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**A Sea of Peace or a Theater of War:  
Dealing with the Inevitable Conflict in Space**

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The views expressed in this article are those of the author and do not reflect the official policy or position of the Department of Defense or the United States Government.



## Table of Contents

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<i>Figures</i> .....	iii
<i>Preface</i> .....	v
<i>About the Author</i> .....	vii
<b>Introduction</b> .....	1
<b>Part I</b>	
<b>Is Conflict in Space Inevitable?</b>	
Chapter 1	
Conflict.....	7
Chapter 2	
The Frontier.....	13
Chapter 3	
Economic Pressures.....	19
Chapter 4	
Military Pressures.....	25
Communications.....	28
Navigation.....	29
Reconnaissance.....	29
Chapter 5	
A Vital National Interest.....	33
Space as a Fuel for the Economy: The Immediate Concern.....	33
The Continuing Development of the Frontier: A Long Term Concern.....	34
<b>Part II</b>	
<b>Dealing with Conflict in Space</b>	
Chapter 6	
The Military Instrument of National Power.....	39
Space Support.....	39
Force Enhancement.....	39
Force Application.....	40
Space Control.....	40
Chapter 7	
Criticisms of the Military Plan.....	47
Where is the Threat?.....	47
How Are These New Systems and Capabilities Going To Be Paid For?.....	48
The Current Organization Cannot Effectively Implement the Military Space Program.....	50
Space is Inherently Different from Air.....	53
Who will Implement the Vision?.....	54
Space Should Remain a Sanctuary.....	55
Chapter 8	
Other Instruments of National Power.....	57
Political Instrument of National Power.....	57
Economic Instrument of National Power.....	58
Informational Instrument of National Power.....	58
Criticisms.....	60

Chapter 9  
An Integrated National Strategy..... 65  
    Conclusion and Recommendations: The United States  
    Critically needs an Integrated National Strategy for Space..... 68  
*Bibliography*..... 77

## Figures

---

FIGURE 1. Development and Settlement of a Frontier.....	16
FIGURE 2. Frequency Crowding.....	22
FIGURE 3. Conflict in the Frontier.....	34
FIGURE 4. Air Force Space Command Long Range Plan: Migrating Missions to Space.....	41
FIGURE 5. Air Force Space Command Long Range Plan—Space Control.....	42
FIGURE 6. Rapid, Precise, Global Strike Capability.....	43
FIGURE 7. Integrated Aerospace Power.....	43
FIGURE 8. New Air Force Space Program Funding Requirements.....	44
FIGURE 9. Air Force Space Budget for the Fiscal Years 1994 through 1998.....	49



## Preface

This past year has been a wonderful opportunity to think and write about a subject that has been important to me for most of my life—the future of the United States in space. As we approach the beginning of a new century, this nation is faced with a number of decisions, a number of choices, that will help determine how space will be used by coming generations. This study is intended to help with those decisions, to provide information useful in debating the issues. Hopefully, anyone who is interested in this subject can learn something from this work. Some aspects of this study may seem familiar to some. Other areas may seem new, even radical. Hopefully though, everyone will find something that will either stimulate curiosity or generate a desire to act—or both.

The problems and concepts presented in this paper have been rattling around in my head for about ten years. This is the first time I've had the time to actually try to organize them into a coherent train of thought. I am extremely fortunate to have been afforded the opportunity to spend this year at the University of Illinois working with the Program in Arms Control, Disarmament, and International Security (ACDIS). The students, fellows, staff, and professors at ACDIS not only encouraged and critiqued my work, but also offered me great fellowship and the chance to experience all the benefits of a great U.S. university. I would like to express special thanks to the director of ACDIS, Professor Clifford E. Singer, and to Professor Jeremiah D. Sullivan for their particular help. I am grateful to the Air Force for selecting me for this position and encouraging me to expand my horizons.

In the course of researching this material, I was fortunate enough, through the financial support of the Institute for National Security Studies, to be able to visit and talk with a number of experts in this field throughout the country. I am especially grateful to Brig. Gen. Mike Hamel, Brig. Gen. (select) Jim Armor, and Col. Doug Loverro from Los Angeles Air Force Base for encouraging this work and providing valuable insight. I would also like to thank the numerous individuals at the RAND Corporation in Santa Monica and Washington D.C., in particular Carl Rhodes and Bob Preston, for providing sometimes brutal, but always helpful critiques of my efforts. I also need to thank Lt. Col. Robin Squatrito from Air Force Space Command in Colorado Springs for keeping me informed of the many changes occurring in military space while I have been “away.”

Finally, I wish to thank my wife and best friend, Laura, and my children, Katie and Chris, for putting up with me as I have dragged them from place to place throughout *our* Air Force career. They are my true inspiration.

John E. Hyten, Lt. Col., USAF  
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## About the Author

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Lt. Col. John E. Hyten was a U.S. Air Force National Defense Fellow assigned to the Program in Arms Control, Disarmament, and International Security at the University of Illinois at Urbana–Champaign during the 1998–99 academic year. He had previously served as commander, 6<sup>th</sup> Space Operations Squadron, Offutt Air Force Base, Nebraska, where he was responsible for providing command, control, communications, and launch support for five Defense Meteorological Satellite Program spacecraft that collect and distribute vital weather data to Department of Defense operations and civilian users worldwide.

Lt. Col. Hyten was commissioned as second lieutenant in 1981 after earning a Bachelor of Arts degree in engineering and applied science from Harvard University and completing the Reserve Officer Training Corps program at the Massachusetts Institute of Technology. Lt. Col. Hyten holds a Masters degree in business administration from Auburn University and served in a variety of space-related engineering and acquisition positions during his career before transitioning into space operations.

He has served in joint positions working for the U.S. Army as well as in unified commands. He served on the senior staff of the Air Force Secretariat in the Pentagon working some of the most sensitive technology programs in the Air Force was a member of the 1992 Air Force Blue Ribbon Panel on Space. Lt. Col. Hyten is the only military recipient of the prestigious William Jump Award for excellence in government (1991).



## Introduction

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*Space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war.*

— President John F. Kennedy  
Address to Rice University<sup>1</sup>

President Kennedy had just finished touring the new Manned Spaceflight Center in Houston, Texas when he spoke these words. In his speech he addressed a broad vision for the future of the United States and the world in space. Kennedy perceived and understood the great potential that space has to offer for all mankind. He hoped and believed that space would be used to promote progress and peace for all the people of the world, but he also understood that there were risks and dangers that could not be ignored. His next words in Houston that day were perhaps even more enlightening as to his vision and priorities. He said,

I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without feeding the fires of war, without repeating the mistakes that man has made in extending his writ around this globe of ours.<sup>2</sup>

President Kennedy understood the delicate balance between peace and war. He had a clear vision of the future of the United States in space. He understood that this country could not go undefended into this new frontier. He believed that only through strength could the United States ensure such a future.

Today, thirty-six years later, the United States is proceeding into the frontier of space in ways that not even President Kennedy had foreseen. Our civil space program has made manned travel to space almost routine, and our Russian partners have launched the first elements of an international space station. The U.S. military has become absolutely dependent on the use of space systems for conducting all military operations—from peacekeeping to major theater wars. And perhaps even more impressively, U.S. and international business interests are moving into space in record numbers. By the turn of the century, the commercial space industry is expected to generate more than \$122 billion in revenue in the United States alone.<sup>3</sup>

The United States is, however, in spite of the warnings of President Kennedy and many others, proceeding “unprotected” into the future. Should any adversary on any level—national, commercial, or even individual—decide to interfere with our space systems, the United States has no coherent policy or means to deal with such a threat.

Opponents of an expanded military space program (beyond the current capability to support terrestrial forces) charge that, with the fall of the Soviet Union and the end of the cold war, there no longer exists any threat of the hostile misuse of space. They argue that space has indeed become the “sea of peace” that President Kennedy dreamed of, where space is being mastered and explored without threat of warfare or conflict.

In fact, in spite of indications to the contrary, this study will demonstrate that conflict in space is inevitable—and on a limited basis, has already occurred. Nations have already interfered with the space systems of other nations—through jamming and interference—solely for commercial advantage. All the nations of the world have learned from the Persian Gulf War how critically dependent the United States is on the use of space assets to successfully operate in a theater of war. No nation would dare to challenge the United States in conventional military operations without attempting to level the information dominant battlefield that the United States currently enjoys; and this dominance, in great part, comes from space.

Using historical precedent and current indicators, this study will demonstrate why conflict in space cannot be avoided. It will then address methods and means for dealing with such a conflict. It should be noted at this point, however, that these methods and means do not necessarily demand the deployment of space weapons.

The topic of weapons in space has long been controversial and difficult to define. Space weapons, for the purposes of this study, will be defined as follows:

Space Weapon: (1) a weapon (ground-based or space-based) that can attack and negate the capability of space systems on orbit or (2) a weapon based in space that can attack targets on the earth.

Many aspects of conflict, however, certainly in the near term, can be assuaged without space weapons—without military intervention in space. But to do so would require the aggressive implementation of other instruments of national power, specifically economic and political. This has not happened. Even though the future of the United States in space is being debated within limited political and military circles, it is not being addressed in any real depth on a national level.

In the 1970s and 1980s, in the midst of an active Soviet space threat, the debate was loud, vigorous, and involved not only leading military officers, presidents, and congressmen, but many from the scientific and academic community as well. Significantly, it was also extremely well covered by the mainstream national media. The debate today lacks this national attention and committed involvement as evidenced by the lack of response to a major speech given at the Fletcher School of Diplomacy in November of 1998 by Senator Bob Smith, Chairman of the Strategic Forces Subcommittee of the Senate Armed Services Committee. In this speech, he proposed, in very strong terms, the need for space weapons and perhaps even the need for a separate space force to develop and operate these weapons. Media response to these radical and bold proposals was almost non-existent. For many weeks, the only media coverage to be found was in primarily defense-related periodicals such as *Inside the Air Force*.<sup>4</sup> The first mainstream U.S. newspaper to even mention this speech was the *Washington Times* when it published an editorial by James Hackett on 11 January 1999 (nearly two months after the speech).<sup>5</sup>

But at least the debate is beginning. Unfortunately, the discourse thus far seems to be focused on two very strong, opposing positions: the need for space weapons versus the need to maintain space as a sanctuary. This study will describe both these positions, but these positions will not be the focus. This is not solely about the debate for weapons in space. It is about choices—choices that will help define the future of this nation, and the world, in space.

General Richard B. Myers, Commander in Chief of the United States Space Command (CINCSPACE), said in a speech in early 1999, “Just as we can’t expect to successfully fight the next war with the equipment of the last war, we surely won’t see victory in the next war using the policies of the last war. To best prepare for the future, we have to energize our thinking, too. We need that national debate on the existing policies and open questions affecting future military capabilities and possibilities in space and we need resolution of that debate sooner rather than later.”<sup>6</sup>

This study will begin to provide some of the information necessary to resolve that debate. It is divided into two parts. Part I, the first five chapters, will answer the question, “Is Conflict in Space Inevitable?” Chapter one will begin by defining and discussing the broad concepts of conflict and war, and how this relates to the problem of space. The role of technology, the military, and the economy in generating conflict will be explained. In chapter two, the historical position of the United States in the world today, as the lone superpower, will be given contextual relevance and compared with other nations in history that have found themselves in a similar role as a dominant power. The role of the frontier, the control of the frontier, and how it has been critical to the shaping of nations is a key concept, and historical analysis can provide invaluable insight into future conflict involving space. Chapters three and four will discuss the current pressures on space, both economic and military. These pressures will be analyzed from a number of different perspectives and are extremely relevant in exploring the potential for future conflict. Chapter five will pull together the various aspects of the discussion. The general nature of future conflict in space will become clear along with an appreciation of the inevitability of such conflict.

Part II will then discuss how to deal with future conflict in space. By evaluating the strengths and weaknesses of the current U.S. political, military, and economic strategies, the study will develop specific recommendations for new strategies and courses of action. Chapter six will discuss the potential for the military instrument of national power to deal with conflict in space. The different military missions will be defined with particular emphasis placed on the mission of space control. Specific military plans, from the United State Space

Command, the U.S. Air Force, and the Department of Defense, will be presented. Chapter seven will present criticisms of these plans. The views of critics from the political, scientific, academic, and military communities will be thoroughly discussed. Chapter eight will explore the use of other instruments of national power with an emphasis on the political and economic possibilities. The possibilities for diplomatic solutions to future conflict in space will be put forth as well as a discussion of current U.S. and international initiatives. The possibilities for commercial space opportunities to effectively influence this conflict will also be described. The latter half of this chapter will present the views of the numerous critics of current political and economic space policy and initiatives. Chapter nine will summarize the paper by providing an overall context for dealing with future conflict in space. It will then conclude by providing nine specific recommendations for the future—recommendations that would allow an improved framework for dealing with the inevitable conflict.

Both before and after his 1962 speech in Houston, President Kennedy directed very specific and consistent actions to implement a space program that aggressively and effectively mixed all the instruments of national power—economic, political, and military. His purpose was to preserve the U.S. ability to protect its national interests while simultaneously preserving the ability of the world to peacefully explore and take full advantage of space. The Apollo program was the most visible effort he pushed, but he also pursued the development and deployment of military space systems including the deployment of space weapons. At the same time, he aggressively pursued with the Soviet Union (then the only other space threat) a verifiable international treaty—eventually resulting in the Outer Space Treaty of 1967—that would help eliminate the dangers of weapons of mass destruction in space. Kennedy fully grasped that the development of credible military options was essential in creating the environment for successful arms control negotiations, and that both weapons and diplomacy had to be pursued aggressively.

Today, however, in looking at the future of the United States in space, there does not appear to be any similar coherent national strategy. On a national level, despite the efforts of many military and political leaders, there is little understanding of the value and importance that space plays in the future of this nation. It is essential that the United States develop a vision for this nation's future in space, and such a vision must include our civil, commercial, and military space programs. The United States, even in the relative peace of today, cannot afford to go into the next century "unprotected against the hostile misuse of space."

### Notes

1. John F. Kennedy, *The Burden and the Glory* (New York: Harper and Row, 1964), 243.
2. Ibid.
3. The White House, *A National Security Strategy for a New Century*, October 1998, 25–26.
4. In addition to a survey of major newspapers, magazines, and the INTERNET performed during the course of this research, the Air Force Space Command Office of the Legislative Liaison, HQ AFSPC/XPPL, Peterson AFB, CO, performs an ongoing, detailed search for anything of interest to military space. They publish these articles every week in their *Legislative Update*. Their survey found no media response by the mainstream press either.
5. James Hackett, "Space Control Horizon," *Washington Times*, opinion editorial, 11 January 1999.
6. General Richard B. Myers, USAF, Commander in Chief, United States Space Command, Address to the United States Air Force Warfighting Symposium, Orlando, FL, 4 February 1999.



## **Part I**

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### **Is Conflict in Space Inevitable?**



## Chapter 1

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### Conflict

*Conflict*—n. 1. A battle or struggle, esp. a prolonged struggle; strife 2. Controversy; a quarrel  
*War*—n. 1. A conflict carried on by force of arms, as between nations or between parties within a nation; warfare, as by land, sea, or air

Webster's Dictionary<sup>1</sup>

Conflict can mean many things to many people—and the line between international conflict and war is often just as confusing. Therefore, it is essential to clarify these critical terms. The dictionary is a good place to start. The definitions above provide an excellent framework for discussion for a couple of reasons. First, in the definition of war, space is not explicitly included. To this date, warfare has not taken place *by* space as it indeed has *by* land, sea, and air. Space has become a critical medium to facilitate the conduct of warfare by land, sea, and air, but has not itself been the actual medium in which warfare has been conducted. Secondly, the definition of war makes it very clear that war is simply a means (albeit a violent one) for dealing with conflict.

The Prussian military theorist, Carl von Clausewitz, is perhaps most remembered for his edict that “war is a mere continuation of policy by other means.”<sup>2</sup> He theorized and believed that war was another step for a nation’s leadership to consider when attempting to resolve conflict. This theory of war has been proven correct a number of times, and it is interesting to note, in looking at the dictionary, that Clausewitz’ edict has essentially defined the term “war” helping to further solidify war as an understood means for dealing with conflict.

A critical element of Clausewitz’ logic and theory that has evolved over the years, particularly in U.S. society, is that war is not only another option for resolving conflict, it *should* also be the final option. In other words, a rational leader should have exhausted all other, more peaceful, methods for resolving a particular conflict before committing the blood and treasure of his or her nation to the act of war. This seems to very much apply to the U.S. political system. The checks and balances inherent in our democratic system currently tend to force U.S. leaders, on most occasions, to consider the application of military force only as a last resort.<sup>3</sup>

Clausewitz, however, clearly focused his arguments and analysis “on war.” Other methods for dealing with conflict were not fully addressed. It is essential in discussing the future of space, on the other hand, to address all means for dealing with conflict in space, not just warfare. Pursuing further the logic of U.S. policy in the previous paragraph, the United States should not pursue war in space unless all other options for resolving a conflict have been attempted. The implications of this statement are far reaching, and will become clearer as the details of the anticipated conflict in space are explored.

Over 1100 companies in 53 different countries are currently exploiting space, and many of these have just begun to take advantage of space in the last decade.<sup>4</sup> In the last few years, space has progressed from a place that was the purview of only a few wealthy nations to one of the most international of resources. It is therefore logical to assume that any conflict in space, even among rival corporations, would most likely have to be resolved on an international level—among nations.

Many libraries are filled with volumes of academic debate describing the numerous theories as to the causes of conflicts and wars among nations. It is difficult to accurately define the beginning of the debate, but perhaps the best place to start is with the Greek historian Thucydides who, in his treatise *The Peloponnesian War*, documented the twenty-eight years of war between Athens and Sparta during the fifth century B.C. Thucydides introduced two basic, yet critical theories for understanding conflict among nations. First he determined that there were two types of factors that could be described as causes of war—underlying causes and immediate causes. The underlying cause was defined as the real cause of the conflict and was often a “relational discord” that had existed for an extended period of time.<sup>5</sup> The immediate cause was simply the match that ignited the actual hostilities—the proverbial “straw that broke the camel’s back.”

Thucydides' second critical theory resulted from his simple and straightforward description of the cause of the Peloponnesian War. He revealed, "What made war inevitable was the growth of Athenian power and the fear that this caused in Sparta (that is the underlying cause of the war)." The true cause of the war was a change in the balance of power in the Mediterranean and the absolute fear that this created among the Spartans.<sup>6</sup> Changes in the balance of power among nations—or perceived changes—have been critical elements in generating conflict throughout history and remain so today.

