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AIR COMMAND AND STAFF COLLEGE

AIR UNIVERSITY

SPACE FORCE 2020:
A FORCE FOR THE FUTURE

by

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Preface

The United States Air Force is (according to *Global Engagement: A Vision for the 21st Century Air Force*) moving from the *air force* of today, to an *air and space force* in the future, and eventually to a *space and air force*. As a space operator for all of my 11 plus years in the Air Force, I must believe that the Air Force is already an air and space force, and has been for at least 11 years. But I was curious as to what this eventual space and air force would look like—what current space capabilities would the future Air Force no longer provide, and what new capabilities would be core Air Force space functions? What would an Air Force space operator in 2025 be concerned with? This paper documents my attempt to answer these and other similar questions.

I am in debt to Lieutenant Colonel Ronald Kennedy, USAF, for his guidance, and especially his patience as the scope and direction of this paper changed more times than I care to admit. I also must thank Lieutenant General Lord, Brigadier General (s) Pettit, Brigadier General (s) Summers, Colonels Willoughby and Perroni, and Lieutenant Colonel Owens from Air Force Space Command, and Captain Huffine (US Navy) from United States Space Command for their opinions and candor on the subject. Finally, I must thank my fellow students and seminar mates for their thoughts and open debate on the subject.

Abstract

This paper presents a conceptual analysis of the environment shaping and answering the following questions: *When* should the transition of the United States Air Force to a space and air force begin in earnest? *What* future capabilities of Air Force space power should the Nation demand? *How*, considering the inherent characteristics of active duty, Reserve, Air National Guard, civil service, and contractors, should the Air Force organize and create its future space force?

The analysis recognizes there will not be a true global or regional competitor for the next 10 to 15 years, while the threats in the 2010 to 2020 time frame will be very different from what the US faces today. The priority, therefore, for transformation must go to responding *now* to asymmetric challenges and to the transition to space. The Air Force has the time and opportunity to begin the transition today. It cannot afford to wait.

The required space capabilities for the future space and air force stem from strategy, Air Force core competencies, and Air Force doctrine. Some capabilities already exist—space asset detection, tracking, identification, & characterization, space environment characterization, space-based navigation, communications, reconnaissance, surveillance, threat warning, & environmental sensing, battle management/command and control, scheduled launch operations, satellite telemetry, tracking, and commanding (TT&C), and mission data distribution. These capabilities only require upgrades and improvements to fully leverage new information technologies. Other capabilities could exist with the right

investment and procurement decisions—terrestrial-based space asset deception, disruption, denial, degradation, & destruction, space asset protection, vulnerability reduction, & survivability enhancement, unscheduled launch operations. Still other capabilities—space-based space asset deception, disruption, denial, degradation, & destruction, air, land, & sea attack, require treaty and policy guidance in addition to the right investment and procurement decisions. All these capabilities are required to fully enable the future operational concepts of *Joint Vision 2010*.

Finally, the analysis answers how to transform the space force of the future (from a manpower perspective) to provide the space power capabilities identified above. The resulting space force relies on a robust private space sector, and a broad mix of civilian, Reserve component, and active duty operators—operators experienced in the employment and doctrine of space power.

Chapter 1

Introduction: When, What, How

Waiting for a crisis to force us to act globally runs the risk of making us wait too long.

—Isaac Asimov

It's time for the United States Air Force (USAF) to act—especially in the dimension of space. The current Air Force vision, *Global Engagement: A Vision of the 21st Century Air Force*, identifies *space superiority* as an Air Force *core competency*, and powerfully states the Air Force is “now transitioning from an *air* force into an *air and space* force on an evolutionary path to a *space and air* force.”¹ These acknowledgments, however, only constitute the first, small step towards action. The hard work remains—transitioning from a vision and “bumper sticker slogans” to an actionable and implementable plan concerning future space operations. When should the transition occur, and what capabilities are required to guarantee superiority in space? If the USAF waits for a credible threat to United States superiority in space to answer these questions and to act, it will have indeed waited too long.

No one is questioning the need to do something. The Department of Defense has recognized the need to reshape the forces, capabilities, and infrastructure of the military Services. This effort has resulted in new strategies, operational concepts, and visions. The *Report of the Quadrennial Defense Review* (QDR, the fourth comprehensive review

of the military since the end of the Cold War) is the overall strategic planning document for the Department, and identifies several “critical enablers” necessary for the worldwide application of US military power. Two of these critical capabilities and assets are **space superiority** and **quality people**. So identified, Air Force Space Command (AFSPC), the Air Force major command charged with organizing, training, and equipping the Air Force’s space force, has begun the specific work to transform USAF space forces. AFSPC’s efforts to date, however, have recognized a deficiency in existing strategic planning. The deficiency lies in the need for a “shift in types of manpower employed for space operations,”² and the need to address a future space “force mix of active duty, Reserve, Air National Guard, civil service, and contractors.”³ The following questions can therefore be added to those posed earlier: Which space capabilities should be institutionalized as core Air Force (active duty or Reserve) skills and expertise? Which capabilities are candidates for civil service or outsourcing and privatization?

This paper presents a conceptual analysis of the environment shaping these questions. Its purpose is to address some answers. *When* should the transition to a space and air force begin in earnest? *What* future capabilities of Air Force space power should the Nation demand? *How*, considering the inherent characteristics of active duty, Reserve, Air National Guard, civil service, and contractors, should the Air Force organize and create its future space force? Finding correct answers to these questions is vitally important.

Notes

¹ Global Engagement: A Vision for the 21st Century Air Force, 7.

² Briefing, HQ AFSPC/XPX, subjects Air Force Space Command Vision.

³ Air Force Space Command Strategic Master Plan, 5 December 1997, 48.

Chapter 2

Strategic Environment: When to Act

The strategic environment facing us is complex, dynamic, and uncertain...It is in this environment that the United States must carry out their tasks to protect America and its interests.

—National Military Strategy, 1997

It's been nearly a decade since the end of the cold war, and everywhere we turn people are speaking of revolutions. There's been a revolution in international affairs—the Soviet Union, one of two global superpowers and the United States' most reliable enemy, no longer exists. We're just beginning to scratch the surface of a revolution in information technology—it is estimated the total amount of information in the world doubles every 18 months.¹ This new “information age” has led to a revolution in business affairs—the American commercial sector has reorganized, reengineered, and downsized to remain competitive in the global marketplace. Also spawned by the new information era, and important to America's men and women in uniform, is the concurrent revolution in military affairs—terms like “information superiority,” “digital battlefield” and “dominant battlespace awareness” are becoming part of the military's collective vocabulary. A revolution less publicized but just as important to the armed forces is the reduction in defense budgets—the 1997 budget was almost 40% below 1985's, and the portion of the Department of Defense (DOD) budget earmarked for procurement is close to 65% below 1985 levels². Finally, there has been a revolution in

air and space power—the 1991 Gulf War marked to many the coming of age of air power, and the first significant contribution of space power. The environment is indeed complex, dynamic, and uncertain. Yet, to decide when to invest in the space power capabilities of the future, we must understand the challenges, trends, and strategies shaping that future.

Challenges

The demise of the Soviet Union marked the end of a time when the US faced a truly global competitor. It did not, however, mark the end of potential conflicts around the world. The first significant challenge to US security to consider then, are a variety of regional dangers.³ Currently, Iraq, Iran, and North Korea present the most pressing regional threat to US interests and security, and “between now and 2015, it is reasonable to assume that more than one aspiring regional power will have both the desire and the means to challenge US interests militarily.”⁴

The second challenge threatening US security transcends traditional state borders—transnational dangers. Terrorism, drug trafficking, international organized crime, and environmental and natural resource threats don’t respect national borders, and pose rising dangers to the US. The US military will increasingly be called upon to combat these threats.

The third challenge to US security is the proliferation of advanced weapons and weapons technology. The best efforts of the US and the international community “will not eliminate transfer of weapons, weapons technology, and the required delivery systems, nor will they stem the diffusion of dual-use technologies in the global marketplace.”⁵ The weapons and related technology of most concern involve advanced

conventional weapons, Weapons of Mass Destruction (WMD - nuclear, chemical, and biological weapons), and missiles and missile technology.

