operational tempo and rapid technological growth. To address these challenges, the Air Force must ensure it effectively prepares future leaders with the right education and training and offers the right experiences to the right mix of Active Duty, National Guard, and Reserve Airmen as well as civilian employees who understand the nature of the dynamic national security environment. The Total Force Development construct is designed to address these challenges by creating leaders with the proper capabilities and focus.

Total Force Development is grounded in doctrine, basically defined at three levels: tactical, operational, and strategic. At the tactical level in the early stages of his or her career, an Airman's developmental focus is on learning a primary skill. As the Airman transitions into the operational level, emphasis on development shifts to include broader operational leadership, supervisory, and managerial responsibilities. Strategic-level

development enhances an individual's knowledge of Air Force institutional management processes, challenges, and vision and how the Air Force mission integrates with the DoD, other agencies, allies, and coalition partners to fully prepare him or her for senior leadership positions. At all three levels, education, training, and experience (assignments) will be carefully tailored to help build the required skill sets.

Traditionally, Airmen have been developed through a "career path choice" that encourages leadership within the boundaries of a particular area and develops a specialist. This philosophy is evidenced by the current primary development of competency skills in a single Air Force Specialty Code or job series. Careers are frequently "stove-piped" and broader development is often left to chance. The new Total Force Development concept recognizes the continued need for strong grounding in functional areas, but at the same time offers the means to obtain the broader range of experience, knowledge, and perspective the Air Force needs from senior leaders. Desired skill sets must be driven by requirements and achieved through the systemic development of occupational and enduring competencies. The Air Force has determined that there are clearly identifiable requirements for leaders who have multi-functional experience. For example, the Air Force will likely need a number of fighter pilots who understand space, acquisition managers who understand plans and programs, and space/missile operators who understand acquisition. Within the Total Force Development construct, the Air Force will optimize the finite time and limited resources it has for developmental education, training, and experiences, including assignments by managing these resources and opportunities through one Development Team.

For Air Force Officers, Developmental Education will be tied directly to Developmental Assignments. The Air Force will target people to receive education necessary both to enhance their primary occupational depth and to transition them into new skill areas as appropriate. Developmental Education is expanded to include not only professional military education, but also highly selective advanced academic degree programs, education with industry, fellowships, and specialty schools. All will be tailored and balanced to meet the objectives in the individual's Development Plan and better meet Air Force needs.

In transforming Force Development for enlisted personnel, the Air Force now provides management oversight for Chief Master Sergeants comparable with that for other senior Air Force leaders. The Service has created a new top level of professional military education for new Chief Master Sergeants to prepare them for strategic level leadership. Modifications to the Chief Master Sergeant assignment policy provide greater development opportunities for senior enlisted leaders. Institutionalizing base level professional enhancement courses fills educational gaps in enlisted professional military education opportunities. The Air Force is further expounding and issuing guidance on each enlisted rank's roles, responsibilities, and expectations ensuring they receive appropriately targeted education, training, and experience. Additional initiatives include improving noncommissioned officers retraining, developing a higher-headquarters orientation course, and developmental assignments for senior noncommissioned officers. These initiatives and improvements in developmental opportunities will result in a better-prepared enlisted force, ready to meet today and tomorrow's leadership challenges.

An important part of Total Force Development, the ultimate goal of Civilian Force Development, is to create a civilian workforce that is responsive to Air Force requirements and is managed as an integral part of the Total Force. Leadership development (education and experience) has been identified as the greatest challenge to making Civilian Force Development a success. In particular, there is a pressing need to provide quality leadership experience equivalent to that of our military personnel for our future civilian leaders. To make this vision a reality, the Civilian Force Development construct entails a comprehensive set of integrated efforts to establish the required organizational structure, processes, and policies. Through development teams, robust career field management, integrated leadership education, and clearly defined requirements, the Civilian Force Development construct will better integrate the development of the civilian workforce with that of the military component in order to produce a Total Force that can lead and be managed as one.

Like the Active Duty force, the Air National Guard and Air Force Reserve are also working hard to provide our Citizen Airmen with deliberate development opportunities. Initial Total Force Development efforts are focused on the officer corps, with the enlisted corps to follow. Areas of concentration include complementary skill pairings as well as an increase in the number of individuals slated for joint, higher headquarters and command experience. In the area of developmental education, the Air National Guard and Air Force Reserve are exploring alternative methods of delivery, appropriate for a predominantly part time force. In addition, efforts are focused on leveraging the many "civilian-acquired" skills that Guard members and Reservists already have. Through this process, the Air Force will ensure that our Citizen Airmen, along with their Active and civilian counterparts provide a seamless leadership to the Total Force that is developed to meet the challenges of the 21st century Air Force.

The Total Force Development transformation will eventually have an effect on all aspects of the Air Force personnel management system. As the Air Force pursues the Total Force Development vision, it will modify processes, policies, and systems affecting accessions, promotions, education and training, evaluations and feedback, information and decision support tools, and the new Development Teams, which will be at the heart of the development process. The resulting Total Force Development structure, supported by investments in key technologies, will optimize the capabilities of Air Force personnel so they are ready to meet the challenges of the 21st century.

Warfighting Headquarters (WF HQ)

The Air Force is implementing new organizational concepts to address the command and control and presentation of air and space forces in the 21st century. While the Air Force has undergone a significant transformation from a "main operating base" mindset to an expeditionary Air Force, its actual organizational structure had changed very little. The main effort to reverse this course, highlighted in a series of CORONA briefs and a white paper on "The Future Warfighting Construct," is re-engineering the Air Force's command structure to address current and future strategic objectives within anticipated fiscal restraints. The construct envisions the development of full spectrum, joint warfighting structures linked through a collaborative planning network. During the evolution of this

construct, the Air Force will be able to proactively integrate with the proposed standing Joint Task Force Headquarters while evolving to a fully joint air and space headquarters. The WF HQ will enable the Commander of Air Force Forces to work daily with the Joint Force Commander staff in habitual supported and supporting relationships.

The Air Force has started the process of establishing nine warfighting organizations. Five of these are regionally focused and four are globally focused. Each WF HQ will have an A-staff and an Air and Space Operations Center (AOC). The WF HQs will be sized to effectively execute their mission. The headquarters will vary in size depending on factors such as geographic locations, responsibilities, and missions assigned. These WF HQs will be led by a three or four-star general and will be the Airman's single voice to the Unified Combatant Commander. This reorganization is designed to enhance combat capability, integrate combat staffs with AOCs, and provide the Unified Combatant Commander with an air and space focused warfighting structure supported by state-of-the-art warfighting command and control. Each WF HQ is focused on its warfighting mission—providing the air, space, information, planning, and computer expertise to execute the National Military Strategy through the combatant commander's plans.

Not all AOCs that support the WF HQs will be identical, but all WF HQs will be integrated into a robust communications network that will facilitate shared understanding, collaborative planning, and the rapid transfer of AOC functions between headquarters. This will improve both day-to-day operational effectiveness and wartime survivability.

VI. Transforming to a Capabilities-Based Force

"In the future, we need to make warfighting effects and the capabilities we need to achieve them the driving factors in our transformational efforts…. I want everyone in the business of inventing, developing, building, purchasing, and sustaining to understand this concept: the CONOPS are the foundation of our transformation efforts."

–Dr. James Roche, Secretary of the Air Force

"We are focused always on programs, always on platforms. We are going to change that. So that the first thing we talk about is the concept of operations. How we fight. Not only with ourselves but how we… join with the other Services, with coalition partners."

–General John Jumper, Chief of Staff of the Air Force

The Air Force CONOPS are a major innovation for the United States Air Force. By clearly defining how the Service intends to fight, the Air Force can then focus its planning, programming, requirements, and acquisition processes on a capabilities-based framework. Through the CONOPS, the Air Force is transforming its planning process to make effects, and the capabilities needed to achieve them, the driving force for all Air Force operational, programming, and budget decisions. The objective is to improve the Air Force's ability to get the right balance of high-quality capabilities into the hands of the warfighters.

At this point, there are six Air Force CONOPS: Global Mobility, Global Persistent Attack, Global Strike, Homeland Security, Nuclear Response, and Space & C4ISR. Each Air Force CONOPS starts with a problem definition. These problems are missions the Air Force must accomplish in the 21st century. Each CONOPS describes how the Air Force solves problems within the context of joint operations. Then, these CONOPS outline the specific effects-based capabilities needed to solve those problems. This effort integrates the warfighter's responsibility to define requirements at the start of the process. The requirements focus on capabilities instead of particular programs or weapon systems. Other benefits include improved communication between the research, development, acquisition, and warfighting communities. The CONOPS capabilities will bridge the gap between the effects the Air Force will create in the battlespace of the future and the systems needed to generate those effects.

The term Air Force CONOPS has a very specific purpose: clearly convey how air and space power capabilities should be used as instruments of national military power. They tie the enduring and evolving principles of air and space power employment directly to the requirements definition and capabilities development processes. The Air Force CONOPS are not independent forces in and of themselves (i.e., there will not be physical entities dedicated to a particular CONOPS). Rather, the necessary capabilities and assets for any given CONOPS are imbedded within the Air and Space Expeditionary Force construct (see Chapter V). When these capabilities are required, in part or in whole, to meet Joint Force Commanders' requirements, they are presented in accordance with Air Force Doctrine as Air and Space Expeditionary Task Forces. As missions change in these theaters, the composition of the AETFs and the capabilities within them will evolve to best meet the needs of the Combatant Commanders. In doing so, they will serve as vehicles to increase understanding of these principles within joint, sister Service, government, and civilian audiences.

The CRRA analyzes the capabilities of each CONOPS against specific scenarios. The CRRA helps identify capability shortfalls, risk areas, and opportunities for new programs. This is then used to make budgeting decisions during the annual POM process.

This chapter summarizes each of the CONOPS and the CRRA process.

Global Mobility CONOPS

The Global Mobility CONOPS supports the QDR transformation goal of global force projection and sustainment. Quick, effective response to any crisis or contingency mitigates instabilities and reduces adversaries' time to mobilize threats, thereby reducing casualties to U.S. and allied forces. Rapid mobility also plays a key role in successful small-scale contingencies and humanitarian relief operations by demonstrating the ability and determination of the United States. The Global Mobility CONOPS represents a collection of Air Force capabilities designed to meet growing challenges to rapidly deploy U.S. military forces and to initiate operations around the globe in minimal time.

According to the Global Mobility CONOPS, the desired effect of these capabilities is the rapid projection and application of joint U.S. military power. This primary effect is achieved through four effects mission areas.

- **Power Projection through Air Mobility**
  - The seamless integration and effective conduct of air mobility operations in CONUS, en-route, or forward locations and with all theater operations.
  - Air Mobility Forces that have the capabilities to seamlessly integrate with joint and coalition forces across all theater boundaries in order to rapidly accomplish the objectives of the combatant commander.
  - The assured ability to deploy, replenish, sustain, and redeploy joint forces in minimum time to allow them to accomplish the missions assigned to them through all phases of conflict.

- **Power Projection through Global Command and Control**
  - Achieving minimum time lapse between the initiation of crisis action planning and the projection and application of joint U.S. military power.
  - Air Force expeditionary planning and force posturing to prepare Air Force forces for rapid, time sequenced deployment, employment, sustainment, and redeployment.
- **Power Projection through Expeditionary Air Bases**
  - Assured ability to mesh seamlessly with other forces (Army, Marine Corps, SOF) to open a base and establish air operations from a spectrum of airfields – austere base, cold base, warm base, and hot base (includes CBRNE environments).
  - Achieving seamless transition from airfield seizure, to base opening, to force employment and sustainment in concert with theater-assigned mobility forces; includes the rapid, efficient redeployment of forces.
- **Power Projection through Space Mobility**
  - The ability to deploy, sustain, and reconstitute space-based forces in minimum time to allow them to accomplish the missions assigned to them through all phases of conflict. The U.S. space capability rests on the foundation of assured access.
  - The ability to deploy a rapid reaction, networked space constellation in minimum time, dedicated to the Joint Force Commander and integrated with National Security Space systems.

As the Global Mobility CONOPS develops, the force required to achieve this effect represents the overall impact of the Air Force capabilities to be presented to the Combatant Commander and, in turn, helps to define the future forces the Air Force will require to perform Global Mobility missions. The capabilities generally fall into the categories of: global command, control, and communications; air refueling; airlift; opening and establishing air bases; spacelift operations; and extend space operations. The capabilities embodied in the Global Mobility CONOPS leverage the inherent characteristics of air and space power: speed, flexibility, and precision.

Global Persistent Attack CONOPS

The future global environment presents the U.S. military a substantial array of potential challenges, adversaries, and operating environments. Rogue states, failed, and failing states also threaten regional stability. These rogue and failing states often prove to be supporters of international terrorist and criminal organizations, or are unable to curtail the activities of these organizations within their borders. In this environment, rogue states and malicious non-state actors combine to produce catastrophic potential for proliferation and indiscriminate use of weapons of mass effects. Accordingly, future engagements will increasingly focus on stabilization of the world order. Though Major Combat Operations against competent regional powers and near-peer competitors may be less likely than the foregoing conflicts, the Global Persistent Attack CONOPS must

balance capabilities to address the most demanding scenarios as well. This CONOPS defines a spectrum of capabilities applicable across a wide range of military operations from Major Combat Operations to peacekeeping and sustainment operations. Achieving and maintaining air, space, information, and decision dominance is an ongoing challenge that continues into persistent operations. The Air Force will continue to integrate legacy platforms into the emerging network-centric infrastructure while sustaining efforts to integrate the capabilities of U.S. and allied forces.

Global Persistent Attack is the application of capabilities-based planning to achieve full spectrum dominance. In order to successfully engage and defeat the enemy, Global Persistent Attack capabilities are required to achieve the following effects:

- **Information Dominance:** Collect, control, exploit, attack, and defend information without effective opposition to enable fused, all-source, tailorable and real-time presentation of the battlespace to friendly forces while complicating the view of the battlespace for an adversary.
- **Freedom to Maneuver:** Unhindered ability of joint and coalition forces to attack targets at will and from positions of advantage.
- **Persistent Force Application:** Execution of joint and coalition operations unconstrained by combat support functions (fuel, munitions, personnel, etc).

The Global Persistent Attack CONOPS provides the Joint Force Commander the critical capabilities to conduct and sustain enduring combat operations to achieve campaign objectives with minimum loss. The CONOPS first seeks to perform decision cycles faster and smarter than the opponent. It does this through effective Battle Management Command and Control informed by Predictive Battlespace Awareness developed through focused intelligence, using advanced penetrating sensors, and anticipatory effects assessment. These capabilities enable information dominance for sustained effects-based operations inherent in this CONOPS. Second, by maintaining information, space, and air superiority, joint forces gain protection and freedom to maneuver into positions of advantage over the adversary. Through persistent force application, Global Persistent Attack forces the enemy into such a disadvantaged position that continued resistance is futile. The CONOPS applies persistent precision strike and information operations to influence, manipulate, or dismantle an opponent's ability to act, both physically and psychologically. Joint forces strategically and methodically persist, attack, and dominate defined areas within the battlespace while reducing the enemy's ability to hide. The persistent application of force continues to erode the range and methods by which the enemy can operate or create regional and global instability, eventually compelling it to abandon its objectives.

Global Strike CONOPS

The Global Strike CONOPS is a power projection concept designed to enable joint forces to meet access and time challenges across a unified battlespace of sea, air, land, space, and cyberspace. It inverts the conventional approach by relying heavily on long-range systems at the initiation of conflict. The concept is to mass the desired effects from air, sea, space, and infosphere before massing theater forces. The majority of initial strike effects are from systems outranging the threat, initially deploying only those forces required to enable attack operations. These initial strikes may include neutralizing the adversary's anti-access systems, paving the way for follow-on persistent forces under the Global Persistent Attack CONOPS, which defines the capabilities needed to continue after the initial anti-access campaign. These strikes may also neutralize key high-value targets in the opening stages of a crisis or conflict.

For smaller-scale strikes of limited national objectives, the Global Strike CONOPS provides the capability to rapidly attack fleeting or emergent, high-value targets without warning, anywhere on the globe. These limited operations may or may not be preceded by an anti-access campaign, and most likely will not require follow-on persistent force application.

Challenges for the Air Force will include the ability to operate from austere, forward-deployed, and CONUS bases. The changing political scene may cause current and potential allies to suddenly deny basing rights for U.S. forces. Additional friction may also come from the absence of an easily definable enemy and uncertain coalition composition.

To quickly achieve war-winning effects, the Global Strike CONOPS outlines the capabilities needed to achieve two overarching battlespace effects. These effects are:

- Access: Gain and maintain battlespace access
- Rapid Global Response: Quickly neutralize the adversary's key high-value targets

The Global Strike CONOPS is designed to facilitate attack on key targets globally and on short-notice, normally within hours or even minutes. It focuses on the initial stages of a conflict and is built around:

- Precision, long-range, quick-reaction air- and space-based strike platforms that can operate in an anti-access environment to facilitate early and rapid-response strike operations
- Networked C4ISR for targeting, battle management, and damage assessment
- Early-entry land forces/SOF to protect ports & airfields, and to help find, fix, track, and destroy targets
- Information operations to apply and integrate non-kinetic capabilities in the pre-crisis, conflict, and reconstitution phases of war within the cyber, electromagnetic, and cognitive domains
- Counterair operations with emphasis on joint missile defense

Homeland Security CONOPS

The objective of this CONOPS is to aid in the transformation of Air Force homeland security planning, programming, requirements, and acquisition processes through Air Force capabilities that support the National Strategy for HLS objectives, Strategic Planning Guidance, and the QDR.

The Homeland Security CONOPS addresses three primary problem areas: (1) defending the homeland through air and space power in an interagency environment within legal and resource constraints; (2) ensuring proactive coordination with and responsive actions to requests for assistance from local, state, and lead federal agencies without compromising combat mission capabilities; and (3) preserving the ability to project forces overseas in a terrorist threat environment and provide for their protection. This CONOPS encompasses only those missions with points of effort within the territories of the United States and its littoral waters out to 500 nautical miles. Many elements of the HLS mission are employed overseas, including most operational theater missile defense systems. However, specific roles, missions, and budget responsibilities are yet to be determined.

Based on its large perimeter, porous borders, and societal emphasis on freedom of travel, the United States remains vulnerable to asymmetric attack. As a result, the Air Force must be prepared to contribute to HLS across the spectrum, whether facing specific weapons (such as CBRNE) or non-kinetic cyber and psychological attacks. More significantly, the domestic character of the HLS mission connotes that force employment, especially ISR, must occur within the guidelines set forth by law. Analysis for the HLS CONOPS begins with Air Force operational capabilities to which legal and policy restrictions are applied. Provisions within Title 10, 18, 32, and 50 of the United States Code, to include the Posse Comitatus Act, define legal roles and actions for domestic employment of both forces and intelligence-gathering assets.

The National Strategy for Homeland Security establishes three prioritized objectives: (1) prevent terrorist attacks within the United States, (2) reduce America's vulnerability to terrorism, and (3) minimize the damage and recover from attacks that do occur. The desired effects provided by the capabilities identified in this CONOPS fall into three major areas that parallel the objectives set forth in the National Strategy for HLS: prevent, protect, and respond.

To prevent attacks against the United States, the Air Force must have the ability to deter, detect, predict, and preempt threats to the homeland, particularly those that target friendly resources through the air and space medium. Protection of critical infrastructure, as defined by the DoD and the National Security Council, must ensure continuity of operations, continuity of government, and must preserve key national capabilities, resources, and landmarks during elevated threat conditions. The Air Force must be capable of defeating adversary threats via the Air Sovereignty Alert network, missile defense, unique capabilities to disarm or disable CBRNE weapons, and precision conventional strikes within the U.S. or the littorals. It also requires the appropriate level of protection or procedures necessary to survive and operate through a CBRNE attack or incident.

HLS is an exceedingly complex mission. It demands a range of government and private sector capabilities. It calls for coordinated and focused effort from many actors who are not otherwise required to work together. The Air Force will conduct operations consistent with U.S. law as tasked in support of combatant commanders, especially U.S. Northern Command, to preserve DoD's ability to project forces and provide support to civilian authorities.

Nuclear Response CONOPS

Now and in the coming decades, the United States is likely to face adversaries possessing a wide range of capabilities, to include CBRNE weapons, which threaten the survival of the United States and its allies. These adversaries include those who support terrorists, have active CBRNE programs, and are developing capabilities to reach forward-deployed U.S. forces as well as U.S. and allied population centers. The ability to deter such adversaries, especially those with authoritarian, unconstrained, and unpredictable leaders, is uncertain. While CBRNE threats are not new, the nature of potential adversaries and the methods they may use have dramatically changed. Therefore, the ways the United States addresses these threats must transform.

The congressionally mandated Nuclear Posture Review, completed in December 2001, put into motion a major change in DoD's approach to the role of nuclear offensive forces in its deterrent strategy and presents a transformational blueprint for a new strategic posture. The Nuclear Posture Review established a "New Triad" composed of offensive strike systems, both nuclear and non-nuclear; defenses, both active and passive; and a revitalized defense infrastructure—all bound together by enhanced command and control and intelligence systems. The addition of defenses and non-nuclear conventional capabilities, combined with information operations, will both reduce U.S. dependence on nuclear weapons and improve the ability to deter attack in the face of proliferating CBRNE. The new capabilities, described in the Nuclear Posture Review, reduce the risk to the United States as it draws down its nuclear forces toward a goal of 1,700–2,200 operationally deployed strategic nuclear warheads. The Review also describes the shift from a threat-based planning construct to a capabilities-based planning construct, recognizing the new relationship between the United States and Russia following the collapse of the Soviet Union and the end of the Cold War.

As a vital element of the New Triad, the Nuclear Response CONOPS fully supports this new concept by providing safe, reliable, and proficient nuclear forces. Capabilities within the Nuclear Response CONOPS act as the AEF top cover, providing the deterrent umbrella under which joint conventional forces operate. They help to deter nuclear attacks and dissuade any adversary from employing nuclear threats to coerce the United States, its forces, or its allies. They also contribute to deterring other CBRNE attacks, as well as major conventional aggression, that endanger U.S. or allied vital interests. If deterrence fails, the Nuclear Response CONOPS links nuclear strike forces with command, control, information, and adaptive planning capabilities to jointly defeat the enemy, through a variety of nuclear attack options, and to reestablish deterrence upon conflict termination. The critical capabilities of the Nuclear Response CONOPS include joint ISR; joint nuclear command and control; joint nuclear strike forces, and joint support forces.

Space & C4ISR CONOPS

This CONOPS' fundamental objective is to identify and define Space & C4ISR capabilities needed by the Air Force to achieve the right mix of assets for supporting joint and combined operations at all levels of conflict and in all operational environments. The Space & C4ISR CONOPS seeks to guide the development of advanced space, counterspace, information operations, command and control battle management, and C4ISR systems to provide Predictive Battlespace Awareness, facilitate and conduct precision attack, and compress the sensor-to-shooter kill chain. Ultimately, the Space & C4ISR CONOPS advocates the evolution of strategic, operational, and tactical capabilities that result in globally responsive and persistent forces that become the centerpiece of Joint Command and Control architectures. Space & C4ISR assets deliver decision dominance, the key to gaining supremacy in all environments while ensuring force protection for U.S. soldiers, sailors, marines, Airmen, and non-combatants.

ISR provides warfighters with information on the constantly changing battlespace. ISR must be available at all echelons of the joint warfighting force. This capability must employ manned and unmanned, air, space, surface, and subsurface sensors to develop and maintain an accurate picture of the battlespace. Additionally, the cooperation of multiple Services and organizations is required to enhance the provided information. These organizations must share planning and execution information across multiple security levels and work with development organizations so databases are shared and command and control capabilities are interoperable across multiple theater battle management systems. ISR management must include the ability to dynamically operate in a networked environment to compress the Kill Chain and conduct effective predictive operations. Predictive analysis derived from Target Development and Intelligence Preparation of the Battlespace, integrated with the ISR Planning and Operations Assessment, come together to form an Air Force concept called Predictive Battlespace Awareness. Intelligence operators will use Predictive Battlespace Awareness (PBA) to provide detailed assessments of an adversary's intentions, capabilities, objectives, and potential courses of action, which will enable commanders to seize and maintain the initiative and create conditions to produce desired effects. The goal is to provide a comprehensive understanding of the battlespace in time, space, and effect, regardless of the adversary, location, opposition, weather, or time of day. Predictive actionable intelligence, based on timely, pertinent, and accurate information, is essential to commanders and decision makers at all levels.

The Capabilities Review and Risk Assessment

In order to precisely assess each CONOPS, the **CRRA** identifies and analyzes current and future capabilities, capability shortfalls, health, risks, and opportunities. The CRRA is a twofold process: each CONOPS executes a CRRA within its effects and capability purview. Then, the Integration CRRA assesses capabilities and capability shortfalls across all CONOPS. The CONOPS first identify desired warfighting effects and then identify top-level capabilities required to generate those effects. The CRRAs then identify capability gaps, overlaps, and robustness within each top-level capability. Finally, the

Integrated CRRA identifies an acceptable level of risk and risk mitigation measures within each capability. This assessment helps the CONOPS Champions articulate any disconnects between required capabilities and programs.

During each CONOPS CRRA, the CONOPS Champion and Risk Assessment Teams will: (1) identify their CONOPS desired effect(s) and top-level capabilities; (2) review existing and planned programs, S&T, and special access programs; (3) determine strengths, weaknesses, and opportunities; and (4) assess capabilities based on analysis of the capability to deal with an adverse event and the impact if the Service fails to provide the capability to achieve the required effects. This analysis will: (1) provide senior Air Force leaders an operational-, capabilities- and risk-based focus for investment decision-making across the DOTMLPF spectrum and (2) achieve the goal of using operational warfighting effects as the drivers for resource allocation for the Air Force. This process is transformational as it concentrates on desired battlespace effects vice specific platforms. Metrics to measure the Air Force's progress towards "transformation" will be derived from this analysis.

The first Integration CRRA in September 2003 identified and prioritized critical operational shortfalls in such areas as:

- **Global Information Grid:** Need a globally interconnected capability that collects, processes, stores, disseminates, and manages information on demand to warfighters, policy makers, and support personnel.
- **Battle-space management:** Implement effects-based planning and provide a common operational picture to the warfighter.
- **Fleeting and mobile targets:** Reduce the time needed to find, fix, track, and target hostile forces.
- **Battle-damage assessment:** Need a toolkit and clarified definitions for commanders to determine effects-based decisions across the battle space.
- **Base defense:** Clarify roles and responsibilities between the Air Force and sister Services.
- **Cargo airlift:** Study and review requirements and prepare for possible force-structure changes.

The initial round of the CRRA reviewed 90 individual capability shortfalls. These were subsequently rolled up into 42 integrated shortfalls based on cross-CONOPs impacts and/or common solution sets. During the Integration process, these shortfalls were prioritized into four tiers with the top twelve shortfalls presented at the Four-Star CRRA. These shortfalls resulted in directives that were incorporated in the FY06 Air Force Annual Planning and Programming Guidance.

The CRRA process continues in FY04 with assessments based on an Air Force Master Capability Library that are analyzing both capability proficiency and sufficiency (force structure) as well as prioritizing and screening capability shortfalls against documented lessons learned and Combatant Commander Integrated Priority Lists. The Air Force

CRRA process will continue to evolve to tie into the Air Force Corporate Structure process, the Air Force requirements process, Joint Operating and Functional Concepts, and the Joint Capability Integration and Development System.

VII. Developing Transformational Capabilities

"Our legacy aircraft systems were built with specialized roles and they were very good. But we have limited networking, limited all-weather delivery and limited stand off and our sensors are only partially integrated. Our deployments require large logistics tails and we currently employ stealth only at night…The force we are building…will employ multi-mission systems with multi-spectral fused air and space sensors and robust all-weather weapons delivery with increased standoff capability. We will deploy with reduced logistics tails. We will attack with improved range, payload, speed, maneuverability and precision. We will network these systems in ways that enable us to find, fix, track, target, engage and assess in timelines unimaginable just a few years ago. It is our goal to have consistent, persistent intelligence, surveillance and reconnaissance, and, once a decision to attack is made, we will attack instantaneously."

–Dr. James Roche, Secretary of the Air Force

The Air Force believes there are 16 "transformational" capabilities, consistent with the discussion of transformation in Chapter II as well as the initial Integration CRRA in 2003 (see Chapter VI). They represent capabilities the Air Force cannot achieve today or that must be significantly improved to enable the new JOCs (see Chapter III), DoD's transformation goals, and the Air Force CONOPS. This chapter organizes these transformational capabilities under the six distinctive Air Force capabilities identified and defined in *Air Force Vision 2020*:

- **Information Superiority:** The ability to control and exploit information to the Nation's advantage to ensure decision dominance

- **Air and Space Superiority:** The ability to control what moves through air and space to ensure freedom of action
- **Precision Engagement:** The ability to deliver desired effects with minimal risk and collateral damage to deny sanctuary to the adversary
- **Global Attack:** The ability to engage targets anywhere, anytime to hold any adversary at risk
- **Rapid Global Mobility:** The ability to rapidly position forces anywhere in the world to ensure unprecedented responsiveness
- **Agile Combat Support:** The ability to sustain responsive, persistent, and effective combat operations

Finally, this chapter summarizes:

- Significant advances in these transformational capability areas during Operation IRAQI FREEDOM
- What the Air Force needs from other Services and DoD agencies to help enable these transformational capabilities

There are several very important caveats concerning the transformational capabilities discussed in this chapter:

- **The nature and details concerning these capabilities are subject to change as the CONOPS and CRRAs mature and evolve.**
- **Details regarding the programs, ACTDs, ATDs, and future system concepts being explored that will help enable these transformational capabilities are discussed in the "For Official Use Only" version of this document submitted to OFT.**
- **The capabilities described here do not represent a comprehensive look at all the capabilities under development by the Air Force.** They only focus on what the Air Force now considers "transformational" capabilities.

Information Superiority

Air Force doctrine defines information superiority as the "degree of dominance that allows friendly forces the ability to collect, control, exploit, and defend information without effective opposition." Put simply, this means getting the right information in the right format to the right place at the right time while denying the same to the adversary. Information superiority combines robust, tailored C4ISR and weather capability with effective information operations. At the operational level of war, information operations are comprised of Network Warfare Operations, Influence Operations, and Electronic Warfare Operations. Most operations rely on achieving and maintaining information superiority.