Although conflict and war have changed significantly since the Peloponnesian War, the basic principles have remained valid. These principles, all of which help influence the balance of power, can be identified by three general categories: (1) wealth and territory, (2) the size and nature of armies, and (3) weapons technology (and the tactics for employing the technology).

Wealth and territory have historically defined a nation's strength in a number of ways. Both create a visible perception of power in the eyes of the world. A wealthy nation can invest in the development of agriculture, industry, education, transportation, communication, and many other aspects of society that allow its citizenry to prosper. Wealth also allows increased investment in security and military power often necessary to allow a nation to both protect itself and expand into new territories and markets. Territory and wealth have often gone hand in hand. A nation that could expand its territory, its area of influence, could reap the benefits of new resources, a larger work force, while at the same time creating an additional barrier of protection for the nation's core. Growth in wealth and territory can often change the perception of the balance of power among nations and thus help create conflict.

Armies, the military power of nations, directly influence the balance of power among nations. An army (or any military force) that grows in power can threaten neighbors even without specific threats to or from those neighbors. Over the centuries, the very nature of armies has changed significantly—from hired armies led by nobility, to professional armies, to revolutionary armies, to draft armies, to volunteer armies. Each of these armies created different threats and influenced power in different ways, but the perceived size and strength of a nation's military, whatever the form, has long had the ability to generate conflict by changing the perceived balance of power.

The third category, technology, has also influenced the nature of conflict from the earliest days of the nation-state. In the thirteenth century, the Mongols changed the nature of warfare through their development and use of the recurve bow. The development of gunpowder followed by the musket, the rifle, and the cannon also significantly effected the overall balance of power among the nations of the world. It should be noted that technology in itself did not actually change the nature of war or impact the balance of power. The changes occurred only when corresponding tactics and strategy were developed to effectively take advantage of this new technology. Technology often generated some concern during its development, but until it was actually employed, its full impact was not achieved. The Mongols even with the recurve bow, had to develop the necessary cavalry tactics to use them effectively in battle. The musket was not fully effective unless used in mass formations, while the rifle subsequently made mass formations less effective and gave power back to the individual soldier.

One of the most important technological advances of the twentieth century was the development of the airplane. The potential of airpower to influence military operations was recognized by many, demonstrated to a certain degree in World War I, and further advanced by Billy Mitchell and others during the inter-war years of the 1920s and 30s. However, it was not until World War II, particularly with the Japanese attack on Pearl Harbor, that airpower began to significantly influence the balance of power.

Each of these categories has the potential to influence the relationships among nations in its own way, but the combination of the three creates the overall perception of a nation's strength. Whenever one nation has made significant advances, whether in wealth, military strength, technological superiority, or a combination of the three, other nations can feel threatened. The result is conflict.

In the twentieth century, technology has played a primary role in influencing the relationships among nations. The most obvious example was the development and use of nuclear weapons. This technology brought an end to World War II, but resulted in a conflict between the United States and the Soviet Union that lasted for more than a generation—the Cold War.

One of the most critical and frightening aspects of the Cold War was the “arms race” with nuclear weapons that occurred between the two nations. Changes or increases in the nuclear arsenal of one state were met with counter moves by the other state in order to ensure the perception that the balance of power remained equivalent enough to prevent nuclear war. The concept of Mutually Assured Destruction (MAD) where each country possessed sufficient firepower to guarantee the nuclear annihilation of the other nation, in any scenario, was simply one of the most recent examples of how changes to the balance of power drive conflict. It created fear—the same underlying cause of the Peloponnesian War described by Thucydides more than two millennia earlier.

An article by the noted historian Samuel Huntington attempted to determine whether this kind of conflict, an arms race, actually precipitated war and, if it did, under what circumstances. Huntington determined that while some arms races did, indeed, culminate in war, others did not. Huntington found that the critical point in an arms race occurred during the very early stages. In Huntington’s logic, when one state attempted, through new military capability, to change the balance of power, the opposing state could then choose one of several courses of action. It could seek a diplomatic response through either an alliance with another nation to combine forces. It could also attempt to enter into an arms treaty with the opposing power. If diplomacy wasn’t an option, the threatened nation might increase its own level of arms (entering the arms race). It could attempt a preemptive military strike to prevent the threatening nation from fully developing and deploying the new weapon and changing the balance of power. Or the state may simply do nothing and allow the state developing the weapons to achieve its goal.<sup>7</sup>

The military use of space is one of the most recent technological advances with the potential to significantly impact the balance of power among nations. Space has, thus far, been developed by the military primarily in support of terrestrial operations. It has significantly altered the way wars have been fought, but space weapons have not yet been deployed that would actually attack other space systems or targets on the earth. Many have argued that the United States should refrain from deploying space weapons because it would create a space arms race that would not be in the best interests of the United States.<sup>8</sup> This argument is founded on two basic tenets. The first tenet is that a unilateral decision by the United States to develop space weapons would unavoidably begin an arms race with other nations, and second, the belief that if conflict did occur involving systems in space, the nation would most effectively respond and be better served by dealing with that conflict here on earth. If the United States did choose to develop space weapons, would this lead inevitably to a future war in space? How would the world respond? The model postulated by Professor Huntington provides an effective method for answering these questions.

Huntington implies that other nations would only enter an arms race to preserve the balance of power. But what if that balance of power was already overwhelming in favor of one side to begin with? Currently the United States has no peer in the world either economically or militarily. The United States has become the world’s sole remaining superpower. If the United States added space weapons to its already massive arsenal of weapons, would this change the balance of power sufficiently to require other nations to respond? This is doubtful. Any other nation—China, Russia, France, and others—would have to simultaneously develop a robust terrestrial military capability while at the same time engaging in an arms race in space. Having the ability to control space without at least a minimally effective force on the ground would be impractical. The Russians and the Chinese currently are the closest competitors to the United States when it comes to military power. The collapse in 1989 of the Soviet Union demonstrated to the world that entering an enormously expensive arms race (which space weapons would certainly be) would have catastrophic results for a nation. No nation today has the combined military or economic wherewithal to enter an arms race in space with the United States.

Would another nation then take the next possible approach put forth by Huntington and decide to use preemptive military action to prevent the United States from developing these weapons? With the exception of nuclear attack, no nation possesses the military capability to take this action. Nuclear attack would be an irrational and politically implausible response to the development of a space weapon resulting in a response-in-kind by the United States. Thus again, preemptive military action is not a feasible option.

This leaves diplomacy as the only rational response for other nations, arms control treaties are the only possible option remaining—and that is precisely what is occurring. There have been numerous efforts on the

part of the Russians, the Chinese, and others to engage the United States in dialogue to prevent an arms race in outer space. The UN General Assembly has, for many years, voted on a resolution for “Preventing an Arms Race in Outer Space.” In 1998, it was resolution number 53/76 and the vote was 165 to 0 in favor, with four nations abstaining—led by the United States.<sup>9</sup>

From the opposing perspective, if another nation should decide to develop space weapons, the United States could respond in any of the ways described by Huntington. At the moment, the United States clearly desires to leave all options open when it comes to dealing with the future of space—which helps explain the vote to abstain on the UN resolution as well as numerous other actions that will be presented in depth at a later point.

The United States is in a very advantageous position at the moment when it comes to issues of balance of power. The United States can almost unilaterally make technological decisions with regard to these issues without any real concern over the reactions from other nations. But technology is not the only aspect of conflict that should be considered in today’s world. As the world approaches the twenty-first century, technology is tending to become less important in defining conflict among nations.

A nation’s wealth, the economic aspect of conflict, is becoming ever more critical as the world’s economies become increasingly interdependent. The Australian historian, Geoffrey Blainey debated the economic causes of war and conflict in his widely quoted book *The Causes of War*. He discussed how economics, although its specific role has changed many times throughout history, has always played a major role in fostering the conditions leading to war. While discussing the subject Blainey first quoted the Italian historian Luigi da Porto who wrote in 1509, “Peace brings riches; riches bring pride; pride brings anger; anger brings war; war brings poverty; poverty brings humanity; humanity brings peace; peace, as I have said, brings riches, and so the world’s affairs go around.”<sup>10</sup>

Blainey then described how, over the latter half of this millennium, different links between economics and conflict have evolved. Initially it was economic need, not abundance that drove conflict. A nation in need saw opportunities available in more prosperous neighbors, and took action to gain the advantage of those opportunities. Alternately, war often occurred because a nation’s leaders would try to divert attention away from economic difficulties by engaging in war. Wars also resulted from the search for wider markets, natural resources or new opportunities.<sup>11</sup>

In the twentieth century, economics has continued to play a critical role in conflict. One of the primary fuels of the modern industrial revolution has been fossil fuel, most critically, oil. Access to oil has played, and continues to play a role in conflict often resulting in war.

Japan’s surprise attack on Pearl Harbor and their entry into World War II were due in part to fears generated by U.S. and allied policy and activities in the Pacific in 1941 that cut off Japan’s access to critical oil reserves necessary to drive their military and economy.<sup>12</sup> The recent Gulf War was also driven in large part by economic concerns related to oil. The United States and her allies feared a world where Saddam Hussein controlled a significant percentage of the world’s oil reserves.<sup>13</sup> Access to oil is still considered in today’s national security strategy as one of the few, *specifically designated*, vital national interests of the United States.<sup>14</sup> Economics has clearly been and will continue to be a critical determinant of conflict in the modern age.

Economics in the preceding examples, caused (or threatened to cause) a perceived change in the balance of power and thus forced nations to act. Thucydides was correct, although he looked at it mainly from a military perspective. Changes in the military balance of power can still drive regional and international conflict and even result in war—particularly when driven by deep-seeded religious or ethnic differences—but changes in economic power can also drive conflict.

In the twenty-first century, changes in the economic balance of power have the potential for creating conflict in ways that are difficult to imagine—because the world, the global economy, is changing so fast. In 1990, John Naisbitt and Patricia Aburdene published *Megatrends 2000*, where they tried to define their visions for the future. In describing the economy of the future, they said, “The new global economy cannot be understood if it is thought to be merely more and more trade among 160 countries; it must be viewed as a world moving from trade among countries to a single economy. One economy, one marketplace, . . . *In the global economy, economic considerations almost always transcend political considerations.*”<sup>15</sup>

Naisbitt and Aburdene were correct in many of their observations and predictions. The global economy, the global marketplace, the information superhighway, and other catch phrases have all become common, popular ways of referring to the world as we head into the twenty-first century. In many ways, economic concerns have become the most influential factor in national decisions. President Clinton's 1992 election strategy was organized around the key phrase; "It's the economy, stupid!"<sup>16</sup> Economic concerns have clearly been one of the prime determinants in decisions made by the Clinton Administration.

*Megatrends 2000*, however, missed completely in predicting the future of conflict and war. Naisbitt and Aburdene looked at Europe in the 1980s and saw a continent that had been at peace for forty-five years. They had observed the end to the Iran/Iraq war and the withdrawal of Soviet forces from Afghanistan. They believed that, "it has begun to dawn on people everywhere that war is now an obsolete way of solving problems."<sup>17</sup> What they failed to take into account was Thucydides' concept of power and fear. Even though they foresaw the global economy, the failure of communism, the advancement of democracy, and the spread of free enterprise, they failed to see how all these things would also create shifts in the power structure that would feed the fires of fear, thereby unleashing conflict based on religious, ethnic, and economic lines. Because of this, they failed to foresee wars in the Middle East, continuing conflict in the Persian Gulf, horrific violence in many parts of Africa, and ethnic wars in the Balkans to name but a few. Sadly, war has not become an obsolete way of dealing with conflict.

Changes in the balance of power, and the trepidation that this can create, will continue to drive conflict into the next century. The world is now proceeding from the industrial age to the information age, and many would argue that the United States is already an "information age" nation. The economic fuels that drove the industrial age were fossil fuels—oil, coal, and natural gas. As mentioned earlier, access to this fuel often changed, or threatened to change, the perceived balance of power and thus helped create the seeds for conflict and war. Are there similar "fuels" that are required to drive the information age? Certainly, our telecommunications network, the information superhighway, is one such critical fuel. The presidential commission evaluating the critical infrastructure of the United States reported in 1998 that this network is one of the more vulnerable aspects of the nation,<sup>18</sup> but what about space?

More and more, as nations begin to understand and take advantage of the unique attributes of space, space is also becoming such a fuel. Someday soon, if it hasn't already, space will become a national interest every bit as vital to the information age as oil has been to the industrial age. If this were the case, would the United States take action to respond to a threat to this "fuel"? The current national security strategy, although it fails to identify space as a specific vital national interest, states in no uncertain terms that the United States would respond to such a threat. It does not, however, say how.<sup>19</sup> It is not clear whether this would entail attacking ground systems, attacking systems in space, working through the United Nations, applying economic sanctions, or any combination of the above. All that is clear is that the United States *would respond*.

Is any response really warranted? Has space become a vital national interest that must be protected with the power and might of the United States? What is unique about space that would cause this to be true?

To begin to understand the character and attributes of space and the potential for future conflict in or involving space, it is necessary to take a step back and attempt to understand the unique position the United States occupies in the world today and how this might impact the future. There are a number of historical examples that can help shed light on this matter.

## Notes

1. *Webster's Encyclopedic Unabridged Dictionary of the English Language* (New York: Grammercy Books, 1989), 308, 1608.

2. Carl Von Clausewitz, *On War* (London: Penguin Books, 1968), 119.

3. President Bill Clinton, "Remarks by the President at Hate Crimes Announcement," White House, Washington D.C., 6 April 1999. Talking about the war in Kosovo, President Clinton addressed war in the following way, "I want to say again, the United States would never choose force as anything other than a last option." <[www.pub.whitehouse.gov/uri-res/I2R?urn:pdi://oma.eop.gov.us/1999/4/6/4.text.1](http://www.pub.whitehouse.gov/uri-res/I2R?urn:pdi://oma.eop.gov.us/1999/4/6/4.text.1)>.

4. United States Space Command, *Long Range Plan*, March 1998, 2.
5. Mark V. Kauppi and Paul R. Viotti, *International Relations Theory*, 2d ed. (New York: Macmillan, 1993), 38.
6. Ibid.
7. Samuel P. Huntington, "Arms Races: Prerequisites and Results," *Public Policy*, 8 (1958): 41–85. Also see an excellent analysis of Huntington's work in Greg Cashman, *What Causes War: An Introduction to Theories of International Conflict*, (New York: Lexington Books, 1993), 177–80.
8. Numerous members of Congress have voiced this opinion. In 1989, Senator Tom Harkin (D-Iowa) and Senator Mark Hatfield (R-Oregon) introduced legislation calling for a ban on all space weapons. In the winter 1999 issue of the *Washington Quarterly*, Senator Chuck Robb made a similar case to keep weapons out of space. On 25 March 1999 at a conference at the Woodrow Wilson Center in Washington D.C., Congressman George Brown (D-California) delivered an address in which he strongly voiced the need to keep space free from weapons. The Union of Concerned Scientists and the Federation of American Scientists also maintain this position.
9. "General Assembly Votes of CD Member States," *Disarmament Times*, published under the auspices of the NGO Committee on Disarmament, December 1998, 2–3.
10. Geoffrey Blainey, *The Causes of War*, 3d ed. (London: MacMillan Press, 1988), 87.
11. Ibid.
12. Military History Section, Armed Forces Far East, *The Japanese Monographs, Political Strategy Prior to the Outbreak of War*, Part IV, 1952, 8. According to post-war Japanese analysis of the events leading up to World War II, "The United States and Great Britain applied drastic economic pressure by freezing Japanese assets overseas and placing an embargo on oil to Japan. This, together with the Netherlands East Indies' refusal to supply Japan with oil, virtually forced Japan to study plans for war against the United States, Great Britain and the Netherlands East Indies." It should also be noted that these embargoes were initiated because of the expansionist Japanese activities in Asia in the late 1930s and early 1940s.
13. The White House, National Security Directive 54, 15 January 1991. The opening statement to the directive authorizing military operations against Iraq reads, "Access to Persian Gulf oil and the security of key friendly states in the area are vital to United States national security."
14. The White House, *A National Security Strategy for a New Century*, October 1998, 32.
15. John Naisbitt and Patricia Aburdene, *Megatrends 2000* (New York: William Morrow and Company, 1990), 21.
16. James K. Glassmen, "It's the New Economy Stupid," *Washington Post*, December 29, 1998. In his article, Mr. Glassmen actually credits campaign strategist James Carville with development of this phrase, but it did become one of the most important slogans of the presidential election in 1992.
17. Naisbitt and Aburdene, 28.
18. *Critical Foundations: Protecting America's Infrastructures*, The Report of the President's Commission on Critical Infrastructure Protection, Chapter 1, 4.
19. The White House, *A National Security Strategy for a New Century*, October 1998, 25–6.

## Chapter 2

### The Frontier

*Military history can be depicted as a progression of frontiers from land to sea to air. With the conquest of each frontier came significant military advantages. Crossing water afforded movement from shore to shore, island to island, continent to continent. Traversing air reduced strike times from weeks and days to hours, allowing a nation to take the battle deep into an enemy's interior. Over the last few decades the military frontier has moved to outer space . . .*

—Senator Charles Robb, D–Virginia  
*Washington Quarterly*<sup>1</sup>

Senator Robb accurately represented military history as a progression of frontiers, but the discussion of frontiers can be applied to much more than just the military. It can also be applied to a study of the history of nations, and not just through a discussion of the military challenges of the frontier, but by analyzing the political and economic challenges of the frontier as well. Senator Robb proceeded from the remarks above to make a strong case why the United States should not pursue space weapons. Others have looked at the very same logic and made an equally strong case for developing and deploying space weapons.<sup>2</sup> Both, however, base their arguments strongly on this frontier analogy. What is it about the *frontier* of space that can support such divergent viewpoints? Looking at the history of the frontier provides many lessons and a thorough analysis will help shed light on the inevitability of and means for dealing with conflict in space.

Nearly every nation throughout history has had to deal with the frontier in one way or another. Nations have had to concern themselves with protecting distant borders, preserving trade routes, conducting commerce, governing distant territories, establishing civil institutions, and controlling their geographic area of concern. In evaluating the current role of the United States in dealing with the frontier, it is helpful to evaluate the current position it occupies—the world's only superpower—and attempt to study similar historical examples.