The fourth challenge facing US security is a result of the previous three. Regional and transnational adversaries, equipped with advanced weapons, will threaten not only US interests abroad, but also the US homeland. The most likely manifestation of this challenge is in an adversary's use of "asymmetric means...unconventional or inexpensive approaches that circumvent our strengths, exploit our vulnerabilities, or confront us in ways we cannot match in kind."⁶ Examples of asymmetrical threats include use of WMD, terrorism, and information warfare. Recognizing the US's current significant advantage in space capabilities (specifically in reconnaissance and surveillance) over any potential adversary, it is unlikely these adversaries will allow the US to operate against them without trying to challenge that advantage in some way.

- 
- Regional Threats
 - Transnational Threats
 - Advanced Weapons and Weapons Technology Proliferation
 - Asymmetric Threats Abroad and Against the US Homeland

Figure 1. US National Security Challenges

The Report of the National Defense Panel, 1997, *Transforming Defense, National Security in the 21st Century*, sums up the challenges and future operating environment: "In short, we can expect those opposed to our interests to confront us at home and abroad—possibly in both places at once—with asymmetrical responses to our traditional strengths."

Trends

In addition to the above challenges shaping the security environment, there are several trends impacting the decisions on when to invest in future space capabilities.

The first trend of interest is the trend towards the commercialization of space. “There is such an economic investment going to space that it is going to be a national security interest and an economic center of gravity for the US.”⁷ As we enter the “information age,” a defining characteristic is the capability to move huge quantities of information rapidly from one location to another. Space is uniquely situated to not only enable information transfer, but also to provide a primary means of information collection. “The increasing commercialization of space makes it feasible for state and non-state actors alike to acquire reconnaissance and surveillance services.”⁸

The second trend is the growing reliance of the US Military on space capabilities. In the future, space systems will be key to every aspect of military operations, and existing terrestrial based missions will migrate to space.⁹ The military will rely increasingly on bought or leased commercial space capabilities, and will focus limited investment dollars on space capabilities unique to the military (e.g., protected communications).¹⁰ Of particular interest is the “control” of space to ensure US freedom of action. “Uninhibited access to and use of space is essential for preserving peace and protecting US national security as well as civil and commercial interest.”¹¹

The final trend impacting future military space capabilities is the current DOD budget environment. As mentioned earlier, the 1997 DOD budget was almost 40% lower (in constant Fiscal Year 1997 dollars) than the 1985 budget.¹² Of greater concern, however, is the corresponding decrease in procurement or modernization funding. Down

63% from 1985 levels¹³, the current \$42.6 billion in the 1998 budget is insufficient to fund the transformation of US forces spelled out in strategy and vision documents. Even the ambitious QDR goal of \$60 billion by 2001 has the potential to fall short (stall in the \$45-\$50 billion range).¹⁴ Without changes to the overall defense program, procurement funding above \$50 billion is highly unlikely.¹⁵ In this difficult budget environment, and while expecting *no* growth in the Air Force budget, the AFSPC Strategic Master Plan assumes a *growth* trend in the percentage of Air Force Total Obligation Authority (TOA) designated for space power! To enable the transition to a space and air force, AFSPC TOA will have to rise to 20% (from approximately 7% today).¹⁶ This increase will be at the expense of the Air Force's heritage—air power, making the transition that much more challenging.

- Commercialization of Space
- Increasing Reliance of US Military on Space
- Constant or Decreasing Procurement Funding

Figure 2. Trends Impacting Space Capabilities

Strategies

Based on the above challenges and trends, the following assumptions and strategies frame the remainder of this research paper.

Environment & Threats. The US will not face a true global or regional competitor through 2015. After that time, there is the possibility that a regional great power or a global peer will emerge,¹⁷ challenging both forward bases and forward-deployed forces, and threatening (through advanced weapons and asymmetric threats) the US homeland. While recognizing that today “the United States cannot ignore the threats posed by Iran

and Iraq in the Persian Gulf and North Korea in Northeast Asia,”¹⁸ it is important to acknowledge that “today we are in a relatively secure interlude following an era of intense international confrontation.”¹⁹

National Security Strategy. Fundamental interests and US goals remain constant. These fundamental interests are enhancing US security, promoting prosperity at home, and promoting democracy abroad.²⁰ The US will remain engaged globally. An overarching capability for the national security strategy of the future is space. “[Space] is essential to our ability to shape and respond to current and future changes in the international environment.”²¹ Accordingly, this paper assumes any cultural or political barriers to increased military mission responsibilities in space, including weapons in space, are overcome.

National Military Strategy. The US military will continue to *shape* the strategic environment, will *respond* globally, and will *prepare now* for the future.²² The QDR developed three alternative paths to meet the shape, respond, and prepare now strategy. Path one emphasized shaping and responding in the near and midterm, and accepted greater risk in the far term. Path two emphasized preparing now for the future, and accepted greater risk in the near and midterm. Path three would attempt to balance risk over the near, mid, and far terms.²³ Appropriately, the “QDR concluded that the overall defense posture associated with Path 3 would best allow the Department to address the fundamental challenge presented by our strategy: to meet our requirements to shape and respond in the near term, while at the same time transforming U.S. combat capabilities and support structure to shape and respond in the face of future challenges.”²⁴ The infrastructure reductions called for by this path (base closures and outsourcing and

privatization efforts) enable increases in DOD's overall investment budget to \$90 to \$95 billion, with \$60 billion (the QDR goal) applied to procurement.²⁵ This final strategy completes the analysis of the current and future strategic environment.

Conclusion

“Defense choices invariably entail risk; the only question is where we take the risk.”²⁶ The previous analysis recognizes there will not be a true global or regional competitor for the next 10 to 15 years, while the threats in the 2010 to 2020 time frame will be very different from what the US faces today. The priority for transformation must therefore go to the far term. This transformation should include an aggressive space procurement program, to not only leverage and protect the growing commercial and military investment in space, but also to posture the US to meet the challenges of the future. While recognizing the challenge of funding a military transformation in the fiscally constrained environment identified earlier, the present and future threats and challenges warrant the increase in TOA AFSPC boldly assumes in their Strategic Master Plan. “Space must expand and become a larger part of the Air Force budget every year.”²⁷ If necessary, the transformation should be funded by infrastructure and acquisition reform, reduced Operations Tempo, canceled or restructured acquisition programs, or force structure and end strength reductions.²⁸

We must anticipate that future adversaries will learn from the past and confront us in very different ways. Thus we must be willing to change as well or risk having forces ill suited to protect our security twenty years in the future. Only one thing is certain: the greatest danger lies in an unwillingness or an inability to change our security posture in time to meet the challenges of the next century.²⁹

When should the USAF transition to space take place? The analysis and quote above clearly state the transformation should proceed immediately and as aggressively as possible without taking undue risk. While a balanced approach between current demands and future challenges is prudent, the priorities for DOD and Air Force investment and procurement dollars must go to responding to asymmetric challenges and to the transition to space. “If we refuse to change in a timely manner we could be fundamentally unprepared for the future, and put at risk the safety of future generations of Americans. We have the time and opportunity to adjust. But we cannot equivocate. We must begin now.”³⁰ But to begin now, we must know what to transition to.

Notes

- ¹ John L. Petersen, *The Road to 2015* (Corte Madera, CA: Waite Group Press, 1994), 4.
- ² Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 20.
- ³ *Ibid.* 3.
- ⁴ *Ibid.*
- ⁵ *Air Force Strategic Plan*, draft vol. 1, 6 November 1997, 13.
- ⁶ *National Military Strategy of the United States of America*, 1997, 9.
- ⁷ Gen Howell M. Estes III, address to the Air Force Association National Symposium, Los Angeles, CA, 14 November 1997.
- ⁸ Report of the National Defense Panel, “Transforming Defense, National Security in the 21st Century,” Executive Summary, December 1997, 1.
- ⁹ *Air Force Strategic Plan*, draft vol. 1, 6 November 1997, 13.
- ¹⁰ *Ibid.* 13.
- ¹¹ The White House, *A National Security Strategy for a New Century*, May 1997, 14.
- ¹² Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 20.
- ¹³ *Ibid.* 20.
- ¹⁴ *Ibid.* 20.
- ¹⁵ *Ibid.* 21.
- ¹⁶ *Air Force Space Command Strategic Master Plan*, 5 December 1997, 11.
- ¹⁷ Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 19.
- ¹⁸ Report of the National Defense Panel, “Transforming Defense, National Security in the 21st Century,” Executive Summary, December 1997, 2.
- ¹⁹ *Ibid.* 1.
- ²⁰ The White House, *A National Security Strategy for a New Century*, May 1997, i.