A Key Enabler of Transformation

Information superiority is a key enabler of the type of revolutionary change described by RMA advocates in Chapter II, including EBO and parallel warfare. It will allow U.S. forces to select the precise targets necessary to achieve desired effects and focus on the quality, rather than the quantity, of targets attacked. For example, American forces could identify an adversary's key centers of gravity and relay that information to combat forces in near real-time. Combined with precision-guided weapons, information superiority will enable U.S. forces to attack and destroy the adversary's centers of gravity in the particular sequence that will be the most devastating to the adversary. This capability can defeat an enemy's forces by disabling its ability to function rather than through traditional mass attrition warfare (or achieve "de-massed forces" to use TPG terminology).

Similarly, information superiority, coupled with rapid precision strike and global attack capabilities, will enable the United States to deny sanctuary to its adversaries through the ability to strike elusive, mobile targets such as terrorists, targets in urban environments, targets attempting to use weather as cover, or CBRNE-related targets as soon as they emerge. Recent operations in Afghanistan and Iraq have demonstrated the immense potential of this capability:

- In Afghanistan, when targets presented themselves, special operations forces on the ground immediately communicated target locations to B–52s loitering in the vicinity armed with precision-guided weapons.
- Similarly, Predator Unmanned Aerial Vehicles (UAVs) relayed live video images of enemy targets to AC–130 gunships patrolling in Afghanistan, which then could rapidly engage the targets before they could hide again.
- When a ground source reported that Iraqi leader Saddam Hussein and his sons might be in a particular building, it took less than twelve minutes for an airborne B–1B bomber to strike the building with four Global Positioning System (GPS)-guided munitions. Future global strike capabilities will greatly expand this "quick strike" capability beyond the theater-level to the strategic-level.
- During the sandstorm event of Operation IRAQI FREEDOM, commanders leveraged accurate weather predictions and integrated environmental impacts knowledge into their decision process. This knowledge enabled operations and intelligence personnel to flexibly adapt to the harsh operational environment. By optimizing sensor and weapon selection, air assets maintained the ability to observe and persistently attack the enemy through the sandstorm. This action eliminated the adversary's ability to leverage adverse weather for sanctuary and was a decisive point of the war.

Even if these effects are not possible, information superiority will also enable the U.S. military to achieve "decision cycle dominance" through speed of command, shared awareness, self-synchronization, and elimination of process and structural lines. This will allow friendly forces to act and react much more rapidly and effectively than any adversary who lacks these capabilities, creating significant military advantages.

Information superiority will provide the commander information on adversary intentions and courses of action before and during crises, identify and develop target solutions that will enable him to achieve his objective, position ISR assets to provide him a clear battlespace picture, and provide him a means to assess the results of his actions. This capability will be enhanced through the integration of sensors; command and control; and Tasking, Processing, Exploitation, and Dissemination (TPED) systems to provide the commander with situational awareness in all conditions to enable increased speed of command as well as Blue Force Tracking to minimize fratricide. While technology will never completely overcome the "fog of war," achieving information superiority will certainly minimize that fog for U.S. forces and maximize it for the enemy.

Information superiority will enable additional transformational benefits:

- Because it will enable the United States to conduct operations with smaller forces in many situations, it will greatly enhance America's ability to rapidly deploy forces abroad, which is key in the post-Cold War security environment.
- By avoiding the need for massive attrition tactics, information superiority will also result in far fewer casualties and collateral damage under most circumstances.
- Under the right circumstances, effective IO capabilities, to include network attack, electronic warfare, PSYOP, military deception, and public affairs operations, may prevent hostilities by influencing adversaries to capitulate before the shooting starts, thus greatly enhancing America's "deter forward" capability.
- Information superiority will significantly enhance virtually all types of operations ranging from high intensity combat to counterterrorism, urban operations, homeland security, peace operations, and special operations.
- Information superiority will provide commanders with the flexibility to adjust ISR support between theaters as the worldwide situation dictates, while allowing national-level leadership adequate time to develop plans on how to employ all elements of national power.
- Information superiority will enable commanders to predict and shape adversary behavior.

Information superiority capabilities will also provide the foundation of the Space & C4ISR CONOPS and will be a key enabler of all remaining CONOPS.

Related Transformational Capabilities

The following related transformational capabilities, when achieved simultaneously, will address these shortfalls and enable information superiority under most circumstances:

1. **Seamless, joint machine-to-machine integration of all manned, unmanned, and space systems**
2. **Real-time picture of the battlespace**
3. **Predictive Battlespace Awareness**

4. **Ensured use of the information domain via effective information assurance and information operations**
5. **Denial of effective C4ISR to adversaries via information operations**

The **seamless joint machine-to-machine integration of all manned, unmanned, and space systems,** not just Air Force systems, will ensure that the right information gets to the right place at the right time and numerous DoD and national assets are interfaced. This includes integrating multi-spectral information across the intelligence disciplines. This capability will, among other things, enable sensors to detect, track, locate and identify mobile targets; provide timely targeting information to weapon platforms; and enable precision assessment of those attacks. The Air Force, as directed by the *Air Force Strategic Planning Directive for Fiscal Years 2006–2023,* will develop a master plan to achieve this machine-to-machine integration.

Real-time picture of the battlespace includes the following two transformational capabilities from the recently completed *Strategic Master Plan: FY06 and Beyond* by Air Force Space Command: (1) an initial space-based Ground Moving Target Indicator capability in the mid-term to provide U.S. global strike forces with the ability to identify and track moving targets anywhere on the surface of the earth and (2) a far-term capability to detect, locate, identify, and track a wide range of strategic and tactical targets that the United States currently has minimal capability to detect. These include weapons of mass destruction, hidden targets, and air moving targets. Real-time picture of the battlespace also includes Blue Force Tracking capabilities that enable the Joint Force Commander to know where all friendly forces are to both better coordinate operations and avoid fratricide. Finally, real-time picture of the battlespace will integrate traditional and non-traditional natural environmental sensors and predictions to identify natural environmental hazards and impacts to operations.

Predictive Battlespace Awareness, also discussed in the last chapter, is a commander-driven process to predict and preempt adversary actions when and where we choose. PBA is an integrated process involving Intelligence Preparation of the Battlespace, Weather Operations, Target Development, ISR Strategy and Planning, ISR Employment, and Assessment that provides the commander a multidimensional understanding of the battlespace in time, space, and effect, regardless of the adversary, location, weather, or time of day. PBA is continuous and achieved by the commander through possession of relevant, comprehensive knowledge, including an accurate forecast of pertinent influences in the battlespace. This knowledge of the operational and natural environment, in concert with command and control, permits commanders to anticipate future conditions, assess changing situations, establish priorities, exploit emerging opportunities, and act with a degree of speed and certainty not matched by adversaries. PBA-derived insights allow the United States to use critical ISR assets for confirmation rather than pure discovery once hostilities begin. Additionally, the PBA process enables space situation awareness to function as the foundation of offensive- and defensive-counterspace operations, by preparing to conduct operations in, from, through, and to space, utilizing cyber-, space-, air-, land-, and sea-based capabilities. PBA will be a key enabler of DoD's goal to "deter forward." The Air Force is integrating weather operations; which determine the impacts of weather on missions, platforms, weapon

systems, targets, tactics, and timing; into the PBA process so that the Joint Force Commander can project adversary actions during severe weather and therefore reduce an adversary's ability to use weather as a sanctuary.

The first three Air Force transformational capabilities described above can provide a revolutionary advantage for U.S. forces only if the joint commander can ensure that the adversary: (1) cannot disrupt, manipulate, or destroy the associated friendly information, information systems, and information processes on which they rely and (2) cannot achieve the same capabilities or enjoy the same advantages of such advanced C4ISR.

Achieving the first requires **effective information operations that ensure friendly use of the information domain**. As the world's most information-dependent fighting force, the U.S. military must use the IO capabilities of network defense, information assurance, operations security, counter-deception, counterintelligence, and counter-propaganda to reduce the ability of adversaries to exploit the U.S. military's reliance on information and assure jam-resistant, secure, survivable C4ISR. By integrating these defensive capabilities to protect or project the commander's objectives and themes, military operations have a much greater chance at success.

Against adversaries with effective C4ISR, achieving the second requires **effective information operations capabilities that can deny, manipulate, or significantly degrade adversary C4ISR.** These capabilities include network attack, electronic warfare, military deception, public affairs operations, operations security, and psychological operations.

The Air Force is leading efforts to present many more of these classified IO capabilities to the Combatant Commanders either as apportioned capabilities or by making Combatant Commanders aware of limited combat capabilities presented by development programs. Most Air Force IO programs are either very small in nature and would collectively be too numerous to list comprehensively in this document and/or are classified in nature.

In addition to the new information superiority efforts, the Air Force is also installing these capabilities in virtually all of its new (such as the F/A–22, F–35, and unmanned vehicles) and existing (perhaps the most well known examples during recent operations are the B–52 and the AC–130) weapon systems and platforms, which will enable them to fully integrate with the joint C4ISR network envisioned by OSD and participate in time-sensitive targeting.

Please refer to Appendix B for details on Air Force information superiority efforts required by the TPG, especially in the areas of interoperability, information operations, and intelligence.

Air and Space Superiority

Five transformational capabilities the Air Force is pursuing support the Air and Space Superiority distinctive capability from *Air Force Vision 2020*. They fall into three major subcategories: Negating Enemy Air Defenses, Space Superiority, and Missile Destruction in Flight.

Negating Advanced Enemy Air Defenses

The proliferation of advanced, radar-guided SAMs and air-to-air missile systems among potential adversaries puts the ability of legacy aircraft to operate in enemy airspace in the future in question. This new generation of "double digit" SAMs is far more capable than existing systems in acquiring and engaging multiple legacy aircraft. They also use shorter times to emit radar energy and are mobile, making them much more difficult to detect. They are also resistant to jamming and use high mach missiles. But perhaps most dangerous of all is their significantly increased range, which would require legacy aircraft to fly within range of the SAMs to deliver their weapons. Maintaining the ability to perform unrestricted operations within heavily defended airspace into the future is an essential precondition to successful U.S. joint power projection operations. Negating advanced enemy air defenses is also critical to enable the Global Strike CONOPS' key objective of gaining and maintaining battlefield access against advanced enemy air defenses to open the way for follow-on joint forces and destroy/neutralize high-value, time-sensitive targets at the onset of hostilities before advanced air defenses can be brought down.

In addition to IO capabilities that can affect enemy air defenses, the Air Force is developing two complementary transformational capabilities to achieve this goal:

6. **Penetration of advanced enemy air defenses to clear the path for follow-on joint forces**
7. **Effective and persistent air, space, and information operations beyond the range of enemy air defenses under adverse weather conditions**

While it might be tempting to invest solely in standoff weapons instead of stealthy penetrating platforms to defeat advanced integrated air defense systems, a mix of both is required for several reasons. First, standoff weapons are extremely expensive compared to direct attack weapons. Second, standoff weapons take far more time to strike targets than penetrating platforms, allowing adversaries adequate time to conceal or move targets out of harm's way or intercept the U.S. weapon in flight. There are also various situations in which time-critical strikes are required, which long-range standoff weapons cannot provide. Third, standoff weapons are not as versatile as penetrating platforms at striking all types of targets, especially mobile ones.

Penetrating New Advanced Air Defense Systems

This capability is required to gain entry into denied battlespace and clear the way for joint follow-on forces by rapidly degrading, and then defeating, the adversary's C4ISR, anti-access weapons, and CBRNE delivery systems. Hopefully, such a capability will also dissuade additional potential adversaries from investing in such new air defenses to begin with. The key to penetrating the next generations of advanced enemy air defense systems is producing systems that: (1) can negate these air defense capabilities and (2) are survivable against them at all times and in all weather. This will be achieved by improved electronic warfare, various directed energy applications, advanced space force applications systems and capabilities, and combining improved "stealth" with state-of-the-art speed, avionics, radar, and maneuverability. Currently, the Air Force's stealthy fleet is limited

to a small force of B–2 bombers and F–117s, which may be inadequate to defeat future generations of air defense systems coming online. In addition, they can only exploit their stealthy qualities at night, as they cannot effectively defend themselves during the daylight if spotted visually.

Negating Advanced Enemy Air Defenses also includes the ability to conduct deep, clandestine special operations missions in support of the Joint Force Commander's operational preparation of the battlespace. The Air Force's capability to conduct long-range, clandestine, or covert infiltration and exfiltration of special operations forces and equipment is rapidly degrading with advances in air defense systems and long-range aircraft detection technology. The 2001 QDR states that special operations forces need to have the "ability to conduct covert deep insertions over great distances." These two points, when combined with the joint doctrine of early introduction of special forces deep in denied, hostile, or politically sensitive areas to help prepare the battlespace, drive the required capability for airpower to penetrate advanced enemy air defenses and enable special forces to achieve critical tactical surprise deep in denied airspace. The required capability can be approached from the "platform" or "system" that performs the clandestine penetration of denied, hostile, or politically sensitive airspace with advanced air systems or it can be viewed as a means to deliver joint special operations capabilities that can strike strategic targets, to include terrorists, before or during conflict in spite of advanced air defenses.

Standoff

The United States has had significant standoff precision strike assets for some time. It began with cruise missiles, which were first used to strike land targets during the Gulf War. However, while effective at precisely striking targets at long range, they are too expensive to use more than in limited numbers. Reducing the cost of the weapons while maintaining long-range has proven very difficult. Current cruise missiles also have limited ability in bad weather and against mobile targets. Developing an affordable standoff weapon that would enable large-scale, persistent standoff operations against fixed and mobile targets in all weather would create a huge transformational effect in defeating future advanced air defenses.

Space Superiority

Space capabilities are integral to modern warfighting forces, providing critical surveillance and reconnaissance information, especially over areas of high risk or denied access for airborne platforms. They also provide weather and other earth-observation data, global communications, precision position, navigation, and timing to troops on the ground, ships at sea, aircraft in flight, and weapons enroute to targets. Space assets are critical to achieving information superiority as they: (1) enable predictive and dominant battlespace awareness and C4ISR integration and (2) reduce the "sensor-to-shooter" cycle to minutes or even seconds. Space assets are also critical in reducing the forward footprint and enabling standoff attacks. Space superiority is also very important in enabling the integration of C4ISR and PBA required by the Space & C4ISR CONOPS and Global Strike CONOPS. The part of space superiority focused on protecting space assets is also critical for one mission of the Homeland Security CONOPS—the protection of critical

infrastructure, which includes ground-based systems that are dependent on space assets. The remaining CONOPS will also rely heavily on space-based assets. The United States cannot effectively exploit space for joint warfighting in these ways if it does not have responsive, reliable, and assured access to space, which requires achieving and maintaining space superiority. It is important to emphasize that space superiority does not include the actual use of space for C4ISR and other purposes. Instead, like air superiority, space superiority consists of activities that enable friendly use of space for those activities without interference from adversaries and to prevent adversaries from using space for the same purposes if we so choose.

The advantages these space assets provide are at risk because adversaries are acquiring equivalent systems and abilities to exploit space that would either deny America's use of space or enable similar capabilities. Commercial space capabilities, such as high-resolution imagery, are now readily available to most nations. Foreign governments constitute 40–80 percent of the commercial remote sensing market. In addition, the cost of launching and maintaining effective satellites is no longer cost prohibitive for a growing number of countries, especially with the advent of microsatellites.

Achieving and maintaining space superiority in the future requires the following transformational capabilities:

8. Protection and survivability of vital space assets

9. Negation of an adversary's access to space services

These capabilities incorporate the transformational capabilities described in Space Command's recent Strategic Master Plan associated with Mission Support and Counterspace.

Space situation awareness enables the Air Force to conduct operations to gain and maintain space superiority. Space situation awareness combines command, control, intelligence, surveillance, reconnaissance, and the environment to understand space operations, threats to operations, and impacts. Having a complete grasp of what is affecting the battlespace with respect to the space arena is critical to allowing the United States to exploit space and protect its assets from exploitation. The Space AOC, in conjunction with theater AOCs, is the focal point that will have the situational awareness necessary to perform tasking deconfliction and Predictive Battlespace Awareness for space systems.

The ability to protect and ensure the survivability of vital space systems is essential to ensure that an adversary cannot disrupt, deny, degrade, deceive, or destroy America's ability to exploit space-based C4ISR assets as previously described. This capability encompasses: (1) space-based space surveillance systems that provide details of space objects unattainable by ground-based systems; (2) an attack detection and reporting architecture capable of detecting, characterizing (identify and geo-locate), and reporting attacks on space systems and of assessing the resulting mission impacts; (3) on-board capabilities to protect friendly space systems from man-made or environmental threats; (4) adequately protecting key ground systems, to include backup command and control capabilities; and (5) fielding space systems that can withstand attacks without the benefit

of tactical warning. This transformation will be enabled by both materiel and non-materiel solutions such as doctrinal and organizational changes and improvements to tactics, techniques, and procedures.

The ability to deny an adversary's access to space services would be essential if future adversaries choose to exploit space in the same way the United States and its allies can. It would require counterspace systems capable of preventing unauthorized use of friendly space services and negating adversarial space capabilities if needed. The focus will be on denying adversary access to space on a temporary and reversible basis. In addition, offensive counterspace may be used to generate or support counterair, countersea, counterland, counterinformation, or strategic effects when the adversary's vulnerable node is a space system. Effective space situational awareness is a key enabler of this capability.

Both protecting space systems and denying access to space also requires the rapid launch and repair of space vehicles, a transformational capability discussed in more detail under the "Rapid Global Mobility" section.

The ability to field adequately trained operators and proven space systems are also essential elements in achieving space superiority. These Space Test and Training Range capabilities include dedicated space-based assets and ground control/processing centers. The development, operations, and management of an integrated Space Test and Training Range capability will support combined air, space, sea and land operations testing and training operations under realistic "battlefield" conditions. In addition, these capabilities will interact with Distributed Mission Operations and OSD's Joint National Training Capability initiatives.

Missile Destruction in Flight

One key component of Homeland Defense, a key transformation objective of the 2001 QDR, as well as the Homeland Security CONOPS, is the ability to protect the territorial United States from missile attacks. It is also essential to protect deployed forces from such attack. Therefore, the Air Force is pursuing the following transformational capability:

10. Detection of ballistic and cruise missile launches and destruction of those missiles in flight

Precision Engagement

Technology has enabled munitions to strike with incredible accuracy. Before precision-guided munitions (PGMs), the only option to strike a target with air power was to send numerous sorties to drop a large amount of ordnance. The number of sorties required put many aircrews at risk, required extensive forward basing, and often resulted in extensive collateral damage around the target. Precision strike capabilities today require few weapons per aimpoint (often as few as one), and the accuracy of the munitions means less exposure for aircrews and significantly reduced potential of collateral damage.

	1943	1970	1991
Bombs	9000	176	1
Sorties	1500	88	1
Circular Error Probability[1]	3300 feet	400 feet	10 feet

TABLE 3: Quantity of 2000 Pound Bombs Assigned for 90% Probability of Kill of One Target
Source: DIA

As shown by the table above, the transformational effects of PGMs are obvious as they have greatly reduced the number of sorties required to strike a target successfully. This means that, in many instances, the United States doesn't need to deploy as many forces (air, sea, and ground) to achieve the same capability and, thus, can deploy more rapidly, which is a key goal of DoD's transformation overall. It also means that the same number of forces armed with PGMs can strike many more targets successfully than a force without PGMs, enabling orders of magnitude improvement in overall firepower. PGMs also greatly reduce collateral damage. This is especially critical in operations less than "total war," which have tended to prevail in the post-Cold War security environment. Precision strike is also a key enabler of effective and efficient EBO and parallel warfare, which, in turn, is critical to the ongoing RMA discussed in Chapter II. The number of PGMs as a percentage of air-delivered weapons has steadily increased from 7.7 percent during Operation DESERT STORM, to 40.5 percent during Operation ALLIED FORCE, to 60.4 percent during Operation ENDURING FREEDOM, to 68 percent during Operation IRAQI FREEDOM. The results have been devastating. During OIF, U.S. precision air strikes reportedly destroyed 1,000 Iraqi tanks and reduced the combat strength of several Republican Guard divisions by 50 percent or more in less than one week—a feat that took six weeks of air strikes in the initial Gulf War.

The next steps of this ongoing transformation involve the following two transformational capabilities:

11. Order of magnitude increase in number of targets hit per sortie

12. Achievement of specific, tailored effects on a target, short of total destruction

The increased accuracy of today's precision weapons reduces the need for explosive power to destroy a target. In most cases, this means that smaller munitions can be deployed to strike targets. Smaller munitions mean that more can be deployed per sortie. Instead of measuring how many sorties it takes to destroy one target, the standard will soon be how many targets can be destroyed per sortie. This magnitude of increase in strike capability would enable the United States to conduct an even higher volume of attacks against hundreds of critical targets in the early hours of conflict with a small number of platforms (thus requiring a smaller footprint) and with a lower amount of collateral damage. The Air Force is beginning to explore the next obvious step: miniature munitions that can loiter on their own to detect and destroy time-critical targets as they emerge.

[1] Circular Error Probable is the radius of the circle surrounding a target in which there is a fifty percent probability the bomb will land.

Achieving effects without destruction will significantly enhance America's ability to minimize collateral damage. At present, the usual option to affect a target is to destroy it with a kinetic weapon. By creating effects short of total destruction, the United States could conduct more precise EBO that match capabilities to desired effects. Such a capability is critical in the post-Cold War operations that do not involve traditional conventional warfare; such as urban, stability, and peace operations. These types of irregular operations often require capabilities that can deliver timely desired effects while minimizing collateral damage to infrastructure and people. Tailoring effects is also critical to disable weapons of mass destruction without catastrophic collateral damage.
In addition to IO capabilities discussed under Section A of this chapter, directed energy weapons are the key to this capability. They would enable the following transformational characteristics compared to traditional systems:

- Long-range force application capabilities.
- Near-instantaneous and new classes of target effects.
- Nonlethal and very low collateral damage engagement capabilities. For example, high-power microwave weapons can destroy electronics without affecting personnel. In addition, high energy laser weapons can surgically engage targets while avoiding personnel.
- Significantly increased magazines for most directed energy systems.
- Enablers of new missions.
- Reduced operational costs and lower manpower requirements.

The Air Force's "Directed Energy Master Plan" summarizes ongoing Air Force directed energy efforts and articulates its strategy to develop and transition directed energy applications for the full scope of missions such as precision engagement, information superiority, space superiority, and ballistic missile defense. It also identifies six directed energy science and technology programs that would offer near-term transformational capabilities to the Air Force if funding were accelerated.

Global Attack

Currently, striking targets conventionally across the globe from the United States requires employing long-range bombers, which takes many hours and enables mobile targets to hide before the strike force arrives. In addition, legacy bombers can only operate in permissive and moderate threat environments. One of the keys to achieving DoD's current transformational objective of denying sanctuary to adversaries is the following transformational capability:

13. Rapid and precise attack of any target on the globe with persistent effects

A non-nuclear, prompt, and persistent global attack capability will provide the United States with a range of options for deterrence and flexible response when rapid response is absolutely critical, risks associated with other options are too high, or when no other

courses of action are available. Such rapid global attack would likely be used against extremely high-value targets such as hardened command and control facilities, terrorists, fixed and mobile integrated air defense system elements, theater ballistic missile launchers, and CBRNE production, storage, and delivery.

An integral part of this transformational capability is deep surveillance and reconnaissance and the associated intelligence analysis that provides high-fidelity information and Predictive Battlespace Awareness (see Section A of this chapter).

This global attack capability would be a key enabler of the Global Strike CONOPS' mission of holding terrorist-related targets at risk everywhere. It would also allow the United States to project power almost immediately in areas with no forward-deployed forces or easy access. Indeed, the traditional U.S. method of deploying air and ground forces at or through ports and airfields will grow more problematic as national and commercial satellite services, missiles, and CBRNE technology rapidly evolve. This capability would also buy valuable time should additional forces need to be deployed to the theater.

The Air Force is conducting a Long Range Strike Analysis of Alternatives to determine the most effective way to develop this capability.

Rapid Global Mobility

The immediacy of terrorist and other asymmetric threats to U.S. interests at home and abroad, as well as the fleeting, often ephemeral nature of emerging targets, demands the timely deployment of U.S. military forces anywhere in the world and rapid projection of CONUS-based combat power. The United States must be able to rapidly respond globally to support the full spectrum of operations. Quick and effective military response can mitigate instabilities harmful to the security interests of the United States and its allies and allows the United States to reach out and influence events around the world, not only during combat but also during peacekeeping and humanitarian operations. Airlift, spacelift, air refueling, and dynamic global command, control, and communications are crucial components in America's capability to deploy quickly around the globe.

Achieving rapid global mobility will require that American forces become increasingly more responsive, deployable, agile, versatile, lethal, survivable, and sustainable. Some relevant transformational Air Force efforts in these areas are discussed in other sections, especially in the following section on Agile Combat Support. It will also require achieving the following transformational capabilities:

14. Rapid establishment of air operations, an air-bridge, and movement of military capability in support of operations anywhere in the world under any conditions

15. Responsive launch and operation of new space vehicles and refueling/repair/relocation of future on-orbit assets

Achieving the first will require that the United States be able to provide airlift, aerial refueling, en route infrastructure, global command and control, and bare base opening to respond within hours of tasking to support peacetime operations or a crisis (up to a major theater war) while maintaining the ability to rapidly swing high priority forces to another major theater war. Such a capability is critical to the Global Strike CONOPS' requirement of being able to employ directly from CONUS and forward-bases with little or no warning. It is also critical to the Global Mobility CONOPS' requirement to provide austere air base operations and rapid and effective air mobility support to combatant commanders supporting the full spectrum of operations, from global strike to humanitarian relief and noncombatant evacuation operations. Achieving this capability would also significantly enhance the U.S. military's ability to conduct operational maneuvers from strategic distances.

The "way ahead" to improve rapid global mobility is contained in the Mobility Air Forces' strategic plan, the Air Mobility Master Plan 2004 (AMMP 04). This plan compiles and identifies the future requirements of over 20 organizations and components making up the Mobility Air Force Partnership. All partners play a crucial role in defining future mobility requirements. The AMMP 04 is a capabilities-based plan looking out 25 years to ensure air mobility remains capable of rapidly establishing air operations, establishing air bridges, and providing movement of forces anywhere on the globe under increased threat and adverse weather conditions that have historically restricted Mobility Air Force access. Modernization efforts are intertwined with the transformation process to provide an increase in overall mobility capability.

The plan first calls for increasing lift capabilities and improving the Air Force's refueling capabilities. It also calls for various technological improvements. Enhanced defensive systems will allow operations in hostile threat environments. Autonomous approach and landing equipment will enable operations to be conducted regardless of weather conditions and independent of ground-based navigation aids. Automated air refueling technologies will permit the refueling of manned as well as unmanned air vehicles on fueling tracks obscured by clouds. Mobility, strike, and ISR operations would not be degraded by weather in the refueling areas. Interoperable Mobility/Combat Air Force command and control systems will enhance global mobility operations.

In the future, a family of transport category aircraft will significantly improve mobility support to the warfighter. They will be capable of transporting the Future Combat System, regardless of weather conditions, over intercontinental ranges to unimproved landing areas of 3,000 feet or less in a threat environment. Variants, with common engines, airframes, and cockpits, could be built to fly a variety of airlift, special operations, ISR, and refueling missions. With this approach, aircraft development and sustainment costs would be minimized. A future generation advanced tanker will have a reduced signature and improved defensive systems to permit refueling closer to the target area, thus extending strike aircraft ranges or time on station.

The Mobility Requirements Study 2005, the Mobility Capabilities Study (scheduled for completion in March 2005), and ongoing U.S. Transportation Command actions are defining and balancing priorities and demands on air mobility and are taking into account all the mobility requirements of the U.S. military.

The ability to launch, operate, and maintain space vehicles responsively is essential because the United States cannot afford the loss of space-based capabilities or the luxury of waiting months to put a replacement satellite in orbit after a system failure. It will require: (1) robust and responsive spacelift and rapid satellite initialization and responsive satellite operations providing quick-turn, on-demand, assured space access for time-sensitive military operations; (2) orbital transfer vehicles to reposition or boost on-orbit access; (3) an optimal mix of mobile, airborne, and space-based assets that make up the Launch and Test Ranges and satellite control networks to increase coverage capability and reduce operations and maintenance costs associated with aging, fixed, ground-based infrastructure; and (4) space vehicles capable of refueling and repairing on-orbit space assets.

Air Force Space Command recently completed a year-long Operationally Responsive Spacelift Analysis of Alternatives focused on how to put payloads into space on short notice. In addition, demonstrations are being conducted in support of operationally responsive space to include rapid- launch systems and tactical space capabilities. The capabilities and needs of the other Services have already been factored into spacelift requirements.

In addition, the Air Force, starting with Operation IRAQI FREEDOM, has formalized its **Assessment Teams** (an integral part of the Contingency Response Group), which assess forward airfields in a theater of operations, with the initial ground assault force. These Assessment Teams assess the suitability of the seized airfield to proceed to the next phase in opening the air base. This allows a seamless integration between airfield seizure and operations enabling forward airfields to be set up significantly faster than before and thus significantly enhancing the combat power available to the Joint Force Commander and joint operations. The Air Force is developing a new concept for a specialized unit to rapidly open airfields.