The frontier, as a subject for historical analysis, has been extremely popular and many historians have developed a wide spectrum of frontier theories. Frederick Turner conducted significant research on the development of the frontier in the U.S. west.<sup>3</sup> Hugh Elton and many others have explored the many facets of the frontiers of the Roman Empire.<sup>4</sup> W. Ross Johnson was one of many historians who evaluated the role of mastering the sea as the frontier for the establishment of the British Empire.<sup>5</sup> But perhaps one of the most well respected scholars in analyzing the impact of frontiers on a nation is Owen Lattimore from Johns Hopkins University. He spent much of his life traveling and studying throughout the world, particularly Asia, and has published numerous volumes of analysis of the frontier in history and the role of the frontier in China.<sup>6</sup> China provides perhaps the most interesting historical analogy of the role of the frontier and how a government's ability to deal with the challenges of the frontier directly impacted that nation and the world as a whole.

Lattimore began his analysis of the frontier in history with a simple statement with far reaching implications. He said, "A frontier is created when a community occupies a territory. From then on the frontier is changed and shaped by the activity and growth of that community, or by the impact on it of another community."<sup>7</sup>

Under this simple definition, the Soviet Union created the frontier of space on 4 October 1957 with the launch of Sputnik. It has been changed and shaped by the remarkable growth that has occurred since Sputnik and by the tremendous impact space has had on the terrestrial community below. Very soon after Sputnik, the world began talking about the next frontier of space. In 1962 Harold Goodwin from NASA published a book entitled *Frontier Unlimited* where he said, "however we think of it, it is a dawning period and one that—in scope and potential—promises to dwarf much of what has gone before . . . The sky is no longer the limit. Space extends to infinity, and while the possibility of applying it to man's needs may not be infinite, it is well to keep in mind that we have not even begun to probe the full scope and extent of what space may make possible." We are still in the early stages of scratching the surface of the potential of space, but we are

expanding into this new frontier rapidly and with vigor. Is it possible to learn lessons from history that can help in understanding the opportunities and risks of dealing with the frontier?

Owen Lattimore did most of his research in the early part of the twentieth century, long before humans first began to explore the frontier of space. His most thorough and interesting historical studies were of China. The observations and analysis of the Chinese frontier experience which now follow are based on the works of Owen Lattimore and the works of the noted Chinese historian John King Fairbank from Harvard University.<sup>8</sup>

For the greater part of nearly two millennia, China was home to one of the most powerful empires on earth. The length of time in which a single Chinese empire dominated Asia dwarfed every other empire the world has seen (including the Roman and British Empires). The Chinese empire was not, however, a continuous experience. It was ruled by a succession of dynasties whose duration ranged from 21 years (the first, Qin dynasty, 221–207 BC) to well over four centuries (the Han, 206 BC–AD 220). This is not to say that the Chinese Empire was at peace for this period of time—hardly. Chinese rulers constantly had to be concerned with problems and threats from inside the realm of their empire as well as from the periphery of the empire—from the frontier and beyond.

The transition from dynasty to dynasty was often violent and sudden, but in most cases, was based on issues (underlying causes) that had prevailed for quite some time and had been allowed to grow out of control. Reasons behind the collapse of the dynasties included failures of the ruling party to effectively govern, economic turmoil, religious opposition, military failure, and natural disasters.<sup>9</sup> In each case, however, the frontier played a critical role. To understand the role the frontier played in Chinese history it is not necessary to examine all 2000 years. A study of the period from the Song dynasty (founded AD 960), through the Mongol conquest (resulting in the Yuan dynasty in 1271), and ending with the Ming dynasty (1368–1644) will provide more than sufficient insight.

From the very beginning of the dynasty period in China, the ruling powers had to concern themselves with two primary functions: creating a civil administrative government and a sufficiently powerful military. They not only had to concern themselves with these functions, but they had to structure them to allow them to operate effectively in tandem.<sup>10</sup> The administrators of the civil bureaucracy, in the tradition of Confucius, tended to look down upon the military and believed that effective governing alone could, in general, keep the peace through a ruler's benevolent conduct. The military, on the other hand, believed in ruling by force and doing whatever was necessary to preserve the dynasty. The conflict between cultivation (*wen*) and military force (*wu*) would define dynasties through the centuries.<sup>11</sup> This was most critically true when it came to managing the frontier.

The various dynasties that ruled China tended to be based in the Yellow River or Yangtze River basins. Each dynasty would set up their ruling court somewhere in one of these basins and rule from that central authority. The further from the authority, the more the region tended to be treated like a frontier. China's land frontiers on the north, the west, and the south were generally comprised of the areas of Manchuria, Mongolia, Turkistan, and Tibet.<sup>12</sup> The dynasties, from the very beginning, attempted to take advantage of economic resources from these regions, while at the same time, defending China proper from any threat the people in these regions might cause. The earliest emperor, Qin, unified numerous local walls into the massive Great Wall of China in an attempt to provide physical security for his dynasty. Each dynasty would also develop a civil governing concept for these frontiers providing limited direction from the central authority, but always backed up with the threat of military intervention should there be any difficulties. A balance between *wen* and *wu* was critical to the success of the ruling power.

The Song dynasty (960) was firmly founded in the tradition of Confucius with a desire to govern with a focus on peace (*wen*). The Song rulers de-emphasized the military and placed their attention on matters of culture. Their ability to control the frontier emphasized peaceful, administrative control through a continuing series of "benevolent" rulers. In great part, the people of the frontier were largely ignored as the emperors focused on the central region and the court. It was a time of great innovation and it lasted for more than three centuries. During this time, the silk and porcelain industries were developed, trade throughout Asia was expanded, the economy flourished, and the printing press and gunpowder were invented. The compass was developed and applied to local shipping for commerce. An elaborate inland waterway system was constructed

with canals and locks that bolstered trade and helped to expand the economy to spectacular levels. But with the focus on *wen* came the neglect of *wu*, and problems began during the earliest part of the dynasty.

The Song rulers were never able to effectively control the frontier and the boundaries of the empire were continually shrinking as tribes on all sides began to push in. As the Song began to lose control of the frontier, opponents in the frontier began to grow in strength—particularly the Mongols to the North. In 1206, Genghis Khan united all the tribes to the north and his Mongol hordes began attacking in all directions, with overwhelming success. Still the Song dynasty did not effectively respond. The Mongols were ruthless and violent and, although they were brilliant military tacticians, they were looked down upon by the “noble minded Confucians” in the Song court. Nevertheless, the Mongols continued their attack with ever increasing conquests. By 1245 nearly half of the Song Empire had collapsed, and by 1271 the Mongols had completely conquered China and set up their own court on the site of the present day Beijing.<sup>13</sup> The Khan established an empire that stretched from Persia through South Russia eventually encompassing all of Central Asia and China. It was an empire founded on violence and destruction. The Song, devout followers of Confucius, believed up to the very end that it was impossible for such a force to overcome their benevolent culture and take power.

Khublai Khan, the most able of the great Khan’s grandsons, established the Yuan dynasty in 1271 and attempted to implement systems and structure to allow for effective rule—but his rule was based primarily upon fear and violence. This focus on *wu* created an even bigger problem for the Mongol rulers than the focus on *wen* had for the Song. Despite their amazing military prowess, they were never able to effectively govern, to fully establish control of their vast empire and enormous frontiers. They were hated in all the areas they conquered and their violent rule lasted less than 100 years.

The Ming dynasty (1368) was, by necessity, formed with a military focus necessary to drive out the Mongols. The founder of the dynasty, Zhu Yuanzhang, reigned as emperor for thirty years. His aim was to first eliminate the Mongols and then to re-establish and maintain a form of centralized control over the Chinese Empire. To this end, as Professor Fairbank described in his book *China—A New History*, “He issued a flood of admonitions and regulations to guide his subjects’ conduct—law codes, commandments, ancestral instructions, a series of grand pronouncements, village and government statutes, and ceremonial regulations.”<sup>14</sup> Zhu set up a very demanding government, with severe sanctions to back up any failures, but it was a very effective means of setting up a functioning civil authority throughout the empire, including the frontiers. His court was also extremely concerned with the military.

Fairbank described this concern as follows: “Because China had to prevent a Mongol resurgence, he [Zhu] copied the Mongol military system, establishing Chinese garrisons at strategic points and creating a hereditary military caste of soldiers who would sustain themselves by farming, but be ever ready for war.” This effective balance of *wen* and *wu*, between peaceful governing and military force, finally allowed China to control its frontiers. The primary lesson learned, and followed by subsequent Chinese rulers to this day, was that a balance had to be struck between military force and peaceful benevolence. If this relationship ever went out of balance, then weakness would result, and the ability of the nation to control its frontiers, as well as provide for and protect its people, would be significantly degraded.

This same lesson was demonstrated by both the Roman and British Empires. The Roman Empire faced very similar challenges to those of the Chinese. The Roman concept of legions combined with local civilian governments very closely matched the system set up by Zhu Yuanzhang to effectively govern and protect China following the Mongol invasion. The British colonial system also provides a similar correlation. The British Navy controlled the seas and Britain controlled the world, but effective local governments had to be established to run the day-to-day operations of each colony. These governments would vary from direct British control as in India to more of a hands-off monitoring in Africa and Asia.<sup>15</sup> Britain controlled the frontier of the sea, but they could not be everywhere, and neither could the Roman legions, and neither could the armies of Zhu Yuanzhang. In all cases the control of the frontier was critical to the success of the great power, but in no case could it be solely maintained through either civilian authority or military power. In all these cases, the frontier could only be controlled through the effective balance of these two factors (*wen* versus *wu*).

This description of the frontier, expressed in Chinese history, although it provides some insight, does not provide a complete understanding of the frontier as it relates to the frontier of space. For a more complete understanding it is necessary to discuss the frontier in more fundamental terms. China, Rome, and Great

Britain each provide bits and pieces of the puzzle, and by integrating them, the following concept will help to provide a clearer, more fully developed picture.

The first stage of a frontier comes with the mere recognition of its existence. When people notice the frontier, they become curious. They wonder what’s out there, is it better than where I am, and is it for me? People begin talking among themselves, discussing and debating the virtues and mysteries of this largely unknown place. Perhaps small numbers of people who have been to these frontiers visits them. Word begins to spread and the curiosity grows.

Eventually it reaches a point where the *curiosity* is overwhelming and the opportunity presents itself—and someone decides to *explore* the frontier. At this point the frontier is “*discovered*.” People discover new advantages of this frontier—open space, natural resources, new sources of trade, new sources of manpower—and they begin to *exploit* the frontier. They begin to travel to the frontier more frequently, establish commerce, take advantage of the new people and resources, and then some of these travelers begin to stay. As they begin to *occupy* the territory, they begin to transfer some of their customs and culture. They begin to establish rules of society, local governments, and means for their own security. Eventually the frontier begins to be transformed. They have established their “*civilization*” in this frontier and at this point, the result is a fairly “stable” society. A simple, graphical representation of this progression would be the diagram in Figure 1.

China, Rome, and Britain all follow this model fairly closely. Transportation played a key role in the development of each of their frontiers: over land in China and Rome, over seas in the case of Great Britain. But in each case, the model is quite applicable. What the model doesn’t indicate is the essential role of the government in allowing the progression to continue.

In each case, in order for the transformation to continue, the government had to provide economic, political, and military support to the frontier. At different times in the progression, different amounts of support were required from the different elements of society. Weaknesses in any of these areas would create an inability for the nation to effectively control the frontier. Again, a balance between civil and military authority was necessary for successful growth. Whenever this balance wasn’t achieved, whether it was a failure of civil or military power, the frontier tended to collapse, and in each of the cases described, the power of the nation collapsed as well.

The United States began to establish their power on a global basis in the twentieth century through the mastery of a different frontier—the air. Even though mastery of the air is geographically quite different from the other frontiers discussed so far, the diagram in Figure 1 is still quite applicable to the U.S. experience.

In the latter part of the nineteenth century, the United States and the world for that matter were incredibly curious about flight—about mastering the air. Eventually, the Wright Brothers “*discovered*” how to conquer this frontier with their first flight in 1903. It wasn’t long before the entire world was attempting to exploit the new frontier, for both commercial and military advantage. It was the United States, however, ahead of the rest of the world, who first established real dominance in the air. The U.S. Navy became a global power with the development of a battleship-based fleet, but in World War II, they secured the critical control of the sea through the development of carrier aviation (through mastery of the air, not the sea). Likewise, in modern warfare, the U.S. Army has achieved dominance on the ground only after achieving dominance in the air. Boeing, Douglas, and Lockheed came to dominate the commercial aviation industry allowing this part of the U.S. economy to fly past competitors around the world. The “stable” society that the international community finds in the air today is due in great part to the strong commercial, civil, and military aviation policies developed and applied by the United States.

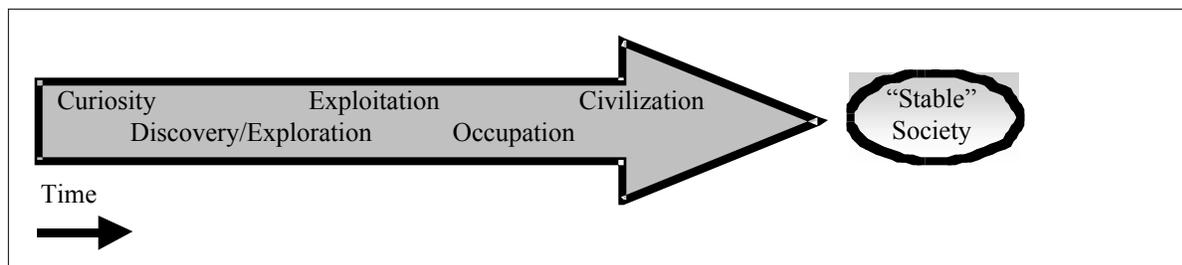


FIGURE 1. Development and Settlement of a Frontier.

In many ways, the mastery of the air was simply the last phase of the industrial age. In recent years, for the first time, the United States has begun to lose market share in the commercial aircraft industry.<sup>16</sup> This decline, although met with concern in some sectors, has not really impacted the overall U.S. economy in any large way. This is, in part, because the industrial age itself is being eclipsed by a new age—the information age. The information age has become the driving force behind the U.S. economy. Mastery of the air is not necessarily essential to effectively compete in the information age; however, it will continue to be important for the foreseeable future as the world continues to transition to this new age.

The new frontier that must be mastered in the information age is space. Space has tickled human curiosity for centuries as well. Sputnik, Yuri Gagarin, John Glenn, and Neil Armstrong transformed curiosity into reality. Humans now know that space can be explored. We certainly understand how space can be exploited in many ways—commercial and military. But in applying the model in figure 1, space is still in the exploitation phase, with just the initial forays being made into the occupation phase. The full occupation and even the civilization of space are probably many decades, perhaps even a century away. But it is now, in the early stages of the frontier, when the critical decisions will be made that will define the frontier of space. Is it possible that another power could rise up, develop the means to control the frontier of space, and thus become the world's next great power?

Many nations around the world are asking this very question, and not just “recognized” space powers like Russia, China, and France. In 1988, in New Delhi, India, Major General V. K. Madhok of the Indian army published a book in which he discussed the future of space. India, at the time, had only the very beginnings of any kind of space program, but their military leaders were already trying to determine the impact of mastering the space frontier. In discussing conflict in space, General Madhok summed up his thinking with the following remarks:

Could the winner in a Space conflict secure an unpleasant form of world supremacy? In a political situation of this nature, could the votes at the UN become a meaningless exercise? These are the questions that will in the future be discussed in seminars, lectures, and political and military circles with increasing concern. But there is hardly any doubt that in time to come, Space cover will be as important as air cover. In this situation countries which are not space powers could remain helpless spectators and the winner of the Space war could well dictate terms to them.<sup>17</sup>

In the People's Republic of China, current military thinking is even more blunt. In a recent article, Major General Zheng Shenxia, President of the Air Force Command College in Beijing, stated unequivocally that, “he who controls outer space controls the Earth.”<sup>18</sup>

If history is any indication, many scenarios involving conflict in space are almost certain to occur in the future. Each frontier that humans have entered has eventually ended up as a theater of warfare. On the other hand, the opportunities are there today for the United States, because of its unique position as the world's sole remaining superpower, to make the decisions and take the actions that will allow the world to more peacefully resolve these conflicts—conflicts that will naturally come in the development of the frontier of space.

There are, however, and will continue to be, significant pressures that impact the development of the frontier of space. These pressures come from both economic activity and military desires and necessities. Both commerce and the military have tracked the frontier as it moved from land to sea to air, and they are continuing to follow the frontier into space. Commerce has always been driven by the need for access (and quicker access) to new markets and resources. The military continues to be driven by the need to protect both the core of a nation and that nation's interests in the frontier. How the United States responds to these pressures—pressures that inevitably create conflict—will define space, and the use of space, in the next century.

## Notes

1. Charles S. Robb, “Star Wars II,” *Washington Quarterly*, (Winter 1999): 81–6.
2. James Hackett, “Space Control Horizon,” *Washington Times*, opinion editorial, 11 January 1999.
3. Frederick Jackson Turner, *The Frontier in American History* (New York: Henry Holt and Co., 1920). Also in testimony before the House Science Subcommittee on 10 April 1997, Dr. Louis Friedman, Executive Director of The

Planetary Society, spoke of Turner and the frontier this way. “A hundred years ago, America’s western frontier came to a close. The meaning of this historic event was captured in a series of essays by Frederick Jackson Turner. “America’s frontier,” he said, “created a boundless confidence in the future, a belief in a destiny and ability to make dreams come true. There is the strongest hope of a nation,” Turner wrote, “that is capable of being possessed with an idea. Now space is our generation’s frontier. Americans continue to yearn to discover, to break new paths. In our blood, there is an indomitable spirit of innovation and boldness.”

4. Hugh Elton, *Frontiers of the Roman Empire* (Bloomington, Indiana: Indiana University Press, 1996).

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6. Owen Lattimore, *Studies in Frontier History* (Paris: Mouton and Co., 1962) and *Inner Asian Frontiers of China* (New York: Capitol Publishing, 1951).

7. Lattimore, *Studies in Frontier History*, 469.

8. Lattimore, *Studies in Frontier History*, and *Inner Asian Frontiers of China*, and John King Fairbank and Merle Goldman, *China: A New History* (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 1998).