Notes

²¹ Ibid. 14.

²² National Military Strategy of the United States of America, 1997, 2.

²³ Department of Defense, Report of the Quadrennial Defense Review, May 1997, 21.

²⁴ Ibid. 27.

²⁵ Ibid. 22.

²⁶ Report of the National Defense Panel, “Transforming Defense, National Security in the 21st Century,” Executive Summary, December 1997, ii

²⁷ Gen Howell M. Estes III, address to the Air Force Association National Symposium, Los Angeles, CA, 14 November 1997.

²⁸ Report of the National Defense Panel, “Transforming Defense, National Security in the 21st Century,” Executive Summary, December 1997, vii.

²⁹ Ibid. i.

³⁰ Ibid.

Chapter 3

Space Force Capabilities: What to Transition To

Today we recognize the importance of space and have labeled space superiority as one of our core competencies, but as of yet, we have very little means of ensuring space superiority. We don't even know how to define it yet...This is the crossroad in history the Air Force has reached...Our actions regarding space over these next few years will set the course for the next quarter century, and I propose we had better choose carefully.

—General Howell M. Estes III

With the argument made that *now* is the time to begin the transformation and transition to a space and air force, the next question is what choices (from a space power perspective) should the Air Force make today? What should the future space force provide? To answer these questions, this chapter outlines a “strategy to capabilities” analysis blending the future operational concepts defined in *Joint Vision 2010* with Air Force doctrine. The result of the analysis identifies required space power functions, operations, and finally capabilities—the “what” behind future Air Force space power.

Joint Vision 2010

In an effort to guide the overall transformation of US forces, capabilities, and support structures, the Chairman of the Joint Chiefs of Staff developed *Joint Vision 2010*. The vision provides a “conceptual template for how America’s Armed Forces will channel the vitality and innovation of our people and leverage technological opportunities to achieve

new levels of effectiveness in joint warfighting.”¹ The goals and operational concepts presented in *Joint Vision 2010* provide the lens for the individual Services to focus their transformation efforts. The Chairman’s vision provides a “new conceptual framework for operations”² based on the improved command, control, and intelligence provided by information superiority. Information superiority is the enabler of the Revolution in Military Affairs (RMA) discussed earlier, and allows four new operational concepts needed to significantly enhance joint operations: Dominant maneuver, precision engagement, full dimensional protection, and focused logistics.³ Characteristics of the information superiority, the operations concepts, and resulting strategy follow.

Information Superiority. To respond rapidly to any conflict, dominate any situation, and optimize day-to-day operations, accurate, timely, and secure information must be available to the US force of the future.⁴ “We must have information superiority: the ability to collect, processes, and disseminate an uninterrupted flow of information while exploiting or denying an adversary’s ability to do the same.”⁵

Dominant Maneuver. Dominant maneuver is the “multidimensional application of information, engagement, and mobility capabilities to position and employ widely dispersed joint air, land, sea, and space forces to accomplish assigned operational tasks.”⁶ By moving faster and more nimbly than an adversary, dominant maneuver allows US joint forces to control the breadth, depth, and height of the battlespace, and forces an adversary to react from a disadvantaged position or quit.⁷ Per the QDR, enhanced capabilities required for Dominant Maneuver include greater reliance on netted firepower to increase mobility and lethality, and more flexible strategic and tactical lift.⁸

Precision Engagement. Precision engagement is a “system of systems that enables our forces to locate the objective or target, provide responsive command and control, generate the desired effect, assess our level of success, and retain the flexibility to reengage with precision when required.”⁹ Requiring intelligence on enemy forces and expert judgement to match force to the desired effect, the characteristics of precision engagement are precise stand-off capabilities, more capable attack platforms and advanced weapons, less risk to our forces, and minimal collateral damage.¹⁰

Full-Dimensional Protection. Full-dimensional protection recognizes “we must also protect our own forces from the very technologies that we are exploiting.”¹¹ Full-dimensional protection builds on information superiority and provides freedom of action for US forces. Characteristics include identification of all forces in the battlespace, information operations (defensive and offensive), in-depth air and missile defense, and new sensors and information dissemination systems to detect chemical or biological attacks and provide warning.¹²

Focused Logistics. To optimize the three preceding concepts, “logistics must be responsive, flexible, and precise. Focused logistics will be the fusion of information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages.”¹³ Characteristics of focused-logistics are faster support (hours and days versus weeks), and accurate tracking of logistics assets.¹⁴

Full Spectrum Dominance. Together, information superiority and the four new operational concepts reinforce each other, and synergistically provide the overarching strategy of *Joint Vision 2010*—Full Spectrum Dominance. “That is, taken together these

four new concepts will enable us to dominate the full range of military operations from humanitarian assistance, through peace operations, up to and into the highest intensity conflict.”¹⁵

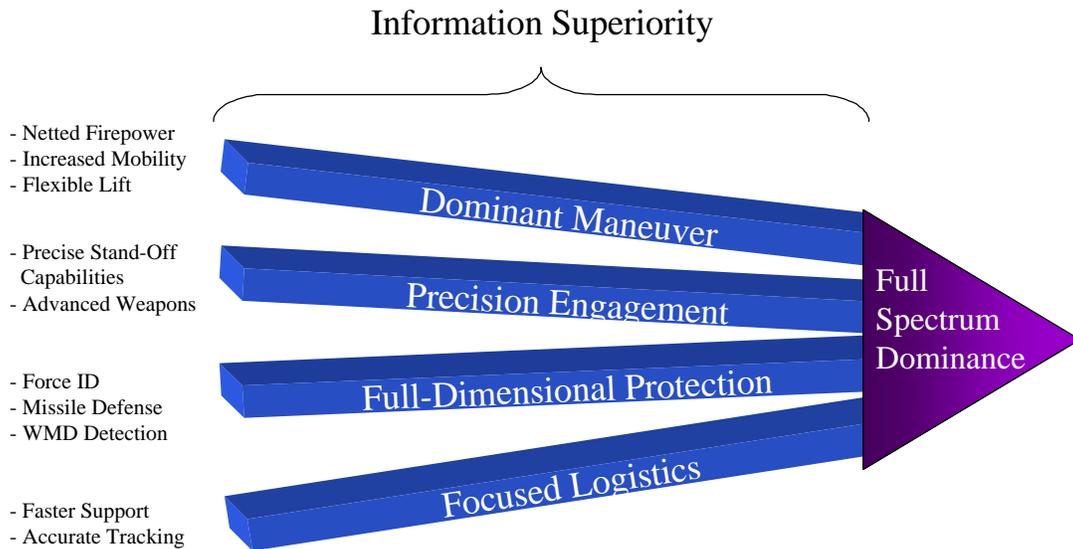


Figure 3. Joint Vision 2010

Air Force Core Competencies and *Joint Vision 2010*

With the future “operational template” of *Joint Vision 2010* established, the next step in the analysis is tying the template to Air Force doctrine. Air Force Doctrine is the “statement of officially sanctioned beliefs and warfighting principles that describe and guide the proper use of air and space forces in military operations.”¹⁶ Any discussion of Air Force doctrine must begin with the Air Force’s core competencies—not doctrine in themselves, but the enablers of Air Force doctrine.¹⁷ Air Force core competencies are:

Air and Space Superiority. Delivering a fundamental benefit to the Joint Force, air and space superiority “prevents adversaries from interfering with operations of air, space or surface forces, and assures freedom of action and movement.”¹⁸

Precision Engagement. Precision Engagement is “providing the ‘scalpel’ of joint service operations—the ability to forgo the brute force-on-force tactics of previous wars and apply discriminate force precisely where required.”¹⁹

Information Superiority. Information Superiority is “the ability to collect, control, exploit, and defend information while denying an adversary the ability to do the same.”²⁰

Global Attack. The ability of the Air Force to “attack rapidly and persistently with a wide range of munitions anywhere on the globe at any time is unique,”²¹ and defines global attack.