Agile Combat Support

Agile Combat Support provides the foundational capabilities operational Air Force Task Forces translate into the responsive, flexible, and precision application of air and space power. It is more than deployed combat capabilities. Agile Combat Support prepares deployed Air Force assets for quick response and sustains engaged forces in persistent operations. More specifically, it entails the following:

- Readying the force by organizing, training, and equipping to produce combat capability across the range of military operations
- Preparing the battlespace by assessing, planning, and posturing for employment in specific mission scenarios
- Positioning the force within the required response timing by assembling modular and scalable capabilities, flowing them incrementally, and establishing effective beddown and force support
- Employing the force by providing immediate launch and/or strike operations, creating right-sized essential generation capacity, and ensuring regeneration of mission capability

- Sustaining the force by maintaining effective capacities of mission support for the duration of operations worldwide beginning on the first day of employment operations
- Recovering the force by accomplishing redeployment and reconstitution
- Ensuring that the instruments of air and space power are tools that can effectively be applied repeatedly

Presently, the Air Force cannot fully accomplish these tasks in a way that maximizes the full potential of air and space power and achieves the "focused logistics" goals of *Joint Vision 2020*. Focused logistics is the ability to provide the joint force the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity, across the full range of military operations in all conditions—to include CBRNE environments. It will result from revolutionary improvements in information systems, innovation in organizational structures, reengineered processes, and advances in transportation technologies. To address this shortcoming, the Air Force is currently pursuing the following transformational capability:

16. Significantly lighter, leaner, and faster combat support that enables responsive, persistent, and effective combat operations under any conditions

Many of the programs and efforts associated with achieving this transformational capability are a part of the "Expeditionary Logistics for the 21st Century" (eLog21) campaign. This campaign is coordinating the implementation of several major process transformation initiatives that will increase weapon system availability and reduce logistics costs to the warfighter. It is discussed in more detail in Chapter VIII.

The Air Force will also soon develop a separate transformation roadmap to provide effective and efficient combat support for the Air Force CONOPS (described in Chapter VI) per direction of the new *Air Force Strategic Planning Directive for Fiscal Years 2006–2023.*

Significant Advances During Operation IRAQI FREEDOM

Preliminary, unclassified "lessons learned" analyses from Operation IRAQI FREEDOM indicate that the Air Force achieved significant advances in many of the capabilities described in this chapter since Operation ENDURING FREEDOM as well as improvements in joint warfighting. Key examples include:

- **Joint Warfighting:** OIF was the first war that executed a campaign as designed by the Goldwater-Nichols Act of 1986: a truly joint warfighting effort from planning to execution. Air, ground, maritime, and space forces worked together at the same time for the same objective, not just because they occupy the same battlespace. For example, Air Force, Navy, Marines, Army Tactical Missile System and Patriot units,

coalition air forces, and space assets were all included in a combined Air Tasking Order. In addition, ground forces were able to bypass major enemy formations because, according to General Peter Pace, Vice Chairman, Joint Chiefs of Staff, of the "trust our ground forces had in precise and timely airpower." To avoid repeating the mistakes made in Operation ANACONDA in Afghanistan, the Air Force enjoyed unprecedented coordination with the land component commander to ensure air and space forces were fully integrated with the Army and Marines, as well as British troops. Two key related initiatives included:

  - **Air Component Coordination Element**. During OIF, an ACCE team was located within each component (land, maritime, and special operations) force headquarters to allow the air component to better integrate air and space power with the operations of the other components to better achieve the Joint Force Commander's objectives.
  - **Battlefield Airmen Modernization:** During OIF, two-thirds of Tactical Air Control Parties (the Airmen embedded in Army ground units for close air support) were outfitted with standardized SOF equipment. This significantly improved their ability to enable time-sensitive targeting and timely close air support of ground forces.

- **Blue Force Tracking:** Blue Force Tracking is the identification and tracking of friendly forces for the purpose of providing the Combatant Commander enhanced battlespace situation awareness and reducing fratricide. American forces enjoyed unprecedented situational awareness during OIF. Common operating picture capabilities enabled much improved area of responsibility battle management and targeting deconfliction that reduced fratricide. However, more progress needs to be made.
- **Time-Sensitive Targeting:** OIF demonstrated the Global Hawk UAV's ability to handle dynamic tasking with actionable intelligence to reduce sensor-to-shooter times down to minutes (though not yet single-digit minutes). Predator UAVs also enabled time-sensitive targeting via streaming videos to strike platforms. In addition, Central Command delegated time-sensitive targeting decision execution authority to the components in the theater.
- **Machine-to-machine integration:** The improved integration of sensors, networks, and the TPED process has enabled very flexible and adaptive operations. During Operation DESERT STORM, only 20 percent of sorties received their targets or had their targets changed after launch. This increased to 43 percent during Operation ALLIED FORCE and 80 percent during Operation ENDURING FREEDOM. Initial data shows that more than 90 percent of sorties during Operation IRAQI FREEDOM received updated target information enroute. This gave the joint commander immense flexibility to adjust to the rapidly changing operational and tactical situation and enhance EBO.
- **Expeditionary Force Modules:** Instead of being reactive and ad hoc, Expeditionary Force Modules; which represent what it takes to open, operate, and maintain a base; were proactive during OIF. This enabled tailored packages to meet the mission.

- **Embedded Contingency Response Groups:** These groups provide the air component a combat advance team to facilitate a full operating capability from a seized or austere airfield. During OIF, they participated in the seizure of airfields and therefore closed the transition seams that existed between airfield seizure (Combined Force Land Component Command) and the commencement of air operations (Combined Force Air Component Command).
- **More Agile Logistics:** Advances in logistics tracking technology, investments in new air and sea lift assets, and the prepositioning of military equipment in the region allowed U.S. forces to deploy with unprecedented speed. In addition, traditional TPFDDs lacked utility because American forces did not know where they were going until the last minute. Therefore, U.S. Transportation Command used a crisis deployment process known as a request for forces deployment order, which entails moving smaller combat units able to begin fighting quickly rather than moving all the pieces of a fighting force at once, as under a TPFDD. However, dedicated Joint Operation Planning and Execution System personnel and new sub-processes are needed to further enhance the effectiveness of the Request for Forces Deployment Process.
- **Special Operations:** Operation IRAQI FREEDOM was a coming-out party for SOF. During OIF (as well as in Afghanistan), they operated in and targeted within large areas with small forces; timely, accurate and relevant ISR; and the strength of rapid, precise airpower. They were a light, yet lethal mobile force and were truly joint in how they operated. In Iraq, special operators were integrated into the theater commanders campaign plan as an independent maneuver element. Strategic, operational and tactical objectives were linked to their operations.
- **Unprecedented command and control:** OIF demonstrated that with the right training, technology, organizations, and concepts of operation, U.S. forces can command and control warfare better than ever before and produce decisive effects faster, farther, and with greater precision than at any time in the history of armed conflict. OIF also demonstrated the incredible effects that advanced technology exploiting this unprecedented command and control could have on the battlefield. Weapons conceived in the 1970s and 1980s, and fielded in the 1990s, are now having a revolutionary effect on combat.
- **Integration of space operations at the strategic, operational, and tactical levels:** For the first time, the Air Force designated a Space Coordinating Authority in the Combined Air Operations Center (CAOC), bringing a senior space advisor and his reachback support network to the Combined Forces Air Component Commander's leadership team.
- **Combat Weather Teams:** Battlefield Airmen embedded with Army conventional and SOF forces used hand-held meteorological sensors and secure Iridium satellite communications to measure and transmit natural environmental information from the deep battlespace to enhance reachback weather forecasting capabilities of the 28th Operational Weather Squadron for Battlespace Awareness, force application, and time-sensitive targeting.

What the Air Force Needs from the Other Services and Agencies

In addition to the ways the other Services already support the Air Force (described in Chapter III), the Air Force requires additional support to enable the transformational capabilities discussed in this chapter:

- Jointly developed communications and information systems to satisfy all Services' requirements and to ensure a common operational picture and a single interpretation of processed information. All Services should jointly pursue common hardware and software development to ensure interoperability and to reduce development, procurement, and overall Operation and Maintenance costs.
- All Services should follow the new Defense Information Systems Agency Net-Centric Operations and Warfare and the Net-Centric Enterprise Services processes. This will ensure better machine-to-machine interfaces and system interoperability between the Services and joint commands.
- A joint fire-control system of systems that enables the Joint Force Commander to seamlessly access the sensor-to-shooter assets of all the Services to put a cursor over a target in a timely manner.
- Common, coordinated understanding of ISR and weather information requirements of all the Services.
- Coordinated information operations efforts, to include ensuring that all information systems are effectively protected against adversary information operations.
- Continued improved coordination of air operations and combat air support between the Services. This includes coming to a common agreement with the Navy on metrics to measure capabilities packaged in an Air and Space Expeditionary Force and a Carrier Strike Group.
- Coordinated missile defense networks. Air Force missile defense capabilities must effectively combine with the Navy's Aegis Cruiser Ballistic Missile Defense; the Army's Ground Based Interceptors, Theater High Altitude Air Defense, and Patriot Advanced Capability-Phase 3 missile systems; and the Marine's TPS–59v3. They must also coordinate with the Federal Aviation Administration, Coast Guard, and Aerostat.
- Effectively detecting cruise missiles will require coordination with Navy Aegis Spy Radars and the E–2, the Army Sentinel Radar, the Department of Homeland Security, and counternarcotic air surveillance assets. Destroying cruise missile threats will require effective teamwork with Army Air Defense Artillery, as well as Navy/Marine fighters and cruisers.
- Coordination of counterspace activities with the Army and Navy.
- Continued efforts to minimize airlift demands. This includes increased prepositioned assets, forward based logistics, and leveraging sea and land transportation capabilities to augment or offset the need for air transportation and refueling.

- Improved force flow development using the Collaborative Force Analysis Sustainment Tool, TPFDD development, and interface with U.S. Transportation Command.
- Continued efforts to improve joint training, experimentation, exercises, professional military education, etc.
- Effective coordination on the development of the new Joint Operating Concepts to ensure that the U.S. military can most effectively execute the U.S. National Military Strategy.
- Agreement on the standards by which all Services will provide human resource services to employees. The seamless delivery of human resource services will ensure that the right people are at the right place and time regardless of Service. For example, if the Air Force needs to employ Army or Marine ground forces to help secure an Air Force Base, or position Airmen on a naval vessel, there should not be a gap or seam in personnel servicing. In addition, Active Duty, Reserve, Guard, and DoD civilians should receive the same level of customer service, regardless of Service, from requirements to accountability.
- Predictive Sustainability Awareness. Services and Agencies (likely with the Defense Logistics Agency and the Army in the lead) need to coordinate to anticipate support challenges and resolve them before they become showstoppers. This includes developing triggers to determine when commitments are exceeding sustainable levels during surge periods to mitigate impacts and respond quickly.
- Integrated Combat Support Situational Awareness. Services and Agencies need to better define their support requirements to properly size the force for major operations to reduce demand for forward presence and be more responsive. This includes integrating multi-Service In-Transit Visibility capabilities.
- Improved coordination with other Services and Agencies on homeland security issues. This includes a broad-based, intelligence-sharing program with the other federal departments and agencies to enhance homeland security.
- Increased coordination of directed energy development. While some cooperative developments are occurring under the auspices of OSD's High Energy Laser Joint Technology Office, more is needed to expedite the development and transition of these transformational capabilities to all the Services.
- Understanding CBRNE effects on land-based air assets.
- Continued support from the Services and Agencies to the DoD Executive Agent for Space.
- Specific manpower, funding, and facility requirements for Base Operating Support when Air Force bases are used as joint bases.
- Specific tools to develop force flow and combat readiness assessment tools for displaying forces. These tools would combine to present a Common Readiness Picture for the Joint Force Commander.
- Clarification of roles and responsibilities between the Air Force and the other Services concerning base defense.

VIII. Transforming How The Air Force Does Business

The Air Force operates in a world in which the United States has global interests, responsibilities, and commitments. It is a world entering a period of dynamic and rapid change with threats to the United States, its interests, and its people both at home and abroad. America's enemies are increasingly non-state actors who employ novel and rapidly changing modes of attack and weapons. The Air Force will meet these new challenges because of the ability of Airmen to innovate, adapt, and lead-turn the enemy in the development of operational concepts, doctrine, and tactics. Implementing the warfighter's visions through the development and delivery of forces, systems, and support demands equal flexibility and agility in the Air Force's business operations.

Although many of the business processes have been incrementally reformed and modernized over the last thirty years, the underlying philosophy and basic architecture of these processes have not changed. They are labor intensive and lack the required agility, flexibility, and speed. To sustain the Service's warfighting advantage, the Air Force must ensure that its business processes and operations are efficient and effective, focused on warfighting capability, and reinforce and support the Air Force's three core competencies, which are the source of its warfighting advantage.

The principal goal of business transformation is to fashion fast, flexible, agile, horizontally integrated operational support processes that enable fast, flexible, agile, and lethal combat forces. The key to this goal is focusing on warfighter needs and eliminating the seams that divide Air Force capabilities today. The Air Force envisions a future business environment that provides fast, predictive operational support and response through situationally aware commanders. The secondary goal of business transformation is to achieve increased efficiencies through better, simplified, integrated processes and better support tools. In addition, the Air Force seeks natural and built infrastructure sustainment to mission capabilities.

Improved efficiency of business process should deliver the following effects:

- A twenty percent shift in business operations resources (dollars and people) to combat operations and new/modern combat systems
- A work load enabling its people to conduct routine (non-crisis, non-exercise) organizational missions safely within a 40- to 50-hour work week

- A compression of average process cycle time by a factor of four (relative to current established process baselines)
- The empowerment of personnel and enrichment of job functions

Measuring these effects will be a considerable challenge for the Air Force. The success of business transformation should not be measured solely in terms of reductions in staff or the number of hours worked per week or measured against the standards of commercial industry. In addition to these benchmarks, the Air Force must realize how best to enable its combat capabilities and measure its products and services against what is needed to enable joint combat capabilities. A mindset change is essential to success.

Preservation and expansion of free markets and support for small business are essential U.S. national security and economic principles. Air Force business transformation will also preserve free competitive enterprise that will ensure small businesses continue to serve as market laboratories for conceiving, testing, and demonstrating innovation that directly supports the Secretary of Defense's transformation vision.

This chapter first discusses the Air Force's business transformation organization and associated tools and efforts. It then discusses key Air Force efforts associated with business transformation: the Business Initiative Council and Sustainment Transformation.

Business Transformation Background and Leadership

In March 2004, the Secretary of the Air Force chartered the **Operations Support Modernization Program (OSMP)** to focus, accelerate, and prioritize the transformation of the Air Force operational support processes, using a warfighter-centric vision of support. To enable the vision of rapid, predictive operational support and response through situationally aware Commanders, the Air Force established the **Commander's Integrated Product Team (CIPT),** which represents the Major Commands and Functions of the Air Force. This group has been tasked to re-engineer the business processes and the availability of information around the needs of Commanders and to steer the business modernization efforts of the Air Force accordingly.

Business Transformation Execution

In addition to the CIPT, the Air Force chartered Business Domain Owners and an integration office to achieve the business transformation vision. These Domain Owners interface with their DoD domain counterparts to:

- Lead transformation of their domain business area
- Refer cross-domain issues to the Air Force CIPT Action Group (CAG) for resolution
- Provide a full-time domain subject matter expert to the Air Force CAG to assist in the integration activities
- Establish governance within the domain

- Advocate and support change within the business domain and reengineer business processes
- Comply with guidance, standards, and policy issued by the Air Force CIPT

The **Air Force CAG** serves as the Service integrating and coordinating arm with the OSD Business Management Modernization Program, manages Air Force enterprise solutions, and ensures all enterprise-wide activities are coordinated and consistent with the Air Force Enterprise Process View, Air Force Enterprise Architecture and technical standards. It is responsible for developing options and evaluating alternatives to maximize the efficiency of the Air Force Enterprise by identifying the expected value of proposed solutions and providing recommendations to the senior Air Force leadership. The Air Force Business Domain Owners will use their functional representatives to integrate and coordinate the development of Air Force enterprise business capabilities across all functional domains and their synchronization with Air Force operational processes.

The CIPT will establish subordinate Integrated Product Teams to deliver specific work products and capabilities. They will also work and address multiple communities (or business domains) reflected in the Enterprise Process View.

Tools for Business Transformation

A wide range of tools, techniques, methods, and approaches as well as extensive skill, experience, and exposure to new ways of thinking will be needed to bring about the envisioned transformation of Air Force business processes. The Air Force is just beginning the execution phase of business transformation. This section highlights some of the initial tools.

Operational Support CONOPS

The Air Force is preparing a new CONOPS to define the operational support capabilities needed from a warfighter perspective. The CONOPS will define the effects and capabilities needed to realize the vision of rapid and predictive operational support through situationally aware commanders. The key effects to be achieved are: Ready Force, Ready Installation, Ready Materiel, Sustained AEF battle rhythm, Mobilize, and Move and Sustain the Force.

Enterprise Process View (EPV)

Establishing the Air Force OSMP with a CIPT and a CAG provides a governance structure from which to promote and achieve the Air Force business transformation vision. It is equally important to provide a logic, framework, and enterprise context with which to guide relevant transformation projects. Consequently, the Air Force developed a conceptual architecture for an enterprise-wide approach to business transformation that would support the three Air Force core competencies. The EPV creates a single enterprise perspective that is critical to supporting a capabilities-based approach to business

transformation. An EPV will instill a disciplined enterprise process orientation that is capability-focused rather than individual platform, program, system, or function focused. In order to optimally reinforce the Service's core competencies, the Air Force needs to understand how its core business processes across the enterprise integrate to support the development of warfighting capabilities. This new view provides a way for the Service to organize its thinking, analysis, and decision-making around the warfighting capabilities.

The EPV captures the Air Force's core processes that provide governance of the core and those that enable the core process to work. The core processes are those that most directly strengthen and reinforce the three core competencies. In the near term, this will discipline Service business transformation efforts. For the long term, it will provide a context to: (1) standardize, rationalize, and improve processes across the Air Force; (2) guide enterprise architecture efforts; (3) provide a framework to rationalize multiple and redundant processes, tools, and systems; and (4) facilitate knowledge sharing and collaboration. All these efforts are focused on one goal: sustainable warfighting competitive advantage.

Business Enterprise Architecture

The Air Force CIPT will employ the EPV in the development of the Air Force Business Enterprise Architecture. This architecture will integrate existing transformation efforts with a focus on identifying cross-domain efforts and targets for enterprise solutions. The Air Force CIPT will leverage this architecture in the development of a phased road map to enable the Air Force to proceed rapidly from pilot programs to an incremental enterprise-wide modernization supported by commercial off-the-shelf components.

Business Process Ownership and Business Process Re-Engineering

The move from a functional view of operational support processes to a capabilities-based, cross-functional approach requires the definition of new concepts for the Air Force. The Air Force CIPT is in the process of designating lead Major Commands and lead Functions to take responsibility of re-engineering specific Air Force processes from an integrated perspective and defining the changes to DOTMLPF required for implementation.

Change Management

Sustaining the pace of operational support transformation requires the adoption of practical and proven change management techniques to ensure engaged leadership support; thorough understanding of the impact of changes on the Airman; and clear communication of the vision, objective, and achievements of transformation. The Air Force CIPT is developing the necessary tools to sustain a transformation effort that will deliver regular results and improvements in a 7 to 10 year timeframe.

Operations Support Flight Plan

In order to realize its charter from the Secretary, the Air Force CIPT will develop an Operations Support Flight Plan that will support the issuing of guidance and direction necessary to achieve integrated Air Force-wide enterprise solutions across all business domains where such solutions and related business practice reforms are ongoing or proposed.

Business Initiative Council

In July 2001, the Under Secretary of Defense (Acquisition, Technology, and Logistics) issued a memorandum forming the Business Initiative Council. This Council, which reports directly to the Senior Executive Council, is designed to improve the efficiency of DoD business operations by identifying and implementing business initiatives that create savings to be reallocated to higher efforts such as transformation. When a DoD component implements an initiative, it retains the savings and the ability to reallocate their use. The Joint Staff and the Services all participate in this council. The chairmanship of the Business Initiative Council rotates among the Services every six months.

Sustainment Transformation

Combat efficiency places a great reliance on the sustainment infrastructure and its business processes. Due to increasing challenges to provide faster and more reliable combat support in the next generation of air and space expeditionary forces, the Air Force launched its overarching Air Force logistics and sustainment transformation campaign known as Expeditionary Logistics for the 21st Century (eLog21). Under eLog21, business processes are being transformed through Business Process Reengineering. The eLOG21 goals are to increase airframe availability by twenty percent over the next three years and to have zero cost growth over the FY04–09 FYDP.

Two elements of eLog21 are Purchasing and Supply Chain Management Transformation and Depot Maintenance Transformation, collaboratively known as sustainment transformation. Depot Maintenance Transformation is taking a "lean" approach to integrate process improvements on the shop floor with production support processes. It will transform the Air Force maintenance depots into a "world class" Maintenance, Repair and Overhaul operation. Integrated with the Depot Maintenance Transformation is Purchasing and Supply Chain Management, which is discussed in the Agile Combat Support section of Chapter VII. Another key element of eLog21 is Serial Number Tracking.

IX. Long-Term Transformation: Future Challenges for Science and Technology

Attaining solutions for the warfighter depends in large measure on research and development. Through robust investment and deliberate focus in science and technology, the Air Force invigorates its core competency of technology-to-warfighting. The Air Force is improving its S&T planning and collaboration with other Services and Agencies to ensure that it:

- Encourages an operational pull that conveys to the S&T community a clear vision of the capabilities the joint commander needs in the future
- Addresses the full spectrum of future needs in a balanced and well thought-out manner
- Enhances the Air Force's ability to demonstrate and integrate promising technologies

As already discussed, the Air Force Vision challenges the Service to maintain global air and space power superiority, not only today but also well into the 21st century. This vision realizes that while the United States possesses a world-class Air Force, constant S&T investment is essential to maintain its superiority and better meet the security demands of an increasingly complex world. In a broad sense, long-term Air Force S&T is focused on: (1) moving the Service's capabilities from a theater to a global focus; (2) integrating air, space, and information capabilities to take advantage of the synergy between these three domains; (3) rapidly projecting capability to anywhere on Earth and into space while still retaining the ability to be expeditionary; (4) creating effects on demand anywhere, anytime; and (5) creating a rapidly composeable environment able to accurately replicate potential battlespace anywhere in the world through the use of rapid scenario generation tools and providing that ability to the warfighters in a timely manner.

The Air Force developed six long-term challenges to help focus the S&T investment beyond the 2020 horizon. The challenges are deliberately expressed in broad terms to avoid specifying solutions that could limit the scope of future S&T research. The six long-term challenges are:

- **Finding and Tracking:** *provide quality information from anywhere in near real-time*
- **Command and Control:** *monitor, assess, plan, and direct operations anywhere, from anywhere*

- **Controlled Effects:** *create precise effects, rapidly, anywhere, any time, for as long as required*
- **Sanctuary:** *allow friendly forces to operate anywhere with the lowest risk possible*
- **Rapid Air and Space Response:** *respond as quickly as necessary and relocate rapidly*
- **Effective Air and Space Persistence:** *sustain force application and supply flow as long as required*

This chapter briefly outlines each challenge and notes some exciting new possibilities that long-term Air Force S&T is exploring over the next few decades.

Finding and Tracking

Precision is one of the fundamental requirements that underpin the effectiveness of air and space power. To be precise in the application of force requires knowledge. For this reason, the United States needs the ability to provide a decision maker target quality information from anywhere in the world in near real-time at any moment in time, something not possible today. In addition, there are items that cannot be reliably found and tracked today even when sensors are present. Although finding and tracking is not the sole purview of the Air Force, airborne and space-borne sensors will fill key roles.

In the long-term, Air Force S&T is exploring exciting possibilities that could be derived from extrapolations of current technologies. One is to control the availability of latent sensory data and integrate it with real-time detection, which would enable unprecedented characterization of potential targets. Another is to understand how to net large arrays of individual sensors to create nearly invulnerable sources of information. Yet another possibility is to dispatch at will a swarm of very small sensors to enter tunnels, look under camouflage cover, listen behind lines, electronically eavesdrop, or sniff out chemical, biological, and radiological presence or threats. This would put eyes, ears, noses, and antennas wherever they are most needed for threat warning, assessment, and, if armed with high-energy-density munitions, even neutralization. The Air Force is also addressing the scientific barriers to miniaturization of components through coordinated research on micro mechanics, nanoelectronics, nanopropulsion, and the role of smart skins and flight dynamics. This would enable the development of sensors at the molecular level. These microscopic sensors or "sensor dust" could be used for novel swarm detection, tagging, tracking, and the identification of difficult targets. This could lead to major extensions of present eyes-in-space through air launch on demand of both "nanosats" and swarms of long-endurance mini UAVs. Such capabilities would enable reductions in time and extensions in space to achieve target quality information in near real-time. The Air Force is also exploring techniques for assessing global conditions and events so that the United States can be forewarned of potential adversarial actions.

Command and Control

Control of military force is central to the American way of war. The United States will always need to improve its ability to gather and assimilate vast amounts of data, discern pivotal information, and communicate knowledge to the right place at the right time.

Inherent in this capability is the need to gather data from multiple sources, fuse that data, and expertly assimilate and display critical information to give joint warfighters knowledge when they need it, where they need it, and how they need it. While the American military has made significant progress in the command and control area, there is a long way to go.

In the long run, the Air Force is trying to find a way to move knowledge through a global grid in order to develop a true "reach anywhere" command and control ability. The Service is focusing the cross-disciplinary research areas of joint battlespace infosphere, information flow, information assurance, network modeling, and monitoring local information systems. Equally intriguing is the potential of a "master caution panel" for the joint commander that would proactively tap him on the shoulder whenever a new critical situation developed in the battlespace and offer alternative courses of action. This could significantly help the commander control the tempo of the conflict. Research areas include: bio, nano, quantum information processing, storage and retrieval; intelligent dynamic software agents; human cognitive enhancement; and high-level fusion tools and algorithms. The Air Force is also pursuing quantum computing with a breakthrough potential of atomic-level computing a million times faster than today's silicon chip. If realized, this would leap the command and control infosphere into the realm of contextual interpretation and proactive projection of alternate futures from which the commander could choose, keeping the tempo of conflict ahead of any adversary. In addition, the Air Force is exploring advanced technological means in artificial intelligence, neural networks, and fuzzy logic capabilities to apply to business and battlefield mission areas to keep the United States inside the opponent's decision cycle in the long-term.

Controlled Effects

To achieve controlled effects into the foreseeable future, the United States must be able to create precise effects rapidly, with the ability to retarget quickly, against complex target sets anywhere, anytime, for as long as required. It also needs the ability to tailor the type and amount of energy on target to create the desired effect, whether it is lethal or non-lethal, precise or dispersed. While there has been significant progress in the past decade with precision, directed energy, and non-lethal weapons, there is yet a long way to go to reach the full potential of these abilities.

Long-term Air Force S&T efforts in this area are exploring various promising possibilities to achieve real control of battlespace effects. For example, the Air Force is beginning to understand how to create temporary and even reversible effects. The emergence of information operations techniques has added yet another dimension of capability. These capabilities are central to the strategic concept of Rapid Aerospace Dominance and enable the idea of Rapid Aerospace Strike. Air Force S&T is also exploring the possibility of putting a warning energy "spot" on any target worldwide that could be rapidly followed with varying levels of effects. This could significantly enhance the value of conventional deterrence to the President, the Secretary of Defense, and the Joint Force Commander. Another area of possible breakthrough deals with solid-state directed energy. If the generation of large quantities of heat could be managed, the Air Force could develop highly effective, cheap, high-power energy weapons.

The Air Force is also looking for ways to provide measured global force projection via high-powered microwaves (HPM). Within HPM, it is investigating how to enhance the lethality of HPM systems, conformal array antennas (in order to put these systems on tactical platforms), and air breakdown mitigation (the physics of propagating HPM through the atmosphere). The Service is also identifying enabling technologies for directed energy for "from tap on the shoulder, through to toast" those we wish to coerce.

In addition, the Air Force is aggressively identifying areas of application of an extremely high-density material recently unveiled by Air Force research, N-5, the first new stable compound of Nitrogen discovered in over 100 years. Combining N-5 with tailored-shape munitions manufactured from nano-particles, whose virtually all-surface structure yields unprecedented "burn-rates" (extreme explosiveness), promises far greater control of battlespace effects than previously imagined.

Sanctuary

The U.S. military must be able to protect its total force from natural and man-made hazards or threats, allowing it to operate anywhere with the lowest risk possible at affordable costs in an increasingly dangerous environment. Inherent in this function is the ability to take appropriate actions to include threat neutralization, CBRNE protection, and information operations. The long-term challenge to the United States is to be able to continue to counter these constantly evolving efforts by potential adversaries. Staying one step ahead of an adversary in a rapidly evolving technological world will challenge Air Force S&T for some time to come.

Some key Air Force S&T efforts in this area include producing a safe source of fuel from water and engaging precisely without kinetic weapons. Both could dramatically increase survivability inside a threat envelope through true dispersed operations. In other domains, the Air Force is exploring new abilities to assure rapid, cheap access to space to provide much more flexibility for protecting increasingly important space assets. It is also looking at how to provide an invulnerable force protected from both natural and man made threats. Areas of research within electromagnetic spectrum manipulation include: stealthy materials, camouflage skins, active camouflage, and dynamic jamming.

The Air Force has also begun work in nanoelectronics to enable more versatile payloads that could be "air-launched" for rapid, cheap space-launch as well as swarms of UAVs and UCAVs of the future. The potential appears limited only by the rate at which the Air Force is choosing to progress in spiral advances towards greater sensing, time on target, and destruction capability for less weight, delay, and cost. The promise for the future is a ring of awareness, then protection, then safety around sites of our choice, or denial of the same to an adversary.

Rapid Air and Space Response

There will always be political and policy reasons to go "forward." It is for this reason that the ability to plan and move quickly anywhere in the world is critical to the effectiveness of military power. Part of the challenge to Air Force S&T will be to meet the Air Force

Vision's mandate to reduce the forward footprint by fifty percent by the year 2020. Another aspect of rapid air and space response is access to space. Today the United States cannot quickly get into space, and U.S. space presence is not assured as space assets grow more vulnerable over time.

Air Force S&T is examining possible solutions to these problems as technology matures. For example, it is looking at ways to collect or generate large quantities of energy on orbit in order to rely on space-based platforms for more missions and provide a greater degree of true global presence. This would change many equations about traditional ideas of rapid response. In addition, the Air Force is pursuing research to enable rapid global reach. One key area of basic research is in Advanced Structural Systems, which includes research in adaptive structures, structural efficient materials based on beryllium, magnetic flow paths and nozzles, and lightweight, high-temperature structures.