9. Fairbank and Goldman, 48.

10. Fairbank and Goldman, 110.

11. Fairbank and Goldman, 111.

12. Lattimore, *Inner Asian Frontiers*, part I, chapter 1, 3.

13. Fairbank and Goldman, 119–21.

14. Fairbank and Goldman, 129.

15. Hugh Elton and W. Ross Johnson.

16. Greg Mastel, “United States Needs Aerospace Strategy,” *The Journal of Commerce*, 18 June 1996. A copy can be found at <[www.econstrat.org/ECONSTRAT/jocaero.htm](http://www.econstrat.org/ECONSTRAT/jocaero.htm)>

17. Major General V. K. Modhok, *Space: Profiles of the Future* (New Delhi: Sujay, 1988), 30.

18. Major General Zheng Shenxia and Senior Colonel Zhang Changzhi, “The Military Revolution in Air Power,” *Chinese Views of Future Warfare*, ed. Michael Pillsbury (Washington: National Defense University Press, 1997) xli, 308.

## Chapter 3

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### Economic Pressures

*The benefits our people will receive from the commercial use of space literally dazzle the imagination.*

—President Ronald Reagan  
July, 1984<sup>1</sup>

The economic power of a nation is the most critical element of a nation's strength. Though military power remains a critical determinant of national prestige and standing, without economic strength, the military cannot be effectively supported. Dr. Richard Cooper of Harvard University gave an address in 1995 where he looked at the changing role of nations in the world and came up with the following conclusion. He believed, very simply, that "Economic power is replacing military power as the decisive determinant of the nation's standing and influence in the world."<sup>2</sup> If this is indeed the case, then the commercial aspects of space, growing rapidly already, will play a critical role in defining the future economic power of any nation.

The commercial sector of space is currently experiencing enormous growth. Over 500 companies in the United States are currently involved in the space industry, with 1996 revenues of 77 billion dollars with the market forecasted to exceed 122 billion dollars by the turn of the century.<sup>3</sup> Though this is less than 2 percent of the U.S. gross domestic product, it is greater than the entire gross domestic product for all of Israel or Ukraine.<sup>4</sup> The sheer size of the industry is impressive; but that in itself does not create any pressure—certainly not pressures that could generate conflict. What is it about the economic aspect of space that makes it ripe for such pressures, such conflict?

If space were truly limitless, then there would be infinite opportunities for human exploitation and conflict could easily be avoided. In the broadest terms, space is infinite. Humans have little real understanding of the size of the universe, but in terms of practical applications of space here on earth, space presents some very real limitations. In order to provide an economic return, space systems (satellites) have needed to be in orbit around the earth. This will remain true, at least for the foreseeable future. Probes into deep space will likely remain of scientific interest only.

Orbits around the earth can be divided into three general categories: low earth orbit (LEO), medium earth orbit (MEO), and geosynchronous earth orbit (GEO). The noted science fiction author Arthur C. Clarke first postulated the commercial use of GEO in 1945 when he predicted the development of a constellation of communications satellites orbiting over the equator more than 22,000 miles from the earth. This orbit would provide the unique characteristic of allowing the satellite to match the rotational angular velocity of the earth and thus remain apparently stationary over the same spot on the globe at all times. This prediction has indeed come true with the bulk of television and large communication satellites currently occupying GEO orbits. In 1965, Arthur C. Clarke would comment on his prediction in an article with the partial title *How I Lost a Billion Dollars in My Spare Time*.<sup>5</sup> Looking at his prediction now, it appears his billion dollar estimate was quite a bit low.

LEO satellites are defined as satellites operating in the lowest altitudes—an altitude just high enough to allow satellites to remain in orbit (without significant atmospheric drag). In general, these satellites are located between 200 and 1500 miles above the earth. This orbit is of particular advantage for missions that require close proximity to the earth or to the customer. Examples of LEO missions are wireless phone service and imagery. LEO is especially useful for these missions because it reduces the time delay created when sending and receiving signals in higher orbit and it allows improved imagery resolution by placing the camera closer to the area being imaged.

MEO satellites operate in the region in between. One of the most useful orbits in MEO is the semisynchronous (12-hour) orbit at about 11,000 miles altitude. In this orbit, the satellite will cover the same

ground track over the earth every day. This orbit is especially efficient for navigation and is currently occupied by the Global Positioning System (GPS).

Each of these operating regimes has unique advantages and disadvantages, some of which create limits, limits that create pressure on commercial operations in space. Perhaps the most significant are limits on the positioning of GEO satellites. Since GEO satellites operate in a single orbital inclination (0 degrees) directly above the equator and at a single altitude (22,300 miles), this creates definable physical limits where a satellite may be placed. And because nearly all satellites at GEO are communications satellites of some type, they all broadcast to the earth, many in similar frequencies. Thus the real possibility exists for one satellite to interfere with another unless there is adequate physical spacing. The potential for conflict in this arena was recognized long ago and the United Nations has tasked the International Telecommunications Union (ITU) with the responsibility for allocating GEO orbital positions and operating frequencies. All nations are supposed to register with the ITU for both position and frequency before launching and operating a satellite in GEO. The ITU has, by design, no enforcement powers or authority. It is intended to be a coordinating agency helping to control this complicated environment. In recent years, however, there have been a number of incidents where nations have violated this arrangement. The Asian operating area has been an area where many of these problems have occurred. This is due in large part to the large number of competitors vying for a competitive edge in Asia.

China and Japan have long been rivals and have historic disagreements that only add to the problem. In late 1993, through the auspices of the United Nations and the ITU, the two countries agreed to cooperate on a broad range of space programs on which they shared common interests.<sup>6</sup> It was hoped that this would be the beginning of a period of increased cooperation concerning the use of space by both nations. On 21 July 1994 China launched a communications satellite (APSTAR I with customers including Time Warner, Turner Broadcasting, Viacom, and ESPN) and placed it in an unauthorized GEO slot with only one degree of separation between satellites operated by Japan and an international consortium in a slot “owned” by Tonga.<sup>7</sup> Satellites in this region are intended to maintain two degrees of separation. China did this without notifying the United Nations or the ITU. Japan immediately cried foul and raised the incident to the level of serious conflict. A Japanese minister told Reuters shortly after the launch, “We’ll immediately take appropriate measures if China switches on the transponders and causes transmission interference with our satellite.” He did not explain what these measures would be.<sup>8</sup> After tremendous pressure was brought on the Chinese, they finally agreed, after six weeks, to move the satellite to another slot that they had to lease from Tonga.<sup>9</sup>

During January of 1996, the ITU supported the Pacific Telecommunications Conference to address both GEO crowding and frequency allocations and developed a number of suggestions to alleviate this problem.<sup>10</sup> Only a few months later, as reported by the United Nations themselves, severe crowding in the geostationary orbital slots over Asia “led to the jamming of a communication satellite by PT Pasifik Satellite Nusantara (PSN) of Jakarta, Indonesia, in defense of an orbital position claimed by Indonesia. This incident focused global attention on a worsening problem of orbital crowding and caused the matter to be brought before the October–November 1997 World Radio Communication Conference (WRC) of the 187 member-nation ITU in Geneva.”<sup>11</sup> The conference, after nearly six weeks, made only minor modifications to the procedures for reserving orbital slots and came to no resolution as to the Indonesian jamming incident.

When contacted in September of 1998 about the incident, Rhea McGraw, a spokesperson for PSN provided the following amplifying information, “There was (and continues to be) some confusion over ‘ownership’ of the slot at 134 degrees East . . . both PSN and APSTAR IA [China] both claim ownership of that position. PSN did carry out testing that may have resulted in the temporary suspension of broadcasting for APSTAR, however, this was in no way intentional, was halted immediately, and has not occurred since. The ITU did not get involved in the dispute settlement process, claiming bilateral negotiations were appropriate. The discussions are ongoing, with no clear resolution in sight.” She later stated that the PSN (Indonesian) satellite project was halted because of the monetary crisis in Asia. Indonesia, therefore, felt no immediate urgency to resolve the dilemma.<sup>12</sup>

Should the economic crisis in Indonesia not have occurred, or if Indonesia should recover from the crisis, it is not clear how this conflict (still ongoing) would be resolved. The ITU could have acted as an intermediary, but has continually refused to get involved. Again, the ITU is not intended to be an enforcement authority.

Who then would resolve the conflict? Even though Indonesia has a legitimate legal claim to the position, China is occupying that position today and providing an important service for numerous U.S. and international companies that rely on that satellite. Indonesia would be in a very weak position, although in the “right.” It is difficult to imagine how this conflict would ever be resolved.

In September 1998, *Space News*, a weekly publication that follows the space industry very closely, published an editorial that addressed the problems of overcrowding in GEO. The editorial discussed two additional conflicts over GEO slots, one in Europe and one in Japan. It noted the difficulty regulatory agencies have in trying to resolve such disputes. It concluded by stating, “regulatory authorities worldwide are going to have to make choices rather than calling for compromise among quarreling parties. Conflicts are likely to increase as available slots become a scarce commodity. The ITU and other regulatory authorities must resolve these conflicts quickly and permanently, enabling satellite projects to move forward and meet the world’s communications needs.”<sup>13</sup>

Even in lower altitudes crowding is beginning to become a problem. Even though there aren’t the orbital limitations in LEO or MEO that restrict GEO, there is still significant spatial crowding to be concerned about down low. NASA reports that more than 9,000 objects larger than 10 cm. are known to exist in orbit around the earth and they estimate the population of particles between 1 and 10 cm. in diameter is greater than 100,000. They further postulate that the number of particles smaller than 1 cm. probably exceeds tens of millions.<sup>14</sup> If one of these objects, even a very small object, should collide with a satellite in space, the results could be catastrophic. Two years ago a piece of debris hit the boom of a French communications satellite, causing severe damage and sending it tumbling.<sup>15</sup> The space shuttle has to maneuver every year or so to avoid debris that could possibly impact the shuttle. The international space station will be one of the best protected spacecraft ever flown, and even so, its most critical systems are designed to survive the impact of objects only if they are less than 1 cm. in diameter.<sup>16</sup> Any increase to the number of objects in space is a concern.

In LEO in the next decade, an explosion of commercial systems is forecast to hit the market to take advantage of the booming wireless telephone industry. With these satellite phones, customers will no longer have to worry about “dead zones” and areas of service. In November 1998, Motorola’s Iridium project went operational with sixty-six satellites. Adding to the LEO boom are forecast to be forty-eight Globalstar satellites, thirty-six from Orbital Sciences, twenty-four from GE Americom, sixty-three Celestri systems, and the two hundred eighty-eight Teledesic satellite systems being financed in part by Bill Gates of Microsoft. This growth in LEO satellites will continue to burden space operators, and even with improved, cleaner launches, will only increase the debris and spatial concern problems in LEO. Article VII of the 1967 Outer Space Treaty says that states are liable for any damage to another state (and its citizens) caused by its space objects—including privately owned ones.<sup>17</sup> Traditionally, this has applied to space objects that reenter and impact the territory of another nation, but, if one considers a satellite as part of a nation, then if it is damaged by another state’s satellite (or debris), is that other state liable? This certainly creates increased possibilities for conflict, although resolution of this kind of conflict would more than likely fall to diplomats and politicians. However, an even greater possibility for conflict in this crowded regime comes not from spatial concerns, but from frequency concerns.

The frequency concerns are so severe that it is difficult to describe the magnitude of the problem in a brief study. The following examples represent only a small portion of the overall situation.

WorldSpace Corporation, a Washington D.C. based international company, is planning to operate the first global satellite radio system allowing the world to have full access to a common radio channel for the first time. However they are having severe problems attempting to coordinate and obtain approval to use its operating frequency in the Western Hemisphere. Some U.S. industries have significant concerns about interference should WorldSpace, as planned, operate their CaribStar satellite in GEO at ninety-five degrees west longitude—where it could see all of Latin America as well as much of the southern United States. The commercial aviation industry is concerned that spillover transmissions will disturb and interrupt telemetry equipment on test aircraft. The Defense Department also believes that operation of this satellite would cause unacceptable interference and has refused to coordinate on use of the planned frequency because of concerns over aircraft interference. WorldSpace has been working hard to resolve the differences and have already settled potential interference issues for their satellites over Asia and Africa.<sup>18</sup> It is so difficult for companies to find

open frequencies in which to operate that their only option is to operate in common frequencies and work out interference problems with other users.

The frequency crowding problem is so severe that the U.S. government has had to take critical frequencies, originally reserved for military operations, and develop methods for sharing these frequencies. The government has done this with the military navigation satellite, the Global Positioning System (GPS)<sup>19</sup> and the military weather satellite, the Defense Meteorological Satellite Program (DMSP). A detailed look at the DMSP frequency problem provides an even better grasp of the overall problem.

A few years ago the Leo One USA Corporation applied to the Federal Communications Commission (FCC) to construct, launch, and operate a forty-eight satellite non-voice low altitude mobile satellite service offering data communication services including two-way data messaging, vehicle tracking, remote meter reading, and other services to users in the United States and around the world. The most significant problem for the FCC was finding a clear frequency to allow the satellite to operate effectively. On 13 February 1998 the FCC authorized Leo One to proceed with their development efforts and use a complicated communications operation requiring the sharing of frequencies with the military’s DMSP satellite. Specifically, “the spectrum sharing plan . . . permits Leo One to share the 400.15–400.505 MHz and 400.645–401 MHz bands with DOD’s Defense Meteorological Satellite Program (the ‘DMSP system’) by utilizing frequency hopping and time-sharing techniques.”<sup>20</sup> The diagram for Figure 2 represents less than 0.01 percent of the operational radio spectrum, but clearly illustrates the magnitude of the problem.

This describes the problem quite well, from a U.S. perspective, and demonstrates the difficulties companies have in finding available frequencies—but it is not the entire problem. The United States, and companies operating in the United States, has a difficult task in operating in this crowded environment, but the international operating environment is even worse. The FCC allocates frequencies for operating in the United States and the laws and power of the U.S. government enforce these FCC decisions. On an international basis, the United Nations and the ITU are the only controlling authorities and they must attempt to regulate this crowded complex environment without enforcement authority. The world attempts to come to agreement on dividing the radio spectrum at the annual World Radio Conference sponsored each year by the ITU, normally in Geneva. FCC Commissioner Susan Ness, in a September 1998 speech, described the problem as follows:

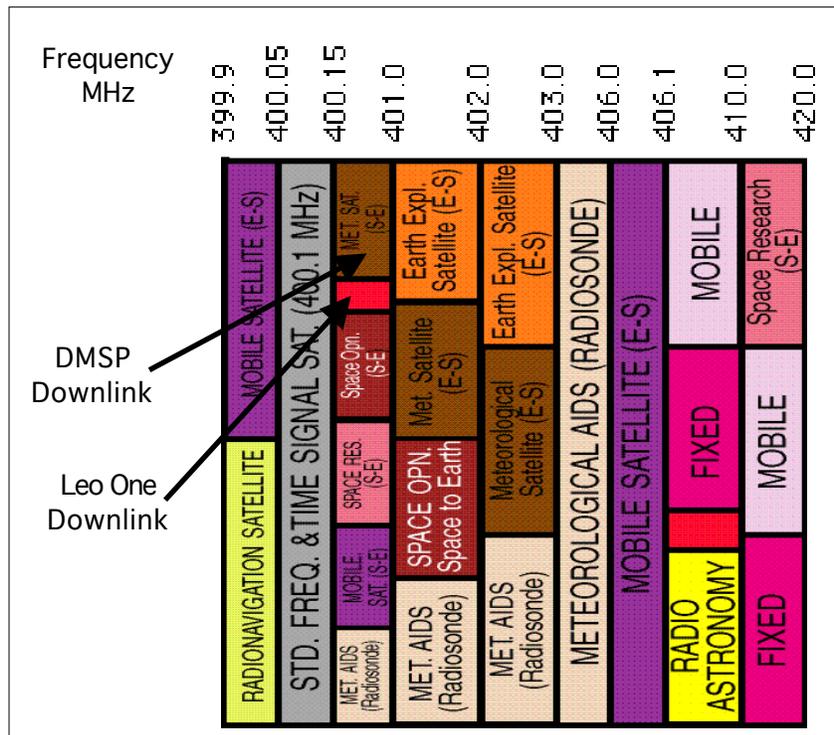


FIGURE 2. Frequency Crowding.<sup>21</sup>

“Competing demands for spectrum have multiplied, even for bands that not long ago were considered the new frontier. The globalization of wireless services has become reality, marked by a contentious 1997 World Radio Conference that challenged our satellite and terrestrial industries to accept complex sharing and non-interference proposals.”<sup>22</sup> The FCC has a big problem trying to manage U.S. interests. The ITU has an almost impossible problem trying to deal with this on an international level. Companies in countries without an effective regulatory body can unilaterally decide to operate in a regime that can impact U.S. commercial and defense concerns around the world. It is certainly a problem that will continue to create contention and conflict as crowding of the spectrum continues to worsen.

Physical crowding and spectrum crowding will continue to worsen as time goes on. The boom in commercial space has only just begun to take hold of the marketplace. The LEO proposals for commercial space ventures discussed earlier in this are not just pipe dreams and wishes. Each of these proposals is backed by some of the most powerful companies in the world. They have no doubt that space (and information) is the future when it comes to the global marketplace.

In 1995, a group of these companies formed a group called the Satellite Industry Association (SIA) to help promote the common interests of the commercial space sector. The SIA is the voice of this industry interfacing (lobbying) directly with policy makers at the White House, the FCC, and Capitol Hill. Their mission is to promote the role of satellites and satellite technology in the development of both national and international projects. Some of its members include Boeing, Motorola, Hughes, PanAmSat, and Orbcomm to name, but a few. In the 17 August 1998 issue of *Fortune Magazine*, the SIA took out a twenty page advertising section that including not only advertising information, but also an article written by the senior business editor for *Aviation Week and Space Technology*. The article summed up the message of the section as follows, “Ultimately, of course, it will be consumers who decide which of the various systems succeed. But this much is certain: satellites have become indispensable to the modern world, and hard as it may be to imagine now, their role will only become more important as commercial space rockets into the twenty-first century.”<sup>23</sup>

Commerce is continuing to follow the frontier—now into space. The space sector is already quite large and growing at a rate that is extremely difficult for national and international bodies to attempt to regulate. Conflicts in commercial space, in terms of spectrum allocation and physical operating locations, are new to the world, but will likely continue. For the military, on the other hand, conflict in space has been an item of concern for decades. The massive growth in space, however, has made the problem for the military even more complex.

## Notes

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7. *Ibid.*, 17.