Rapid Global Mobility. This capability “refers to the timely movement, positioning, and sustainment of military forces and capabilities through air and space.”²²

Agile Combat Support. Agile Combat Support is how the Air Force sustains the forces it deploys through rapid global mobility. It involves providing a “seamless, agile, and responsive combat support system of systems.”²³

These core competencies are the heart of the Air Force’s contributions to the Joint Force, and support *Joint Vision 2010* through the following relationships.

Information superiority is the enabler for the four operations concepts found in *Joint Vision 2010*, and is an Air Force core competency. While not the sole province of the Air Force, “the Air Force is the major operator of sophisticated...space-based intelligence, surveillance, and reconnaissance systems”²⁴ which allow domination in the information spectrum.

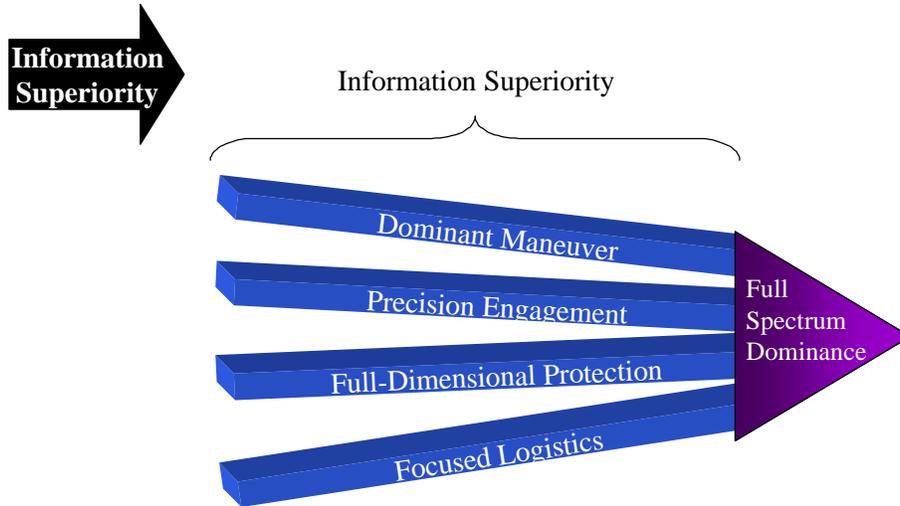


Figure 4. AF Core Competencies and Information Superiority

The freedom of action for joint forces made possible by space power (space superiority), the potential for space power to rapidly project combat power anywhere in the world (rapid global mobility), and the potential ability for space power to engage at any place on land, sea, in the air, or in space (global attack) support the operational concept of dominant maneuver.²⁵

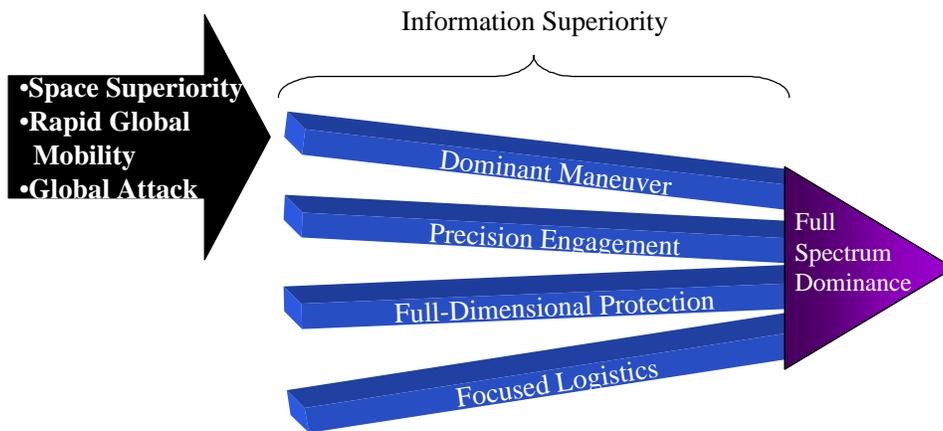


Figure 5. AF Core Competencies and Dominant Maneuver

Obviously the Air Force core competency of precision engagement supports the operations concept of the same name in *Joint Vision 2010*. And while precision applies to more than just weapons, the potential ability for space power to engage at any place on

land, sea, in the air, or in space (global attack) is also a key element of precision engagement.²⁶

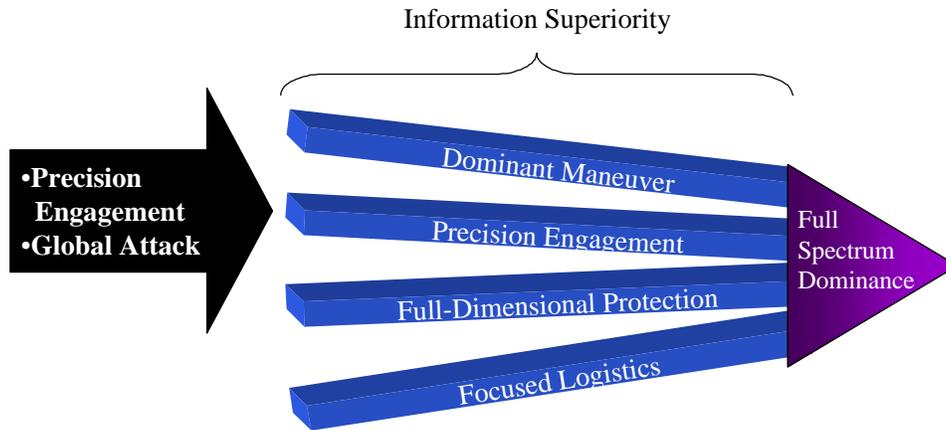


Figure 6. AF Core Competencies and Precision Engagement

The freedom to attack and more importantly the freedom from attack (space superiority) provide the basis for full-dimensional protection. Add the attributes of global attack and precision engagement, and space power can provide the means for quickly countering unexpected threats and for exploiting fleeting opportunities.²⁷

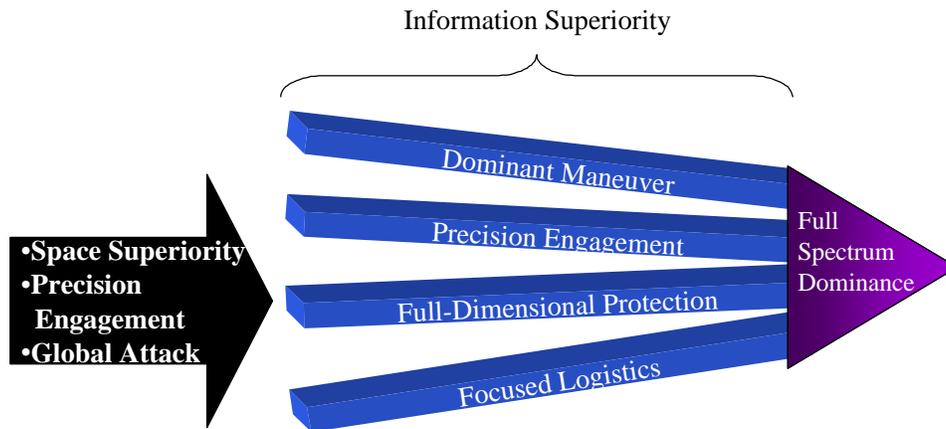


Figure 7. AF Core Competencies and Full-Dimensional Protection

Finally, focused logistics requires a combination of logistics technologies ensuring the right supplies arrive at the right place at the right time—the aim of agile combat support. Together with rapid force projection (rapid global mobility) and precisely

delivering material (precision engagement), agile combat support enables focused logistics.²⁸