Air Force S&T is also engaged in plasma dynamics studies that have already demonstrated significant air-drag reduction on vehicles and missiles. If such plasmas can be generated with sufficient energy efficiency on leading edges of aircraft or missiles, they can significantly increase range and reduce time to target, aircraft time-on-target, and fuel consumption. Pulse-detonation rockets may increase payloads by up to fifty percent in boost, upper stage, and orbit transfer, all at increased reliability.

Effective Air and Space Persistence

Closely linked to the ability to respond is the military imperative to persist once there. Persistence applies to the ability to keep an adversary at risk in his own territory for as long as necessary, to do "air and space occupation." While this is possible today under certain circumstances, Air Force S&T is focusing on how to achieve this in all circumstances, anywhere on the globe in air and space, against all potential threats.

Some areas that long-term Air Force S&T is examining include: (1) on-orbit maintenance, repair, and upgrade of space systems to enable true persistence; (2) "recovering" space vehicles on demand, to protect space assets as well as improve the currency of technology in space; (3) routinely operating at 30 to 70 miles above the earth to give the Joint Force Commander unparalleled operational flexibility and persistence at very low risk; and (4) dramatically reducing the time to move anywhere on the globe from CONUS not only to make dramatic improvements to America's ability to respond, but also to create many opportunities for ways to persist.

In addition, access to space is one of the areas the Air Force is researching within this long-term challenge. Various architectures are being studied for future constellations. This research would include satellite clustering; adaptive satellites; micro, nano, and pico satellites; and miniature satellite mechanical systems.

Revolutionary polynitrogen compounds for all-nitrogen propellants, strained-ring hydrocarbons for liquid boosters, and energetic monopropellants for launch and satellite propulsion are converging on the goal of reducing space delivery costs (for a fixed payload) by half at increased burn rates. This, combined with a miniaturization-science

for space (to reduce weight to orbit, where applicable) may significantly enhance space persistence, with spin-off enhancements to UAV and UCAV persistence. The Air Force is also exploring precision airdrop capabilities.

X. Conclusion

It is an exciting time for the Air Force. It is engaged in developing new strategies and new CONOPS to meet an entirely different set of challenges and vulnerabilities. Technology is creating dynamic advances in information systems, communications, and weapon systems, enabling the joint commander to understand the enemy, plan and deploy forces, and deliver more precise effects faster than ever before. Airmen are more educated, more motivated, and better trained and equipped than any time in the past.

The Air Force is fully committed to the transformation process and to maximizing joint combat capabilities. It is using the Secretary of Defense's construct, expressed by the new defense strategy, the Transformation Planning Guidance, Strategic Planning Guidance, and the 2001 QDR's six operational goals for transformation and risk framework to guide its transformation efforts. The *U.S. Air Force Transformation Flight Plan* lays out the Service's ongoing transformation efforts, which, in concert with the other Services, will help achieve the effects required by the Joint Force Commander in the changing security environment.

The ongoing transformation of the Air Force will help enable the Joint Force Commander to:

- Achieve decision cycle dominance to strike adversaries before they can mount an effective defense
- Deny sanctuary to adversaries
- Use smaller forces to disable an adversary rather than having to destroy it with mass attrition
- Maximize the power, lethality, and flexibility of a truly joint, global force
- Successfully neutralize mobile targets
- Integrate air, space, sea, and land systems across all Services
- Achieve Predictive Battlespace Awareness
- Deploy with significantly smaller combat support footprints
- Penetrate and defeat the next generation of advanced air defense systems to sustain air superiority into the foreseeable future
- Ensure the joint force has the right personnel, equipment, and supplies in the right place, at the right time, and in the right quantity under all conditions
- Conventionally strike targets persistently anywhere on the globe in a timely manner
- Choose among multiple kinetic and non-kinetic capabilities to achieve the desired effect

- Protect friendly information systems
- Make the enemy fight blind, deaf, and dumb by disrupting its C4ISR
- Protect space systems and deny space to adversaries, if necessary
- Rapidly deploy forces abroad
- Defend against ballistic and cruise missile attacks
- Protect resources on the ground for forces both within the United States and abroad
- Assure continuous operations in a CBRNE environment
- Significantly improve combat air support to ground forces

In turn, these capabilities strongly support DoD's transformation goal, articulated in the Transformation Planning Guidance, to produce military forces capable of the following type of operations by the end of the decade:

- Standing joint force headquarters will conduct effects-based, adaptive planning in response to contingencies, with the objective of defeating enemy threats using networked, modular forces capable of distributed, seamlessly joint and combined operations.
- U.S. forces will defeat the most potent of enemy anti-access and area-denial capabilities through a combination of more robust contamination avoidance measures, mobile basing, and priority time-critical counterforce targeting.
- U.S. forces will leverage asymmetric advantages to the fullest extent possible, drawing upon unparalleled C4ISR capabilities that provide joint common relevant operational situational awareness of the battlespace, rapid and robust sensor-to-shooter targeting, reachback, and other necessary prerequisites for network centric warfare.
- Combined arms forces armed with superior situational awareness will maneuver more easily around the battlefield and force the enemy to mass where precision engagement capabilities may be used to maximum effect.

Air Force transformation will not only revolutionize traditional, high-intensity combat operations, but also help enable the United States to face new irregular, potentially catastrophic, and disruptive challenges in the post-Cold War security environment summarized in Chapter II. For example (referring primarily to broad transformational capability categories detailed in Chapter VII):

- Rapid global attack, rapid global mobility, persistent ISR, standoff, ballistic and cruise missile defense; information operations; stealthy air defense penetration capabilities; force protection; and CBRNE detection, defeat, and decontamination capabilities will counter various disruptive and irregular anti-access and area-denial strategies by adversaries.
- Effective information operations will protect critical C4ISR systems and networks against adversary attacks and counter adversary PSYOP campaigns.

- Space superiority capabilities will protect critical space assets against growing adversary threats to them.
- Information superiority capabilities will counter advanced dispersal and deception techniques and enable the tracking of targets under the cover of night, in adverse weather, and hiding underground.
- Information superiority, non-lethal, loitering munitions, SOF, agile combat support, and rapid global mobility capabilities will greatly enhance urban operations, peace operations, and stability operations.
- Rapid global attack, loitering munition, information superiority, and rapid global mobility capabilities will be essential in the ongoing global war on terrorism.
- Predictive Battlespace Awareness; ballistic and cruise missile defense; force protection; emergency response programs; and weapons of mass destruction detection, defeat, and decontamination capabilities as well as efforts associated with the Homeland Security CONOPS will greatly enhance the protection of U.S. forces from new technologies available to adversaries and the U.S. homeland against potentially catastrophic attacks.
- Agile Combat Support capabilities will enable U.S. forces to conduct responsive, persistent, and effective combat operations in all environments – to include CBRNE.
- Predictive Battlespace Awareness capabilities will significantly mitigate the unpredictability of threats in the new security environment.
- Information superiority, rapid global mobility, agile combat support, and rapid global attack capabilities will significantly mitigate the greatly reduced access to forward bases.
- Information superiority capabilities as well as future non-lethal gunships, SOF transports that can penetrate advanced air defenses, tactical UAVs, and the new Battlefield Airmen initiative will significantly enhance special operations.

In addition to developing capabilities, the Air Force has robust strategic planning, innovation, and long-term S&T processes in place to support the development of these transformational capabilities. It is creating flexible, agile organizations to facilitate transformation, institutionalize cultural change, and enable the Air Force to more effectively operate in the post-Cold War security environment. The Air Force is transforming the way it educates, trains, and offers experience to its Airmen so they understand the nature of the changing security environment and are encouraged to think "outside the box." It is continuing the transformation of how it integrates the Air National Guard, Air Force Reserve, and civilian force with its Active Duty force. The Air Force is continuing to transform into a capabilities-based force through the Air Force CONOPS and the CRRA. It is working with the Joint Staff, OSD, and the other Services and Agencies to improve joint warfighting and develop new joint concepts. The Air Force is also working to ensure that its business processes and operations are efficient, flexible, and agile to support the needs of the warfighter in this rapidly changing environment.

The Air Force excels at providing air and space focused capabilities to the joint warfighter, while enhancing the capabilities of soldiers, sailors, and marines. The diversity and

flexibility of Air Force efforts and capabilities through concepts of operation, technology, and organizational structure provide unparalleled value to the Nation and make the whole team better. DoD must integrate the existing capabilities of the Services in a way that is most efficient and effective to address the rapidly changing security environment. The Air Force will continue to work with the rest of DoD to keep transformation focused to provide the capabilities required for the Nation in the 21st century.

The key themes of the Flight Plan can also be found in the Air Force pamphlet "The Edge: Air Force Transformation."

Appendix A:
TPG Guidance for Service Transformation Roadmaps

This appendix reproduces in italics the text of Appendix 3 of the Transformation Planning Guidance, which details OSD requirements for the annual transformation roadmaps beginning with the previous 2003 edition. It cites the chapters and sections where the requested information can be found within the Flight Plan in bold parentheses.

As described in the body of the TPG, the Services and Joint Forces Command will build transformation roadmaps to achieve transformational capabilities (as represented in the six operational goals) in support of joint operating concepts and supporting operations. The transformation roadmaps will plot the development of capabilities necessary to support these concepts and will serve as baseline plans for achieving the desired joint operating concepts. They will outline the concrete steps organizations must take in order to field capabilities for executing joint and Service concepts.

To ensure that the transformation roadmaps provide a level of consistency for the purpose of comparison and analysis, it is important that the roadmaps adhere to certain fundamental guidelines. The updated transformation roadmaps will:

- *Use the definition of transformation presented in this guidance;* **[Chapter II]**
- *Utilize timelines consistent with the development of joint operating concepts as explained in the body of this document;* **[Appendix D and Chapter III]**
- *Describe how the organization plans to implement transformational architectures for future operating concepts, consistent with the joint operating concepts and supporting joint and service mission concepts, to include:*
    - *When and how capabilities will be fielded;*
        - *Identify critical capabilities from other Services and Agencies required for success;*
        - *Identify changes to organizational structure, operating concepts, doctrine and skill sets of personnel.*

      [Appendix D and Chapters V, VI, and VII]
- *As possible, include programmatic information that includes appropriation breakouts through the FYDP necessary for the desired capabilities;* **[Separate classified annex]**
- *Unclassified or collateral roadmaps will be supplemented with a compartmented annex when required to expand identification of key capabilities and fully represent the spectrum of Service and Agency capabilities.* **[Briefing to be presented to Director, OFT]**

A central element of transforming our force is interoperability—the ability to bring all relevant information and assets to bear in a timely, coherent manner. All roadmaps will directly address the interoperability priorities listed on page 16 of [the TPG]. Additionally, Services will explicitly identify initiatives undertaken to improve interoperability in the following areas: deployment of a secure, robust and wide-band network; adoption of "post before process" intelligence and information concepts; deployment of dynamic, distributed, collaborative capabilities; achievement of data-level interoperability; and deployment of "net-ready" nodes of sensors, platforms, weapons and forces.

Roadmaps will identify plans for achieving these critical capabilities by ensuring that:

- *Systems are capable of participating in a Joint Technical Architecture collaborative environment;*
- *Systems are tested and evaluated to determine actual capabilities, limitations, and interoperability in realistic Joint Warfare scenarios and in performing realistic missions;*
- *New C4ISR, weapons and logistics systems incorporate* [Internet Protocol] *IP-based protocols;*
- *Systems are capable of "post before processing" functionality;*
- *Selected legacy systems are retrofitted with these capabilities.* **[Appendix B]**

I*n addition to adhering to the guidelines above, the roadmaps will address plans to implement other aspects of transformation to include:*

- *Incentives to foster concept-based experimentation, the use of prototyping methodologies, and development of training and education programs;* **[Chapters IV and V]**
- *Information superiority, the identification and employment of all its elements, how it should be represented in war plans and joint experimentation, and how to achieve it;* **[Chapter VII, Section A and Appendix B]**
- *Seamless integration of operations, intelligence and logistics;* [**Appendix B]**
- *Support Standing Joint Force Headquarters and joint command and control;* **[Appendix B]**
- *Metrics to address the six transformational goals and transformational operating concepts;* **[Chapter VI]**
- *Transformational intelligence capabilities, specifically those mentioned on page 16 of [the TPG];* **[Chapter VII, Section A, especially regarding "Predictive Battlespace Awareness" and Appendix B]**

And how experimentation programs meet the TPG experimentation criteria (on page 17–18 of [the TPG]) and support the priorities for experimentation. **[Chapter IV]**

Appendix B: Additional Details Required by Transformation Planning Guidance

This appendix includes most of the specific details about ongoing and planned efforts in the Air Force required by Appendix Three of the TPG. They are included here because their scope and detail did not fit the broader, more strategic level focus of the body of the Flight Plan.

The information is organized in three sections.

- The first section addresses the interoperability priorities listed on page 16 of the TPG.
- The second section addresses the following guidance from Appendix III on Service interoperability efforts:

  A central element of transforming our force is interoperability—the ability to bring all relevant information and assets to bear in a timely, coherent manner…. Additionally, Services will explicitly identify initiatives undertaken to improve interoperability in the following areas: deployment of a secure, robust and wide-band network; adoption of "post before process" intelligence and information concepts; deployment of dynamic, distributed, collaborative capabilities; achievement of data-level interoperability; and deployment of "net-ready" nodes of sensors, platforms, weapons and forces.

  - *Roadmaps will identify plans for achieving these critical capabilities by ensuring that:*
    - *Systems are capable of participating in a Joint Technical Architecture collaborative environment;*
    - *Systems are tested and evaluated to determine actual capabilities, limitations, and interoperability in realistic Joint Warfare scenarios and in performing realistic missions;*
    - *New C4ISR, weapons and logistics systems incorporate IP-based protocols;*
    - *Systems are capable of "post before processing" functionality;*
    - *Selected legacy systems are retrofitted with these capabilities.*
- The third section addresses the following TPG guidance on Air Force efforts regarding information superiority, to include "*the identification and employment of all its elements, how it should be represented in war plans and joint experimentation, and how to achieve it.*"

For convenience, the following graph charts the primary Air Force interoperability efforts discussed in the first two sections of this appendix associated with the information required by the Transformation Planning Guidance.

TPG Requirement	Associated Air Force Efforts
Interoperability Priorities on p 16 of TPG	
Standard operating procedures and deployable joint command and control processes, orgs, and systems for Standing Joint Force HQ	AOC Formal Training Unit, Command and Control Constellation, Warfighting HQ
Common Relevant Operating Picture for joint forces	Combatant Commanders Integrated Command and Control System, E–10A, Family of Interoperable Operational Pictures, Single Integrated Air Picture
Enhanced ISR	Automated ISR, Command and Control Constellation, Distributed Common Ground System, E–10A, Extended Tether Program, Global Broadcast Service, Global Network Centric Surveillance and Targeting, ISR Management, Link 16 links to Situational Awareness Datalink, Multi-Platform Common Data Link, National Tactical Integration, Network Centric Collaborative Targeting, Predator UAVs, Space-Based Infrared System, Space-Based Radar, Transformational Air and Space ISR Project, UAV video feed modernization
Selected sensor-to-shooter linkages prioritized by contribution to the Joint Operations Center	Combined Air Operations Center, E–10A
Reachback capabilities that provide global information access	Airborne Networking capability, Bandwidth Sharing, Distributed Common Ground System, E–4B, E–10A
Adaptive mission planning, rehearsal, and joint training linked with C4ISR	Most of the programs/future system concepts associated with Chapter VII, Sections A and F; Distributed Mission Operations, M&S Foundation
Interoperability Initiatives in Appendix Three of TPG	
Deployment of a secure, robust, and wideband network	Advanced Extremely High Frequency system, Bandwidth Sharing, Combatant Commanders Integrated Command and Control System, Combat Information Transport System, Distributed Common Ground System, Joint Tactical Radio System Networking, Quality of Service, Transformational Satellite Communications
Adoption of "Post Before Process" intelligence and information concepts	Distributed Common Ground System, E–10A, ISR-Management
Deployment of dynamic, distributed, collaborative capabilities and achievement of data-level interoperability	Airborne Networking Management, AOC as a weapon system, Air Force Transformation Center, Automated Deep Operations Collaborative Force Analysis Sustainment Tool, Coordination System functionality into Theater Battle Management C4I System as part of the Family of Interoperable Operational Pictures effort, Battle Management Command and Control, Command and Control Constellation, Distributed Common Ground System, E–10A, eXtensible Markup Language, Global CONOPS Synchronization, Joint Tactical Radio System, Leadership of JEFX process, Link 16, Multi-Platform Common Data Link, Standing Joint Force HQ prototype, Tactical Data Link Roadmap
Deployment of "Net-Ready" sensors, platforms, weapons, and forces	Adaptive Joint C4ISR Node ACTD, Agile Transportation (AT 21), Distributed Common Ground System, Digital Imagery Request and Distribution System (BRITE), E–3B/C Block 40/45 Upgrade, E–10A, Joint STARS Attack Support Upgrade and Improved Data Modem, Joint Tactical Radio System, Multi-Mission Payload, Network Centric Collaborative Targeting ACTD, Situational Awareness Data Link Gateway, Space-Based Radar, Tactical Data Link Infrastructure, UAVs/UCAV efforts

TABLE 4: Mapping Air Force Efforts with TPG Interoperability Requirements

Addressing TPG's "Interoperability Priorities"

This section outlines Air Force efforts that support each of the interoperability priorities listed on page 16 of the Transformation Planning Guidance.

Standard Operating Procedures and Deployable Joint Command and Control Processes, Organizations, and Systems for the Standing Joint Force Headquarters

Future Air Force Component theater battle management command and control systems will meet Global Information Grid Capstone Requirements Document requirements to support interoperability with C4ISR and information systems and sources and those developed in the future for U.S., allied, coalition (multinational), and joint forces and Agencies. Deployable Air Force command and control systems are designed to be interoperable with allied and host nation command and control systems to support combined joint operations. Database standardization, digital production, and semantic tagging of data and information are critical enablers for operating in this multi-level security environment.

The Air Force **Air and Space Operations Center Formal Training Unit** reinforces standard operating procedures for joint command and control processes, organizations, and systems. Training joint common process standards for Air Tasking Order generation and dissemination allows integration with the current and future command and control and information systems of all other expeditionary command and control nodes to enhance AOC processes and functions. Joint and combined command and control exercises, such as Blue Flag and Ulchi Focus Lens, further refine standardized tactics, techniques, and procedures, securing essential Service core competencies while ensuring cross-functional compatibility during worldwide contingencies.

The Air Force **Command and Control Constellation** infrastructure and communications architecture will be an open-architecture, Global Information Grid (GIG)-compliant network capable of serving all command and control mission applications. New command and control systems will identify and use common standards for data and metadata presentation. These systems will also comply with applicable information technology (IT) standards contained in the DoD Joint Technical Architecture and the security standards of the Air Force Department of Defense Intelligence Information System. All of the system's data that will be exchanged, or has the potential to be exchanged, shall be tagged in accordance with the current Joint Technical Architecture standard for tagged data items (eXtensible Markup Language), and tags will be registered in accordance with the DoD eXtensible Markup Language Registry and Publisher's Clearinghouse policy and implementation plan. The network will be designed to interoperate with compatible future to-be-determined systems.

The **Warfighting Headquarters** implementation (detailed in Chapter V) will enable the Air Force to proactively integrate with the proposed Standing Joint Task Force Headquarters while evolving to a fully, joint air and space headquarters.

Common Relevant Operational Picture for Joint Forces

The Common Relevant Operational Picture will present timely, fused, accurate, and relevant information that can be tailored to meet the requirements of the joint force commander and the joint force. The Air Force is working to achieve this through their Family of Interoperable Operational Pictures effort. The Air Force is also supporting JFCOM's Joint Interoperability Plan to achieve interoperability priorities, including the Common Relevant Operational Picture.

The **Family of Interoperable Operational Pictures** is a multi-Service program with new funding provided by OSD that will close the seams between existing legacy C4ISR and weather systems and extend the capability of systems under development in order to exploit the full data collection and management abilities of current C4ISR and weather assets. In order to provide an all-source picture of the battlespace containing actionable, decision-quality information to the warfighter through a fusion of existing databases, it will implement data-sharing and fusion among heterogeneous, stovepiped systems in support of both operational and tactical users. It will facilitate the establishment of interoperability standards and architectures to guide future acquisitions. The Air Force is the lead agent for this program and serves as the systems engineer for Joint Forces Command in coordinating joint battle management command and control programs.

The **Single Integrated Space Picture** will be the primary system for Space situation awareness and will support planning and execution of global space operations. It will provide global and regional awareness of space forces to the warfighter to enable the Air Force to command and control space forces and present space forces to support Effects-Based Operations. It will evolve into a seamless component of the Family of Interoperable Operational Pictures, along with a Single Integrated Air Picture, Single Integrated Ground Picture, Single Integrated Maritime Picture, Common Relevant Operational Picture and Common Tactical Picture.

The **E–10A** is the next generation wide area surveillance platform designed to provide a near real-time, horizontally integrated view of the air and surface battlespace through the use of advanced sensors, network centric systems and high-speed, wide band communication systems. It will provide a focused Air Moving Target Indicator capability for cruise missile defense, robust Ground Moving Target Indicator and Synthetic Aperture Radar capabilities, and onboard integration and Battle Management Command and Control capabilities for rapid joint decision making, forward in the battlespace. The Battle Management Command and Control suite will be an open systems architecture to facilitate future growth. The E–10A will achieve decisive operational capability through the rapid integration of information from manned, unmanned, and space-based sensors. The E–10A is a key enabler of joint rapid decisive operations and the joint theater air and missile defense architecture. The aircraft will also be a key node of the Command and Control Constellation, which will enable the horizontal integration of ground, air, and space sensors and battle management platforms such as strike aircraft and ground troops.

The **Combatant Commanders Integrated Command and Control System** is a command and control system that supports the Commander, NORAD to execute the aerospace warning and control missions and supports the Commander, U.S. Strategic Command to execute space missions through Air Force Space Command. The system also provides space situation awareness to Combatant Commanders and government agencies. Additionally, it is the command and control capability supporting the National Security Space Plan.

Enhanced Intelligence, Surveillance, and Reconnaissance Capabilities

The **Air Force-Distributed Common Ground System (AF-DCGS)** weapon system is a central component of Air Force efforts to transform the ISR infrastructure to a net-centric enterprise. The foundation of AF-DCGS is a robust space and terrestrial communications network. The terrestrial backbone is a high-speed, wide-area network that will ultimately connect at least 22 DCGS nodes around the world. The communications backbone provides added flexibility to deliver ISR data to DoD nodes to allow dispersed and distributed entities to share information, thereby generating synergy. This cross section of capabilities and expertise result in a shared knowledge base that permits AF-DCGS elements to self-synchronize as the environment changes. The result is near real-time multi-sensor tip-offs and cross-cues that facilitate dynamic retasking of sensors available to the Joint Task Force commander. The AF-DCGS concept results in a reduced forward footprint, reduced airlift requirement, and an increased level of timely support to Joint Task Force commanders. Speed of command is enhanced as AF-DCGS provides the warfighter an actionable awareness of the accelerating changes in the environment, contributing immeasurably to Information Superiority.

The Air Force is also integrating an **ISR Management** capability into the AF-DCGS and Air and Space Operations Center weapons systems. The ISR management function enables the operators and collections managers in the AOC to visualize the status and capabilities of ISR assets in the area of operations and dynamically retask them in near real-time based on battlefield activity.

The **Space-Based Infrared System** will be a responsive, taskable, and steerable platform that can provide near real-time Overhead Non-Imaging Infra-Red (i.e., sensor-to-shooter connectivity) data to warfighters.

In the long-term, the **Space-Based Radar** will provide the capability to look deeply and persistently into areas that are inaccessible to current platforms due to political restrictions, geographical constraints, or the technological limitations of legacy systems. The continuous global access of Space-Based Radar and the extended-loiter capability of intercontinental range UAVs such as **Global Hawk**, combined with near real-time data transfer to multiple relevant command and control elements and the **E–10A**, will allow constant imaging or tracking of all relevant mobile or fixed surface targets in any weather conditions in all types of terrain as well as within urban areas.

Architectural Efforts

While the Air Force has committed to ISR integration through the establishment and funding of organizations dedicated to this goal, it is also advancing architectural improvements described below.

The Air Force is transitioning from collecting data through a myriad of independent systems (such as Rivet Joint, AWACS, JSTARS, and space-based assets) to a **Command and Control Constellation** capable of providing the Joint Force Commander with real-time, enhanced battlespace awareness. It will provide Ground Moving Target Indicator capabilities along with focused Air Moving Target Indicator capabilities for Cruise Missile Defense. Additionally, every platform will contribute to the integrated network. Regardless of mission function (command and control, ISR, shooters, tankers, etc), any data collected by a sensor will be passed to all network recipients. This requires networking all air, space, ground, and sea-based ISR systems, command and control nodes, and strike platforms to achieve shared battlespace awareness and a synergy to maximize the ability to achieve the Joint Force Commander's desired effects.

The capabilities needed to exchange tactical information derived from multiple sensors is being addressed by initiatives such as the **Multi-Platform Common Data Link System**.

The **Automated ISR** initiative will use technology to automate the TPED process to speed the delivery of finished intelligence to the user. It includes upgrades such as Distributed Common Ground System Block 10 and 20 upgrades, Network Centric Collaborative Targeting, Link 16, Automated Geo-Precise-Positioning of sensors, and Computer Aided Target Detection.

Network Centric Collaborative Targeting is an ACTD that will demonstrate a network centric operating system designed to horizontally integrate air, space, and surface ISR assets at the digital level. By providing a seamless, machine-to-machine interface, this ACTD can dramatically improve geo-location accuracy, timeliness, and combat identification of time sensitive targets. With an enhanced wideband battle management C4ISR network, it will ultimately enable a network centric, distributed processing environment by leveraging existing sensors, communications, and processing systems to dramatically reduce the time required to detect, identify, locate, and designate fleeting targets. The ACTD continues to work with the Airborne Overhead Integration Office to expand its initial capabilities. The long-range goal is to expand this capability to additional ISR sensor systems to create a greater network centric approach to find, fix, and track time-sensitive targets. It will perform its Military Utility Assessment in fall 2004. If successful, the Air Force will program for this as a fielded system.

The mission of **Global Network Centric Surveillance and Targeting** (funded by the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence) is to deliver a near real-time, actionable multi-sensor ISR output to the warfighter through automated upstream correlation and fusion of airborne and national data to detect, locate, and identify and prosecute previously undetected mobile time-critical targets. This program is initially focused on surface-to-air missiles and mobile theater ballistic missile launchers. The Air Force is providing operational expertise to the National Geospatial Intelligence Agency, which is executive agent.

National Tactical Integration is an 8th Air Force initiative to improve information flow between national-level intelligence producers and tactical warfighters. The objective is to improve the timeliness and quantity of information available to air component staffs. Sensitive source information is stripped off and the remaining relevant tactical information is inputted into collateral level warfighter channels, making it more useable to the targeting and execution nodes in the kill chain. National Tactical Integration personnel imbedded in the AOC will understand the battle rhythm and critical information requirements by actively pulling information from national sources. This will improve the push system to a smart push-pull system.

Another Air Force effort to improve dissemination of actionable information is the **Integrated Broadcast Service.** It is a Ultra High Frequency satellite-based capability that will disseminate near real-time intelligence (threat avoidance, targeting, maneuver, force protection, target tracking, and battlefield situation awareness) to users in a given AOR and relayed to sites around the globe. The migration capability will also provide a single message format across DoD and will enable increased interoperability with Australian, British, Canadian, and New Zealand partners. The Air Force is the Executive Agent for the Integrated Broadcast Service, which is an umbrella program for the following intelligence systems: (1) the Air Force's Tactical Information Broadcast Service, (2) the Navy's Tactical Related Applications Data Dissemination System, (3) the National Security Agency's Near Real-Time Dissemination System; and (4) the Army's Tactical Reconnaissance Intelligence eXchange System.

Global Broadcast System provides a true global and fully mobile communications architecture to DoD operators. Its satellite-based (Ka-band) architecture transcends previous geographic limitations to allow relatively high bandwidth transmission of mission critical information to forces virtually anywhere in the world with relative simplicity. The Global Broadcast System was and continues to be used to support Operation Enduring Freedom in various locations throughout the U.S. Central Command area of responsibility. It is used extensively to transmit perishable high-bandwidth intelligence, such as UAV streaming video, and operational support data to aid combat air force and special operations personnel to fuse strategic and tactical operational views of the battlespace improving the ability to tighten the kill chain.

The Air Force is also working on developing a communications gateway to extend and integrate the datalink architectures within the battlespace. The **capability to provide limited Link 16 information to Situational Awareness Datalink equipped platforms** for issuing commands, providing situational awareness, and reducing the risk of fratricide are the goals of this effort. The capability not only will allow aircraft with varying communications architectures to communicate with each other, but provide machine-to-machine interface and permit CAOC-to-cockpit digital command and control and extend CAOC fusion beyond line-of-site.

The **Transformational Air and Space ISR Project** is an Undersecretary of Defense (Intelligence)- and Deputy Director of Central Intelligence-chartered study to look at air and space transformational ideas for 2008–2018 timeframe. The study is on a fast track and will be completed in time to affect the FY05–09 Amended POM. The project has five working groups: CONOPS (Air Force lead), Information Needs, Scenario, Metrics,

and Research and Evaluation. The plan is to create candidate force-mix architectures to evaluate against the CONOPS, information needs, metrics, and scenarios. The resulting recommendations will propose air and space trade-offs to aid executive decisions for the National Foreign Intelligence Program build.

Future ISR Integration Efforts

While some integration of ISR sensors has already taken place, there is still a long way to go. The Air Force ISR integration strategy is transitioning to align with the Air Force CONOPS and associated CRRA process (described in Chapter VI) to define ISR integration requirements. Once these requirements are validated, the Air Force will develop and acquire new methods for ISR integration according to an ISR technology roadmap. New doctrine and/or tactics, techniques, and procedures will need to be developed to accompany the new technology. All of these new efforts will fit within the OSD C4ISR architecture since the Air Force owns a majority of the Low Density/High Demand ISR platforms and supports component commanders and other Services.