8. David Holley, “Tokyo Says New Chinese Satellite Violates Pact,” *Los Angeles Times*, 25 July 1994, B5.

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10. The United Nations, *Highlights in Space: Progress in Space Science, Technology, Applications, International Cooperation and Space Law, 1996* (Vienna: United Nations, 1997) 38.

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19. Office of Spectrum Management, National Telecommunications and Information Administration, *A Preliminary Analysis to Determine Interference Effects to GPS from Other Radio Services*. A copy can be retrieved from the Office of Spectrum Management home page at <[www.ntia.doc.gov/osmhome/osmhome.html](http://www.ntia.doc.gov/osmhome/osmhome.html)>. A report on the GPS issues with frequency sharing with Inmarsat can be found at <[www.laafb.af.mil/SMC/CZ/homepage/future/report.htm](http://www.laafb.af.mil/SMC/CZ/homepage/future/report.htm)>.
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21. The entire spectrum allocation chart can be found at <[www.ntia.doc.gov/osmhome/allochrt.html](http://www.ntia.doc.gov/osmhome/allochrt.html)>.
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## Chapter 4

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### Military Pressures

*For the first time in history, the center of gravity of a military operation was located outside the earth's atmosphere.*

—George and Meredith Friedman  
Discussing the Gulf War in *The Future of War*<sup>1</sup>

It is easy to learn many invalid or incorrect lessons in analyzing the 1991 Persian Gulf War with Iraq. It is not very often that the greatest military power on earth gets to fight a fool, in a desert, with unified world support and six months to prepare. But the one lesson that seems to be valid and irrefutable is the lesson of information dominance. Space played a key role in providing this information dominance. Because of a variety of circumstances, the United States and its allies achieved a near monopoly on the use of space during the Gulf War.

The issues of information dominance and the effective control of space have been important topics of discussion since the earliest days of venturing into space. Concerns about military superiority in space helped drive much of the Cold War for more than thirty years. In 1959, the RAND Corporation sponsored a conference in Washington D.C. and invited leading thinkers from around the world to participate—the subject was International Political Implications of Activities in Outer Space. Even though it had been only two years since Sputnik, the conference discussed many of the same issues concerning the future of space that still face the world today. Many forecasts made at the conference have come true, but some predictions were off—not because of faulty logic, but because the world did not develop as the participants had expected. Karl Deutsch from Yale University wrote: “it seems extremely improbable that any one power, alone or with its allies, will have the ability to ‘control’ outer space in any way comparable to that in which the British navy may be said to have controlled the seas in the nineteenth century.”<sup>2</sup> But in the Gulf War, the United States and its allies were able to operate largely uncontested in outer space. The assumption that caused Dr. Deutsch to be mistaken was made by many at the conference—that the world would continue to be bipolar, if not multipolar, long into the future. The possibility of a world with the United States as the sole remaining superpower was not conceivable in the minds of these thinkers in 1959, during the height of the cold war. But despite this mistaken view of the future, the critical role of space for the military was indeed well understood and a vision for the future of the military in space was clearly set out. The concepts discussed and developed at this conference would define and drive the development of military space systems for more than thirty years.

Specifically, the key question posed at the conference was: “Would a lead in space technology by one of the Big Two (later on perhaps the ‘Big Few’) confer on it decisive military superiority over the other (or others)?”<sup>3</sup> Political and military planners at the conference and in subsequent decades clearly felt the answer was yes.

Leaders in both the Soviet Union and the United States aggressively went after the new frontier of space for two reasons: (1) to take advantage of the unique attributes of the space environment, and (2) to make sure they kept up with the enemy, preserving the balance of power between east and west. It was a clear example of concerns about changes to the balance of power and a resulting arms race.

Although the full concept of information dominance and the role that space would play was not well understood at the time (and is still being further defined even today), the military missions for which space could provide unique advantages were being pursued from the very beginning. In 1965 a book was published by Lillian Levy that included a collection of twenty-two essays by some of the nation's political, military, and social elite. It was entitled *Space: Its Impact on Man and Society* and included articles by President Lyndon Johnson, astronaut John Glenn, and NASA Administrator James Webb to name a few. General Bernard Schriever, commander of the Air Force Systems Command, wrote an article discussing the many roles for the military in space. In one section of the article, he discussed the future role of space in supporting warfare,

specifically how “space systems would enhance the defense of the United States by increasing in many ways the military capabilities of our terrestrial forces. For example, they can provide early warning of a missile attack and perhaps ultimately they may even afford an active defense against ballistic missiles. Surveillance weather satellites can report meteorological conditions, and communications systems can improve the response and provide the command control of our forces.”<sup>4</sup>

Military space systems have been developed over the past decades to accomplish nearly all the missions foreseen by General Schriever and others at the beginning of the space program. The only exception is active defense against ballistic missiles using systems based in space. The Soviet Union, during the same period of time, developed similar systems to perform each of these missions as well, with the same exception. This exception was not solely because of physical or technical limitations preventing such a defensive system, but because the United States and the USSR had agreed not to develop such systems in the Antiballistic Missile (ABM) Treaty of 1972. By agreeing not to develop such systems, both parties hoped to limit the numbers of nuclear weapons being developed by each side, prevent any significant change to the balance of power, and reduce the chance for nuclear war.<sup>5</sup>

Over the years, however, both parties began to develop other space weapons that could either operate in or attack systems in space. These weapons were, for the most part, designed to threaten the capability of the enemy to fully exploit and control space.

The first attempts at space weapons were the use of nuclear weapons exploded outside the earth’s atmosphere. The United States conducted tests in the late 1950s looking at the utility of such nuclear devices. Operation Argus was a series of three live nuclear tests in 1958 that took place at an altitude of about 300 miles to evaluate, among other things, whether nuclear detonations in space would create a radiation belt that could damage or destroy the arming and fusing mechanisms for incoming intercontinental ballistic missiles (ICBM) warheads.<sup>6</sup> The test series showed very little effectiveness against incoming missiles and reentry vehicles. It did, however, demonstrate an enormous capability to destroy satellites in orbit. Further tests (for instance, Bold Orion across the orbital path of Explorer VI in 1959) proved the feasibility of such anti-satellite (ASAT) weapons, but President Eisenhower decided that there was insufficient need for deployment.

During the early 1960s, the Soviets began work on their own nuclear space weapons program—but with a different focus. They began to develop both an orbital bombardment system (OBS) and a Fractional Orbital Bombardment System (FOBS). The OBS was designed to place a nuclear weapon in LEO “where it would remain until commanded to reenter the atmosphere and strike the United States.” The quick strike capability of such a weapon would potentially reduce the warning time for the United States and thus prevent any quick retaliatory response. The FOBS was a system that would launch a nuclear weapon from Soviet silos into orbit and then “reenter the atmosphere and attack its target before completing a full revolution.” This design was intended to allow the attack to sneak in under the line-of-sight radar and avoid the bulk of the U.S. early warning system then concentrated at looking over the North Pole.<sup>7</sup> These were some of the challenges facing President Kennedy during his presidency, and the conditions that caused him to choose the words that were used in the introduction to this paper. To repeat his words again, “I do not say that we should or will go unprotected against the hostile misuse of space any more than we go unprotected against the hostile use of land or sea, but I do say that space can be explored and mastered without feeding the fires of war, without repeating the mistakes that man has made in extending his writ around this globe of ours.”<sup>8</sup>

To respond to the threat posed by these Soviet initiatives, President Kennedy directed the development of a U.S. anti-satellite (ASAT) capability called Project 437.<sup>9</sup> At the same time Project 437 was being developed, President Kennedy also entered into negotiations with the Soviet Union in an attempt to agree to ban the deployment of weapons of mass destruction (nuclear weapons) in space. President Kennedy believed that the continuing peaceful exploration of space could not continue with such a frightening nuclear threat. Any nuclear exchange in space would prevent man from successfully using space for any purpose for many years into the future. After President Kennedy’s assassination, President Lyndon Johnson continued both the development of Project 437 and the treaty negotiations with the Soviet Union. The Johnston Island ASAT went operational in 1965, but in 1967 its reason for being was eliminated when the United States and the USSR signed the Outer Space Treaty prohibiting, among other things, the deployment of weapons of mass destruction in space.

This did not, however, eliminate attempts to gain the upper hand in space. First the Soviets, then the U.S. in response, attempted to develop conventional ASAT weapons. The Soviets, very soon after the Outer Space Treaty was signed, began to develop and test a co-orbital ASAT system. The system would launch a satellite into an orbit matching the target of interest, and when in proximity, it would explode a conventional device in an attempt to destroy the target with debris. In response to this non-nuclear program, President Ford directed a development program that became the miniature homing vehicle (MHV) program. This system would launch a missile containing the MHV hit-to-kill warhead from an F-15 aircraft. This warhead would be placed on an intercept trajectory toward the target and contained a seeker that would allow the weapon to make any final adjustments necessary to allow for a successful intercept—at extremely high velocities. This kinetic energy intercept would destroy the target.

The Soviet co-orbital ASAT was tested against objects in space twenty times over fourteen years with only nine successes. The air-launched MHV program was only tested against an object in space one time (1985). The test was successful, the target satellite destroyed, but the system never went operational. The MHV program was canceled in 1988 because of congressional restrictions to prohibit further testing, technical difficulties, and cost overruns.<sup>10</sup>

Both the Soviet Union and the United States also pursued the development of directed energy weapons that would potentially have significant ability to control space, but no operational capability was ever fielded. The U.S. Strategic Defense Initiative in the 1980s threatened to change the perceived balance of power and caused the Soviet Union to expend enormous resources to try to keep up, but again, no operational capability was achieved.

Throughout the cold war, both sides sought to develop space systems in order to provide improved support to terrestrial military operations. Both sides succeeded in this effort. They also sought to develop systems that would ensure their ability to control space in the event of conflict on the earth. These efforts met with very little success—never enough to, in reality, change the balance of power. Space power between the two superpowers (given the view of historical perspective) maintained a rough parity. At times, one side would appear to step slightly ahead with some breakthrough in technology, but the other side would almost immediately level the playing field. But in terms of the military pressure on space, the Cold War and its supporting space arms race defined this pressure for more than thirty years. The fall of the Soviet Union changed that.

The Gulf War occurred nearly simultaneously with the end of the Soviet Union. The Soviet Union had been weakened by severe internal problems and Mikhail Gorbachev had been seeking to define a new Soviet Union through perestroika—a system of reforms to all of Soviet society implemented in the latter half of the 1980s. In 1990 and 1991, the Soviet Union, for the first time since World War II, supported the United States in a military action—in this case through the United Nations in the effort to remove Iraq from Kuwait. So although the actual systems in space changed very little from the 1980s into the 1990s, the ability of U.S. space systems to impact the battlefield changed extraordinarily.

The United States, working with her allies and without interference (and even with some help) from former Soviet enemies, was able to achieve a near space monopoly over the battlefield and reap the benefits of the information dominance that resulted. In the introduction to the book *The First Information War*, Alan D. Campen described what occurred like this: “The United States unveiled a radically new form of warfare in the Persian Gulf in 1991. By exploiting *knowledge*, it devastated Iraq’s formidable military machine, astonished the world, confounded defense critics, surprised itself and quite possibly ‘changed the standards for performance of U.S. forces in armed conflict.’ By leveraging information, U.S. and allied forces brought to warfare a degree of flexibility, synchronization, speed, and precision heretofore unknown.”<sup>11</sup> This was due in great part to the allied freedom to operate in space.

But Campen also challenges whether Desert Storm was a valid test. He asks the questions that all military men and women must ask in evaluating this conflict. “Will it be a harbinger; one of those defining moments in military history that shapes force structure and doctrine? Or, will it be dismissed as an aberration—the product of an improbable scenario and unworthy of serious study?”<sup>12</sup>

As stated earlier, the benign role of the Soviet Union was a key factor in the conflict. The fact that Iraq could not access the same type of information available to the allied coalition put them at a distinct disadvantage. But this was also the first time, in any major conflict, where space information was readily available on a tactical level to U.S. forces. U.S. space systems were developed primarily to support the strategic conflict with the Soviet Union. They were not originally designed to influence the tactical arena. By the time of Desert Shield/Desert Storm, they had finally reached sufficient maturity to allow their integration on the battlefield, and the change was extraordinary.

Speaking after the conflict was over, General Thomas Moorman, then commander of Air Force Space Command, summed up the views of many when he observed:

Desert Storm was a watershed event for space systems. Satellites and the ground systems and people trained to control them played a crucial role in the outcome of the conflict. Space owned the battlefield. We had a robust on-orbit constellation and the inherent spacecraft flexibility to alter our operations to support specific needs of the terrestrial warfighter.<sup>13</sup>

This was one of the critical differences in the Gulf War, perhaps the most important new difference. Space “owned the battlefield.” Satellites were able to adapt to support the tactical as well as the strategic situation. Space systems allowed planes, ships, tanks, and the individual soldier to navigate in a foreign environment with accuracy better than a few meters. The enemy could not. Space systems provided information to describe specific weather conditions and reconnaissance information over a target area many hundreds of miles from the attacking force. The enemy force was effectively blind. Space systems provided critical missile warning information of incoming attacks from Scud missiles. The enemy had no warning of attack and expected no such warning being available to the allies. Space systems allowed secure, robust communications among the allied forces spread out throughout the theater. After the first week of the Desert Storm air attack, the enemy had very little communications capability from Baghdad to the dispersed Iraqi forces. Space systems, for the first time, provided an important advantage, and just as importantly, were not interfered with by the enemy.

The conflict turned out to be perhaps the most one-sided war in the history of warfare. This is not to say that allied forces would have failed without this information dominance. Allied weapons and training were clearly superior to those of the enemy. However, the price of victory, in terms of casualties and loss of life would have been much higher. Prior to the conflict, predictions were made about casualties in the tens of thousands and a war that would last for more than a year.<sup>14</sup> Neither of these predictions was even close to the truth. A great deal of the difference could be placed upon the improved accuracy and lethality of U.S. weapons. Airpower, for the first time, began to live up to the expectations of airpower theorists from Mitchell to Douhet. But the radical change that occurred on the battlefield was because of improved information—information to define targets, pinpoint the enemy, provide the weather, and navigate quickly throughout the theater. Space and information systems provided this difference. It would be very difficult to imagine the U.S. military engaging in conflict in the future without attempting to secure a similar advantage.

But what systems will the United States have to counter in the next war? The possibilities are many and difficult. Addressing a number of different military mission areas will help to define the threat of the future.

### **Communications**

In the Gulf War, Iraqi communications were primarily via landlines. In the first days of Desert Storm, telecommunications centers were destroyed by allied airpower, effectively removing Saddam Hussein’s ability to centrally command and control, and in many cases even communicate, with his fielded forces. In the next war, the United States will likely attempt to sever the ability of an enemy to communicate with its forces. Any potential enemy in the future is likely to be aware of this U.S. strategy.

### **Future Complications**

On 18 July 1997 at a meeting of the ITU in Geneva, 120 industry and government representatives agreed to reduce constraints on the international, cross border use of wireless telephones. Licensing of these types of phones and carrying them across borders will become much easier as customs regulations and duties are phased

out.<sup>15</sup> On 1 November 1998 the Iridium constellation of LEO communications satellites became operational. Now, a user with an Iridium telephone can communicate with any other phone anywhere in the world. It is possible that an enemy, with little ingenuity required, could develop a rudimentary communications capability that would ensure continued uninterrupted communications and basic command and control of fielded forces even in the face of a formidable air attack from the United States. If Iridium was the only international provider of such a service, perhaps regulations or strategies could be developed to prevent or defeat such a concept. But how do you defeat such a concept when the enemy can choose among Iridium, Teledesic, Globalstar, Orbital Sciences, GE Americom, Celestri, or some other (perhaps European or Japanese) commercial provider?

### **Navigation**

In the Gulf War the United States exploited, for the first time in combat, the GPS constellation to provide navigation for forces throughout the theater. Although not all allied forces were equipped to take advantage of GPS during the conflict, it provided an enormous advantage to forces in the desert. The enemy had no such capability, and even though they were fighting on familiar soil, they were at a disadvantage in maneuvering and targeting forces.

### **Future Complications**

In the last few years, GPS has become a global utility providing navigation for everything from aircraft to bass boats to cars. Not long ago, a hand held GPS receiver was difficult to obtain and cost well over \$2000. Now a receiver can be ordered off the INTERNET for less than \$90.<sup>16</sup> The GPS signal is now available throughout the world and, because of increased civilian reliance, will never be shut off in case of national crisis. Any potential enemy could attempt to take advantage of the GPS signal and provide navigation to his military forces—from the soldier, to the airplane, to the guided missile. Efforts to defeat such a strategy (NAVWAR) have begun,<sup>17</sup> but defeating such a strategy is difficult without impacting your own forces as well—especially because the U.S. military now relies on GPS even more heavily than during the Gulf War.

### **Reconnaissance**

Prior to the Gulf War, Iraq was able to obtain satellite overhead imagery from the French company Spot Image. As the allied forces began to deploy into theater in Desert Shield, the French agreed to stop providing this service to the Iraqis. The only other providers of imagery at the time were the United States and the USSR so Iraq, without any effective air or space reconnaissance, was effectively blind to any allied movements during the entire war. This was critical in maintaining the surprise of the final flanking movement to the west (the “Hail Mary”) of the final ground offensive.

### **Future Complications**

Several independent U.S. ventures are attempting, at this moment, to raise enough funding to launch six spacecraft within the next few years to provide overhead imagery with resolution as sharp as one meter. European efforts are also proceeding in this direction at a somewhat slower rate, preferring to focus for the time being on a more medium resolution market.<sup>18</sup> The U.S. government is closely monitoring this situation and struggling with ways to somehow keep high-resolution imagery out of the hands of potential adversaries. It is not clear, from a commercial perspective, whether there is a sufficient market to support this many initiatives. What is clear is that imagery, with resolution good enough to provide military utility, will be available through a variety of sources within the next few years. If it is available on the open market, will it be possible to prevent critical imagery from being obtained by a future enemy in conflict with the United States?