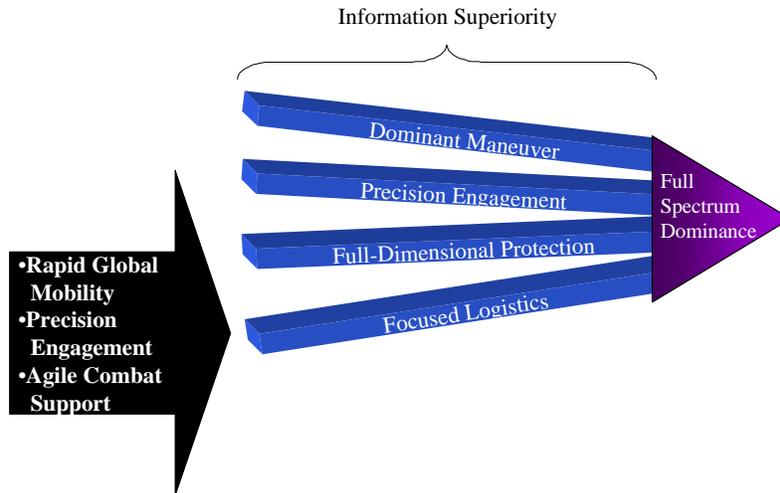


Figure 8. AF Core Competencies and Focused Logistics

Space Power Functions

With the link between *Joint Vision 2010* and the Air Force’s core competencies established, the next step in the “strategy to capabilities” analysis is to tie the core competencies to space power functions. These functions are broad, fundamental, and continuing activities, and represent the means by which Air Force space power can accomplish the missions assigned to joint force commanders.²⁹ The following short definitions and Figure 9 present these functions.

Counterspace involves operations to attain and maintain a desired degree of space superiority by the destruction or neutralization of enemy forces.³⁰

Counterair consists of operations to attain and maintain a desired degree of air superiority by the destruction or neutralization of enemy forces.³¹

Counterland involves operations to attain and maintain a desired degree of superiority over surface operations by the destruction or neutralization of enemy surface forces.³²

Countersea is a collateral function and is an extension of Air Force functions into the maritime environment.³³

Strategic Attack is operations intended to directly achieve strategic effects by striking the enemy's centers of gravity.³⁴

Counterinformation seeks to establish information superiority through control of the information realm.³⁵

Command and Control is the process by which a commander decides on an action, and the system that monitors the implementation of the decision.³⁶

Spacelift projects power by delivering satellites, payloads, and materiel into or through space.³⁷

Intelligence provides clear, brief, relevant, and timely analysis on foreign capabilities and intentions for planning and conducting military operations.³⁸

Surveillance systematically observes air, space, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means.³⁹

Reconnaissance obtains, by visual observation or other detection methods, specific information about the activities and resources of an enemy or potential enemy, or secures data concerning the meteorological, hydrographic, or geographic characteristics of a particular area.⁴⁰

Navigation and Positioning provides accurate location and time of reference in support of strategic, operational, and tactical operations.⁴¹

Weather Services supply timely and accurate environmental information, including both space environment and atmospheric weather.⁴²



Figure 9. Space Power Functions

Each core competency is supported by multiple functions. For instance, space superiority stems from the counterspace, command and control, intelligence, surveillance, and reconnaissance (C²ISR, a combination of four of the space power functions), navigation and positioning, and weather services functions. Similarly, agile combat support (from a space power perspective) stems from the spacelift, C²ISR, navigation and positioning, and weather services functions. It is significant to note that all of the core competencies stem from the C²ISR, navigation and positioning, and weather services functions. These functions represent *force enhancement functions*—functions conducted to enable or support space, air, land, and sea operations. The relationships of all the Air Force core competencies and the space power functions they stem from are shown in the following cross-impact matrix:

Table 1. Core Competency vs. Function Cross-Impact Matrix

Core Competency \ Functions	Space Superiority	Air Superiority	Precision Engagement	Information Superiority	Global Attack	Rapid Global Mobility	Agile Combat Support
Counter-Space	X		X ¹		X		
Counter-Air		X	X ¹		X		
Counter-Land			X ¹		X		
Counter-Sea			X ¹		X		
Strategic Attack			X ¹		X		
Counter-Information				X			
Spacelift			X ²			X	X
C ² ISR	X	X	X	X	X	X	X
Navigation & Positioning	X	X	X	X	X	X	X
Weather Services	X	X	X	X	X	X	X

¹Precise delivery of weapons to targets

²Precise delivery of material or forces

As a mid-analysis example to show how the research to this point has drawn the thread between high level strategy to the fundamental activities of space power, consider focused logistics. To dominate the full range of military operations (full spectrum dominance), a required enabling operational concept is focused logistics. The Air Force contributes to focused logistics through its core competencies of rapid global mobility, precision engagement, and agile combat support. These core competencies stem from the basic space power functions of spacelift, C²ISR, navigation and positioning, and weather services. (Note: While the counter-space, air, land, sea, and strategic attack functions also enable precision engagement, for focussed logistics, precision engagement

represents the precise delivery of material or forces—not precise delivery of weapons to targets)

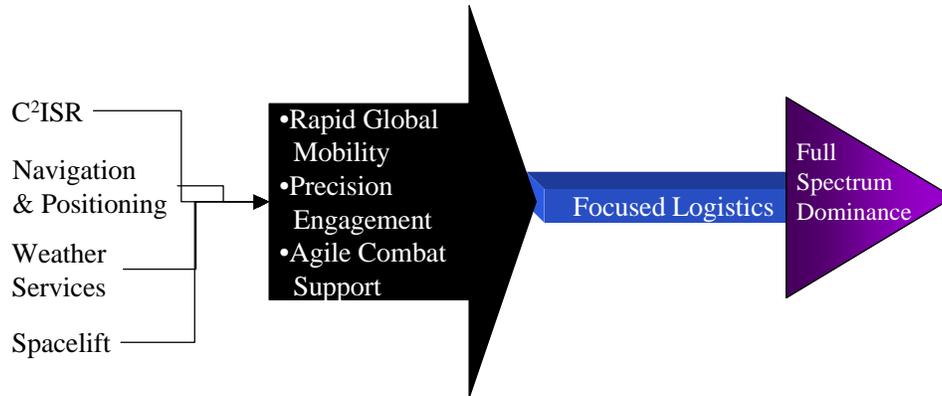


Figure 10. Strategy to Space Power Functions Example (Focused Logistics)

Space Force Operations and Capabilities

The final step in the “strategy to capabilities” analysis is tying space power functions to space force operations and ultimately capabilities. Air Force space operations are based on the core competencies and functions outlined above, and focus on controlling the space environment, applying force, and conducting enabling and supporting operations.⁴³ Mapping these operations to space power functions results in the correlation shown in figure 11.

<i>Functions</i>	<i>Operations</i>
Counter-Space	Space Control
Counter-Air	Force Application
Counter-Land	Force Application
Counter-Sea	Force Application
Strategic Attack	Force Application
Counter-Information	Space Control / Force Application
Spacelift	Space Force Support
C²ISR	Force Enhancement
Navigation & Positioning	Force Enhancement
Weather Services	Force Enhancement

Figure 11. Functions and Operations

It should be noted that any capability that is space-based, whether it supports space control, force application, or force enhancement operations, requires space force support (spacelift and satellite operations).

Space Control. “Space control is the means by which we gain and maintain space superiority to assure friendly forces can use the space environment while denying its use to the enemy.”⁴⁴ Space control is accomplished through the counterspace mission which in-turn includes offensive, defensive, and contributing capabilities.