In addition, the Air Force will expand its efforts at integration across processed data networks through multi-discipline intelligence product networks. The capacity of communication lines and on-board processing capabilities used to distribute and process ISR data needs to be increased to handle the large bandwidth and processing demand that sensor data places on the network. Continued use of compression, pre-processing of sensor data before transmission, and fiber optics will help to alleviate this shortfall. Even if the bandwidth issues are resolved, once the data arrives, there are often multiple terminals necessary to access all relevant sources of information. The Air Force is emphasizing the need for common user interfaces that allow analysts to access multiple sources from one terminal to alleviate this problem. In addition to procuring more horizontally integrated systems, the Air Force acknowledges the need to continue wargaming and experimentation of future ISR concepts. The focus of JEFX 04 is battle management command and control, with an emphasis on air and space integration. Three focus areas will be Network Centric Infrastructure, Effects-Based Operations, and Predictive Battlespace Awareness.

Selected Sensor-to-Shooter Linkages Prioritized by Contribution to the Joint Operations Center (JOC)

The theater **CAOCs** and the functional area managers of the AOC and E–3B/C will work with the Joint Operations Center to ensure the Joint Operations Center Air Operations Cell has the information it needs to prioritize required air-to-ground and air-to-air sensor-to-shooter linkages and can access these selected sensor-to-shooter links. Specifically, the CAOC Time Sensitive Targeting Teams and E–3B/C units can provide lessons-learned information on using sensor-to-shooter links to help the Air Operations Cell to prioritize these links based on Joint Operations Center requirements.

The **E–10A**, described earlier, also will provide important capabilities in this area.

Reachback Capabilities that Provide Global Information Access

A new **Airborne Networking capability** is now operational on Distinguished Visitor, Special Air Mission, and Combatant Command support aircraft. Significant capability is being provided with the operational validation of the C–32s(2), C–40Bs(2), and VC–25 aircraft equipped with integrated classified and unclassified Local Area Networks, "Connexion," and High Speed Data International Maritime/Marine Satellite air-to-ground data service. This supplements the very limited legacy capability (16K fax/data and low speed dialup). The requirement was to enable access to unclassified and classified email, shared files, and applications hosted on their home station networks as well as view-live television and participation in secure video teleconferences. The intent of the Airborne Networking capability is to provide an "office in the sky" and extend the Global Information Grid into the airborne platforms. The Nation's most senior leadership is now enjoying this quantum leap and applying it directly to continuity of governance and operations. The Air Force has established Air-to-GIG gateways and an Air Network Operations and Security Center to support these airlift platforms mentioned above. The next step in this effort is to expand this capability to more airborne platforms such as the E–4B National Airborne Operations Center, which is currently undergoing this modification

On 31 March 2001, an OSD memo requested that the Air Force provide a plan to implement a ground infrastructure to support modifications to the Distinguished Visitor fleet that included both primary platforms and smaller assets such as the C–37As. Therefore, Block I focused on initial support to the primary platforms. With the initial infrastructure operational, it is now necessary to focus support to the remaining Distinguished Visitor aircraft with robust global infrastructure, increase performance, and begin the support other platforms equipped with the antenna systems. This effort emphasizes three major objectives to homogenize capability across platforms, maximize performance, and ensure continuous availability to senior leadership.

The Air Force selected high-speed data International Marine/Maritime Satellite as the most viable solution to extend the GIG to smaller platforms such as C–37As. For a small investment, the Air to GIG gateways can be enhanced to support Dial access into the Non-Secure Internet Protocol Router Net and Secure Internet Protocol Router Net via Integrated Services Digital Network Remote Access Servers. In doing so, not only can distinguished visitor aircraft be supported but the Air Force can also extend GIG services to other platforms such as C–17s and KC–135s that implement high-speed data International Marine/Maritime Satellite antennas. It may even be possible to provide support to the Joint Enroute Mission Planning and Rehearsal System with this small investment.

This project builds upon its prior success and applies "lessons learned" from the initial effort to take the next step in extending the GIG to all airborne platforms.

Bandwidth sharing is another key associated Air Force effort. Bandwidth sharing is a technique to provide more throughput, a higher rate return channel, and greater bandwidth efficiency. It provides an "always on" connection for network access, central server or database access, video streaming, voice services, and other multimedia services while economizing on satellite bandwidth.

Internet Protocol version 6 (IPv6) is DoD's future solution to implement a bandwidth sharing scheme and resolve contention for resources. DoD is currently using IPv4. Today's circuit-based satellite communication systems provide communications services by provisioning satellite resources to support specific user missions. Certain measures (e.g., priority, preemption, and fencing) are taken in order to guarantee such communications services. In an IPv6-based communications system, Quality of Service mechanisms can be employed to provide and guarantee equivalent communication services in order to support numerous user missions by providing bandwidth sharing. In comparison, the mechanisms employed in an IP-based environment can enhance the quality of service experienced by allowing the network to be flexible enough to dynamically react to user needs and offer better service.

The **E–10A** and **DCGS**, both described earlier, also would provide important capabilities in this area.

Adaptive Mission Planning, Rehearsal, and Joint Training Linked with C4ISR

Achieving adaptive mission planning, rehearsal, and joint training linked with C4ISR will require efforts in several key areas. First, the C4ISR architecture must continue to evolve to enable more robust network centric warfare. Second, modeling and simulation tools must continue to evolve. A synthetic, realistic environment will allow better integration between units—coalition, joint, and Air Force. Third, developing and embedding new and improved Decision Support Tools will allow commanders to leverage advantages in communications and intelligence to maintain decisive advantages over future enemies. Of course, fielding these systems will require applicable training programs as well as executable plans and implementing tools that can keep pace.

C4ISR Architecture

Commanders rely increasingly on surveillance to gather information on targets in real-time—and then get the information to the shooter fast enough for that asset to act. Maturing the C4ISR architecture will allow developmental teams to identify shortfalls and build a more robust and persistent ISR capability. Improving C4ISR provides greater asset capability, shorter kill cycles, and quicker battle damage assessments. The concepts of parallel warfare and EBO depend greatly on measuring opponent reactions, identifying opposing capabilities, and frustrating efforts to protect key infrastructures. C4ISR gives commanders the ability to respond quickly to opportunities to destroy critical enemy assets. The recent PGM attacks on Iraqi leadership exemplify the increased benefits associated with shortening the kill chain.

Leveraging existing capabilities creates a more persistent and robust technology. Network centric warfare gives commanders unprecedented insight into enemy actions as well as

a more complete picture of assets being arrayed. For example, UAVs linked to Air and Space Operations Centers gave commanders real-time images of potential targets and allowed them to respond to opportunities that emerged. Architecture will allow the systematic linkage of existing systems to occur, thereby increasing capabilities. Most of the programs and initiatives associated with Chapter VII, Section A on "Information Superiority" will support this. The Command and Control Constellation Architecture is the foundation for transformation of Air Force C4ISR.

Modeling and Simulation

The increased sophistication and robustness of modeling and simulation creates the trade space for transformation to happen in a low threat, yet realistic environment. The keys for this to continue will be the definition and development of the **M&S Foundation** elements that allow for the Rapid Scenario Generation for various theaters of operations. Such scenario generation will allow for mission rehearsal, testing of new capabilities, and Course of Action Development. Creating the M&S Foundation will allow DoD to train tailored forces to any scenario imaginable.

Modeling and simulation needs to continue developing in two areas to effect transformation. First, the ability to create realistic scenarios quickly enough to allow commanders to prepare for operations anywhere in the world is critical. Current capabilities allow for desert scenarios but do not allow for sorties.

In addition, **Distributed Mission Operations** will provide complete integration of live, virtual and constructive systems for training, mission rehearsal, and operations support in a theater of war environment—a capability not fully provided by current programs, and will enhance the kill chain by allowing the sensor-shooter links training time that is currently not available due to the Low Density/High Demand realities of the C4ISR assets. The realism achieved by this capability will further augment the commander's desire to "be inside the opponent's decision loop" and improve combat effectiveness.

Embedding Decision Support Tools

The next frontier of transformation is embedding decision-support tools for the commander. Selected sensor-to–shooter linkages prioritized by their contribution is a capability that is needed for the Joint Operational Commander. The ability for machine-to-machine communications to acquire targets, assign assets against opportunities, and conduct battle damage assessment will provide commanders with unimagined opportunities to shape the battlespace. The tediousness of such operations is rife with opportunities for mistakes. Freeing up manpower, like the air tasking order automation process, improves efforts and further enhances system capabilities.

Second, developing reachback capabilities allowing global information access will allow the Joint Operational Commander more rapid decision-making and better optimization of force mix. Commanders in the states can follow logistical support, munitions expenditures, medical requirements in real-time, empowering "just in time logistics" to function in global operations.

Most initiatives associated with Chapter VII, Sections A (Information Superiority) and F (Agile Combat Support) will achieve these goals.

Addressing TPG Guidance in Appendix III Regarding Interoperability Initiatives

This section addresses TPG guidance in Appendix III on pages 29–30 for Services to "explicitly identify initiatives undertaken to improve interoperability in the following areas [which comprise the sections below]…"

Deployment of a Secure, Robust, and Wideband Network

The primary Air Force effort to deploy a secure, robust, wideband network involves new **laser communications**. Laser communications offer new potential for extremely high capacity as well as secure means of communication using different frequencies and propagation means. They are inherently jam-resistant, providing much greater security. Laser communications will also transform the way data flows through the military satellite communications system by making it more network (rather than platform) centric, so data will flow more like it does on the Internet. Key associated programs that will operationalize laser communications include the **Transformational Satellite Communications**.

Additional relevant efforts include the **Combat Information Transport System**, which will provide a network centric, fiber-optic system to move, process, and protect all Air Force information, and the **Advanced Extremely High Frequency** system, which will allow secure, jam-resistant, worldwide, satellite-based communications independent of ground relay stations and distribution networks.

In addition, **Joint Tactical Radio System (JTRS) networking** will include or support:

- Interoperability between the Services
- Seamless delivery of video, voice, and data services
- Adaptation to user message requirements or network conditions
- Ad hoc formation of scalable networks
- Automatically (waveform controlled) and manually (user controlled) adaptable radio frequency or routing features
- Standard protocols and interfaces, if possible
- Evolutionary implementation of requirements and simple insertion of new capabilities

The JTRS networking design process uses the JTRS Application Programming Interfaces and modularity features. The design includes standardized Application Program Interfaces at each layer of the waveform to provide an easy mechanism for iterative performance improvements and overall waveform evolution with advancing technology developments.

The Air Force will use JTRS networking to provide a seamless extension of the Global Information Grid to Air Force users requiring wireless network connectivity. The JTRS networking will:

- Provide high throughput, dynamically adaptable connectivity for exchange of IP-based voice, data, and video traffic.
- Support efficient and reliable interconnection between terrestrial (fixed and mobile) and airborne users of the Global Information Grid in a changing network topology without introducing gateway bottlenecks.
- Support network nodes on mobile and airborne platforms (as well as deployed and fixed platforms) without the need of intervention by the personnel on those platforms.
- Be robust and adaptable to support communications connectivity during rapidly changing distances and orientations between nodes and will support operation in the following environments: (1) co-site environments typical of command and control, ISR, and other communications-intensive airborne and ground platforms; (2) tactical radio frequency propagation environments; and (3) radio frequency spectrum utilization suitable for worldwide operation.

In addition, the JTRS networking routing capability will be robust and sufficiently flexible to support dynamically changing network topologies and radio silent subscribers. The routing capability in both ground and airborne nodes must interface to commercial routing and network planning and management processes and systems used by the Air Force (including those used with wideband satellite communications networks) that are provided externally to JTRS.

JTRS networking will also provide network services to ground (fixed, deployed, and mobile) and airborne nodes operating in a theater-size geographical area. The network will include intra-Air Force as well as joint participants.

JTRS networking will provide network services to ground (fixed, deployed, and mobile) and airborne nodes in a theater-size geographical area of approximately 1000 by 1000 nautical miles.

JTRS networking will support theater and worldwide network connectivity by internetworking with IP-based networks on wireless and terrestrial media.

In simplest terms, **Quality of Service** is the ability of a network to differentiate between traffic types and provide differential treatment to them without adversely affecting its function or performance. In addition, the concept of networks and interconnectivity between networks through an IP infrastructure introduces the situation of "weakest link" where a single network can limit the quality of service by a) implementing poor schemes within its domain or b) implementing schemes so unique they cause poor Quality of Service translations across the network boundaries. The IP-based Quality of Service framework helps the Transformational Communications network (which includes laser communications-related systems such as the Transformational Satellite Communications) efficiently and reliably support a variety of operational needs, e.g., emergency services, time-sensitive applications, and high priority communication channels, across a complex network.

The **DCGS, bandwidth sharing,** and **Combatant Commanders Integrated Command and Control System**, all described previously, also play a key role in this area.

Adoption of "Post Before Process" Intelligence and Information Concepts

The primary Air Force effort to address this subject is the **Distributed Common Ground System**, which is a central component of Air Force efforts to transform the ISR infrastructure to a net-centric enterprise. It was described in greater detail earlier in this appendix.

The Air Force is also integrating an **ISR Management** capability into the AF-DCGS and Air and Space Operations Center weapons systems. The ISR management function enables the operators and collections managers in the AOC to visualize the status and capabilities of ISR assets in the area of operations and dynamically retask them in near real-time based on battlefield activity.

The **E–10A**, described earlier, also would provide important capabilities in this area.

Deployment of Dynamic, Distributed, Collaborative Capabilities and Achievement of Data-Level Interoperability

Most key Air Force efforts to deploy dynamic, distributed, collaborative capabilities and achieve data-level interoperability fall under one of the following categories: (1) eXtensible Markup Language implementation or (2) operational collaboration and data interoperability initiatives.

eXtensible Markup Language (XML):

The Air Force Scientific Advisory Board recommended the Joint Battlespace Infosphere concept in 1999 as an infrastructure to integrate, aggregate, and distribute information to all combat echelons. XML is a tool that will enhance machine-to-machine information exchange and help the Air Force achieve timely and accurate decision making during operations. It is the key enabling technology to create the link between content creators and content consumers to deliver the "right information to the right user at the right time in the right format" to multiple devices, including personal computers and wireless mobile devices. XML can be used to describe metadata for content and "fuselets," a Joint Battlespace Infosphere construct for simple processing applications.

The Infostructure Architecture Council will lead an Air Force-wide implementation strategy. The Air Force is currently developing XML implementation guidelines and procedures to ensure consistency and to avoid duplication of effort across Air Force commands.

The Air Force Departmental Publishing Office recently selected PureEdge's XML-based electronic forms product that will enable personnel worldwide to file electronic forms with electronic signatures. It is converting 18,000 forms that are used by more than 700,000 Service members worldwide.

In addition, the Air Force plays a leading role in migrating the U.S. and North American Treaty Organization Message Text Formats to XML representations and has developed an Air Force XML-Message Text Format roadmap to guide future work on this and related DoD XML messaging activities.

Operational Collaboration and Data Interoperability Initiatives

The Air Force has and/or participates with the Services in a host of initiatives to improve operational collaboration and data interoperability. These include:

- The Air Force has designated the **AOC as a weapon system** to provide the Joint Force Air and Space Component Commander a standardized capability to command and control air and space forces. This action will greatly enhance horizontal integration and provide a much improved capability to support joint operations with planning, tasking, command and control, data fusion, and near real-time common operating pictures of the battlespace.
- **Link 16** provides jam-resistant, secure communications that can be relayed over long distances for integrated operations and supports the concept of machine-to-machine interface for horizontal integration. It is currently being installed in attack aircraft beginning with the F–15 and F–16 Blocks 40/50. The goal is to put Link 16 on all attack aircraft enabling digital interface with command and control aircraft and a variety of joint command and control ground forces.
- **Joint Tactical Radio System**, described in more detail previously in this appendix, is a joint program in which the Air Force participates. It will provide a software reprogrammable joint Services radio and data transmission system.
- Previously, an AOC used its own unique hardware, software, and servers that were often incompatible with other systems in other Centers. The **Air Force Transformation Center** will ensure that the latest new technologies to achieve the capability to provide the commander a clear, coherent, real-time picture of the battlespace are incorporated into the global and theater AOCs in a timely and standardized manner.
- The **Global CONOPS Synchronization** will demonstrate ability to and benefits of sharing real-time information among Mobility Air Forces (global) and Combat Air Forces (multi-area of responsibility centric) command and control planning and execution systems, and flying assets via machine-to-machine data exchange.
- The **Multi-Platform Common Data Link** will provide point to multi-point, network enabled, secure, wideband data dissemination operations. It is compatible with all of the Services' data links and was specifically developed to disseminate information from an airborne platform to both the Army and Air Force Distributed Common Ground Systems. This common data link will be installed onto the Global Hawk, Rivet Joint, E–10A, and ultimately in every Army Distributed Common Ground System.

Additional Air Force efforts in this area include:

- Tactical Data Link Roadmap
- Automated Deep Operations Coordination System functionality into Theater Battle Management C4I System as part of the Family of Interoperable Operational Pictures effort
- Leadership of Joint Expeditionary Force Experiment process
- Standing Joint Force Headquarters prototype
- Battle Management Command and Control
- Airborne Networking Management
- Command and Control Constellation
- E–10A
- DCGS
- Collaborative Force Analysis Sustainment Tool

Deployment of "Net-Ready" Sensors, Platforms, Weapons, and Forces

The Air Force is pursuing a wide range of efforts to deploy "net-ready" sensors, platforms, weapons, and forces:

E–3B/C aircraft was designed to provide a quick reaction, highly mobile air surveillance platform for offensive and defense postures. It provides surveillance, battle management, and command and control support for air operations including Counterair (Offensive Counterair and Defensive Counterair), and Counterland (Interdiction and Close Air Support, reconnaissance, combat search and rescue, air refueling and airlift). Programs are in place to enhance machine-to-machine interfaces and decrease the kill chain timeline.

The JSTARS is the nation's premier provider of ground battlespace situational awareness—a critical command and control platform that provides persistent ISR capability to U.S. and coalition warfighters. JSTARS' wide area surveillance operations, using ground moving target indicator, fixed target indicator, and synthetic aperture radar capabilities enables a wide variety of Effects-Based Operations and gives theater commanders command and control and battle management of air-to-ground forces.

The **Distributed Common Ground System**, described in great detail elsewhere in this appendix, will be an open architecture, net-centric system that will enable the support of multiple, simultaneous, worldwide operations from in garrison and through scalable, modular system deployments. DCGS is also developing a common Services backbone of which other Service partners can leverage in utilizing their own TPED assets, to include AF DCGS Block 10.2

The **Multi-Mission Payload** is the first in a family of Scalable, Modular, Airborne, Relay Terminals, which will be suitable for a variety of platforms to include tankers, unmanned and ground- or sea-based vehicles. Initially, it will be a Link 16 relay that will allow line of sight-beyond line of sight communication between participants in the network. It will become a vital part of a global network to provide critical data to warfighters more quickly for faster decision-making and time-sensitive engagement of critical targets.

As the result of the Air Force Chief of Staff's Task Force for Link 16 Acceleration, the Air Force has taken several steps to improve the **Tactical Data Link Infrastructure**. These include the Interim Joint Interface Control Officer toolsets, common software, Tactical Data Link management tools, and improvements to the joint/combined Tactical Data Link Infrastructure.

The Air Force has also taken numerous initiatives to improve interoperability in deploying "net-ready" UAV and ISR assets:

- The Air Force participates in the DoD UAV Interoperability Working Group to pursue joint-Service and international cooperation in UAV programs to support system development. Its goal is to implement a standards-based approach for UAVs, including combat support and combat applications, to satisfy joint interoperability requirements and allow rapid integration into combat operations.
- The Joint Unmanned Combat Air System office was stood up on 1 October 2003 to address Air Force and Navy UCAV issues. This joint office will create standards that will allow UCAVs to be built along common lines with the hope of decreasing costs while retaining interoperability.
- The UCAV program is about to begin a compatibility study for operations with the next generation of Extremely High Frequency Milstar satellite communications and the Advanced Extremely High Frequency system.
- Global Hawk will possess an Ultra High Frequency military satellite communications data interoperability capability in 2004, with voice interoperability being added in 2007.
- Global Hawk UAV and the U–2 are currently reviewing options and planning to migrate to the JTRS, which will improve interoperability with the airborne network.
- Predator UAV has just completed a major initiative that improved interoperability and "net-ready" operations by implementing a robust, CONUS-based, reachback architecture. The Predator Operations Center is fully operational and is the central Predator UAVs control facility that takes maximum advantage of access to CONUS communications and classified intelligence networks. This has resulted in having to forward deploy only the air vehicles and the launch and recovery station, which has greatly reduced the amount of communications network infrastructure that is required at the forward operating location.
- The Tactical UAV Initiative, which will embed a small tactical UAV squadron within Air Force Special Operations Command, includes the seamless integration of smaller unmanned systems with the established mainline systems the Air Force currently employs.

In the near-term, the Air Force is pursuing a number of initiatives to improve the kill chain timeline by linking the sensor and shooter and linking the shooter into a network of information. This includes accelerating installation of **Situational Awareness Data Link Gateway** and Near-Term Enhancements to the Tactical Data Link Architecture. These combine to allow greater numbers of combat aircraft to access the Tactical Data Link Architecture and give access to a wider variety of Air Force and Navy platforms from Active, Guard, and Reserve components. The Air Force has also installed **Digital Imagery Request and Distribution System** at a number of locations to give friendly forces national and theater imagery faster. In the long-term, programs such as **Space-Based Radar** will provide unprecedented persistence and send critical target location information to a network of users worldwide to find, fix, track, target, engage, and assess targets anywhere on the globe and send that targeting information to the right network of shooters at the right time.

Finally, the **E–10A** and **JTRS**, described previously in this Appendix, also contribute to this objective.

Associated Advanced Concept Technology Demonstrations

Adaptive Joint C4ISR Node: This ACTD will integrate, demonstrate, and transition a single, multi-mission, morphable radio frequency system that provides seamless interoperable communications, signals intelligence, electronic, and information capabilities. It will be demonstrated in an aircraft for the ACTD, but can be employed in a variety of platforms in a theater-wide networked constellation providing ubiquitous multi-mission support of radio frequency operations. This ACTD will enable interoperability among the Services and coalition partners, reduce reliance on Low Density/High Demand assets (e.g., Rivet Joint), improve timeliness in responding to emerging requirements and threats and disseminating intelligence collection, increase fidelity in battlespace picture and broad situational awareness, significantly increase access for conducting network warfare operations, and reduce the logistics burden through common hardware.

Agile Transportation (AT21): This ACTD will demonstrate total visibility of all transportation requirements, available lift assets, personnel, and equipment moving to and within the various theaters of operation. Advanced scheduling decision-support tools will be used for mode determination and optimization of strategic lift assets resulting in reduced force closure times, smaller theater logistics footprint, and approximately $40 million annual cost avoidance. U.S. Transportation Command is the operational sponsor.

Network Centric Collaborative Targeting: This ACTD will demonstrate a network centric operating system designed to horizontally integrate air, space, and surface ISR assets at the digital level and dramatically reduce the time required to detect, identify, locate, and designate fleeting targets.

Joint Tactical Radio System Networking Requirements and Capabilities in Relationship to the GIG

To achieve the specific and derived requirements of Joint Vision 2020 and the Global Information Grid CAPSTONE Requirements Document requires a single interconnected, end-to-end information transport network. The Joint Tactical Radio System, as the OSD designated network enabler of the deployed operational area, provides the GIG transport for the deployed force commander. It will provide a seamless, highly flexible, and adaptive communications capability, offering the means for total horizontal and vertical C4 systems interoperability, for all radio sets and networks at all echelons for the 21st century warfighter, to ensure full spectrum dominance in peacetime and in war.

While a JTRS radio or JTRS Network node may not serve every user across the deployed area, the JTRS Network will service every mobile user and the majority of large stationary users. All nodes connected to the deployed area will be JTRS Network compatible/compliant, including those of existing or planned deployed static wide area networks and supporting networks such as Transformational Communications.

The JTRS has primary responsibility for providing the deployed portion of the GIG's information transport and network operations functions, along with other supporting systems.

The JTRS network is a collection of JTRS-enabled user nodes. When connected, these nodes will create an information mesh across the battle space. Each node, whether moving (orbiting satellite, aircraft, surface ship, submarine or vehicle) or static (geosynchronous satellite, fixed or stationary command post, fixed sea or land sensor) will provide a portion of the network. Each node not only provides for its own information needs, but as a part of the network, provides transit and other support for the overall network. The sum of the nodes will create the network. The nodes will establish and use discrete connections with one another to disseminate information. Connections may not be direct, but may be virtual through other nodes. The key to this adaptable network connectivity will be nodal network awareness. Each node in the network constantly will query its surrounding nodes for changes of network status and will conduct self-queries to establish internal status and provide information for its surrounding nodes. This will provide the network information necessary to maximize the information transport capabilities given the resources allocated to each node and the network.

Addressing Information Superiority Guidance in TPG Appendix III:

Page 30 of the TPG requires that Service transformation roadmaps "address plans to implement…information superiority, the identification and employment of all its elements, how it should be represented in war plans and joint experimentation, and how to achieve it." Much of this is directly addressed in Chapter VII, Section A ("Information Superiority") and in earlier sections of this Appendix addressing interoperability and

intelligence. This section addresses the remaining key aspect of information superiority: information operations. As described in Chapter VII, information superiority can provide a revolutionary advantage for U.S. forces only by ensuring that the adversary: (1) cannot disrupt, manipulate, or destroy the associated friendly information, information systems, and information processes on which they rely and (2) does not have effective C4ISR of its own.

Achieving the first requires effective information operations that ensure friendly use of the information domain. In fact, as the world's most information-dependent fighting force, the U.S. military, must use the IO capabilities of network defense, information assurance, operations security, military deception, counterintelligence, and counter-propaganda to degrade, disrupt, deny and destroy the ability of adversaries to exploit this reliance on information and assure jam-resistant, secure, survivable C4ISR. By integrating these IO capabilities to protect or project the commander's objectives and themes, military operations have a much greater chance at success.

Against adversaries with effective C4ISR, achieving the second requires information operations capabilities that can effectively degrade, disrupt, deny, and destroy an adversary's C4ISR capability. These include network attack, electronic warfare, military deception, public affairs operations, Operations Security, and PSYOP.

The Air Force is leading efforts to present many more of these classified IO capabilities to the Combatant Commanders either as apportioned capabilities or by making Combatant Commanders aware of limited combat capabilities presented by development programs. Most programs are very small in nature and would collectively be too numerous to list comprehensively here. Determining even unclassified funding for IO is extremely difficult at the present time as most funds are embedded in larger Program Elements that contain non-IO funding or, in the case of information assurance, is built into new C4ISR systems. The Air Force, however, is in the process of attempting to determine actual IO funding levels.

The Air Force is currently redefining its Information Operations mission area. It has initiated a two step process that will align it better with OSD and Joint Staff terminology and better define its components. First, the Air Force is in step with the OSD and Joint Staff efforts to refocus IO into five core capabilities: electronic warfare, network warfare operations, operational security, MD, and psychological operations. This will essentially refine a mission area that has been too broadly defined in past doctrine and was difficult to operationalize. In addition, the Air Force will move away from the information warfare and information-in-warfare construct and move to a doctrinal framework that defines information warfare as theory and IO as the application of that theory. Second, the Air Force has taken the five core IO capabilities and applied them to the operational level of war. This has resulted in the following Air Force understanding of the joint IO definition: *"Information operations is the integrated planning, employment, and assessment of Influence Operations, Electronic Warfare Operations, and Network Warfare Operations capabilities, in concert with specified integrated control enablers, to influence, disrupt, corrupt, or usurp adversarial human and automated decision making while protecting our own."* Influence Operations, Electronic Warfare Operations, and Network Warfare Operations are the "operational-level functions" associated with IO. The IO Mission Area Plan will

reflect this structure, and ultimately Program Elements will reorganize to give greater insight into the programming and budgeting for IO. These doctrinal refinements should leave the Air Force better poised to seamlessly integrate into the joint community.

The Air Force's current focus in IO via the effects-based IO Mission Area Plan reflects a mix of materiel and non-materiel solutions: These efforts include:

- **Information Warfare Flights:** The Air Force trains, equips, and fields units to provide IO combat power to the Combat Air Forces, Mobility Air Forces, Special Operations Forces, the space community and combatant commanders. The Flights provide integrated IO planning capabilities to air and space operations at the operational and tactical levels for planning and execution monitoring, including IO support for AEFs. Each Flight includes experts in network attack/defense, operational security, military deception, PSYOP, electronic warfare, information assurance, counter-intelligence, and intelligence, who are trained to synchronize the planning and execution of IO actions in support of the Joint Force Air Component Commander, Joint Force Commander, and/or functional AOC (e.g., Tanker Airlift Control Center) commander. While Information Warfare Flights have existed for several years now, the Air Force is currently in the process of evaluating the force and command and control structure for these Flights to provide better support to the warfighter and incorporate Operation Enduring Freedom and Operation Iraqi Freedom lessons learned. It is also working to better integrate the Flights into the Air and Space Operations Center planning by exploring a better chain of command than currently exists. For example, the Electronic Warfare Coordination Cell made significant contributions as a formally organized entity operating on the AOC staff during OIF. The Air Force is taking steps to ensure this functional capability, representing a traditional stand-alone function, exists in all future operations and is able to contribute meaningfully to the Information Warfare Flights in whatever form it takes in the future.
- **Information Warfare Planning Capability:** This capability is currently being developed as an integrated set of information warfare campaign planning and execution applications to support analytical collaboration, data fusion, event sequencing, and synchronization, targeting, situational awareness and information domain visualization to support IO course of action development in the AOC. In the future, the IW Planning Capability will need to address the specific needs of the Air Force IO defined operational functions (Electronic Warfare Operations, Network Warfare Operations, and Influence Operations) to ensure functional needs are met. The Information Warfare Planning Capability will interface with Joint Targeting Toolbox resident in the Air and Space Operations Center's Theater Battle Management Core System machines. This will allow non-kinetic targeting planning and development that parallels current kinetic targeting processes and cycles. In December 2002, OSD recommended that the Information Warfare Planning Capability Planning Capability suite of tools be adopted as the joint standard for IO planning.
- **Integrated Information Operations Training:** In the future, the key to achieving information superiority is to integrate the planning and execution of information operations and to develop and foster a robust, trained, and experienced IO

workforce. The Air Force has established the only DoD school for advanced hands-on IO training. It provides experienced communications, intelligence, counterintelligence, space, information assurance, public affairs, and PSYOP personnel with specialized technical training in IO and IO support. In addition, the Air Force will develop standard procedures and techniques to more fully plan, integrate, employ, and assess the operational functions of IO. The Air Force is working to more closely align this training with AOC weapons system crew training. It is also working to make it available to a wider Air Force audience and to the joint warfighter community through expanded classroom education and training, mobile training teams, distance learning, virtual exercises and experimentation, increased red teaming, etc.