These are but a few of the military pressures on the frontier of space and the answers to many of the questions posed are still unknown. These pressures don't even take into account the tremendous pressures that would occur, during the next conflict, if another government with indigenous space capabilities (Russia, China, France, and others) would happen to either be the adversary or support the adversary in the next major crisis involving the United States. These pressures, although maybe not as well defined as the pressure applied by the

Soviet Union during the Cold War, are enormous pressures nonetheless—perhaps even more far reaching in their implications for the future. The pressure would become even more extreme should an adversary develop the capability to attack and degrade our space systems, but as Bob Bell, currently serving on President Clinton’s National Security Council, told the *Air Force Magazine* in February of 1999, “we don’t have the option of turning the clock back and negotiating some arms control treaty with Russia . . .” The problem is much more complicated today. We have to figure out how we [the United States] are going to control space.<sup>19</sup>

The rapidity with which space is changing is perhaps its most difficult challenge. Space systems are proliferating at such an enormous rate that figuring out how, or whether it is even possible, to control space is a daunting task. For many years, the U.S. military dominated the space business in the United States. In just the last few years, the military has become a minority partner, almost a “niche” market.<sup>20</sup> Space information that can be used for military purposes in some cases is becoming more and more readily available to a variety of users. This kind of information can change the course of a conflict in the future, regardless of whether that conflict develops into a war.

The U.S. military has learned that information will be key in any future military conflict. Doctrine, strategy, and operational concepts have begun to change over the last few years to take into account information operations and space control. The current National Military Strategy (1998) states very clearly that “success in any operation depends on our ability to quickly and accurately integrate critical information and deny the same to an adversary. . . . As we will continue to do at sea and in the skies, we will also endeavor to maintain our current technological lead in space as more users develop their commercial and military capabilities. . . . Space control capabilities will ensure freedom of action in space, and, if directed, deny such freedom to adversaries. . . . Information superiority allows our commanders to employ widely dispersed joint forces in decisive operations, engage and reengage with the appropriate force, [and] protect the force throughout the battlespace.”<sup>21</sup>

The United States dominated the use of space in supporting the Gulf War. Space was a critical factor in establishing the information dominance that was so critical in the successful prosecution of the war. The military expects to use space, and control space, to achieve information superiority in future military actions. How, with the vast proliferation of space systems throughout the world, can this be carried out? The answer is not clear, and this, along with the other issues described in this chapter, are only a few of the many pressures the military is facing in the new frontier of space.

## Notes

1. George and Meredith Friedman, *The Future of War* (New York: Crown, 1996), 303.
2. Joseph M. Goldsen, *International Political Implications of Activities in Outer Space: A Report of a Conference, October 22–23, 1959*, Report R-362-RC, The RAND Corporation, 1960, 164.
3. *Ibid.*, 140.
4. General Bernard A. Schriever, “Does the Military Have a Role in Space,” in Lillian Levy, ed., *Space: Its Impact on Man and Society* (New York: W. W. Norton, 1965), 62.
5. For a more thorough discussion, see William J. Durch, *National Interests and the Military Use of Space* (Ballinger: Cambridge, Massachusetts, 1984), 1–10.
6. Public Affairs Office, Defense Nuclear Agency, *Fact Sheet: Operation Argus*, 1 May 1982.
7. Stephen M. Meyer, “Space and Soviet Military Planning,” *National Interests and the Military Use of Space*, William J. Durch, ed. (Cambridge, Massachusetts: Ballinger, 1984), 77–8.
8. John F. Kennedy, *The Burden and the Glory* (New York: Harper and Row, 1964), 243.
9. Paul B. Stares, “Space and United States National Security,” *National Interests and the Military Use of Space*, William J. Durch, ed. (Cambridge, Massachusetts: Ballinger, 1984), 39. Paul Stares refers to the Johnston Island ASAT efforts as an “orbital bomb defense system.”
10. Numerous studies have been conducted exploring the subject of weapons in space. One of the most current and thorough is by Lt. Col. Randall Weidenheimer, United States Air Force and is soon to be published by Air University Press. The full citation is Randall S. Weidenheimer, *Increasing the Weaponization of Space: A Prescription for Further Progress*, Center for Strategy and Technology, Air War College, Air University, Maxwell AFB, Alabama, August 1998. See also *National Interests and the Military Use of Space*, William J. Durch, ed.

(Cambridge, Massachusetts: Ballinger, 1984), as well as numerous sources which can be retrieved from the Federation of American Scientists through the following web site: <[www.fas.org/spp/military/program/asat/index.html](http://www.fas.org/spp/military/program/asat/index.html)>.

11. Alan D. Campen, ed., *The First Information War* (Fairfax, Virginia: AFCEA International Press, 1992), ix.

12. Ibid.

13. David N. Spires, *Beyond Horizons: A Half Century of Air Force Space Leadership* (Air Force Space Command in association with Air University Press: Maxwell Air Force Base, Alabama, 1998), 260.

14. Richard P. Hallion and Micheal Irish, "Air and Space Superiority," in *Air and Space Power in the New Millenium*, ed. Daniel Goure and Christopher M. Szara (Washington: Center for Strategic and International Studies, 1997), 90.

15. The United Nations, *Highlights in Space: Progress in Space Science, Technology, Applications, International Cooperation and Space Law, 1997* (Vienna: United Nations, 1998), 50.

16. For example, see the web site for San Jose Navigation, Inc. at <[www.sanav.com](http://www.sanav.com)>. Price of less than \$90 current as of 2 April 1999.

17. "NAVSTAR Global Positioning System (GPS) Industry Days," *Commerce Business Daily*, 20 March 1997. A copy of the announcement describing Air Force efforts in navigation warfare (NAVWAR) to "develop a GPS system-level solution that protects the Department of Defense's (DOD) and United States Allies' operational use of GPS during times of conflict while preventing the use of GPS by adversaries and without impacting civil use outside the combat arena," can be found at <[www.laafb.af.mil/SMC/PK/CBD/cbd0320.htm](http://www.laafb.af.mil/SMC/PK/CBD/cbd0320.htm)>.

18. Joseph C. Anselmo, "Space Ventures Reach For New Markets," *Aviation Week and Space Technology*, 23 March 1998, 68.

19. Stewart M. Powell, "Bell at The White House," *Air Force Magazine*, February 1999, 43.

20. At a conference on Defense and Civil Space Programs sponsored by the American Institute of Aeronautics and Astronautics (AIAA) in Huntsville, Alabama from 28–30 October 1998, numerous speakers from both government and industry referred to the military share of the space business as a "niche market."

21. The Joint Chiefs of Staff, *National Military Strategy: Shape, Respond, Prepare Now—A New Military Strategy for a New Era*, The Joint Force, Pentagon, Washington D.C., 1998, 4–5. A copy can be found at <[www.dtic.mil/jcs/nms/joint.htm](http://www.dtic.mil/jcs/nms/joint.htm)>.



## Chapter 5

### A Vital National Interest

*New frontiers—in space and on earth—are always risky . . . and often dangerous*  
—Dan Goldin  
NASA Administrator<sup>1</sup>

The pressures on the space frontier are enormous—from both an economic and a military perspective. Looked at in isolation, each of these pressures is severe enough to create conflict. In combination, they create the risk that future space conflicts could result in war—either on earth, in space, or both.

On the economic front, conflict has already occurred because of crowding in GEO orbits and through saturation of the available radio spectrum. On the military front, conflict has been avoided because the United States, in recent years, has retained an effective monopoly on the use of space during conflict.

Conflicts involving the commercial use of space will continue to increase as crowding increases. There are limited unoccupied slots at GEO and a limited spectrum remaining to be allocated. On the military side, one cannot imagine the United States allowing an enemy to either threaten U.S. space capabilities or use space systems to their advantage, putting the U.S. at risk. Conflict involving space systems could be a significant part of the next major theater war involving the United States.

Space is such a diverse frontier that predicting how conflict will occur is a challenge of infinite possibilities. What is clear, however, is that future conflict will likely be derived from the two interests heavily dependent on space—the commercial sector and the military. The pressures of these two sectors will precipitate conflict in two areas: (1) conflict over the use of space as a precious “fuel,” necessary for economic prosperity and military imperative, or (2) the continuing development of space as a frontier. Conflicts in the first category are of immediate concern. Conflicts in the second are longer term.

#### Space as a Fuel for the Economy: The Immediate Concern

As discussed in the earlier chapters, space has reached a point of critical importance as a fuel for the information age. But to understand the full impact on the United States of space as a fuel, it is first necessary to look at the October 1998 National Security Strategy (NSS). The current NSS makes it clear that, because of tremendous demands for U.S. action in a multitude of arenas, the President and the nation need to look at U.S. national interests in three broad categories: vital, important, and humanitarian. Only vital national interests will result in the most significant national response. A vital national interest is defined specifically as:

Those of broad, overriding importance to the survival, safety, and vitality of our nation. Among these are the physical security of our territory and that of our allies, the safety of our citizens, our economic well-being and the protection of our critical infrastructures. We will do what we must to defend these interests, including—when necessary—using our military might unilaterally and decisively.<sup>2</sup>

Vital interests of the United States, for the most part, are only talked about in general terms in the document. In only two places are vital interests specifically identified in the NSS, and they both provide interesting insights. First, in the section on *Providing for Energy Security*, the NSS states, “Conservation and energy research notwithstanding, the United States will continue to have a *vital interest* in ensuring access to foreign oil sources.”<sup>3</sup> Second, “The United States has *vital security interests* in the evolution of Russia, Ukraine, and the other newly independent states into democratic market economies, peacefully and prosperously integrated into the world community.”<sup>4</sup> In all fifty-nine pages of the National Security Strategy, the only two areas that are specifically identified as a vital interest in any way are both related to economic aspects of the world. How does this relate to space? With regards to space, the NSS also says:

Our policy is to promote development of a full range of space-based capabilities in a manner that protects our *vital security interests*. We will deter threats to our interests in space, and if deterrence fails, defeat hostile efforts against U.S. access to and use of space. We will also maintain the ability to counter space systems and services that could be used for hostile purposes against our ground, air, or naval forces, our command and control system, or other capabilities critical to our national security.<sup>5</sup>

The *vital security interests* in the above paragraph are not specifically defined. In this, and other sections where it is mentioned in similar terms, it is left for the reader to interpret what these vital interests might be. General Howell Estes, former CINCSPACE, said in a speech in 1997, “More than ever, it is important that all Americans understand . . . our investments in space are rapidly growing and soon will be of such magnitude that they will be considered a vital national security interest on a par with how we value oil today. And, that the understanding of what space means to us as a nation and the support of all the U.S. are both critical for making the hard decisions required to realize the full potential of space in the years ahead.”<sup>6</sup>

Given the critical role that space now occupies for both economic prosperity and national security, for all intents and purposes, *space has already become a vital national interest for the United States*. By simply changing the term “foreign oil sources” in the declaration of vital interest for providing energy security, the following statement results: the United States will continue to have a *vital interest* in ensuring access to space.

Space is a critical fuel for the information age. The United States has maintained the world’s leading economy by being the first to take advantage of the benefits of the information superhighway. Space, still a young industry, already accounts for more than \$100 billion in business for U.S. companies. Space has significant limitations in terms of spatial crowding and spectrum allocation that cause concern for future business development. Space is also the fuel that helps propel U.S. military capability—with inherent vulnerabilities that must be protected.

### The Continuing Development of the Frontier: A Long Term Concern

As time passes into the next century, the frontier of space will become even more complicated—ripe with the potential for more dangerous conflict. As discussed in Chapter 2 and explained by the diagram in Figure 1, space is currently early in its development as a frontier. It is still in the phase of exploitation just beginning to be occupied by humans. The concern in this phase, the exploitation phase, is about conflict as described above. However, taking a longer-term perspective, as it becomes more and more common for humans to live in and travel through space, the possibility for conflict will increase dramatically. What used to be science fiction will, in the next century, become reality. When an aerospace plane is developed, making space travel common among the nations of the world, a new military capability will inherently be possible. Each time a new outpost is established, the possibility for economic or military advantage must also be considered. In each of these cases, the possibility for conflict increases, and along with escalating conflict comes the possibility for war.

Each time a conflict occurs, nations will struggle with means for a peaceful solution. Peaceful solutions are in the best interests of all concerned whenever common ground can be found. When peaceful solutions cannot be found, however, war can occur. It may not occur for many decades, but the current approach by the nations of the world, would indicate that it is inevitable. A continuing cycle of conflicts will take place over the coming decades, with different methods of resolution. If these conflicts can be resolved without damaging or destroying the space frontier for continued exploitation and occupation, then eventually space will mature to the point where it is fully used by society. “Civilization” will have been established, issues concerning its further use will have been resolved, and space will reach a point of relative stability. Even as it reaches stability, however, conflicts will continue to occur from time to time requiring the involvement of the nations of the world for resolution (hopefully peaceful). Again, this requires a longer-term perspective, which is sometimes difficult. The diagram in Figure 3 below (an expansion of Figure 1) should help solidify this long-range view.

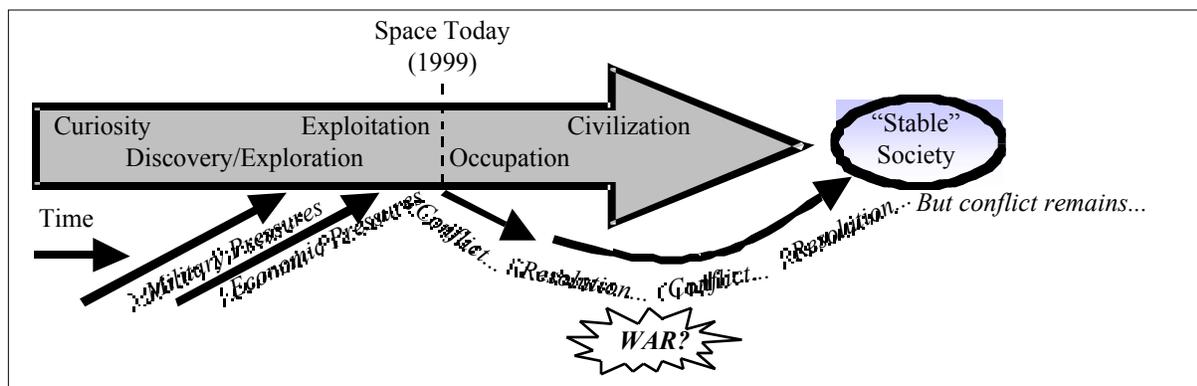


FIGURE 3. Conflict in the Frontier.

If the history of the world and the history of the frontier are any indications, then war in space is impossible to avoid. It is just a matter of time.

But President John Kennedy in 1962 saw a different view of the future. As stated in the introduction, President Kennedy believed that space could be different: “I do say that space can be explored and mastered without feeding the fires of war, without repeating the mistakes that man has made in extending his writ around this globe of ours.” Can space truly be the first frontier in which man does not make the mistakes of feeding the fires of war?

Now is the critical time when the important decisions need to be made. These decisions will define the future of space for the next century. Postponing these decisions will only feed the fires that President Kennedy believed could be avoided. What are these decisions? What actions need to be taken? The next part of this study will be devoted to answering these difficult questions and understanding how the United States can more effectively prepare to deal with *the inevitable conflict in space*.

### Notes

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2. The White House, *A National Security Strategy for a New Century*, October 1998, p. 5.
3. *Ibid.*, 32.
4. *Ibid.*, 39.
5. *Ibid.*, 25–6.
6. General Howell M. Estes III, “The Promise of Space,” address to the United States Space Foundation’s 1997 National Space Symposium, Colorado Springs, Colorado, 3 April 1997.



## **Part II**

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### **Dealing with Conflict in Space**



## Chapter 6

### The Military Instrument of National Power

*The United States military must guard against having our dependence on space turn into a vulnerability. Thus, protecting our freedom to use space and having an ability to deny an enemy's use of space will grow more important in the future. We know that when the challenge comes, our nation's leadership will turn to us for answers.*

—General Howell M. Estes III  
Commander in Chief, United State Space Command<sup>1</sup>

There is no doubt in the minds of most of the members of the U.S. Space Command that conflict in space is inevitable and that, in the not-to-distant future, America will look to the military to deal with that conflict. The U.S. Space Command has studied the future, developed a vision, and is now, through the military services, beginning to pursue critical technologies and programs that would allow this vision to become a reality. Although many military leaders have come to appreciate the criticality of space in the future of warfare, they have not yet embraced the full vision of the Space Command.

The President, via the administration's National Space Policy, has directed the Department of Defense to execute four basic missions in space: space support, force enhancement, space control, and force application. The National Space Policy does not explicitly define these four important terms, but it does direct DOD to accomplish the following: act as launch agent for the defense and intelligence sectors, maintain the nation's launch infrastructure, develop a new fleet of expendable launch vehicles, pursue improved and integrated satellite control capabilities, pursue improved use of intelligence assets, and develop military unique intelligence assets if necessary. The policy also states that the United States will pursue a ballistic missile defense program for both theater and national missile defense and directs an advanced technology program to support this effort. By far, however, the mission area that receives the most attention and the most specific direction is space control—which, among other things, must deal with conflict in space. Using words consistent with the National Security Strategy, the National Space Policy states:

Consistent with treaty obligations, the United States will develop, operate, and maintain space control capabilities to ensure freedom of action in space and, if directed, deny such freedom of action to adversaries.<sup>2</sup>

However, even though these or similar words have been part of national policy for many years, the policy never specifically directs *how* DOD is supposed to meet this direction. It is left to the Pentagon to fill in the details.

Each military service (Army, Navy, and Air Force) has component space commands subordinate to the unified U.S. Space Command. Each of these commands is responsible for executing a specific portion of the DOD space program. The Air Force is by far the largest of the component commands providing more than 90 percent of the military space budget and 93 percent of all military space personnel.<sup>3</sup> The Air Force, in August 1998, published Air Force Doctrine Document 2-2, *Space Operations*. In this document the Air Force describes, in detail, plans for dealing with each of the mission areas directed in national policy. A brief description of each of these mission areas will help clarify the roles and responsibilities of the military in space.

#### Space Support

This mission area supports space forces. This mission is carried out by terrestrial-based elements to “sustain, surge, and reconstitute” elements of a military space system or capability. These activities deploy and operate spacecraft and involve launch and satellite operations.<sup>4</sup>

#### Force Enhancement

Force enhancement operations consist of those operations conducted from space with the objective of enabling or supporting terrestrial-based forces. This is the most generally understood of the four military missions and includes navigation, communication, weather, reconnaissance, surveillance and ballistic missile warning.<sup>5</sup>

### Force Application

The application of force would consist of attacks against terrestrial-based targets carried out by military weapon systems operating in space. The Air Force explains that there are currently no force application assets operating in space and that such systems would only be developed and used when it is consistent with national policy *and* they are the best methods to achieve the military objective. Often, ballistic missile defense systems that would be based in space are referred to as force application weapons. The Air Force, however, identifies this mission as space control (see below) because such a weapon would not be attacking a target on the earth.<sup>6</sup>

### Space Control

Similar to the National Space Policy, the Air Force doctrine document spends the most time and effort in discussing the mission area of space control. To add additional emphasis to this mission, the Air Force also places it as the first mission area in the doctrine document. Well over half the discussion of military space missions takes place in the single mission area of space control.