Offensive counterspace operations destroy or neutralize an adversary’s space systems (or the information they provide) at a chosen time and place. The operations can involve lethal or non-lethal means and are conducted to achieve the deception, disruption, denial, degradation, or destruction of space assets or capabilities.⁴⁵

Defensive counterspace operations reduce the effectiveness or preclude an adversary’s counterspace operations, preserving the US’s ability to use friendly space systems. Defensive counterspace operations consist of active and passive defense missions. Active defense detects tracks, identifies, intercepts, and destroys or neutralizes adversary counterspace and missile forces. Passive defense reduces the vulnerabilities, protects, and increases the survivability of friendly space forces through measures such as encryption, frequency hopping, hardening, camouflage, concealment, deception, redundancy, mobility, and dispersion.⁴⁶

Contributing capabilities enable successful offensive and defensive counterspace missions, and involve surveillance of space, ballistic missile warning, and space environment operations. Space surveillance detects and identifies space systems and characterizes the space threat environment. Ballistic missile warning detects, tracks, and reports threatening ballistic missile launches. Knowledge of the space environment helps operators optimize space systems against space environment disturbances.⁴⁷

Table 2. Space Control Capabilities

Operation	Mission	Capabilities
Space Control	Offensive Counterspace	Deceive, Disrupt, Deny, Degrade, Destroy
	Defensive Counterspace	Active: Detect, Track, Identify, Intercept, Destroy or Neutralize Passive: Reduce Vulnerability, Protect, Increase Survivability
	Contributing	Detect, Identify, Characterize Space Systems & the Space Environment Detect, Track, Report Ballistic Missile Launches

Force Application. The application of force consists of attacks against terrestrial (air, land, and sea) targets carried out by military weapons systems operating in space. **For example**, a space-based laser, in addition to providing offensive and defensive counterspace capabilities, could provide space-based attacks against terrestrial targets. Transatmospheric vehicles, in addition to providing spacelift capabilities, could also provide force application capabilities by delivering weapons to and through space⁴⁸

Table 3. Force Application Capabilities

Operation	Mission	Capabilities
Force Application	Terrestrial Attack	Air, Land, and Sea Target Attack

Force Enhancement. Enhancing operations enable or support terrestrial forces. Air Force space operations doctrine identifies navigation, communications, reconnaissance, surveillance, threat warning, and environmental sensing as space-based force enhancement capabilities.⁴⁹ AFSPC, in their Strategic Master Plan, additionally lists battle management/command and control as a force enhancement mission.⁵⁰ This inclusion clearly ties space force enhancement operations to the command and control space power function. Additionally, this paper chooses to use the broader threat warning capability from AFSPC’s plan vice ballistic missile warning from Air Force Doctrine Document 2-2. This broader capability, when combined with reconnaissance and surveillance, not only detects and provides warning of strategic and theater ballistic weapons, but also encompasses satellites, cruise missiles, aircraft, unmanned aerial vehicles, maritime targets, mobile ground targets, fixed targets, deeply buried targets, and nuclear, biological, and chemical weapons.⁵¹

Table 4. Force Enhancement Capabilities

Operation	Mission	Capabilities
Force Enhancement	Enable or Support Terrestrial Forces	Navigation, Communications, Reconnaissance, Surveillance, Threat Warning, Environmental Sensing, Battle Management/Command and Control

Space Force Support. Space force support operations are conducted by terrestrial elements of military space forces to sustain, surge, and reconstitute elements of a military space system or capability. Space force support involves spacelift and satellite operations.⁵²

Spacelift (a space power function and space force support mission) launches or deploys new and replenishment space assets as necessary. Spacelift missions include launch to deploy, launch to sustain, and launch to augment. A launch to deploy is a launch on a predetermined schedule made to initially achieve an operational capability. A launch to sustain replaces satellites predicted to fail or that abruptly fail. These launches may be scheduled or may require unscheduled operations. A launch to augment increases operational capability in response to a contingency, crisis, or war, and will require unscheduled operations.⁵³

Satellite operations maneuver, supports, and sustain on-orbit space forces. Satellite operations provide telemetry, tracking, and commanding (TT&C) support, and distribute satellite mission data.

Table 5. Space Force Support Capabilities

Operation	Mission	Capabilities
Space Forces Support	Spacelift Satellite Operations	Scheduled and Unscheduled Launches TT&C, Mission Data Distribution

Combining the capabilities from each space operations area, completes the “strategy to capabilities” analysis of this chapter. The required space power capabilities to meet the strategy and operational concepts of *Joint Vision 2010* are:

- Space asset deception, disruption, denial, degradation, destruction
- Space asset detection, tracking, identification, characterization
- Space asset protection, vulnerability reduction, survivability enhancement
- Space environment characterization
- Air, land, sea target attack
- Space-based navigation, communications, reconnaissance, surveillance, threat warning, and environmental sensing, and space force battle management/command and control
- Scheduled and unscheduled launch operations
- Satellite TT&C and mission data distribution

Continuing with our example earlier (focused logistics), the space capabilities required are scheduled and unscheduled launches, satellite TT&C and mission data distribution, and space-based navigation, communications, reconnaissance, surveillance, threat warning, and environmental sensing, as well as battle management/command and control of these assets. (See figure 12)

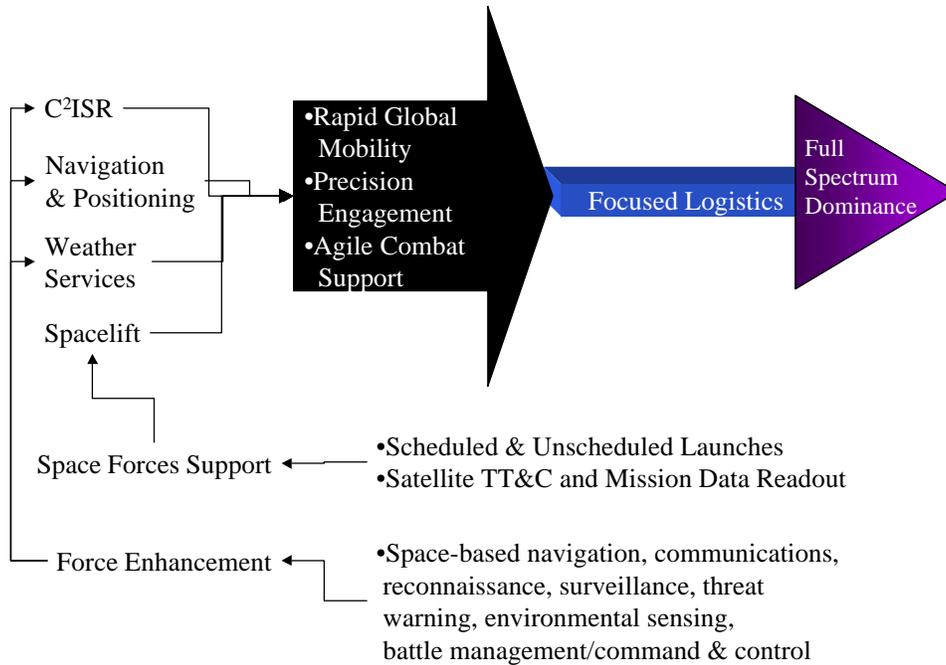


Figure 12. Strategy to Capabilities (Focused Logistics)

Conclusion

This chapter answered “what”—what capabilities Air Force space power should provide. These required capabilities stem from strategy, Air Force core competencies, and Air Force doctrine. Some capabilities already exist—space asset detection, tracking, identification, & characterization, space environment characterization, space-based navigation, communications, reconnaissance, surveillance, threat warning, & environmental sensing, battle management/command and control, scheduled launch operations, satellite TT&C and mission data distribution. These capabilities only require upgrades and improvements to fully leverage new information technologies. Other capabilities could exist with the right investment and procurement decisions—terrestrial-based space asset deception, disruption, denial, degradation, & destruction, space asset protection, vulnerability reduction, & survivability enhancement, unscheduled launch

operations. Still other capabilities require treaty and policy guidance in addition to the right investment and procurement decisions—space-based space asset deception, disruption, denial, degradation, & destruction, air, land, & sea attack. Chapter two established that now is the time to make these decisions, and this chapter defines what the result of these careful decisions should be to fully underwrite *Joint Vision 2010* and provide full-spectrum dominance. The next chapter addresses the future force required to provide these capabilities.