- **Influence Operations Capabilities:** IO uses multiple influence capabilities to shape the cognitive battlespace prior to and during crisis/conflict and return to peace. The objective of influence operations is to promote synergy with the full range of air and space operations and to ensure Air Force influence capabilities are synchronized, interoperable, and integrated to increase overall joint influence capabilities and avoid redundancy. In peacetime, influence operations communicate the objective of American, allied, and coalition forces and exhibit the overwhelming power inherent in air and space forces with the objective of achieving a decisive outcome, negating the requirement for more traditional military operations, thereby reducing friendly casualties and lowering operating costs. The Air Force is working to develop, produce, distribute, and disseminate influence operations messages across the technological spectrum—sophisticated to primitive—and maintain the ability to operate successfully in "no tech/low tech" while developing techniques to operate successfully in high tech areas of the world to include denied and permissive areas.

- **Counterintelligence Support to Network Operations and Security Centers:** Counterintelligence expertise is needed to recognize threats and mitigate the vulnerabilities of U.S. and allied information and information systems. Critical nodes must be monitored and protected by regional counterintelligence experts to catch and prevent intrusions and ensure the integrity of Air Force information systems. Increased emphasis on the human intelligence aspect of counterintelligence must be rejuvenated within the Air Force to effect understanding of the vulnerabilities associated with the re-defined threat to the Air Force global mission.

- **Enhanced Air Force PSYOP:** PSYOP is an important perception management tool throughout the spectrum of conflict. Psychological preparation of the battlespace permits identification of psychological vulnerabilities, effects-based targeting, and PSYOP measures of merit. Automated tools, increased emphasis on analytical techniques and tools, and improved delivery mechanisms will significantly enhance the effectiveness of Air Force and DoD PSYOP capabilities.

- **Information Superiority Range:** The Air Force is currently working to develop full-spectrum research, development, test, engineering, and experimentation range infrastructure to support IO that is integrated with existing ranges used for RED FLAG and other force-on-force exercises and training. Such a range is needed to support transformational changes in the technological environment. It must leverage existing combat training ranges and encompass policies and programs in all mediums of warfare to allow total integration of sensor-to-shooter activities vice mere

de-confliction in time. This is the only way to ensure successful development of multi-platform weapons and create an environment for commanders to practice the integration of all ground, maritime, air, space, and information capabilities.

- **IO Normalization:** The Air Force has several initiatives completed and in progress to operationalize and normalize IO for effective force presentation and warfighting planning/execution. Among them:
  - ***Policy:*** Several Air Force policy documents have been published to guide IO development and operation. This includes drafting a new Air Force Policy Directive 10-7 to tie together IO policy guidance previously split between several documents into a single IO policy document. The Air Force is creating an overall IO CONOPS to describe the integration of IO and formalize the conduct of IO throughout the Air Force. It will provide clear guidance on cross-functional IO support to the Joint Force Air Component Commander, Joint Force Commander, or functional AOC Commander.
  - ***Career Force and Progression:*** To ensure field commanders have trained, experienced, mission-ready personnel, the Air Force is determining the feasibility of a stand-alone IO career field, with a desired skill set for an IO career force and guidelines for career progression. The Air Force has established technical training curricula, fundamental career progression guidelines, and classification tools to build and track IO warriors. This is essential to develop a trained, experienced IO career force, and is being integrated with broader OSD efforts as they begin to develop a Joint IO career force.

The Air Force will also take steps to capture lessons learned from recent operations and define and develop relations and objectives toward which the IO team will achieve.

- **Electronic Warfare Revitalization:** Several initiatives focus on improving Air Force electronic warfare capabilities. There is now a single office responsible for all electronic warfare matters across the Air Force (AF/XORE), bringing together previously scattered duties and responsibilities. In summer 2000, a 4-star Air Force summit reviewed and reaffirmed the importance of Air Force electronic warfare programs. Action items to address people, equipment, intelligence, ranges and exercises, metrics, organization, future roadmaps, and doctrine issues are in progress.

  In addition, the Air Force was fully engaged in the **Airborne Electronic Attack Analysis of Alternatives** study, and it conducted an Electronic Warfare Long Range Assessment to ensure appropriate electronic warfare capabilities are available to meet a full-range of future military requirements. Using this study as the catalyst, the Air Force is addressing the joint need for airborne electronic attack as part of a broader context.

- **Air Force IO School:** The IO Integration Course trains Air Force information warriors in the latest information gain, exploit, attack, and defend methodologies. Graduates from the IO Integration Course are assigned to IO integration positions worldwide, providing IO products and services to field combatant commanders.

- **Air Force Network Operations and Security Center:** Currently the Air Force Computer Emergency Response Team defends Service networks, and the Air Force

Network Operations Center enables information flow. Base network control centers reporting to the major command network operations and security centers are the gatekeepers for information flow within the MAJCOM. The Air Force Network Operations and Security Center will unite these nine MAJCOM Network Operations and Security Centers, as well as other communications agencies, to provide a single command and control authority. This will completely change the way the Air Force handles the command and control of network warfare operations. It will enable the Air Force to maintain its information superiority by giving the Air Force one organization to handle both Service-specific and joint computer responsibilities.

Appendix C:

How the Air Force Supports the QDR's "Critical Operational Goals of Transformation"

"Our job is to close off as many…avenues of attack as possible. We must prepare for new forms of terrorism, to be sure, but also for attacks on U.S. space assets, cyber-attacks on our information networks, cruise missiles, ballistic missiles, and nuclear, chemical, and biological weapons. At the same time, the United States must work to build up its own areas of advantage, such as our ability to project military power over long distances, our precision strike weapons, and our space, intelligence, and undersea warfare capabilities."

–The Honorable Donald Rumsfeld, Secretary of Defense

The Transformation Planning Guidance states that the annual transformation roadmaps beginning with the previous 2003 edition "will address capabilities and associated metrics to address the six transformational goals [the "QDR-6"] and the joint operating concepts." This chapter describes how the Air Force's ongoing transformation strongly supports the six "critical operational goals of transformation" articulated in the 2001 QDR.

For each QDR transformation goal, this appendix begins by quoting the portions of the QDR in italics describing the goal. It then briefly summarizes how the Air Force transformation efforts discussed in the Flight Plan are addressing those goals. To avoid repeating information, it makes references to relevant details discussed in other parts of the Flight Plan. In those cases in which there are key relevant Air Force efforts not already discussed in the Flight Plan, this chapter describes them in more detail.

Please refer to Chapter VI for more details on specific Air Force CONOPS.

It is important to emphasize there are numerous Air Force legacy systems and capabilities not discussed in the Flight Plan that are also critical enablers of these broad objectives. An initial assessment in late 2001 revealed that nearly 80 percent of all Air Force programs and funding support the QDR's six operational goals of

transformation in some way. However, including them all here did not appear to be consistent with guidance from the Office of Force Transformation not to rehash legacy programs in the Flight Plan and, instead, focus on efforts related to ongoing and future transformation, which is scoped in Chapter II.

A. Protect bases of operation at home and abroad and defeat the threat of CBRNE weapons

Protecting the American homeland from attack is the foremost responsibility of the U.S. Armed Forces and a primary mission for the Reserve Components. Future adversaries will have a range of new means with which to threaten the United States. It is possible to identify some of these means, including new techniques of terror; ballistic and cruise missiles; weapons of mass destruction, including advanced biological weapons; and weapons of mass disruption, such as information warfare attacks on critical information infrastructure. Others, like those used to attack the United States on September 11, 2001, may be a surprise. Defenses against known and emerging threats must be developed. New approaches to achieving early warning of new threats are a high priority. [QDR, page 30]

The continued proliferation of ballistic and cruise missiles poses a threat to U.S. territory, to U.S. forces abroad, at sea, and in space, and to U.S. allies and friends. To counter this threat, the United States is developing missile defenses as a matter of priority. Integrating missile defenses with other defensive as well as offensive means will safeguard the Nation's freedom of action, enhance deterrence by denial, and mitigate the effects of attack if deterrence fails. The ability to provide missile defenses in anti-access and area-denial environments will be essential to assure friends and allies, protect critical areas of access, and defeat adversaries. DoD must be prepared to provide near-term capabilities to defend against rapidly emerging threats and more robust capabilities that evolve over time.

DoD has refocused and revitalized the missile defense program, shifting from a single-site "national" missile defense approach to a broad-based research, development, and testing effort aimed at deployment of layered missile defenses. These changes in the missile defense program will permit the exploration of many previously untested technologies and approaches that will produce defenses able to intercept missiles of various ranges and in various phases of flight. These defenses will help protect U.S. forward-deployed forces. Moreover, they will provide limited defense against missile threats not only for the American people, but also for U.S. friends and allies. [QDR, page 42]

Efforts to defeat the CBRNE threat are focused on protecting U.S. and friendly forces and civilian personnel while maximizing operational capabilities, including sortie generation and cargo throughput, in CBRNE threat environments. Managing the CBRNE threat must be accomplished with a layered offensive and defensive capability. The Air Force C-CBRNE operational spectrum begins with Proliferation Prevention and continues through various Counterforce, Active Defense, and Passive Defense Capabilities. Success in deterring a potential adversary from acquiring or developing CBRNE capabilities will reduce the requirements for counterforce and active and passive defensive capabilities. If the adversary's CBRNE capability is severely degraded or

destroyed through effective counterforce targeting and strike operations, then the burden placed on missile and ground defense elements is reduced. If missile and ground defense elements are able to deny, divert, or destroy inbound CBRNE attacks, there is less of a C-CBRNE passive defense requirement on the installation level, thereby making it easier for forces to sustain operations in contaminated environments. If CBRNE attacks reach the fixed operating sites, forces must be organized, trained, and equipped to continue mission-critical operations in a complex, but manageable, environment. These elements of offensive strikes, active missile and ground defense, and Counter-CBRNE passive defense operations must work in concert to ensure that the Air Force is prepared to operate against adversaries armed with CBRNE.

The Air Force has developed a C-CBRNE Master Plan to direct and coordinate the Service's contribution to the DoD's layered C-CBRNE capability. Through the approach laid out in the Master Plan, the Air Force will establish, maintain, improve, and evaluate its readiness to conduct C-CBRNE operations both in support of homeland defense and abroad. The Master Plan directs the development of implementation roadmaps to achieve the specific objectives outlined in the plan. The C-CBRNE CONOPS, with individual annexes for each threat, complements all the other efforts and provides commanders the practical means to assess the unit's capability to deliver airpower and conduct air operations in all the environments. C-CBRNE progress will be monitored by the C-CBRNE Council, and reported annually to the Air Force Chief of Staff.

Several Air Force transformational capabilities support this QDR objective:

- Missile defense (both against ballistic and cruise missiles)
- Standoff (would help enable C-CBRNE)
- Negation of advanced enemy air defenses (would help enable C-CBRNE)
- Global attack (would help enable C-CBRNE)
- Agile Combat Support (which includes the sustainment of operations in any conditions, passive defense measures, and base defense)
- Predictive Battlespace Awareness

The Chief of Staff of the Air Force's Biodefense Task Force identified 59 total initiatives in 2003. Work plans encompass areas such as medical surveillance, mental health, prophylaxis and treatment, quarantine, as well as heating, ventilation, and air conditioning related to biowarfare response. Executing these work plans will include technical assessments, operational assessments, and policy reviews. Their outcomes will: (1) advance and refine the Air Force Medical Service's operational ability to meet DoD's CBRN response goals of sense, shape, shield, and sustain and (2) support the development of an Air Force Biowarfare Concept of Operations.

The Air Force is also participating with the Defense Threat Reduction Agency and other Services in Science and Technology efforts to investigate new technologies for transition into equipment developments that will keep the Air Force well ahead of any future potential adversaries contemplating the use of CBRNE weapons.

The Air Force is also expanding its anti-terrorism and force protection efforts. It has developed a Force Protection and an Integrated Base Defense CONOPS to compliment the Air Force CONOPS and implement transformational technologies as well as Tactics, Techniques and Procedures that address the new asymmetric threat to bases in both CONUS and abroad. The Force Protection Battlelab and other Air Force battlelabs have expanded their foci to identify innovative concepts to combat terrorism and have instituted programs to address physical security, explosive detection and blast mitigation, and chemical and biological detection. The latter programs follow DoD-established standards for decontamination and containment operations to enable continuity of operations in nuclear, biological, and chemical environments. In cooperation with its DoD partners, including the Joint Program Office for Biological Defense, the Force Protection Battlelab is experimenting with the next generation package of test equipment and logistics concepts designed to compress the time required to detect the presence of chemical or biological agents from hours to a few minutes to significantly enhance the protection afforded troops in areas susceptible to attack.

Drawing upon lessons learned from past events, the CONOPS for Integrated Base Defense and Force Protection defines a role for every Airman as a force protector and a sensor. Besides these changes to training, tactics, techniques, and procedures, the Air Force is also developing a wide range of offensive and defensive capabilities in the Integrated Base Defense Security Systems. These include new sensors, command and control systems for a common operating system, and a suite of remotely operated sensors, weapons, and robotics. Also included are a group of non-lethal weapon systems like the Active Denial System ACTD, which will enable a revolutionary new set of capabilities for the commanders.

The Homeland Security CONOPS will integrate Air Force capabilities into joint and interagency efforts to effectively prevent, protect against, and respond to a variety of threats to the homeland. The AEF support elements will have organic force protection capabilities and be capable of defending against conventional air attack and surveillance, deploying robust theater missile defenses, protecting bases against unconventional threats to equipment and personnel, maintaining adequate force protection in high threat environments, and mitigating damage for attacks that get through. With air refueling support, the Global Strike CONOPS will provide the preemptive capability to defeat the threat of CBRNE weapons at their source, thereby allowing the Global Mobility CONOPS to rapidly deploy follow-on combat forces to sustain combat operations.

In January 2002, the Air Force also stood up the Directorate of Homeland Security within the Air Staff to develop and implement the Air Force's HLS strategy, lead HLS efforts at the headquarters, and coordinate HLS efforts between the headquarters and the Air Force MAJCOMs. The Directorate's ultimate goal is to incorporate homeland security into every aspect of Air Force policy, procedure, and doctrine. The Air Force, as directed by the *Air Force Strategic Planning Directive for Fiscal Years 2006–2023,* will identify specific required Air Force capabilities to support the National Strategy for HLS objectives of preventing terrorist attacks within the United States, reducing vulnerability to terrorism, and minimizing the damage and recovering from attacks on the United States that do occur.

B. Assure information systems in the face of attack and conduct effective information operations

The increasing dependence of societies and military forces on advanced information networks creates new vulnerabilities and opportunities. Potential adversaries could exploit these vulnerabilities through means such as computer network attack and directed energy weapons. The emergence of these new tools of warfare also provides opportunities for non-kinetic attack by U.S. forces. [QDR, page 31]

Information operations provide the means to rapidly collect, process, disseminate, and protect information while denying these capabilities to adversaries. Such operations provide the capability to influence perceptions, perform computer network defense and attack missions, conduct electronic warfare, and carry out other protective actions. Information operations represent a critical capability enhancement for transformed U.S. forces.

The QDR highlights both the imperatives for the United States to maintain an unsurpassed capability to conduct information operations, as well as the need to strengthen U.S. capabilities in these areas. DoD must also develop an integrated approach to developing information system requirements, acquiring systems, and programming for the force of tomorrow. The ability to conduct information operations has become a core competency for the Department. [QDR, page 43]

The Air Force is developing a wide range of IO capabilities to be employed across the spectrum of conflict and in every phase of a campaign to enable the following transformation capabilities discussed in the Information Superiority section of Chapter VII: (1) ensured use of the information domain via effective information assurance and information operations and (2) denial of effective C4ISR to adversaries via effective information operations. These capabilities will be planned, presented and executed within responsive but normalized organizational constructs that support Joint Force Air Component Commander and Joint Force Commander objectives. Many details of these capabilities and programs are classified and too numerous to list. The Global Strike, Global Persistent Attack, and Global Mobility CONOPS underscore the requirements for IO; the Homeland Security CONOPS includes the requirements to protect "critical infrastructure," which includes information systems; and the Space & C4ISR CONOPS describes a full-range of critical IO activities. The Air Force has made significant progress in formalizing IO doctrine and policy and integrating IO into operational air and space missions. Specific efforts include: the reorganization of the Eighth Air Force to incorporate the IO capabilities, the formation of Information Warfare Flights, the Electronic Warfare Coordination Cell, the development of an IO planning tool called IW Planning Capability, Integrated IO Training, Counterintelligence Support to Network Operations and Security Centers, enhanced Air Force PSYOP and Influence Operations, an Information Superiority Range, IO CONOPS, IO Career Progression, electronic warfare revitalization, IO Integration, and the Air Force IO School. In addition, the Air Force Network Operations and Security Center will unite the nine MAJCOM Network Operations and Security Centers as well as other communications

agencies to provide a single command and control authority to significantly improve network defense. Please also see Appendix B for more details.

C. Project and sustain U.S. forces in distant anti-access and area-denial environments

> *Future adversaries could have the means to render ineffective much of our current ability to project military power overseas. Saturation attacks with ballistic and cruise missiles could deny or delay U.S. military access to overseas bases, airfields, and ports. Advanced air defense systems could deny access to hostile airspace to all but low-observable aircraft. Military and commercial space capabilities, over-the-horizon radars, and low-observable unmanned aerial vehicles could give potential adversaries the means to conduct wide-area surveillance and track and target American forces and assets. New approaches for projecting power must be developed to meet these threats. [QDR, page 31]*
>
> *The defense strategy rests on the assumption that U.S. forces have the ability to project power worldwide. The United States must retain the capability to send well armed and logistically supported forces to critical points around the globe, even in the face of enemy opposition, or to locations where the support infrastructure is lacking or has collapsed. For U.S. forces to gain the advantage in such situations, they must have the ability to arrive quickly at non-traditional points of debarkation to mass fire against an alerted enemy and to mask their own movements to deceive the enemy and bypass its defenses. Consequently, DoD must carefully monitor attempts by adversaries to develop capabilities that could detect and attack U.S. forces as they approach conflict areas or hold at risk critical ports and airbases with missiles and CBRNE attacks.*
>
> *The QDR emphasizes the need for new investments that would enable U.S. forces to defeat anti-access and area-denial threats and to operate effectively in critical areas. Such investments will include: addressing the growing threat posed by submarines, air defense systems, cruise missiles, and mines; accelerating development of the Army Objective Force; enhancing power projection and forcible entry capabilities; defeating long-range means of detection; enabling long-range attack capabilities; enhancing protection measures for inter-theater transport aircraft; and ensuring U.S. forces can sustain operations under chemical or biological attack. [QDR, pages 43–44]*

The Air Force is developing numerous transformational capabilities to address the many capabilities encompassed by this objective. According to the QDR guidance outlined above, this goal can be subdivided into the following categories, which are followed by a short summary of relevant Air Force efforts:

- **Rapid Deployment:** The Rapid Global Mobility section of Chapter VII discusses relevant Air Force transformational efforts.
- **Monitoring adversary anti-access capability development:** This will require a wide range of improved persistent ISR capabilities across the board. The Space-Based Radar and UAVs will be critical to this goal with their ability to penetrate deep into adversary territory. The Information Superiority section of Chapter VII contains more details.

- **Defeating air defense systems:** This is addressed squarely in the Negating Enemy Air Defenses section of Chapter VII. In addition, IO capabilities, especially net warfare operations and electronic warfare, constitute a new effective tool to defeat air defenses. New capabilities to rapidly locate and target enemy air defenses, such as the fiber-optic towed decoy and advanced tactical targeting technology, are now emerging and have the potential to enable legacy fighter aircraft to contribute to this mission. Also, the Global Strike CONOPS is designed, among other tasks, to defeat advanced air defense systems.
- **Enhance power projection and forcible entry capabilities:** Virtually all Air Force transformational capabilities described in Chapter VII will significantly enhance power projection in some way. Stealthy platforms (such as the F/A–22), standoff weapons, IO, and UCAVs are at the heart of forcible entry capabilities. New capabilities demonstrated during Operation Iraqi Freedom include Embedded Contingency Response Groups and Expeditionary Combat Support Modules. In addition, the Global Strike CONOPS is designed primarily for this purpose.
- **Defeating long-range means of detection:** Relevant Air Force transformational efforts include IO (see the Information Superiority sections of Chapter VII and Appendix B for details) and space superiority (see the Space Superiority section of Chapter VII) capabilities to deny space to adversaries, if necessary.
- **Long-range attack capabilities:** Relevant Air Force transformation efforts are discussed in Chapter VII in the sections concerning Global Attack and effective and persistent operations beyond the range of enemy air defenses under any weather conditions (under the Air and Space Superiority section).
- **Protection measures for transport and air refueling aircraft:** The Large Aircraft Infrared Countermeasures and Advanced Situational Awareness/Countermeasures System will enhance protection measures for air mobility aircraft. High Energy Laser Self-Protection Systems can also be incorporated into air refueling aircraft to enable these assets to operate much closer to enemy air defense threats and thus deeper long-range strikes into enemy territory. These are discussed primarily in the Rapid Global Mobility section of Chapter VII.
- **Ensure U.S. forces can sustain operations under chemical or biological attack:** Relevant Air Force transformation efforts are discussed primarily under the Agile Combat Support section of Chapter VII as well as Section A of this appendix.
- **Defeat adversary cruise missiles:** In addition to interoperable joint C4ISR (see the Information Superiority section of Chapter VII) to rapidly locate cruise missiles, the Air Force is pursuing two key programs.
- **Send well armed and logistically supported forces to critical points around the globe, even in the face of enemy opposition, or to locations where the support infrastructure is lacking or has collapsed:** Air Force efforts to develop significantly lighter, leaner, and faster combat support is detailed in the Agile Combat Support section of Chapter VII. In addition, the Global Strike CONOPS will serve as the initial, leading edge force designed to conduct operations in an intense anti-access environment. It will pave the way for persistent follow-on forces by rapidly rolling back adversary anti-access threats, thereby allowing the Global Mobility CONOPS to rapidly deploy follow-on combat forces to sustain combat operations. Finally, the

Air Force, per direction by the new *Air Force Strategic Planning Directive*, will develop joint operational concepts for defeating the full range of anti-access threats, force sequencing, and reductions in the first-deployer footprint.

D. Deny enemies sanctuary by providing persistent surveillance, tracking, and rapid engagement

Adversaries will also likely seek to exploit strategic depth to their advantage. Mobile ballistic missile systems can be launched from extended range, exacerbating the anti-access and area-denial challenges. Space denial capabilities, such as ground-based lasers, can be located deep within an adversary's territory. Accordingly, a key objective of transformation is to develop the means to deny sanctuary to potential adversaries. This will likely require the development and acquisition of robust capabilities to conduct persistent surveillance, precision strike, and maneuver at varying depths within denied areas. [Page 31 of QDR]

Likely enemies of the United States and its allies will rely on sanctuaries-such as remote terrain, hidden bunkers, or civilian "shields" for protection. The capability to find and strike protected enemy forces while limiting collateral damage will improve the deterrent power of the United States and give the President increased options for response if deterrence fails. Such a capability would not only reduce the likelihood of aggression, but would offer the National Command Authorities the ability to respond immediately in the event of hostilities.

Achieving this objective will require investments in a wide range of cross-Service programs. Investments in intelligence, surveillance, and reconnaissance initiatives must be bolstered. Also emphasis must be placed on manned and unmanned long-range precision strike assets, related initiatives for new small munitions, and the ability to defeat hard and deeply buried targets.

DoD will procure unmanned combat aerial vehicles and intelligence, surveillance, and reconnaissance unmanned aerial vehicles such as Global Hawk. The Department will also increase procurement of precision weapons.

Special Operations Forces will need the ability to conduct covert deep insertions over great distances and will need enhanced C4ISR capabilities to remain in contact with their commanders and to ensure access to real-time intelligence in a number of forms. These capabilities will enable Special Operations Forces to access additional communication, intelligence, and firepower assets in support of their missions deep in hostile environments and to aid in the reduction of friendly losses and casualties. These capabilities will also enhance the strategic and operational agility of Special Operations Forces. [Page 44 of QDR]

This objective asks the Services to develop or improve the following list of capabilities, which are accompanied by brief summaries of key Air Force efforts to address them:

- **Persistent ISR:** The Air Force is pursuing various programs to conduct persistent ISR, seamlessly transition from global to focused persistent ISR, and effectively integrate and manage ISR platforms and sensors, which are all discussed in the Information Superiority section of Chapter VII and Appendix B.
- **Capability to find and strike protected enemy forces while limiting collateral damage:** A combination of virtually all Air Force efforts described in Chapter VII sections entitled Information Superiority, Precision Engagement, Standoff, and Global Attack will significantly enhance this capability. Together, they will enable the United States to almost immediately strike any target, to include mobile, hard, deeply buried, and information targets, in all weather and all-terrain before they can escape or hide.
- **Manned and unmanned long-range precision strike assets:** Relevant Air Force transformation efforts are discussed in Chapter VII in the sections concerning Global Attack and effective and persistent operations beyond the range of enemy air defenses under any weather conditions (under the Air and Space Superiority section).
- **New small munitions:** Relevant Air Force transformation efforts are in the Chapter VII section on Precision Engagement.
- **Ability to defeat hardened and deeply buried targets:** Defeating these targets will likely require a combination of new or modified, more lethal munitions utilizing advanced technologies such as thermobaric weapons that generate highly sustained blast pressures in such confined spaces as tunnels and underground facilities. These munitions release energy over a longer period of time than standard explosives, thereby creating a long-duration pressure pulse when detonated in confined spaces. Also required will be IO capabilities that can cut off power, life support, and other critical services to such targets. The Common Aero Vehicle would also be effective against these targets. The Air Force is also exploring the possibility of developing a Ground Penetrating Radar on a UAV as a possible future system concept.
- **UAVs:** The Air Force is developing UAVs such as the Global Hawk and Predator-B (see the Information Superiority section of Chapter VII). The Air Force complements their larger system with increased emphasis on smaller systems to improve last minute target verification and "around the corner" information superiority for SOF. Such smaller UAVs include: the Desert Hawk, Force Protection Aerial Surveillance System, the Pointer UAV, and the BatCam Micro UAV, which is part of the Battlefield Air Operations Kit.
- **Ability to conduct covert deep insertions over great distances:** In the near-term, the CV–22 is the key platform under development to achieve this objective. In the longer run, the Air Force is examining a concept called the Advanced SOF Air Mobility Platform, a covert transport aircraft with increased speed, range, and agility that is capable of undetected infiltration.

The Space & C4ISR CONOPS will harness Air Force capabilities to achieve horizontal integration of manned, unmanned, air, surface, information, and space systems, eventually through machine-to-machine interface of ISR and command and control, to provide executable decision-quality knowledge to the commander in near real-time from

anywhere, which is critical to denying sanctuary to adversaries. In addition, the Global Strike CONOPS will provide an integrated joint air, space, maritime ground, and IO capability to respond globally to fleeting targets using precise and decisive force in an attack window ranging from minutes to hours.

E. Enhance the capability and survivability of space systems

In addition to exploiting space for their own purposes, future adversaries will also likely seek to deny U.S. forces unimpeded access to space. Space surveillance, ground-based lasers and space jamming capabilities and proximity microsatellites are becoming increasingly available. A key objective for transformation, therefore, is not only to ensure the U.S. ability to exploit space for military purposes, but also as required to deny an adversary's ability to do so. [Page 31 of QDR]

Because many activities conducted in space are critical to America's national security and economic well being, the ability of the United States to access and utilize space is a vital national security interest. During crisis or conflict, potential adversaries may target U.S., allied, and commercial space assets as an asymmetric means of countering or reducing U.S. military operational effectiveness, intelligence capabilities, economic and societal stability, and national will. Ensuring the freedom of access to space and protecting U.S. national security interests in space are priorities for the Department.

The mission of space control is to ensure the freedom of action in space for the United States and its allies and, when directed, to deny such freedom of action to adversaries. As the foundation for space control, space surveillance will receive increased emphasis. DoD will pursue modernization of the aging space surveillance infrastructure, enhance the command and control structure, and evolve the system from a cataloging and tracking capability to a system providing space situational awareness.

In recognition of the high-technology force multipliers provided by space systems, the QDR places increased emphasis on developing the capabilities to conduct space operations. Ensuring freedom of access to space and protecting U.S. national security interests are key priorities that must be reflected in future investment decisions. [Page 45 of QDR]

The Air Force is the primary Service charged with achieving this objective. Achieving space superiority is the essential component of this objective. Space superiority combines the following three capabilities: protect space assets, deny adversaries' access to space if necessary, and quickly launch vehicles and operate payloads into space to quickly replace space assets that fail or are damaged/destroyed. All of these depend on first establishing effective Space situation awareness in order to sense and track actual threats to space assets and ascertain whether problems are actually attacks or something else. Chapter VII's sections on Space Superiority and Rapid Global Mobility (which includes rapid space launch) describe relevant Air Force transformation efforts in these areas.

F. Leverage information technology and innovative concepts to develop interoperable Joint C4ISR

Finally, new information and communications technologies hold promise for networking highly distributed joint and combined forces and for ensuring that such forces have better situational awareness—both about friendly forces as well as those of adversaries—than in the past. Information technology holds vast potential for maximizing the effectiveness of American men and women in uniform. [Page 31 of QDR]

Information technology will provide a key foundation for the effort to transform U.S. armed forces for the 21st century. The recent U.S. experience in Kosovo underscored the need for high-capacity, interoperable communications systems that can rapidly transmit information over secure, jam-resistant datalinks to support joint forces. In the near future, the United States must also develop alternatives capable of overcoming current and projected bandwidth constraints. The Department must stay abreast of the new communications landscape and leverage it to maximize U.S. advantages in this area.