Space control is the means by which space superiority is gained and maintained to assure friendly forces can use the space environment while denying its use to the enemy. To accomplish this, U.S. forces must survey space, protect their own space systems, prevent adversaries from exploiting space systems, and negate the ability of adversaries to exploit their own space forces. *Counterspace* is the mission carried out to achieve space control. Offensive counterspace operations destroy or neutralize an adversary's space systems through attack on the space, ground, or link segments of these systems. At the current time, the principal method for attacking these systems is through attacks on the ground segments or supporting infrastructure. Defensive counterspace consists of active and passive operations to protect U.S. capabilities from attack or interference.<sup>7</sup>

Space control is the key for dealing with conflict in space. Although it is clear in the definitions and descriptions above that space control need not necessarily include combat operations in space, the long term vision of military space promulgated by U.S. Space Command clearly defines the need for space weapons in order to accomplish the full space control mission. U.S. Space Command, in its *Vision of 2020*, clearly states "a need to dominate space" that requires the deployment of robust negation systems. These systems must have lethal and non-lethal capabilities, be able to inflict either temporary or permanent damage, and must be able to destroy, disrupt, delay, degrade, or deny.<sup>8</sup> U.S. Space Command's Long-Range Plan defines the following end state:

By 2020, a robust and wholly integrated suite of space and ground capabilities provides total situational awareness of the space region along with the ability to assure access, to, through, and from space while defending against all hostile threats. It will require the development of new systems, concepts of operations (CONOPS), and organizations to achieve and maintain space dominance.<sup>9</sup>

It is interesting to note that this vision for the future, in part, restates the current direction of the National Space Policy (NSP) and National Security Strategy (NSS). The United States should have unimpeded access to and use of space (NSS)<sup>10</sup> and freedom of action in space and the ability to deny such freedom to adversaries (NSP).<sup>11</sup> Without the development of new systems (especially space weapons for negation), U.S. Space Command is basically saying that it will be impossible to meet the current direction put forth by the President.

Military space planners, therefore, have laid out a detailed plan for meeting these deficiencies in the coming years. It is a plan based first on the development of technology, but ultimately on the deployment of new systems and new weapons.

Again, the Air Force has taken the leadership position in defining this future. In the mid-1990s, the Air Force leadership (Chief of Staff General Ronald Fogleman and Secretary of the Air Force Sheila Widnall) published a vision for the twenty-first century Air Force entitled *Global Engagement*. In this vision, they described the Air Force as in the midst of a transition of enormous importance. They stated:

We are now transitioning from an *air* force into an *air and space* force on an evolutionary path to a *space and air* force. The threats to Americans and American forces from the use of space by adversaries are rising while our dependence on space assets is also increasing. The medium of space is one which cannot be ceded to our nation's adversaries. The Air Force must plan to prevail in the use of space.<sup>12</sup>

This was an important statement for the leadership of the Air Force. In a way, much more significant than ever before, the Air Force leadership was clearly stating that space is indeed the future of the Air Force. Such a

future may be many decades away, but the path is clear. General Michael E. Ryan, current U.S. Air Force Chief of Staff has sought to emphasize the importance of space to the Air Force today by resurrecting the term “aerospace” to more accurately define the Air Force mission.

The term “aerospace” was coined in 1958 by General Thomas D. White to encompass the continuous medium including both air and space. General Ryan has emphasized the importance of an aerospace force again and again in many speeches and his words provide important insight. “We speak of aerospace power because we no longer view space as a remote place beyond our reach. . . . As the second half of the twentieth century has matured the air realm, the first half of this next century will mature our aerospace realm. . . . We should think of the aerospace domain as a seamless volume, in which, and from which, we provide military capabilities in support of national security.”<sup>13</sup> The Air Force has been primarily responsible for military space for more than thirty years and is planning to meet this new vision of an aerospace force in the twenty-first century.

The Air Force Space Command developed a Long Range Plan in 1998 to address the needs of this new aerospace force. The plan called for significant upgrades in all space mission areas: the development of a new generation of expendable launch vehicles; development of reusable launch vehicles; replacement of the current missile warning satellites with the Space Based Infrared System (SBIRS) both high (at GEO) and low (at LEO) to provide a more robust warning capability as well as support to ballistic missile defense programs; development of a space based radar; upgrades to space weather and navigation satellites; development of a high speed precision ground penetrator; and significant upgrades to U.S. space control capabilities including the development of weapons necessary for such a mission, to name but a few.

Although the plan clearly states that both technology developments and policy decisions are necessary before many of these systems can be developed and fielded, it is also clear that Air Force Space Command is currently advocating and pursuing the technology for such systems. Perhaps most important, and unique from a space perspective, is the introduction of the concept of migrating missions from air to space as time and technology allow—when operating from space makes more sense, from a military perspective, than operating in the atmosphere. The chart in Figure 4, taken from the briefing supporting the long-range plan, shows this migration in very clear terms.

This is the vision of the Air Force—migrating missions from air to space when it makes sense from a perspective of increased capability and improved cost effectiveness. This is the seamless environment of

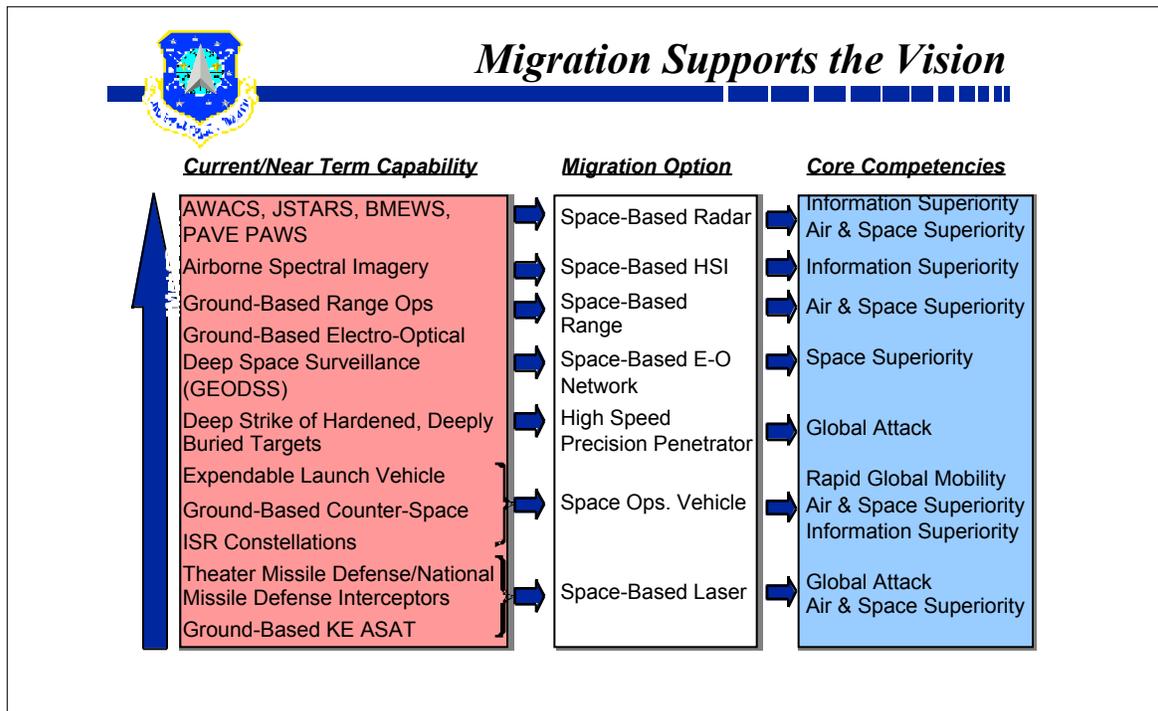


FIGURE 4. Air Force Space Command Long Range Plan: Migrating Missions to Space.<sup>14</sup>

aerospace that General Ryan envisions for the Air Force. Every mission should be evaluated to determine the environment (air or space) that can most effectively accomplish a mission, and then systems will be built and operated to take advantage of this environment.

The one mission that does not effectively migrate, is the mission of space control—the mission of space superiority. But this is a mission that all Air Force officers understand completely. The first mission of the Air Force in any conflict is to establish air superiority. Without air superiority, no other military missions are possible without extreme risk. The same is true for space. According to General Ryan, “As we both militarily and commercially become increasingly dependent on space-based systems—we must be prepared to protect those vital equities in space.”<sup>15</sup> Without control of space, other missions in space are at risk. It is not desirable to migrate missions from air to space if those missions become more vulnerable in the space environment. In order to achieve space control, the Air Force sees the need for the development of a myriad of new capabilities in the future. The chart in Figure 5 describes the kinds of capabilities that will be needed.

Air Force Space Command developed these concepts in support of both the vision of the U.S. Space Command and the vision of the Air Force leadership. The plan is thorough and complete, addressing all missions and the need for significant upgrades in all four space mission areas. Executing this plan would also be expensive, but the space planners understood this and addressed it as follows. Technology would be developed over the next few years that would allow informed decisions to be made as to the effectiveness of transitioning current missions to space. These missions have to be accomplished by the Air Force in the next century, either in air or space, so decisions would be made when the technology is ready, and policy allows, for the migration of a mission to space. The funding would become available at that time for the mission—the medium where that mission would be accomplished would be a secondary consideration. When it makes sense from a military perspective to develop a mission in space, the Air Force would step up to that mission. This is the Air Force Space Command plan.

The Air Force leadership, specifically the Secretary of the Air Force and the Chief of Staff, supported the concept and vision of this long-range plan, but also felt they needed additional insight to better define a roadmap for proceeding into the next century. Therefore, the leadership tasked the Air Force Scientific Advisory Board (SAB) with examining “the steps the U.S. Air Force should take in order to posture itself to make the best use of space in accomplishing its assigned operational tasks in a rapidly changing world.”<sup>17</sup> In November of 1998, the SAB published a report entitled *A Space Roadmap for the 21<sup>st</sup> Century Aerospace Force*.

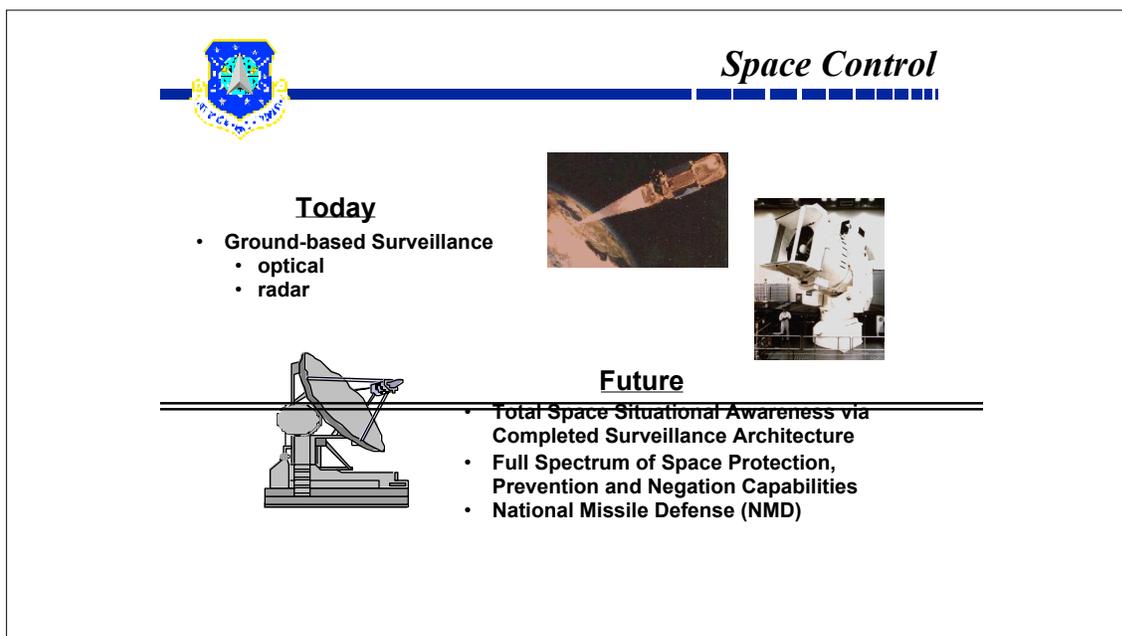


FIGURE 5. Air Force Space Command Long Range Plan—Space Control.<sup>16</sup>

The roadmap is a detailed plan that responds directly to the tasking of the Air Force Chief and the Secretary. It focuses on two basic elements: (1) a revolution in aerospace power and (2) a plan to pay for this revolution. The first part is basically what the Air Force needs to be doing and the second part answers how.

In defining future requirements, the SAB provided two encompassing examples to illustrate the potential of integrated aerospace power. Figure 6 describes the scenario for the first example. It is based on a system with the capability to deliver precision-guided munitions integrated into a system that provides global, high resolution sensing, precision targeting, and responsive command and control. This system “would permit destruction of the target in less than an hour from a national command authority’s order with complete surprise, immunity to currently fielded active defenses, and a lower prospect of collateral damage. It could equally well conduct a photo reconnaissance mission to prove that a prohibited action was in progress.”<sup>19</sup>

Figure 7 describes the other end of the spectrum of conflict—a major theater conflict involving joint and coalition partners. This figure indicates the critical role that aerospace forces will play in such a conflict. “Here, space systems create information-rich warfighters, negate asymmetric threats like theater missiles, and make the diverse elements of the force interoperable. These examples illustrate capabilities that have not been available in earlier conflicts and that have enormous potential to promote the nation’s security and influence.”<sup>21</sup>

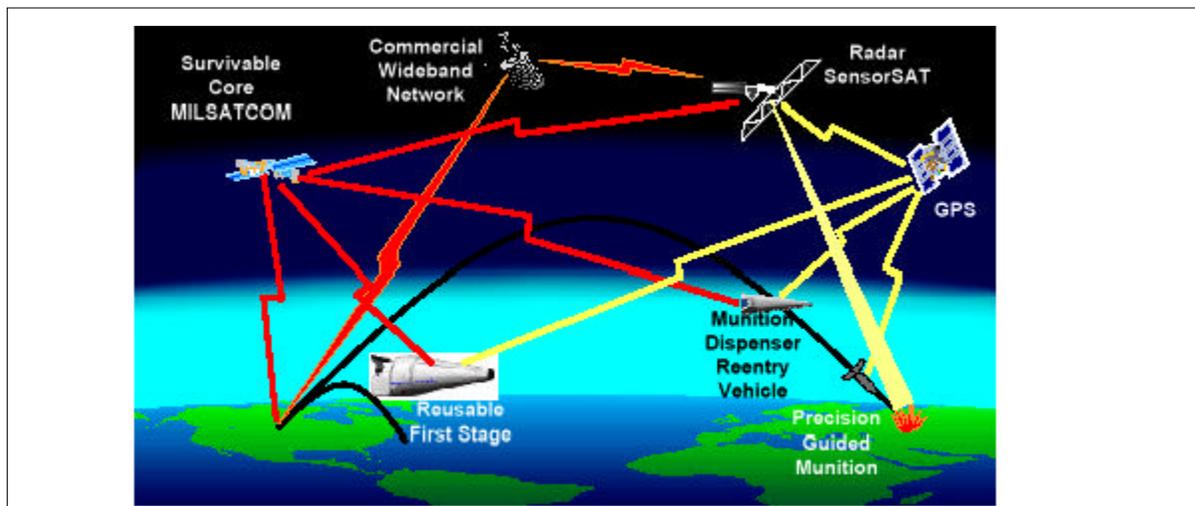


FIGURE 6. Rapid, Precise, Global Strike Capability Illustrates the Potential of Aerospace Forces to Contribute in New Ways to Achieving National Objectives.<sup>18</sup>

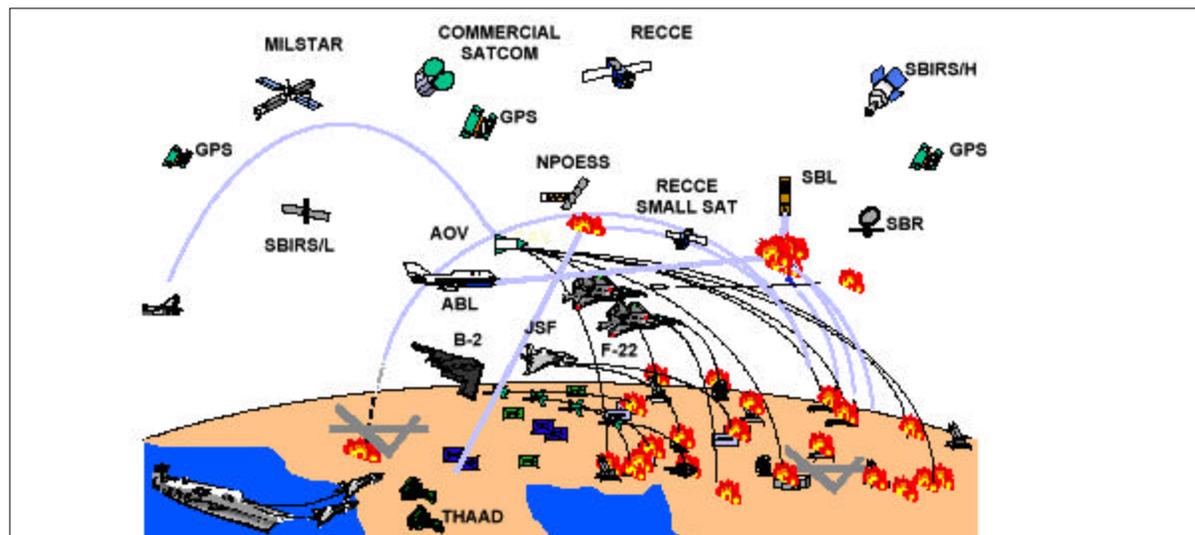


FIGURE 7. Integrated Aerospace Power is an Essential Element of Joint and Coalition Warfare.<sup>20</sup>

The SAB proceeds to describe the various technologies and programs that they recommend be pursued in order to allow space (aerospace) to fulfill its true potential. The SAB also describes the funding challenges that must be overcome in order to free up sufficient budget within the Department of Defense to allow these efforts to move forward. The SAB makes numerous specific recommendations that would need to be implemented to allow this growth. Their recommendations include the following.