Notes

- ¹ Gen John M. Shalikashvili, *Joint Vision 2010*, 1.
- ² *Ibid.*, 12.
- ³ *Ibid.*, 13.
- ⁴ Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 40.
- ⁵ Gen John M. Shalikashvili, *Joint Vision 2010*, 10.
- ⁶ *Ibid.*, 13.
- ⁷ *Ibid.*, 13.
- ⁸ Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 40.
- ⁹ *Ibid.*, 14.
- ¹⁰ *Ibid.*, 40.
- ¹¹ Gen John M. Shalikashvili, *Joint Vision 2010*, 15.
- ¹² Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 41.
- ¹³ Gen John M. Shalikashvili, *Joint Vision 2010*, 16.
- ¹⁴ Department of Defense, *Report of the Quadrennial Defense Review*, May 1997, 41.
- ¹⁵ Gen John M. Shalikashvili, *Joint Vision 2010*, 18.
- ¹⁶ Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, September 1997, 1.
- ¹⁷ *Ibid.*, 27.
- ¹⁸ *Global Engagement: A Vision for the 21st Century Air Force*, 10.
- ¹⁹ AFDD 1, 30.
- ²⁰ *Ibid.*, 31.
- ²¹ *Ibid.*, 32.
- ²² *Ibid.*, 33.
- ²³ *Ibid.*, 35.
- ²⁴ *Ibid.*, 31.
- ²⁵ *Ibid.*, 37.
- ²⁶ *Ibid.* 38.
- ²⁷ *Ibid.* 39.

Notes

- ²⁸ Ibid., 38.
²⁹ Ibid., 45.
³⁰ Ibid., 47.
³¹ Ibid., 46.
³² Ibid., 48.
³³ Ibid., 50.
³⁴ Ibid., 51.
³⁵ Ibid., 53.
³⁶ Ibid.
³⁷ Ibid., 56.
³⁸ Ibid., 58.
³⁹ Ibid., 59.
⁴⁰ Ibid.
⁴¹ Ibid., 60.
⁴² Ibid.
⁴³ AFDD 2-2, Space Operations, February 1997, 5.
⁴⁴ Ibid., 6.
⁴⁵ Ibid., 6.
⁴⁶ Ibid., 7.
⁴⁷ Ibid., 7-8.
⁴⁸ Ibid., 8.
⁴⁹ Ibid., 8.
⁵⁰ Air Force Space Command Strategic Master Plan, 5 December 1997, 29.
⁵¹ Ibid., 28.
⁵² AFDD 2-2, 9.
⁵³ AFDD 1, 57.

Chapter 4

Air Force Space Operators: How to Reshape the Force

We will sustain the forces and capabilities needed to meet the demands of our strategy in the near term while at the same time beginning to transform the force for the future. The issue is not whether we will reshape our forces, but how and when.

—Report of the Quadrennial Defense Review, May 1997

The previous two chapters have addressed *when* to transform the Air Force’s space force, and *what* capabilities the resulting force should have. The remaining question is *how* to transform the force. This chapter seeks to answer that question from the perspective of the most important element of Air Force military capability—people. “The composition of the Total Force will change as the nature of air and space power changes.”¹ Regarding the future space force, the Total Force mix consists of those active duty, Air National Guard and Air Force Reserve, civilian, and private sector elements providing space power capabilities. The analysis will first identify which space power functions and capabilities are inherently governmental, and which are candidates for outsourcing and privatization (private sector element). Once the private sector capabilities are identified, the analysis will consider which of the remaining governmental capabilities primarily support the general public interest, and which primarily support military action. Finally, of the remaining military capabilities, the

analysis considers which functions and capabilities are appropriately active duty, and which are appropriate for reserve and guard forces.

“Inherently Governmental” versus “Outsourcing and Privatization”

The Air Force has recently made outsourcing and privatization (O&P) a priority “in order to realize inherent efficiencies, reduce support costs, and free more uniformed personnel for operational assignments—to preserve “tooth”, streamline the “tail,” and support modernization.”² Contractors may not perform all functions and capabilities, however. Those functions directly involved with combat operations (primary mission is destruction or neutralization of enemy forces and/or installations³) are not candidates for O&P. However, there may be some operational functions contracted to relieve combat forces for other operations. For a working definition, an “inherently governmental function” is a “function that is so intimately related to the public interest as to mandate performance by Government employees.”⁴ Outsourcing is the transfer of a function to the private sector, while the Government retains responsibility and control. Privatization is the transfer of control of an asset and the associated activity.⁵ The following analysis applies these definitions to each of the space power capabilities identified in the previous chapter.

Of the required space power capabilities listed in table 6 on the next page, space environment characterization, some space-based communications, reconnaissance, surveillance, and environmental sensing, some scheduled launch operations, satellite TT&C, and mission data distribution are not intimately related to the public interest. In fact, with the growing commercialization of space identified as a trend in chapter 2, most

challenges facing the capabilities listed above are being faced by commercial ventures.

The “evidence” supporting O&P for each of these capabilities follows.

Table 6. Government vs. O&P

<i>Capability</i>	<i>Inherently Governmental</i>	<i>O&P Candidate</i>
Space asset deception, disruption, denial, degradation, destruction	X	
Space asset detection, tracking, identification, characterization	X	
Space asset protection, vulnerability reduction, survivability enhancement	X	
Space environment characterization		X
Air, land, sea attack	X	
Space-based navigation	X	
Space-based communications	X	X
Space-based reconnaissance	X	X
Space-based surveillance	X	X
Space-based threat warning	X	
Space-based environmental sensing	X	X
Battle management/command and control	X	
Scheduled launch operations	X	X
Unscheduled launch operations	X	
Satellite TT&C		X
Satellite mission data distribution		X

With the number of commercial satellites in orbit, and the investment they represent, knowledge of the space environment is critical to commercial space operations. With the private sector’s dominant interest vice the public’s, space environment characterization is a candidate for O&P.

Similarly, DOD no longer leads in space-based communications. To take advantage of the economies of scale offered by commercial communications, the US military is purchasing space-based communications capability from commercial vendors. For instance, DOD is buying a “gateway,” or high-capacity connection to the future Iridium global satellite communications network.⁶ Not all DOD communications, however, can

be provided by the private sector. Protected, high capacity, and mobile satellite communications services will continue to be inherently governmental capabilities.⁷

While the Government still leads in the fields of space-based reconnaissance, surveillance, and environmental sensing, the private sector is also expanding commercial space-based capabilities in these areas. As they are doing with communications, the Government will be able to purchase services, while still requiring some inherently governmental capabilities.

While unimpeded access to space is an inherently governmental capability, launches to deploy or sustain (those scheduled in advance) are candidates for O&P. The Navy currently outsources its deployment and sustainment launches, effectively taking command of the satellite when it has reached its operational orbit. Some launches to deploy or sustain (based on sensitivity, effectiveness, or efficiencies), and all launches to augment in support of contingencies, crisis, or war will remain inherently governmental operations.

Government satellites will be providing inherently governmental capabilities, but the TT&C for these satellites, while still under Government responsibility and control, is not inherently governmental (contractors have and do perform these functions for the Government). TT&C, where again the most difficult challenges are being faced by commercial satellite ventures,⁸ is an Air Force outsourcing candidate.

Finally, mission data distribution is primarily a communications function and is not inherently governmental. Mission data distribution is (in the form of Air Force Satellite Control Network Remote Tracking Station operators) already contracted out to the private sector.

Separating these capabilities from the inherently governmental functions, and grouping them as either outsourcing (where the Government retains responsibility and control) or privatization candidates, results in the following table.

Table 7. Outsource vs. Privatize

<i>Capability</i>	<i>Outsource</i>	<i>Privatize</i>
Space environment characterization	X	
Space-based communications		X*
Space-based reconnaissance		X*
Space-based surveillance		X*
Space-based environmental sensing		X*
Scheduled launch operations	X	
Satellite TT&C	X	
Satellite mission data distribution	X	

*For these capabilities, privatization means purchasing some capabilities from the private sector, not necessarily transferring any Government assets.

Civilian versus Military

With the inherently governmental space power capabilities identified, the next step in the analysis is to determine civilian (Government) versus military functions. The criteria applied in this case are military capabilities are those providing combat missions (destruction or neutralization of enemy forces or installations) or combat support missions (direct operational assistance to combat elements). Using these definitions, the following capability breakout results.