Future operations will not only be joint, but also include Reserve Components, civilian specialists, and other federal agencies and state organizations. Most likely they will involve a coalition effort with other countries. The effectiveness of these operations will depend upon the ability of DoD to share information and collaborate externally as well as internally. Interoperability, which enables joint and combined operations, is a key element in all DoD operational and systems architectures. It must include the ability to overcome language and cultural barriers. Experience shows that fixing systems after the fact to achieve interoperability is typically costly and often fails to satisfy mission requirements and creates security problems. The better approach is to incorporate interoperability at the outset in designing new systems. However, the Department will continue its efforts, where cost effective, to bring its legacy systems up to interoperability standards.

Based on QDR deliberations, funding will be focused on achieving end-to-end Command, Control, Communication, Computer, Intelligence, Surveillance, and Reconnaissance capabilities. An integrated joint and combined C4ISR capability is necessary to ensure that accurate and relevant information can be gathered swiftly from various sources and then securely transmitted to forces and their commanders. Improving communications must be a priority for U.S. conventional, special operations, and strategic forces. Information technology offers U.S. forces the potential of conducting joint operations more effectively, with smaller forces and fewer weapon systems. [Pages 45-46 of QDR]

All of the Air Force transformation efforts associated with the first three transformational capabilities described in the Information Superiority section of Chapter VII and Appendix B address this critical goal, which arguably is at the center of the U.S. military's ongoing transformation. The Air Force is investing more than $50 billion over the FYDP in the FY04 President's Budget in joint C4ISR. Those transformational capabilities include:

- Complete joint integration of all manned, unmanned, and space systems
- Real-time picture of the battlespace
- Predictive Battlespace Awareness

In addition, during Operation Iraqi Freedom, the Air Component Coordination Element allowed the air component to better integrate air and space power with the operations of the other components to better achieve the Joint Force Commander's objectives.

The Air Force, as directed by the *Air Force Strategic Planning Directive for Fiscal Years 2006–2023*, will develop a master plan to achieve the horizontal integration of manned, unmanned, space, and information systems to provide decision-quality knowledge to the joint commander in near real-time.

In the area of training, Distributed Mission Operations will integrate live, virtual, and constructive aspects into a single seamless training environment. Through Distributed Mission Operations, command and control links with distributed warfighters and ISR assets so they can train and exercise as AEF forces prior to employment. It also enables the participation of Low Density/High Demand assets without regard to current operations, reduces the training impact of range encroachment, and allows forces to effectively train as they would fight. This is described in more detail in the Training Transformation section of Chapter IV.

The Space & C4ISR CONOPS is the primary concept driving the requirements of these systems. In addition, the Global Strike CONOPS includes extensive details and guidance regarding the types of capabilities required to achieve this QDR goal.

Appendix D:
How Air Force Transformation Supports the Required Capabilities of the Joint Operating Concepts

To address a TPG requirement (listed in Appendix A), this appendix specifies how the Air Force transformation efforts described in this document would enable or significantly enhance the required capabilities of those new JOCs that have been vetted by the Services and the Joint Staff and/or approved by the Secretary of Defense. At the time of publication, this included the Homeland Security and Strategic Deterrence JOCs. Future editions of the Flight Plan will include additional JOCs once vetted and/or approved.

This appendix is divided into separate sections for each JOC. Each section first reproduces the language from the most recently available JOC draft describing the required capabilities to enable the JOC and then uses a table to crosswalk each required JOC capability with:

- Relevant transformational capabilities described in Chapter VII that will enable or significantly enhance the required JOC capability
- Air Force CONOPS that are driving requirements associated with the required JOC capability (both transformational and non-transformational) and, in turn, future spending (summarized in Chapter VI)
- Other relevant transformational efforts highlighted in the Flight Plan not already covered by either of the above that will help enable or significantly enhance the required JOC capability

The Air Force transformational capabilities in the second column of these tables are primarily referred to by their numbers 1–16 (as assigned in Chapter VII) with brief titles or descriptions of each transformation capability or a group of them. Please refer to their full descriptions in Chapter VII. For convenience, their full titles are reproduced below and binned under the relevant Air Force distinctive capabilities from *Air Force Vision 2020:*

Information Superiority:

1. Seamless, joint machine-to-machine integration of all manned, unmanned, and space systems
2. Real-time picture of the battlespace
3. Predictive Battlespace Awareness

4. Ensured use of the information domain via effective information assurance and information operations
5. Denial of effective C4ISR to adversaries via effective information operations

Air and Space Superiority:

(subdivided into three categories)

Negating Enemy Air Defenses:

6. Penetration of advanced enemy air defenses to clear the path for follow-on joint forces
7. Effective and persistent air, space, and information operations beyond the range of enemy air defenses under adverse weather conditions

Space Superiority:

8. Protection and survivability of vital space assets
9. Negation of an adversary's access to space services

Missile Destruction in Flight:

10. Detection of ballistic and cruise missile launches and destruction of those missiles in flight

Precision Engagement:

11. Order of magnitude increase in number of targets hit per sortie
12. Achievement of specific, tailored effects on a target short of total destruction

Global Attack:

13. Rapid and precise attack of any target on the globe with persistent effects

Rapid Global Mobility:

14. Rapid establishment of air operations, an air-bridge, and movement of military capability in support of operations anywhere in the world under any conditions
15. Responsive launch and operation of new space vehicles and refueling/repair/relocation of future on-orbit assets

Agile Combat Support:

16. Significantly lighter, leaner, and faster combat support to enable responsive, persistent, and effective combat operations under any conditions

This appendix should not be viewed as a comprehensive list of how the Air Force supports the JOC capabilities. There are numerous existing "legacy" systems/capabilities and non-transformational "recapitalization" efforts within the Air Force not discussed in the Flight Plan that are just as important in supporting and enabling the required JOC capabilities. However, per OFT guidance, this Appendix focuses on how ongoing *transformation* efforts

will enable or significantly enhance those required JOC capabilities, most of which are not transformational in and of themselves. OFT intends to use the JOC requirements as a primary, but not the only, filter to appraise DoD transformation progress (see Chapter I).

In addition, some of the required capabilities of these draft JOCs are not actual "capabilities" that can be developed and fielded by a Service or Department or addressed by a CONOPS. These are marked by "n/a" in this appendix.

Homeland Security JOC
(February 2004 FINAL DRAFT)

Required JOC Capabilities

In order to implement the DoD HLS JOC strategic concept, future joint forces should possess a number of capabilities. These future capabilities identify what DoD must be able to do in order to detect, deter, prevent, and if necessary, defeat potential attacks on the Homeland, or to mitigate the effects of attacks that do occur.[2] These capabilities are closely linked with the attributes (discussed following the capabilities) that characterize the future Joint Force, which will be able to accomplish the Homeland Defense and Civil Support missions and Emergency Preparedness planning activities. The capabilities required to implement the strategic concept include the ability to:

- **Detect, prevent, (including through deterrence and preemptive attack) and defeat potential threats to the Homeland as they arise in the Forward Regions.**

  Detecting and preventing attacks before they can be set in motion or defeating them once initiated is the best way to ensure a secure Homeland. U.S. military presence in the Forward Regions will continue to serve as a deterrent to potential attacks on the Homeland. This presence will be enhanced through shared information among U.S. and multi-national agencies on known or suspected threat countries, organizations, and individuals. Sharing of information, knowledge, and teamwork with friendly nations through theater security corporation programs will further the detection and deterrence of threats within the Forward Regions. However, the ability to conduct preemptive attacks (which can range in size and complexity from a single strike to major combat operations) must also be an available option for senior decision-makers. These strikes could include targeting key development nodes, command and control systems or processes, or the weapons system itself at any point during the development and preparation process before an attack on the Homeland is actually initiated. Illustrative preemptive attacks include a strike in the Forward Regions to prevent ballistic missile launch by destroying the delivery systems and/or enabling infrastructure prior to launch or destroying adversary aircraft before takeoff.

  (This capability is also addressed in the Strategic Deterrence JOC under Global Strike).

[2] These capabilities support the six critical operational goals identified on p.30 of the 2001 QDR (see reference ll).

- **Detect, deter, prevent, and defeat ballistic missile threats to the Homeland.**

  The objective of missile defense in 2015 will be to protect the U.S., our friends and allies, and our deployed forces. This will be accomplished by a combination of (a) preemptive actions aimed at detecting and preventing missile attacks prior to launch by destroying the delivery systems and enabling and sustaining infrastructure before they can be employed (in the Forward Regions); (b) regionally-oriented defenses that protect deployed forces (a force protection responsibility), and (c) missile defense for the Homeland. Dependent on timely, reliable, and accurate early warning information, this capability must provide a layered defense that allows multiple engagement opportunities throughout the boost, midcourse, and terminal phases of a missile's flight in order to negate or defeat an attack as far from the Homeland as possible.

  (This capability is also discussed in the Strategic Deterrence JOC under Active and Passive Defenses).

- **Detect, deter, prevent, and defeat airborne threats to the Homeland.**

  National air sovereignty is essential to keep the Homeland safe while ensuring maximum use of the airspace for commercial and civilian activities. Detection of airborne threats in the Homeland or in the Approaches is complicated in that attacks can be either externally or internally initiated and may not be easily differentiated from benign air activity. Thus, this capability must provide the ability to detect and prevent threats early, determine intent of threats, and provide sufficient warning to defeat threats before they reach their intended target. This is a complex challenge that, due to the significant overlap between national security and law enforcement, will require close cooperation, coordination, interoperability, and collaboration between DoD and its interagency partners.

- **Detect, deter, prevent, and defeat hostile space systems threatening the Homeland.**

  Space defense should focus on detecting, identifying, tracking, and preventing/negating adversary space systems supporting attacks on the Homeland. This includes the ability to conduct space negation, whereby adversary space systems are any or all of the following: deceived, disrupted, denied, degraded, and/or destroyed (including attacks against ground-based support and launch infrastructures in the Forward Regions, possibly in coordination with related or unrelated ongoing military combat operations).

  (This capability is also discussed in the Strategic Deterrence JOC under Space Control).

- **Detect, deter, prevent, and defeat maritime threats to the Homeland.**

  Maritime security is essential to keep the Homeland safe while maximizing commercial and civilian benefit. This is a complex task in that hostile maritime platforms may not be easily differentiated from benign activity, and any disruption of commercial trade could lead to significant detrimental financial implications. It is also critical for DoD to maintain unrestricted freedom of movement in order to ensure the ability to deploy forces overseas. This capability must provide for the detection, localization, evaluation, sorting, and

possible interception, by force if necessary, of maritime traffic to prevent or defeat an attack. Coordination and interoperability with local, state, and federal law enforcement agencies (particularly the U.S. Coast Guard) are important in this effort due to their regulatory and law enforcement roles, which overlap significantly in the maritime environment with DoD's national security responsibilities. Additionally, sharing of information and cooperation with allied nations in regards to maritime activities could greatly assist in the early detection and interception of maritime threats.

- **Detect, deter, prevent, and defeat land threats to the Homeland.**

  In the land domain, protecting the Homeland from national security threats and foreign aggression is the foremost responsibility and highest priority of the U.S. Armed Forces and a primary mission for the Reserve Components. While the likelihood of a land invasion of the Homeland in the 2015 timeframe is remote, this capability must provide the United States the ability to counter a range of possibilities—from conventionally equipped militaries to small, elusive adversaries able to employ the most sophisticated technologies. The Joint Force requires the ability to defend bases, installations, critical infrastructure, national borders, and U.S. sovereignty against National Security threats as directed by the President. This capability must provide the ability to detect and prevent threats early, determine intent of threats, and provide sufficient warning to defeat threats before they reach their intended target. This is a complex challenge that, due to the significant overlap between national security and law enforcement, will require close cooperation, coordination, interoperability, and collaboration between DoD and other federal agencies and between the U.S. and its multi-national partners.

  If the land threat exceeds local, state, and non-DoD federal capabilities, the President may direct DoD to take the lead to counter the threat. Neither the Posse Comitatus Act nor any other federal statute denies or limits the President's use of the Armed Forces when countering a National Security threat. Short of a Presidential directed DoD response to an invasion of the Homeland, the land defense mission remains an inherent protection and law enforcement responsibility of DoD's interagency partners. DoD must also be prepared to support other federal agencies in a civil support role when directed by the President or the Secretary of Defense based upon the principles of cooperation, partnership, the rule of law, and civilian control of the military. Military involvement will be part of a synchronized strategic approach involving federal, state, and local resources, as directed, to defeat or otherwise respond to any adversary threat to the homeland.

  (DoD's ability to conduct land defense is also discussed in the Major Combat Operations Joint Operating Concept).

- **Detect, deter, prevent, and defeat physical and cyber threats to DoD assets in the Homeland.**

  Protecting defense critical infrastructure and assets is essential in order to maintain DoD's ability to project power, conduct traditional and special military operations, and secure the Homeland. While some aspects of this capability will

take place during operations, the majority of the actions necessary to achieve this capability must be taken prior to the commencement of operations. In order to achieve this capability, the Joint Force must first determine what infrastructure is critical to the completion of its missions, systematically and comprehensively assess vulnerabilities, detect the emergence of threats, and then put into place physical and electronic barriers, security protocols, and consequence management procedures necessary to protect that infrastructure and ensure continuity of operations in the event of an attack on, or failure of part of, that infrastructure. Because an effective infrastructure is crucial to modern warfighting, this capability is intrinsically linked to strategic deterrence, as well as major combat and stability operations.

(The capability to protect DoD installations and facilities is also discussed in the Protection Functional Concept).

- **Collaborate with other federal agencies; conduct or facilitate vulnerability assessments; and encourage risk management strategies to protect against and mitigate the effects of attacks against the Defense Industrial Base**.

  Protecting the Defense Industrial Base, whose unauthorized exploitation or destruction could have a catastrophic impact on not only the Nation's prestige and morale, but also on DoD's ability to complete its assigned warfighting missions, is paramount. DoD must have the capability to work with all relevant Federal departments and agencies to identify, prioritize, and coordinate the protection of all Defense Industrial Base critical infrastructure and key resources. DoD and its Interagency partners must develop vulnerability assessments and risk management strategies designed to prevent and if necessary, reduce the consequences of failures, whether caused by terrorist and non-terrorist acts/events. The ability to share information about physical and cyber threats, coupled with direct collaboration between DoD and its interagency partners will enable mutual understanding and identification of indicators and precursors of an attack and allow for adequate preventive measures to be taken. This capability is intrinsically linked to strategic deterrence, as well as major combat and stability operations.

- **Project power to defend the Homeland.**

  To be able to detect, deter, prevent, or defeat threats in the Approaches and/or in the Forward Regions before they reach the Homeland, DoD must be able to rapidly and effectively deploy and sustain forces in and from multiple dispersed locations to respond to crises, to contribute to deterrence, and to enhance regional stability. Projecting U.S. military power globally and conducting effective theater-level military operations (including major combat or stability operations) are essential contributors to Homeland Defense because they serve as visible deterrents to potential adversaries and reduce instability that can incite potential adversaries to act. In addition, forward deployed forces can be made available to rapidly conduct preemption or interception operations. This capability is closely tied to strategic deterrence, as well as major combat and stability operations.

(This capability is also addressed by the Overseas Presence discussion in the Strategic Deterrence JOC and in the Focused Logistics Functional Concept).

- **Prepare for and mitigate the effects of multiple simultaneous CBRNE events.**[3]

  Among the threats facing the Homeland, one of the most severe is the threat of CBRNE attacks or emergencies. These events present not only an extreme danger to the U.S. population, but could also adversely impact the ability of the Joint Force to project power from the Homeland. DoD will require capabilities and forces uniquely qualified and trained for CBRNE events. These forces must be prepared to support DoD requirements on DoD bases and installations as well as local, state, and federal agencies overwhelmed in an emergency. This capability must include forces and assets able to provide agent detection and assessment, agent containment, quarantine, evacuation, force protection, decontamination, medical operations in a contaminated environment, and medical surge capabilities. These forces and assets must be available in a timely and reliable manner, and capable of deploying and sustaining themselves (potentially in an austere or contaminated environment).

  (The capability to mitigate the effects of CBRNE events is also discussed in the Protection Functional Concept).

- **Conduct Homeland Defense and Civil Support operations, and Emergency Preparedness planning activities while operating as the Lead Federal Agency, providing support to a Lead Federal Agency, and during transitions of responsibility.**

  Providing robust and rapid response in coordination with other federal, state, and local agencies is a critical aspect of DoD's ability to provide security to the Homeland. DoD must be able to accomplish this mission as both a Lead Federal Agency and a supporting federal agency. DoD must develop the policies, processes, and procedures to ensure that, regardless of which Federal agency has responsibility, operations critical to the security of the nation are conducted rapidly, correctly, and in the best interests of the nation.

  During the course of a Homeland Defense or Civil Support operation or Emergency Preparedness planning activity, Lead Federal Agency responsibility may change. The period where lead responsibility transitions from one agency to another is especially challenging. Policies and procedures should enable and facilitate continuous and effective operations during this transition. DoD must also ensure DoD Homeland Defense, Civil Support, and Emergency Preparedness capabilities can function during this transition of operational lead agency.

- **Conduct Homeland Defense and Civil Support operations and Emergency Preparedness planning activities when responsibilities overlap and in the absence of formal designation of Lead Federal Agency.**

[3] This capability is inherently linked to capabilities relevant for force protection (FP) in Major Combat or Stability Operations (decontamination or protective gear, for example) that could be employed by joint forces wherever they are required.

DoD must be prepared to ensure the security of the Nation during time critical situations where responsibilities may overlap between federal agencies, as well as when Lead Federal Agency has not been formally designated for a given situation. This potential "seam" between HLS and Homeland Defense requires the development of authorities and procedures to ensure the ability to communicate and operate with other federal agencies in these challenging situations. These authorities should include, but not be limited to: interagency coordination, communications interoperability, pre-approved "use of force" policy, ability to control operational assets and funding obligations, and entrance and exit strategies for DoD involvement.

During these time-critical situations where operations are required to protect the Homeland prior to a Presidential decision on Lead Federal Agency, DoD will require authorities and policies to empower on-scene leaders to take lead responsibility or to provide support to other federal agencies. In these situations, DoD must develop the ability to work closely with other federal, state, and local agencies to ensure that critical operations are conducted, that security of the Homeland is the overarching goal, and that questions regarding the absence of a formally designated Lead Federal Agency do not lead to inaction or delayed actions.

- **Support a prompt and coordinated federal response for Homeland Defense and Civil Support missions, and Emergency Preparedness planning activities; and facilitate and streamline rapid decision-making on supported-supporting relationships among agencies and actors.**

  DoD must be prepared to ensure the security of the Homeland during time critical situations by rapidly energizing military command and interagency partner linkages to recommend and facilitate decisions. This ability includes rapid crisis action planning and intelligence sharing to support the appropriate Cabinet officials in their process of designating Lead Federal Agency responsibilities. This capability will enhance DoD response times during a crisis and improve multi-agency coordination for Homeland Defense and Civil Support operations, as well as Emergency Preparedness planning activities. This ability should include, but not be limited to: interagency coordination, communications interoperability, pre-approved rules on intelligence sharing, and policies/procedures on entrance and exit strategies for DoD involvement.

  During a Homeland Defense, Civil Support, or Emergency Preparedness crisis, the potential ambiguity of agency and actor responsibilities requires the development of appropriate authorities and procedures to ensure the ability to rapidly recommend and decide supported-supporting relationships.

How Air Force Transformation Supports These Required JOC Capabilities

Homeland Security JOC: Required Capabilities	Relevant AF Transformational Capabilities from Flight Plan (Chapter VII)	Relevant AF CONOPS (Chapter VI)	Other relevant AF transformational efforts from Flight Plan
Detect, prevent (incl. Deterrence and preemptive attack) and defeat potential threats to the Homeland as they arise in the Forward Regions	Information Superiority capabilities (#s 1–5), Global Attack (#13), plus all additional capabilities tied to the Strategic Deterrence and MCO JOCs per the JOC capability description	All	All associated with Strategic Deterrence and MCO JOCs per the JOC capability description
Detect, deter, prevent, and defeat ballistic missile threats to the Homeland	Missile Destruction in Flight (#10) plus all additional capabilities associated with the Strategic Deterrence JOC per this JOC capability description	Homeland Security, Space & C4ISR, Nuclear Response	All associated with the Strategic Deterrence JOC per JOC capability description
Detect, deter, prevent, and defeat airborne threats to the Homeland	All Information Superiority capabilities (#s 1–5), Negating Enemy Air Defenses (#s 6–7) plus all additional capabilities associated with the Strategic Deterrence JOC per this JOC capability description	Global Strike, Homeland Security, Space & C4ISR	Air and Space Expeditionary Force (Chap V), all associated with the Strategic Deterrence JOC per JOC capability description
Detect, deter, prevent, and defeat hostile space systems threatening the Homeland	Space Superiority (#s 8–9) plus all additional capabilities associated with the Strategic Deterrence JOC	Homeland Security, Space & C4ISR	All associated with the Strategic Deterrence JOC per JOC capability description
Detect, deter, prevent, and defeat maritime threats to the Homeland	Information Superiority (#s 1–5), Negating Enemy Air Defenses (#s 6–7), Precision Engagement (#s 11–12), Global Attack (#13), plus all additional capabilities associated with the Strategic Deterrence JOC	Global Strike, Global Persistent Attack, Homeland Security, Space & C4ISR	All associated with the Strategic Deterrence JOC per JOC capability description
Detect, deter, prevent, and defeat land threats to the Homeland	Information Superiority (#s 1–3), Negating Enemy Air Defenses (#s 6–7), Precision Engagement (#s 11–12), Global Attack (#13) plus all additional capabilities associated with the Strategic Deterrence JOC per the capability description	Global Strike, Global Persistent Attack, Homeland Security, Space & C4ISR	
Detect, deter, prevent, and defeat physical and cyber threats to DoD assets in the Homeland	Information Superiority (#s 1–5) plus all additional capabilities associated with the Strategic Deterrence JOC per the capability description	Homeland Security, Space & C4ISR	All associated with the Strategic Deterrence JOC per JOC capability description

Homeland Security JOC: Required Capabilities	Relevant AF Transformational Capabilities from Flight Plan (Chapter VII)	Relevant AF CONOPS (Chapter VI)	Other relevant AF transformational efforts from Flight Plan
Collaborate with other federal agencies; conduct or facilitate vulnerability assessments; and encourage risk management strategies to protect against and mitigate the effects of attacks against the Defense Industrial Base		Homeland Security	
Project power to defend the Homeland	Information Superiority, Negating Enemy Air Defenses, Space Superiority, order of magnitude increase in # of targets hit per sortie, Global Attack, Rapid Global Mobility, Agile Combat Support (#s 1–9, 11, 13–16)	All	
Prepare for and mitigate the effects of multiple simultaneous CBRNE events	Agile Combat Support (includes efforts to operate under any conditions, including CBRNE) (16)	Homeland Security	
Conduct homeland defense and civil support operations, emergency preparedness planning activities while operating as the lead federal agency, providing support to a lead federal agency, and during transitions of responsibility	Seamless, joint machine-to-machine integration (#1)	Homeland Security	
Conduct homeland defense and civil support operations and emergency preparedness planning activities when responsibilities overlap and in the absence of formal designation of a lead federal agency	Seamless, joint machine-to-machine integration (#1)	Homeland Security	
Support a prompt and coordinated federal response for Homeland Defense and Civil Support missions, and Emergency Preparedness planning activities; and facilitate and streamline rapid decision-making on supported-supporting relationships among agencies and actors	Seamless, joint machine-to-machine integration (#1)	Homeland Security	

Strategic Deterrence JOC
(February 2004 FINAL DRAFT)

Required JOC Capabilities

Military strategic deterrence capabilities are the "means" by which the Joint Force Commander implements the overarching joint operating concept. These capabilities must be effective against a range of potential adversaries across a multitude of scenarios, including both state and non-state actors. These capabilities must be sufficiently credible to deter any adversary through their perceived utility and usability. Successful strategic deterrence requires the capability impact be visible to the adversary and be perceived as implementing an unequivocal national will to protect and further U.S. vital interests. The ability to communicate this resolve and associated deterrent capabilities in a tailored way to individual adversary decision-makers is vital. Coalition support should be integrated, when available, to enhance deterrence credibility, but strategic deterrence also must be viable as a unilateral strategy.

Consequently, future U.S. joint forces must be capable of successfully carrying out denial and cost imposition operations and of providing unmistakable signals of national resolve to a wide range of potential adversaries. This means U.S. joint forces must be able to defend against unprovoked attack, provide responsive global delivery of intended cost imposition effects, and possess the clear-cut ability to combine these capabilities to dominate an escalating conflict. Should deterrence fail, these forces must provide a seamless transition in support of major combat and/or homeland defense operations, as well as coexist with other major combat, homeland defense, and/or stability operations.

Direct capabilities required for strategic deterrence include the ability to carry out: force projection operations, including the capability to decisively defeat regional aggression; kinetic and non-kinetic Global Strike operations, including the possible employment of nuclear weapons; active and passive defense measures; strategic deterrence information operations; inducement operations; and space control operations. All of these efforts are enabled by global situational awareness, command and control, overseas presence, and allied/coalition military cooperation and integration. Because these enabling capabilities underpin the more direct capabilities required for strategic deterrence, they are discussed first in this section.

Global Situational Awareness

Global situational awareness is the foundation of strategic deterrence and includes specific strategic deterrence intelligence efforts. Strategic deterrence intelligence takes two forms. The first is the underlying information regarding adversary decision-makers' perceptions of benefits, costs, and consequences of restraint on which deterrence operations are based. The second is the operational intelligence information about adversary assets, capabilities, and vulnerabilities required to conduct credible and effective deterrence operations.

Improved understanding of adversary decision-makers' value structures and perceptions (beyond what is typically provided to U.S. decision-makers today) enhances our ability to tailor deterrence operations against each potential foe under varying scenario conditions.

The Joint Force Commander, supported by the national intelligence community, must identify and profile adversary decision-makers to identify adversary value structures, as well as the decision-making structures and processes in which adversary decision-makers interact. Data already existing in numerous military, agency and allied/coalition databases must be mined and analyzed for its deterrence value. The ability to translate foreign language information (electronic or hardcopy) in near-real time is needed to improve our understanding of diverse adversaries. Because strategic deterrence is a full spectrum campaign conducted predominantly in peacetime, many crucial elements necessary to fully characterize potential adversaries need to be given a higher collection priority than has been traditionally associated with non-crisis periods.

The ultimate goal of this information collection and analysis is to develop actor-specific analyses of adversary decision-making that describe an adversary's values, culture, decision calculus, risk propensity, and capacity for situational awareness to the maximum extent possible. These ISR efforts also seek to identify the adversary's potential attack means (that our forces will seek to deny success) and the most appropriate targets to be attacked (to deliver on deterrent cost imposition threats). Interagency cooperation will be a key to achieving success in these efforts. It will require creation of a collaborative environment that incorporates intelligence community, diplomatic, law enforcement, armed service, and multinational inputs to achieve true global situational awareness for strategic deterrence.

Effective and credible strategic deterrence operations will also require specific enabling improvements in our global situational awareness regarding key adversary assets and capabilities. Assets (military, economic, social, etc.) highly valued by adversary leaders will need to be identified, catalogued, targeted, weaponeered, and maintained in digital format readily available for strike planning. Where information gaps exist, full-spectrum ISR will seek to provide persistent surveillance of leadership figures, facilities, proliferation mechanisms and high-value forces, and do so in the face of increasingly sophisticated adversary denial and deception efforts. ISR efforts must be persistent across time, be seamless across key geographic regions, take advantage of the most capable collection platforms, gather data across the information spectrum (from human sources to the most sophisticated technical means available) and benefit from cooperation and timely cross-cueing of national agency, overhead and sensitive reconnaissance assets. Human intelligence must focus on gaining access and insights into the most difficult "targets," e.g., terrorist cells, hard and deeply buried targets, closed regimes, weapons of mass destruction/effects (WMD/E) weapons development efforts, and deployment plans. Effective human intelligence will enable better positioning of technical collection systems. Human intelligence reporting must be integrated into situational awareness displays that provide joint forces with battlespace visualization. Once cued on a foreign 'target' of interest, seamless machine-to-machine interfaces amongst technical collection systems will help ensure no activity of interest goes unnoticed or unanalyzed.

Because WMD/E play such an important role in adversary strategies, our ability to identify their location, specific nature, origin, ownership, supporting capabilities, or the source of their employment is crucial for strategic deterrence. WMD/E attribution is particularly important for deterring state sponsorship of WMD/E terrorism and some covert attacks by nation-states. Technical capabilities to support attribution are required for nuclear, chemical, biological, radiological and explosive weapons as well as attacks on space systems and computer networks.

Successful strategic deterrence also requires much improved understanding of our own capabilities, limitations, and current situation (blue force tracking and force status, to include our allies and interagency partners). Such understanding can be achieved by exploiting shared information, shared awareness, and shared understanding of the situation across a networked infrastructure by means of a collaborative information environment. Highly networked forces will increase the commander's flexibility to substitute widely varying types of forces or capabilities to achieve the same deterrence value.

Command and Control

All capabilities supporting strategic deterrence rely on the existence of robust, reliable, secure, survivable, timely, unambiguous and sustainable DoD-wide command and control. A horizontally and vertically integrated distributed network is required to provide key leadership (e.g., President, Secretary of Defense, Chairman of the Joint Chiefs of Staff, Combatant Commanders, Service Chiefs, and subordinate Joint Force Commanders) with an effective command and control capability. This network must be resilient and provide for secure collaboration, and real-time decision making. It must support planning, tasking and dynamic control for the efficient conduct of strategic deterrence. This strategic capability requires a redundant system of multi-domain communications technologies to convince adversaries they cannot easily disrupt or deny U.S. command and control. The command and control system must provide secure, wideband communications that will degrade gracefully to a survivable thin-line backbone—providing connectivity to decision-makers under the most severe circumstances. Additionally, senior U.S. leadership may require the ability to directly communicate with fielded forces or initiate weapons employment without support from intermediate levels of command.