Table 8. Civilian vs. Military Capabilities

<i>Capability</i>	<i>Civilian</i>	<i>Military</i>
Space asset deception, disruption, denial, degradation, destruction		X
Space asset detection, tracking, identification, characterization		X
Space asset protection, vulnerability reduction, survivability enhancement		X
Air, land, sea attack		X
Space-based navigation	X	
Space-based communications		X
Space-based reconnaissance	X	X
Space-based surveillance		X
Space-based threat warning		X
<i>Capability</i>	<i>Civilian</i>	<i>Military</i>
Space-based environmental sensing	X	
Battle management/command and control		X
Scheduled launch operations	X	
Unscheduled launch operations		X

Of these capabilities, all except space-based navigation, space-based environmental sensing, and scheduled launch operations primarily support combat or combat support missions, with space-based reconnaissance equally supporting civil and military missions. While the space-based navigation Global Positioning System (GPS) was initially developed and employed by the military, and remains critical to military operations, it has evolved into primarily a civil capability. The President, in fact, included in a March, 1996 policy that GPS was to “continue to provide the GPS Standard Positioning Service for peaceful civil, commercial, and scientific use.” The Department of Transportation (DoT) is the logical governmental organization to provide space-based navigation capability⁹, and the Air Force should pursue the transfer of GPS responsibility and operations to DoT.

Similarly, the Air Force's space-based environmental sensing satellite system is already scheduled to converge with the system operated by the National Oceanographic and Atmospheric Administration (NOAA). NOAA will provide a national space-based environmental sensing capability for civil and military use.¹⁰

Space-based reconnaissance provides specific information for both civil and military users, and is assigned to the National Reconnaissance Office (NRO). The military (primarily the Air Force) and the Central Intelligence Agency equally support the NRO, and this capability is therefore listed as both a civilian and military capability.

Finally, the Air Force will begin exploiting reusable launch capabilities providing more responsive, less expensive access to space. The Air Force will achieve this exploitation by leveraging off the National Aeronautics and Space Administration (NASA).¹¹ NASA should be called upon to provide scheduled launch operations (as they have in the past) that are not outsourced to the private sector. This will leave the Air Force to focus on unscheduled launch operations provided by concept systems such as the Space-X Vehicle. Space-X Vehicle capabilities, in addition to supporting spacelift, could also support space control and force application operations.

Active Duty versus Reserve and Guard

The final step in defining the space force manpower mix of the future is to define which capabilities should be performed by active duty forces, and which should be performed by National Guard/Air Force Reserve forces. The Secretary of Defense has emphasized the need for increased reliance on the Reserve components, and has called for an integration of the Reserve and active components into a seamless force.¹² Keeping this guidance in mind, a notional integrated space force mix is provided below.

Table 9. Active Duty vs. Reserve & Guard

<i>Capability</i>	<i>Active Duty</i>	<i>Reserve/Guard</i>
Space asset deception, disruption, denial, degradation, destruction	X	
Space asset detection, tracking, identification, characterization	X	
Space asset protection, vulnerability reduction, survivability enhancement	X	
Air, land, sea attack	X	
Space-based communications		X
Space-based reconnaissance	X	X
Space-based surveillance		X
Space-based threat warning		X
<i>Capability</i>	<i>Active Duty</i>	<i>Reserve/Guard</i>
Battle management/command and control	X	
Unscheduled launch operations	X	

This breakout simply assigns the currently immature or future capabilities within the space control and force application functions (combat missions) to active duty forces. Additionally, the capabilities to manage, command, and control these forces, and to launch them in support of a contingency, crisis, or war, is assigned to active duty forces. The relatively more mature force enhancement missions of space-based communications, surveillance, and threat warning are assigned to the Reserve component. Military support to the NRO and its space-based reconnaissance capability should be provided by both active duty and reserve forces. This division seeks to “capitalize on the synergy of the Air National Guard and Air Force Reserve forces in an integrated TOTAL Force.”¹³

Conclusion

This chapter addressed “how” to transform the space force of the future (from a manpower perspective) to provide the space power capabilities identified in chapter three, and to meet the challenges and threats investigated in chapter two. The resulting space

force relies on a robust private space sector, and a broad mix of civilian, Reserve component, and active duty operators—operators experienced in the employment and doctrine of space power. With the space power capabilities appropriate for Air Force operators identified, it is now up to the Air Force to recruit and train space operators in those capabilities, and then equip them with the most advanced weapons and most efficient support systems possible.¹⁴ “Only a force that has the courage, stamina, and intellectual ability to cope with the complexity and rapid pace of future joint operations will have the capability to achieve full spectrum dominance.”¹⁵

Notes

¹ Global Engagement: A Vision for the 21st Century Air Force, 19.

² Air Force Strategic Plan, draft vol. 1, 6 November 1997, 28.

³ Joint Pub 1-02, Department of Defense Dictionary, 23 March 1994, Updated thru April 1997, 107.

⁴ Executive Office of the President, Office of Management and Budget, Policy Letter 92-1, subject: Inherently Governmental Functions, 23 September 1992.

⁵ Briefing, Colonel Bob Corsi, Deputy Director, Directorate of Manpower, Organization and Quality, Deputy Chief of Staff for Plans and Programs, subject: Outsourcing and Privatization, 17 December 1997.

⁶ Quentin Hardy, “Iridium Gets U.S. as First Customer Of Wireless Communication System,” The Wall Street Journal, 26 January 1998, interactive edition.

⁷ Air Force Space Command Strategic Master Plan, 5 December 1997, 25.

⁸ Ibid., 20.

⁹ Ibid., 21.

¹⁰ Ibid., 25.

¹¹ Ibid., 17.

¹² “Secretary Cohen Emphasizes Increased Reliance on the Reserve Components,” ROA National Security Report, The Officer / January-February 1998, 1-2.

¹³ Global Engagement: A Vision for the 21st Century Air Force, 19.

¹⁴ Air Force Strategic Plan, draft vol. 1, 6 November 1997, 26.

¹⁵ Gen John M. Shalikashvili, Joint Vision 2010, 19.

Chapter 5

Summary: The Shape of Things to Come

We are now transitioning from an air force into an air and space force on an evolutionary path to a space and air force.

—Global Engagement: A Vision for the 21st Century Air Force

The quote above is worth repeating. It charts a path for the United States Air Force into the 21st Century, but it only provides the first small step in defining the Air Force's vision—establishing where it wants to go. To understand the future direction of the Air Force, several other questions must be answered. When should the Air Force make the transition to a space and air force, what will the future space force provide to the Nation, and how should Air Force personnel and specialties be organized to advance the strategic perspective and rapid response of space power?

By examining the broad trends characterizing, shaping, and defining the future strategic environment, this paper suggests that *now* is the time to aggressively establish planning initiatives, focus science and technology investment, and create milestones to develop future space power capabilities. The capabilities required are by no means revolutionary, and in fact are merely an extension of the traditional functions of air power to the medium of space. The areas requiring the most investment, and perhaps the most debate, are space control and space force application. Finally, the Air Force cannot forget its most valuable asset—its people. The analysis presents a logical, synergistic

space force mix of active duty, Reserve component, civil service, and private sector elements that allow the Air Force to focus on the “tooth” of space power, and minimize the “tail.”

To fully implement the vision of *Global Engagement*, however, more work must be done. Whether the Air Force is modernizing current space force capabilities or developing new ones, decisions and tradeoffs must constantly be made. Enabling technologies may or may not exist, and even where the technology exists, the cost may be prohibitive. In some areas, technology or funding may not be limiting factors, but policy or treaty implications may impact the employment of a space power capability. In all cases, decisions on how to seamlessly integrate air and space capabilities are required. This research is a conceptual start to the transition of the Air Force to a space and air force, but to truly “actionalize” the Air Force vision, detailed planning, programming, and budgeting guidance must follow. It promises to be a transition of enormous importance.

Still the question recurs ‘can we do better?’ The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is so new, we must think anew, and act anew.

—Abraham Lincoln

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