In addition to physical command and control systems, today's organizational command and control constructs may prove inadequate for the Joint Force of 2015. Today's joint forces, operating in complex environments from over the horizon in situations with a high political-military context, must act in concert with the interagency and coalition partners. Addressing command and control process is as critical as more bandwidth, especially as increased bandwidth leads to increased quantities of data transmitted to diverse users. Today, dispersed groups across the DoD and interagency coordinate independent actions to achieve overall objectives, but not in a truly integrated fashion. National strategic unity of effort encompasses elements of national power beyond military force, to include diplomatic, information and economic tools. Joint Force Commander mission accomplishment increasingly relies upon successful integration of enhanced joint, interagency and coalition capabilities outside his direct control. Therefore, Joint Force Commanders must incorporate synchronized, collaborative decision-making and decision support environments with unique theater knowledge to leverage a shared Commander's Intent.[4] Providing the "right" data to national decision-makers at the "right" time will allow for consistent unity of effort when implementing strategic deterrence activities.

[4] The command and control requirements for conducting future Global Strike missions provide an example of this. Global Strike may lead to relationship changes between functional and regional combatant commanders to meet the overarching needs of national leadership. Successfully striking critical, time–sensitive, targets may require expedited coordination with the regional combatant commander in whose AOR the strike is being conducted. The solution to this command and control challenge must achieve

Overseas Presence

In 2015, strategic deterrence will continue to be enhanced by U.S. military capabilities resident in forward-stationed and forward-deployed multi-purpose combat and expeditionary forces across the globe. Our overseas presence demonstrates commitment to the defense of U.S. vital interests, in some cases ensuring that an attack on a U.S. ally will be an attack on U.S. forces as well. Overseas presence also enhances U.S. global situational awareness by providing forward-based ISR assets that significantly augment national technical means. Overseas presence is an enabler of both allied/coalition military cooperation and integration and force projection operations.

Allied/Coalition Military Cooperation and Integration

U.S. vital interests are increasingly intertwined with those of U.S. friends and allies. As a result, strategic deterrence can in some instances be enhanced through military cooperation and integration with allied/coalition forces. The deterrent impact of such cooperation and integration is both political and military in nature. The political impacts are primarily derived from: 1) the effects that coalition-based responses have on an adversary's perception of U.S. and allied political will, and of 2) the potentially long-lasting, harmful post-conflict political and economic effects of taking on a U.S.-led international coalition. The military impacts are derived from improvements in both U.S. and coalition capabilities to defeat adversary military operations. Allied and Coalition contributions to the joint fight are significant. For example, they can provide host nation security, fly additional sorties, supplement naval presence, provide additional maneuver forces, conduct maritime and ground mine clearing operations, to name just a few. These actions contribute significantly to force protection and overall operational success.

Force Projection

The capability to project U.S. military power globally and conduct effective theater-level, military operations across the domains of air, sea, land, space, and information—including the capability to win decisively in a Major Combat Operation—is essential to strategic deterrence. Force projection capability greatly enhances the Joint Force Commander's capacity to use all three "ways" of influencing an adversary's decision-making. U.S. force projection capabilities need to be responsive, sustainable, and executable in the face of anti-access strategies, weapons of mass destruction employment, and other means of asymmetric warfare. For strategic deterrence it is especially critical that force projection operations be executable such that we can limit the damage an adversary can inflict—on U.S. forces, allies, and potentially their own civilian populace.

Nuclear Strike Capabilities

Survival of the U.S. as a free and independent nation, with its fundamental values intact and its institutions and people secure, remains our nation's permanent and primary security interest. This interest is best achieved by a defense posture that makes possible nuclear war outcomes so dangerous, as calculated by potential adversaries, that the adversary's desire to initiate aggression is removed. U.S. nuclear forces contribute uniquely and fundamentally to strategic deterrence—through their ability to impose costs

and deny benefits to an adversary in an exceedingly rapid and devastating manner no adversary can counter.

They cast a lengthy shadow over a rational adversary's decision calculus when considering coercion, aggression, weapons of mass destruction employment, and escalatory courses of action. Nuclear weapons threaten destruction of an adversary's most highly valued assets, including adversary WMD/E capabilities, critical industries, key resources, and means of political organization and control (including the adversary leadership itself). This includes destruction of targets otherwise invulnerable to conventional attack, e.g., hard and deeply buried facilities, "location uncertainty" targets, etc. Nuclear weapons reduce an adversary's confidence in their ability to control wartime escalation.

The revitalization of our nuclear support infrastructure (including the transition to an improved testing posture), the retaining of scientific expertise and tradesmen and the ability to produce new weapons is critically important to dissuading potential adversaries from engaging in a potentially costly arms race. Barring these improvements, a legacy force structure supported by a neglected infrastructure invites adversary misbehavior and miscalculation.

The use (or threatened use) of nuclear weapons can also reestablish deterrence of further adversary weapons of mass destruction employment. Alternatively, nuclear weapons can constrain an adversary's weapons of mass destruction employment through U.S. counterforce strikes aimed at destroying adversary escalatory options. Nuclear weapons provide the U.S. with proportionate and disproportionate response options that an adversary cannot counter. They can also help deter intervention by adversary allies in an ongoing conflict.

Although advances in conventional kinetic and non-kinetic means {e.g., computer network attack, High Energy Radio Frequency, directed energy, etc.} by 2015 will undoubtedly supplement U.S. nuclear capabilities to achieve these effects, nuclear weapons that are reliable, accurate, and flexible will retain a qualitative advantage in their ability to demonstrate U.S. resolve on the world stage. These capabilities should be further enhanced by improving our capability to integrate nuclear and non-nuclear strike operations. Providing the President an enhanced range of options for both limiting collateral damage and denying adversaries sanctuary from attack will increase the credibility of U.S. nuclear threats, thus enhancing deterrence and making the actual use of nuclear weapons less likely. Additionally, nuclear weapons allow the U.S. to rapidly accomplish the wholesale disruption of an adversary nation-state with limited U.S. national resources. While the legacy force was well suited for successful deterrence throughout the Cold War, an enhanced nuclear arsenal will remain a vital component of strategic deterrence in the foreseeable security environment.

Active and Passive Defenses

The development and deployment of effective active and passive defenses will contribute significantly to strategic deterrence, particularly in the areas of deterring adversary weapons of mass destruction use or attacks on U.S. population and critical U.S. military and civil infrastructure.

Ballistic and cruise missile active defenses will be a crucial element of U.S. military capabilities in 2015. These defenses will be layered and networked, incorporating land-, sea-, air-, and space-based elements, and will use both kinetic and non-kinetic means to achieve target destruction and/or negation. Regionally oriented defenses will protect fielded U.S. forces and allies, and will seamlessly integrate with homeland defenses to provide overlapping and complementary global protection. Additionally, the ISR and command and control elements of active missile defenses will enable a robust offense/defense integration, to include long- or very-long range counter-battery fires aimed at destroying the adversary's missile launch capabilities. The ability to thwart adversary missile attacks prior to launch as well as to shoot missiles down in flight is key to achieving effective strategic deterrence while enhancing a Joint Force Commander's economy of force efforts. Near-peer nation-state adversaries may seek to defeat such active defenses in order to hold the American homeland hostage and constrain U.S. freedom of action. However, most potential adversaries are unlikely to be able to overcome U.S. active missile defense capabilities through 2015. Passive defenses complement active defenses, reducing the effectiveness of attacks that active defenses fail to prevent. They consist of measures taken to reduce the probability of (and to minimize the effects of) damage caused by hostile action. Examples include WMD/E force protection measures that reduce the vulnerability of U.S. force projection capabilities, homeland security civil defense measures (e.g., consequence management) that limit the potential damage done by WMD/E attacks, and critical infrastructure protection measures that make such infrastructure more resilient in the event of attack.

The increasingly networked joint force of the 21st Century will capitalize on passive defense effects achieved through widely dispersed forces. While still able to achieve operational objectives through their ability to more efficiently communicate, maneuver, and share a common operating picture, networked forces will present a decreasingly lucrative target for an adversary's weapons of mass destruction. However, because adversaries are more likely to use weapons mass effects (e.g., electromagnetic pulse) to attempt asymmetric defeat of technologically superior U.S. forces, improved weapons-effects hardening/survivability will be required for a broader range of joint force systems than required today. Effective interoperability and functional redundancy between joint force units (particularly in the areas of ISR and command and control) will reduce the potential for single points of failure within complex systems and organizations, and ensure that critical command and control capabilities degrade gracefully. Information assurance for networked forces will ensure only trusted data are shared between users. Camouflage, concealment, and deception will increase in importance as adversaries become increasingly sophisticated users of widely available global information sources.

Global Strike

Global Strike is the ability to rapidly plan and deliver limited-duration and extended-range attacks to achieve precision effects against highly valued adversary assets. Effects-based targeting, analysis, planning, and execution are combined to support attacks on high-payoff/high-value targets. These targets may include weapons of mass destruction production, storage, and delivery systems, adversary decision-makers, critical command and control facilities, and various adversary leadership power bases. U.S. leadership could use Global Strike capabilities both to impose costs and to deny benefits to an

adversary in a highly customized manner appropriate to the future security environment. Global Strike capabilities must be capable of defeating anti-access strategies imposed by distance, physical hardening or active and passive defenses and be able to operate in an environment where friendly forces may not have battlefield dominance. Because of the potentially urgent employment timelines, Global Strike will primarily rely upon long-range, high-speed, kinetic (advanced conventional and nuclear) and non-kinetic aerospace delivery platforms, unmanned systems, cyber systems, and/or small numbers of special operations forces employed over extended distances. In-theater capabilities will supplement these forces if available and appropriate, but the defining characteristic of Global Strike will be its unique blend of "high-end" and "low-end" military capabilities without resort to large numbers of general purpose forces traditionally associated with major combat operations.

Global Strike normally will be conducted with an abbreviated logistics footprint and have limited objectives and rapid execution timelines (minutes to hours). Because adversaries will continue to pursue anti-access strategies, Global Strike must allow for independent operations anywhere in the world with minimal, if any, support from overseas forces and facilities. In many cases, senior national leadership will want to delay a Global Strike execution decision until the last possible minute. Future Global Strike missions will use weapons possessing two-way secure communications that allow for real-time command, targeting, retargeting, disarm, and disablement from the time of weapons release through impact/detonation. Since most Global Strike targets will be well protected, future forces must leverage stealth, speed, and low probability of intercept (e.g., ballistic) attack profiles to ensure arrival on target.

Threatened use of Global Strike will be more effective to the degree that both U.S. and adversary leaders are confident effects can be achieved without inflicting significant collateral damage. Our ability to create only intended strategic effects raises the credibility of strategic deterrence. Effects can be achieved through either kinetic or non-kinetic means, and may be massive or limited depending upon specific objectives, although the number of forces involved will be substantially less than those involved in major combat operations. In some cases, rapid execution against fleeting, "time-sensitive targets" will be needed to create desired effects against high-value targets such as mobile missile launchers or adversary decision-maker convoys.

Because many Global Strike scenarios involve threatened (or actual) preemptive attacks on very-high value targets that will only be exposed for brief periods, Global Strike capabilities must also be highly reliable. Single-string operations lacking the redundancy commonly associated with traditional military operations will be common. The Global Strike philosophy will be "one shot equals one kill." Simultaneous attacks against all the major targets in a given category, e.g., all division headquarters, all weapons of mass destruction facilities, may be required against more capable adversaries, although the total scope of operations will remain dramatically less than those associated with major combat.

Key elements of Global Strike capabilities should be periodically demonstrated openly on the world stage—to ensure adversaries fully comprehend the credible threats they face. However, in all scenarios, it will be highly desirable to conduct strike operations without alerting in advance the adversary, who, if warned, might employ certain capabilities

(e.g., weapons of mass destruction) rather than lose them. A "black" or covert component within an otherwise highly visible Global Strike capability is highly desirable. This capability could assure allies without provoking an adversary. If subsequently revealed, this capability will serve to deter third parties by reminding them of their inability to fully characterize the United States' capability to wage war.

Strategic Deterrence Information Operations

This capability takes two forms. The first is information operations designed to indirectly influence adversaries' perceptions of U.S. intent, political will or resolve, and non-information operations capabilities. The second is information operations that shape adversaries' perceptions directly through their potential or actual operational impact (e.g., electronic warfare). Both forms of strategic deterrence information operations are a subset of all national strategic information operations.[5] There may be a high degree of coordination required among the military, other U.S. Government departments and agencies, and allies/coalition partners to achieve these objectives.

Successful strategic deterrence information operations of the first type will reliably communicate to adversary decision-makers the information necessary to deter. This includes the ability to inform adversaries explicitly of U.S. national interests and intentions, communicate our confidence in our ability to limit damage to ourselves and our allies, reveal their vulnerability to U.S. attack through a wide range of capabilities, provide terms and conditions for adversary compliance, and influence other elites or centers of power to undermine adversary decision-makers, if required. Successful information operations must leverage the full range of communications means available today and in the future, and allow for both one- and two-way communications with adversary decision-makers at a variety of levels. Examples include television/radio broadcasts, email, text messaging, voice, leaflet drops, and other direct/indirect lines and means of communication yet to be developed. Because deterrence is about influencing adversary decision making, the ability to efficiently and effectively communicate in the adversary's native language is imperative.

The operational role of deterrence information operations focuses on ***psychological operations***, computer network operations, ***deception***, and electronic warfare capabilities that can affect ***adversary morale and unit cohesion, decision superiority,*** lines of communication, logistics, command and control, and other key adversary functions. Simultaneously, it is essential that we are able to protect similar friendly capabilities and activities through advanced network security, information assurance and operations security capabilities. Continued advances in these areas enhance strategic deterrence greatly, as they have the potential to affect how an adversary perceives the potential benefits and costs of actions we seek to deter.

[5] Defined as "the spectrum of activities directed by the President of the United States and Secretary of Defense to achieve national objectives by influencing or affecting all elements (political, military, economic, or informational) of an adversary's or potential adversary's national power and perceptions, while protecting similar friendly elements."

Inducement Operations[6]

For strategic deterrence, the Joint Force Commander has a limited number of means available to influence or mitigate an adversary's consequences of restraint. These options are almost exclusively limited to nation-states and are not generally intended for non-state actors. Diplomatic, economic, and informational instruments of power can effectively assure allies and dissuade adversaries and non-committed states. Several of these means could also extend to strategic deterrence.

For example, shared early warning of aerospace and weapons of mass destruction attack can be used to improve an adversary's (or potential adversary's) situational awareness. Although perhaps counterintuitive, the deliberate dissemination of accurate information by the U.S. will reduce the likelihood of an unconsidered (or inappropriate) adversary reaction to U.S. or third-party activity. Information systems processing shared early warning must allow ad hoc warning networks to be seamlessly created and modified based on the current situation. Data must be presented in a manner understandable to diverse cultures. Finally, the U.S. must maintain the ability to add or delete membership from warning networks under changing circumstances while protecting U.S. information networks from adversary attack or exploitation.

The Joint Force Commander must be prepared to respond to an adversary's decision to forgo weapons of mass destruction ownership in response to U.S. strategic deterrence efforts. The Joint Force Commander must be ready to assist in securing weapons of mass destruction storage sites and participate in deweaponization or agent neutralization activities. These activities may occur in uncertain environments and may require transporting weapons of mass destruction to more secure locations, possibly under international inspection regimes. These activities enhance deterrence by providing the adversary with an alternative that, if presented properly in concert with the other instruments of national power, may enhance the adversary decision-maker's prestige at home or in international venues.

The Joint Force Commander may conduct or facilitate strategic information operations (to achieve influence and induce adversary restraint) in the form of direct monetary compensation or other kinds of support to individuals or groups within adversary decision-making centers—if such actions can reasonably be expected to enhance strategic deterrence. Support must be deliverable by overt and covert means, as appropriate, consistent with the Joint Force Commander's objectives, national policy, and international/third-party considerations. These activities aim to shape the decision calculus of second-tier adversary influence groups, particularly those deeper in the military chain of command that implement senior-level directives or orders.

Particularly in instances where the U.S. has limited objectives, the Joint Force Commander needs to be able to conduct military operations in a manner that makes U.S. restraint and intent as clear as possible to the adversary. Adversary decision-makers must comprehend that the joint force ***could*** be doing more harm to him than is taking place, and those

[6] Many potential inducement operations are, in a sense, a subset of broader strategic deterrence information operations (with the narrowly focused aim of inducing adversary restraint).

operations currently ongoing are not simply a precursor to broader operations with more ambitious objectives. Techniques to accomplish these goals are discussed in the Stability Operations JOC.

To enable each of these efforts, the Joint Force Commander requires robust lines of communications (more capable than those available today) with potential adversaries. Inducement operations most often require a detailed street address and knowledge of the occupant's whereabouts, not just "to whom it may concern." Methods of communication may be one-way, two-way, and/or multi-party and must allow for secure, rapid, and unambiguous transfer of information in crisis and non-crisis environments. Textual, visual, voice, and data communications will be required, as well as safe passage of personnel and material in some instances. Communications media must accommodate widely varying cultural norms and diverse situations. Flexibility will be the key to success in this area.

Space Control

America's national security and economic well-being are increasingly dependent on activities conducted in space. For instance, the U.S. military is increasingly reliant on very precise air-delivered munitions guided by space-based assets such as GPS. In the 12 years between Operation Desert Storm and Operation Iraqi Freedom, new concepts of operations leveraged improved intelligence, surveillance, and reconnaissance (made possible by space systems) along with cheaper precision guided munitions. These concepts of operations enable more effective military operations by improving logistics efficiencies, reducing manpower requirements, and placing smaller numbers of U.S. troops under the threat of battlefield attack.

The greatest shift in commercial space activity over the last decade has been the global proliferation of enterprises providing space system services that rival those of the U.S. Commercial investment in space services today is roughly $100 billion and will grow considerably by 2015. Once available only to the senior leaders of industrialized nation-states, all state and non-state actors are now (and will be increasingly so by 2015) "space capable" due to commercially available space products and services. These products and services include: high-bandwidth satellite communications, high-resolution imagery of the earth's surface, precise navigation and timing signals, near real-time environmental hazard data, Internet-based space surveillance data, and the ability to move information as rapidly and as securely as U.S. forces. The growing availability of space services data marketed over global networks will make it difficult to determine exactly who is exploiting space services for potential hostile actions against the U.S., its allies, and friends. The global free market economy and the democratization of information will fuel commercial space technology development, as well as provide an opportunity for adversaries to disrupt these services and threaten our standard of living.

In many ways, the growing role of space to U.S. and international security is analogous to the role of the high seas since the 17th century. The ability of the United States to access and use space, and to deny such access and utilization to adversaries if necessary, is a vital national security interest directly impacting strategic deterrence. Potential adversaries

will target U.S., allied, and commercial space assets to counter or reduce U.S. military operational effectiveness, intelligence capabilities, economic and societal stability, and national will. A credible adversary capability against space systems decreases our overall strategic deterrence posture unless we can respond to these threats.

Space control is defined as operations to ensure freedom of action in space for the United States and its allies and, when directed, deny an adversary freedom of action in space. Because space systems rely upon space, terrestrial, link, and user segments to achieve their effectiveness, space control operations may take place in any of the operational domains of land, sea, air, space, and information. Applicable space control tasks include: Space situation awareness; protection of U.S. and friendly space systems; prevention of adversary use of space systems and services; and negation of space systems and services used for purposes hostile to U.S. national security interests. More broadly, space control must also provide for assured U.S. access to the space environment. The Joint Force Commander must accomplish space control activities consistent with U.S. obligations under international law and pursuant with national policy.

By 2015, space control will be most greatly enhanced by the joint force's ability to use space systems in a highly-networked, peer-to-peer manner--to deny an adversary the easy means of holding critical U.S. space system link, user, terrestrial, or space segments at risk. This approach (for capabilities, systems, and forces alike) is best characterized as one of "integrated, assured defense" where the U.S. can see first, understand first, and act first. This will be accomplished by proliferating, networking, protecting and integrating each of these segments in a manner previously considered unachievable. The combination of low-cost production combined with miniaturization and shared understanding will enable both response and denial options for strategic deterrence.

Space systems will incorporate improved protection measures throughout the space, terrestrial, link, and user segments. These measures may include: ground facility protection (hardening/dispersal of systems and facilities; security; covert facilities; camouflage, concealment, and deception; mobility), alternate nodes, spare satellites, link encryption, increased signal strength, adaptable waveforms, satellite radiation hardening, on-board environmental sensors, redundant architectures, and space debris protection measures. Protection measures must provide unambiguous indications of whether a failed satellite was deliberately attacked, suffered a natural environmental failure, or experienced an onboard anomaly (either operator induced, latent, or subtle/dispersed attack).

Satellite design will migrate toward small, single-purpose, distributed constellations providing continuous earth coverage. This will deny an adversary the ability to easily target a small number of critical nodes and create a much-needed measure of defensive redundancy. Command and control of these constellations will rely heavily on automated machine-to-machine interfaces. Terrestrial ground support infrastructure will not be stovepiped by specific mission area (i.e., ISR, Positioning, Navigation and Training, communications, etc.) but instead will service a variety of functions in a scalable, tailorable fashion. This support infrastructure will rely more heavily on camouflage, concealment, and deception than today, and will widely migrate across the joint force to include deployed forces in-theater.

To populate, replenish, and rapidly reconstitute these constellations, low-cost responsive spacelift is essential. This capability will allow the U.S. to respond to an adversary weapons of mass effect attack by rapidly reconstituting systems destroyed or degraded by enemy action. Responsive spacelift requires mobility and proliferation that reduces an adversary's opportunity to target systems while in preparation for launch. Modular, production-line methods that allow for "mass customization" of satellites, launch systems, terrestrial command and control and user segments are required. To achieve economies of scale and increase flexibility and robustness, the same components, infrastructure, and joint force operational procedures that enable long-range Global Strike capabilities should be considered for their potential dual-use application for responsive spacelift.

Space situation awareness, a subset of global situational awareness, will be achieved through the integration of land, air, sea, space, and information systems deployed worldwide. This includes legacy joint force capabilities not previously considered in the context of space situation awareness (such as airborne or shipborne radars) or new expeditionary systems (such as low-cost, mobile optical telescopes) in direct support of fielded forces. The global distribution and proliferation of sensors, combined with full-spectrum integration and information fusion, will enhance space situation awareness and enable the Joint Force Commander to take effective denial and response actions to counter adversaries.

Denying enemy freedom of action in space is accomplished through prevention (primarily non-military means) and negation (military actions). Prevention capabilities include elements of the diplomatic, informational, and economic instruments of national power. Negation consists of five elements: deception, disruption, denial, degradation, and destruction. ***Deception*** consists of those measures designed to mislead the enemy by manipulation, distortion, or falsification of evidence to induce the enemy to react in a manner prejudicial to their interests. ***Disruption*** is the temporary impairment (diminished value or strength) of the utility of space systems, usually without physical damage to the space system. These operations include the delaying of critical, perishable operational data to an adversary. ***Denial*** is the temporary elimination (total removal) of the utility of the space system, usually by stopping access to a system without creating any physical damage. This objective can be accomplished by such measures as denying electrical power to the space terrestrial nodes or computer centers where data and information are processed and stored. ***Degradation*** is the permanent impairment of the utility of space systems, usually with physical damage. This option includes attacks against terrestrial nodes and capabilities. It may also include the use of information operations. ***Destruction*** is the permanent elimination of the utility of space systems. This last option includes any means to interdict critical terrestrial nodes; use of attacks to destroy uplink/downlink facilities, electrical power stations, and telecommunications facilities; and attacks against space segments themselves.

For a variety of reasons, the Joint Force Commander will generally approach these space control negation options in ascending order. The wide and increasing existence of multinational space system ventures (involving a host of state and non-state actors) creates the need to limit collateral damage to the greatest extent possible. Additionally, the Joint Force Commander must minimize hazards to navigation created by space debris that impacts all spacefaring activity. Finally, strategic deterrence is enhanced both by the

ability to achieve precision effects (enhancing credibility) as well as providing the option to escalate conflict should an adversary take courses of action counter to U.S. vital interests.

The joint force in 2015 will use a variety of techniques to achieve desired negation effects. These will include reversible effects (such as jamming, dazzling, or data corruption) that allow for space systems to be disrupted or denied during conflict but remain viable subsequent to conflict resolution. These effects must also be scalable to threaten an adversary with degradation or destruction. Adversary decision-makers must perceive they cannot credibly pursue courses of action (such as "hiding behind" third-party systems) without the U.S. imposing unacceptable costs or denying them intended benefits.

How Air Force Transformation Supports Required JOC Capabilities

Strategic Deterrence JOC: Required Capabilities	Relevant AF Transformational Capabilities from Flight Plan	Relevant AF CONOPS	Other relevant AF transformational efforts from Flight Plan
Global Situational Awareness	Joint machine-to-machine interface (#1); Predictive Battlespace Awareness (#3)	Space & C4ISR	
Command and Control	Joint machine-to-machine interface (#1); Real-time picture of the battlespace (#2), Predictive Battlespace Awareness (#3), Information Assurance (#4)	Space & C4ISR	Interoperability initiatives (Appendix B)
Overseas Presence			Combat Wing Organization (Chap V), Air and Space Expeditionary Force (Chap. V), Innovative Infrastructure Transformation (Chap. V)
Allied/Coalition Military Cooperation and Integration			Combat Aviation Squadrons (Chap. V), Enhancing Coalition Warfighting (Chap. III)
Force Projection	All transformational capabilities associated with the Major Combat Operations JOC	All CONOPS associated with the Major Combat Operations JOC	Combat Wing Organization (Chap V), Air and Space Expeditionary Force (Chap. V), Innovative Infrastructure Transformation (Chap. V)
Nuclear Strike Capabilities	Information operations (#5) and Global Attack (#13) will provide non-nuclear strike options, which enhance nuclear threat—according to the capability description	Nuclear Response	
Active and Passive Defenses	Information assurance (#4), Missile defense (#10)	Homeland Security, Space & C4ISR	

Strategic Deterrence JOC: Required Capabilities	Relevant AF Transformational Capabilities from Flight Plan	Relevant AF CONOPS	Other relevant AF transformational efforts from Flight Plan
Global Strike	Information operations (#5), Penetration of Advanced Air Defense Systems, especially via special operations and UCAVs (#6), Standoff (#7), Global Attack (#13), Rapid Global Mobility (#14)	Global Mobility, Global Persistent Attack, Nuclear Response, Global Strike	
Strategic Deterrence through Information Operations	Information operations (#5)		Addressing Info. Superiority Guidance (Appendix B)
Inducement Operations	Real-time picture of the battlespace (#2) to share early warning of air, space, or weapons of mass destruction attack with adversary—per JOC. Information assurance (#4), information operations (#5). All additional capabilities tied to Stability Ops JOC (to show adversary U.S. is capable of restrained operations per the capability).	All CONOPS associated with the Stability Operations JOC	
Space Control	Space superiority (#s 8–9) and responsive space launch/sustainment of space assets (#15)	Space & C4ISR	
Applicability of Means to State vs. Non-State Actors	All capabilities already described in this JOC	All CONOPS already described in this JOC	

Acronyms

ACCE	Air Component Coordination Element
ACTD	Advanced Concept Technology Demonstration
AEF	Air and Space Expeditionary Force
AETF	Air Expeditionary Task Force
AF-DCGS	Air Force Distributed Common Ground System
AMMP	Air Mobility Master Plan
AOC	Air and Space Operations Center
APTX	Advanced Process and Technology Experiment
ATD	Advanced Technology Demonstration
BRAC	Base Realignment and Closure
C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
CAG	CIPT Action Group
CAOC	Combined Air Operations Center
CBRNE	chemical, biological, radiological, nuclear, and high explosive
C-CBRNE	counter chemical, biological, radiological, nuclear, and high explosive
CIPT	Commander's Integrated Product Team
CONOPS	concept(s) of operation
CONUS	continental United States
CRRA	Capabilities Review and Risk Assessment
DCGS	Distributed Common Ground System
DoD	Department of Defense

DOTMLPF	doctrine, organization, training, materiel, leadership and education, personnel, and facilities
EBO	Effects-Based Operations
eLOG21	Expeditionary Logistics for the 21st Century
EPV	Enterprise Process View
FTF	Future Total Force
FY	fiscal year
FYDP	Future Years Defense Plan
GIG	Global Information Grid
GPS	Global Positioning System
HLS	homeland security
HPM	high powered microwave
IO	information operations
IP	Internet Protocol
IPv6	Internet Protocol version 6
ISR	intelligence, surveillance, and reconnaissance
IT	information technology
JEFX	Joint Expeditionary Force Experiment
JFC	Joint Functional Concept
JFCOM	Joint Forces Command
JIC	Joint Integrating Concept
JOC	Joint Operations Center; Joint Operating Concept
JOpsC	Joint Operations Concept
JSTARS	Joint Surveillance Target Attack Radar System
JTRS	Joint Tactical Radio System

M&S	modeling and simulation
MAJCOM	Major Command
MCO	Major Combat Operations
NATO	North Atlantic Treaty Organization
OFT	Office of Force Transformation
OIF	Operation IRAQI FREEDOM
OSD	Office of the Secretary of Defense
OSMP	Operations Support Modernization Program
PBA	Predictive Battlespace Awareness
PEO	Program Executive Officer
PGM	precision-guided munition
POM	Program Objective Memorandum
PSYOP	psychological operations
QDR	Quadrennial Defense Review
RMA	Revolution in Military Affairs
S&T	science and technology
SAM	surface-to-air missile
SEAD	Suppression of Enemy Air Defense
SOF	special operations forces
TENCAP	Tactical Exploitation of National Capabilities
TPED	Tasking, Processing, Exploitation, and Dissemination
TPFDD	time-phased force and deployment data
TPG	Transformation Planning Guidance
UAV	unmanned aerial vehicle

UCAV	unmanned combat aerial vehicle
U.S.	United States
WF HQ	Warfighting Headquarters
WMD/E	weapons of mass destruction/effects
XML	eXtensible Markup Language

"Making the whole team better"