1. **Getting out of some mission areas all together—for instance, the launch business.** Launch, and the infrastructure that supports the nation’s launch industry, has traditionally been looked at as an Air Force responsibility. The Air Force, in the future, should limit itself to military-unique functions that fall within its “core competencies.” Launch should be developed and supported by the commercial sector, particularly because the commercial sector is now the primary user of these facilities. The Air Force would then act as a customer for launch, and not a provider.
2. **The Air Force should buy commercial services whenever and wherever practical.** The Air Force has traditionally developed and operated unique space systems to support all military missions. In today’s environment, many of these services can be purchased quicker and more economically from the commercial sector while still meeting all the military’s requirements.
3. **The Air Force should take advantage of partnerships and synergy among systems.** In the past, air and space have been developed and operated separately from each other, despite the fact that they were largely developed within the same service. Airborne and spaceborne systems need to be developed as an “integrated force structure” that is then optimized to meet the overall military requirement.
4. **Streamline space operations.** In the past, the Air Force has developed a large infrastructure using active duty military personnel to operate and maintain space systems. Using commercial practices and contracting out (outsourcing) certain non-critical functions, many thousands of military personnel could be freed up to perform other critical missions.
5. **The space budget will have to be increased as a portion of the overall Air Force budget.** Even with the savings achieved from the other initiatives described above, the Air Force will still have to make the difficult decisions and reallocate budget authority from other programs to pay for the increased activity in space. Failure to do so “will send a clear message to DOD and the world that the Air Force is not serious about taking a leadership role and becoming the aerospace force that the nation needs.” The Air Force must make the tough decisions. These decisions will have to be made at the expense of some air breathing systems, but only when it is proven that space offers the ability to do the job better.<sup>22</sup>

The Air Force Scientific Advisory Board, however, did not simply leave their recommendations in the realm of such general discussion. To the contrary, the SAB took every mission area and defined the specific programs that should be pursued. They then applied a cost estimate, using consistent methodology and extensive analysis, to each of these initiatives and rolled up the cost into a budget estimate for the next twenty years. They started with the current Air Force space budget, then looked at the Future Year Defense Program, the budget for the next five years, and then applied a standard 2.2percent inflation rate through the out years. This created a “baseline” space program from which to work. They then applied what they felt were conservative savings that could be made via implementation of their recommendations and then laid the cost of new programs and initiatives on top of that. The result is the table shown in Figure 8.

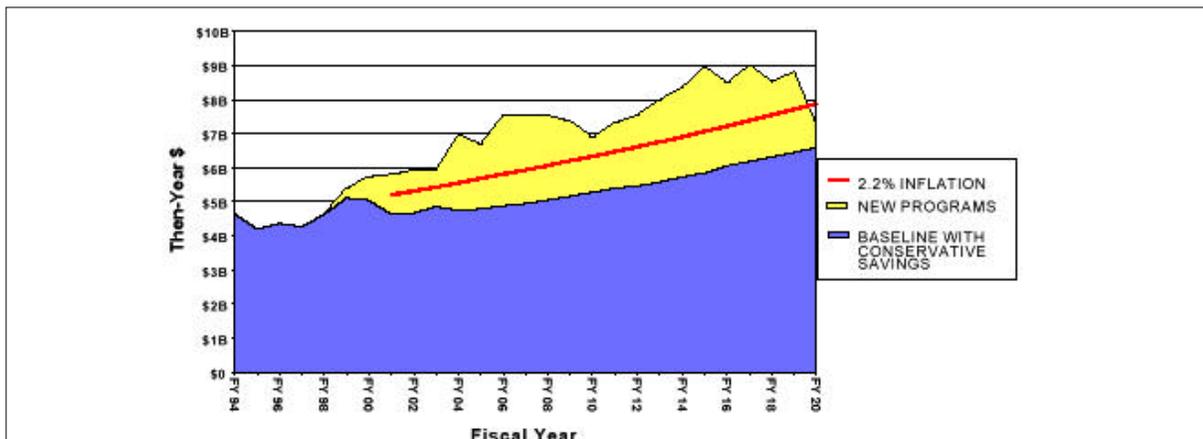


FIGURE 8. New Air Force Space Program Funding Requirements after Implementing Conservative Savings Initiatives.<sup>23</sup>

The result of this analysis showed an increased funding requirement of \$2 to \$3 billion per year with initial increases impacting other programs beginning immediately. The impact to other Air Force programs would be lessened if (1) a more aggressive program of cost saving initiatives was implemented, or (2) Congress decided to increase the overall Air Force budget to allow for the development of new space systems without making the Air Force give up other programs, or (3) the DOD decided to fund the needed budget by transferring funding from other services. In any case, it appears the Air Force will have to make some very difficult decisions in order to fulfill this vision for space.

The U.S. Space Command, the Air Force Space Command, and the Scientific Advisory Board all make strong and vigorous arguments that the military, specifically the Air Force, must move ahead quickly in space, in all four mission areas. They all discuss the importance of space control and make recommendations for the future, but most of the details in all the plans (concerning space control) have been classified. In the SAB report, in particular, nearly all discussion of space control has been placed in a classified volume. It is clear from the current focus of the leadership, however, that significant migration of missions into space will not occur without guaranteeing the control of space. Space control and space superiority is the lynchpin that will allow other activities to move forward.

Early in 1999, in an attempt to place additional emphasis on the space control mission area, the DOD created a new Space Control Technology Program that will begin in fiscal year 2000. The new program will deal with protection, prevention, negation, space surveillance, and command and control research and development. Funding for this program was provided by the Air Force with other services encouraged to begin similar efforts. According to the program direction, the focus of the new program will be in four key areas:

*Protection* activities include active and passive defensive measures to ensure that U.S. and friendly space systems (including satellites, links, and the supporting ground segments) operate as intended by seeking to overcome an adversary's attempts to negate them and minimize damage if negation is attempted.

*Prevention* activities include measures to preclude an adversary's ability to use U.S. space systems and services for purposes hostile to U.S. national security interests.

*Negation* activities include measures to disrupt, deny, degrade or destroy any space systems and services used for purposes hostile to U.S. national security interests.

*Surveillance and BM/CAI* activities includes measures to monitor, detect identity, track, assess, verify, categorize and characterize objects and events in space.<sup>24</sup>

The Department of Defense recognizes the importance of space control to the future and is beginning to develop a coherent program that focuses technology on support to this mission area. But the importance of space control is also recognized elsewhere within the executive branch of government.

In a 1999 interview with *Air Force* magazine, Bob Bell of the National Security Council discussed space control in some detail. His view is that the concept of space control is changing. He addressed the subject this way. "We need not be victim to 'old think.' The old think Cold War mentality was that we envisioned space control as ASAT [anti-satellite weapon], and we equate ASAT with a dedicated system that went up and destroyed something." Bell emphasized that, "revolutionary advances in technology, particularly in the area of information operations, are so phenomenal that . . . We just need to widen our horizon" beyond reliance on ASAT systems to protect U.S. interests in space.<sup>25</sup>

In a speech to the U.S. Space Foundation, Bell stated:

There are a range of alternatives being explored or under consideration . . . and that are fielded and available, including options for destroying or jamming the links between an adversary's satellite and the earth. If we were in a classified session I could say more, but I can't.<sup>26</sup>

Space control is clearly in the minds of not only the military, but the National Security Council as well. Space Command planners have developed thorough plans—well thought out in attempting to deal with the inevitable conflict in space. These plans require the development of space weapons in the future. The Scientific Advisory Board has evaluated these plans and provided recommendations to the senior leadership as to how they should be implemented. The Department of Defense has directed a new technology program to focus on

this critical mission area. All these plans, however, leave themselves open to criticism. This criticism, which will be discussed in detail in the next chapter, is not necessarily the result of faulty logic, but the result of incomplete information. The military plans are open to criticism because they were, by necessity, developed in a “military vacuum.” Without a thorough national debate and without specific direction from the President and the Congress, the military is forced to look at the inevitable conflict in space and attempt to come up with military unique solutions.

### Notes

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2. The White House, National Science and Technology Council, *Fact Sheet: National Space Policy*, 19 September 1996, 6. A copy can be found at <[www.hq.nasa.gov/office/oss/spacepol.htm](http://www.hq.nasa.gov/office/oss/spacepol.htm)>.
3. General Michael E. Ryan, Chief of Staff, United States Air Force, *Evolution to a Space and Air Force*, delivered at the Air Force Association National Symposium, Los Angeles, California, 14 November 1997.
4. *Space Operations*, Air Force Doctrine Document 2-2, 23 August 1998, 12.
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13. General Michael E. Ryan, United States Air Force Chief of Staff, various remarks that can all be found at <[www.af.mil/news/speech/current/CSAF\\_Quotable\\_Quotes.html](http://www.af.mil/news/speech/current/CSAF_Quotable_Quotes.html)>.
14. Major Larry Nikolaus, Air Force Space Command, *Long Range Plan for Space: AFSPC Strategic Master Plan*, Briefing to 50th Space Wing Commanders’ Conference, Colorado Springs, Colorado, April 1998.
15. General Michael E. Ryan, United States Air Force Chief of Staff, various remarks that can all be found at <[www.af.mil/news/speech/current/CSAF\\_Quotable\\_Quotes.html](http://www.af.mil/news/speech/current/CSAF_Quotable_Quotes.html)>.
16. Major Larry Nikolaus.
17. United States Air Force Scientific Advisory Board, *Report on A Space Roadmap for the 21st Century Aerospace Force*, Volume 1, SAB-TR-98-01, November 1998, 1.
18. *Ibid.*, ix.
19. United States Air Force Scientific Advisory Board, *Report on A Space Roadmap for the 21st Century Aerospace Force*, ix–x.
20. *Ibid.*
21. *Ibid.*, x.
22. Taken from United States Air Force Scientific Advisory Board, *Report on A Space Roadmap for the 21st Century Aerospace Force*.
23. *Ibid.*, 35–6.
24. “PBD Outlines Focus of New Space Control Technology Program,” *Inside the Pentagon*, 28 January 1999, 9–11.
25. Stewart M. Powell, “Bell at The White House,” *Air Force Magazine*, February 1999, 41–2.
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## Chapter 7

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### Criticisms of the Military Plan

*Right now, space is sick.*

—General Charles Horner, USAF (retired)  
former Commander in Chief, U.S. Space Command<sup>1</sup>

Criticism of the military's plans and efforts are coming from all sides—from those who believe the military is failing to step up to the challenges of space to those who think the military is going too far. All of the military services have been facing severe funding restrictions, as the defense budgets have declined following the collapse of the Soviet Union—the Air Force no more than the Army and the Navy. All the services are finding it difficult to prepare for the challenges of the future while still meeting the obligations of today—from Bosnia, to Kosovo, to Africa, extending all over the world as the U.S. military is called upon again and again to act. The desire to aggressively develop military space is being tempered by fiscal realities. At the same time, many in the nation strongly believe that space should remain a sanctuary for peaceful exploration and should never be weaponized. There are many competing criticisms.

#### Where is the Threat?

The future threat in space, when it is discussed in military publications at all is described in only the most general terms. The U.S. Space Command uses phrases like these to describe the threat. “In 2020, if not sooner, adversaries will essentially share the high ground of space . . . The U.S. must be prepared to ensure our space advantage over an enemy . . . It is inevitable that those bent on doing us harm will challenge us in space . . . Our nation's increasing dependence on space capabilities—both militarily and economically—produces a related vulnerability that will not go unnoticed by adversaries.”<sup>2</sup> All these statements may be true. The problem is an inability to specifically define exactly when and where the threat will come.

John Pike of the Federation for American Scientists (FAS) has long been one of the most outspoken critics of anti-satellite (ASAT) weapons and space weapons in general. His positions are well supported by numerous members of the academic and scientific community and he is extremely well versed on these issues. In discussing the future threat, Pike largely structures his criticisms on the lack of a specific defined threat. Proponents of the need for space control weapons, according to Pike, “have had some difficulty pointing to just precisely which satellites they would wish to attack. The canonical ‘rogue state’ threats—the Irans and Iraqs of the world—currently lack space capabilities and are unlikely to develop worthwhile targets for many years to come. Even Communist China, that has recently enjoyed something of a renaissance on the threat board, has declined to deploy military space systems in any appreciable quantity. And Russia is too recently departed from the enemies list to return to the baseline planning threat.”<sup>3</sup>

If these comments are true, a likely use of space by an enemy in the future might instead come from their ability to take advantage of commercially or internationally available space assets, rather than from indigenously developed systems. Why would a nation spend the billions of dollars necessary to develop a satellite communication system when the services can be purchased from Iridium or another LEO supplier? Why would a nation develop a separate navigation system when GPS is readily available and a world standard? If the threat in the future is most likely to come from commercial satellites operated by international consortiums, would the United States actually develop a robust weapon with the capability to destroy a commercial satellite? What is the utility of an ASAT weapon against this kind of threat? Again, where is the threat?

U.S. Space Command recognized this criticism in the development of their plans. They understood that the United States would not likely face a peer competitor within the next two decades—but they also felt it was inevitable the threat would arise. Space Command is also legitimately concerned about the vulnerability of U.S. satellites.

Effectively characterizing the future threat to U.S. satellites is difficult. General Myers talked about this problem in an article in *Aviation Week and Space Technology*. According to General Myers, the current U.S. intelligence system does not have sufficient capability to track the growing threat to U.S. satellites. U.S. intelligence agencies used to keep close watch on Soviet ASAT technology, but the recent refocusing of intelligence priorities has created a gap in tracking such information. Intelligence “has, over time, migrated to other issues and it leaves us a little bit naked in knowing exactly what the threat is.”<sup>4</sup>

Interestingly, John Pike also recognizes the threat to U.S. satellites. After criticizing the lack of a specific threat that would require the development of a U.S. ASAT weapon, he stated that an ASAT development might actually make sense for an emerging power. He further asserted, “The sole remaining superpower presents an extremely target rich environment of expensive and relatively fragile spacecraft upon which it has become entirely dependent for the conduct of the full spectrum of military operations.” He also indicated that countries like Iraq and China, rather than seeking to match U.S. military space systems, would more likely seek to develop their own ASAT capabilities, providing them “an asymmetric response to the U.S. advantage in space.” Pike further substantiates his argument by pointing out that Iraq, prior to the Gulf War, and China today have reportedly engaged in the exploration of these kinds of capabilities.<sup>5</sup>

Critics and defenders of the military plans for space both agree that we are now in a period of “strategic pause,” a time similar to the period between the two world wars. Some feel that if the United States makes the correct decisions on an international basis, this pause, in space, could last indefinitely. Space Command, on the other hand, feels that the military must take advantage of this pause, to explore new warfighting concepts and develop new capabilities. Space Command’s Long Range Plan states the urgency of responding to this future, complicated threat. “Given the continuing and dynamic nature of the space environment and the long lead times necessary to develop and field space capability, there is a sense of urgency to articulate future requirements today.”<sup>6</sup>

The recent space control technology program introduced by DOD is an example that critics point to in addressing the lack of specific threats. The Program Budget Decision directing the program was developed in response to criticism from Congress. It states in part, “the reluctance with which we have executed these Congressional adds [space control programs] and our unwillingness to budget for space control have caused several key members of Congress to ignore the Department and to turn to outside special interest groups for ideas on how the Department should address the space control mission area.” According to John Pike, instead of focusing on any real threat posed by enemy satellites, the new program was created to deal with a political need to respond to Congress. “It’s totally divorced from any discussion of what the country actually needs,” Pike said.<sup>7</sup> The Pentagon is focusing on “things” not requirements. Again, where’s the threat?

### **How Are These New Systems and Capabilities Going To Be Paid For?**

In the statement quoted at the beginning of this chapter, General Horner was describing the enormous problems facing the military in space today. He is not alone in his concerns. Senator Bob Smith (R-New Hampshire) and other members of Congress share similar concerns. The Pentagon, the Air Force in particular, has defined future requirements for space programs, but in the eyes of many is unwilling to budget for the resources necessary to fund it.

The Air Force Scientific Advisory Board anticipated this criticism. Again, as quoted earlier from their final report, failure to effectively support space “will send a clear message . . . that the Air Force is not serious about taking a leadership role and becoming the aerospace force that the nation needs.”<sup>8</sup> Almost simultaneously with the release of this report, Senator Smith gave a speech at the Fletcher School of Diplomacy where he provided very harsh (and nearly identical) criticism. In the speech, he presented a number of ideas about the future of space, but he also severely criticized the Air Force and its support of space. In the audience were a number of Air Force generals including General Richard Myers, current CINCSPACE. Senator Smith said:

In their rhetoric, both the Department of Defense and the Air Force have acknowledged the importance and promise of spacepower. In his 1998 report to Congress, Secretary [of Defense] Cohen stated that “spacepower has become as important to the nation as land, sea, and air power.” In 1995, the Air Force made clear in

*Global Engagement* that: “The medium of space is one which cannot be ceded to our nation’s adversaries. The Air Force must plan to prevail in the use of space.” . . . Compared to the magnitude of the technical challenges involved—and these programs’ potential military value—the investments being made by the Air Force in these areas are paltry.<sup>9</sup>

This criticism is based on Senator Smith’s perception of Air Force budget decisions on space over the last five years. Senator Smith and other critics in Congress believe that the space threat in the future is growing and they feel the Department of Defense should be responding accordingly. The Scientific Advisory Board report explained, indirectly, the very reasons why this perception has developed. In the budget roll-up they proposed for the future (Figure 8), they described the increased budget necessary for the Air Force to meet the needs of the future. It also showed the *actual* Air Force space budget for the last five years. These data are shown in Figure 9.

The chart shows that the actual Air Force expenditures on space have declined slightly or stayed fairly level over the last five years. This is the data that Senator Smith refers to when criticizing the Air Force’s investment in space. The senator believes that the Air Force has had ample opportunity to step up to the future for the last five years and has failed to meet this obligation.

At the program level, the Air Force is also coming under fire for decisions made in early 1999 to delay both the high and low portions of the Space Based Infrared System (SBIRS), the new missile warning satellite programs. For a number of reasons (technical, programmatic, and funding), the Air Force decided to delay these programs for about two years. This decision was seen by many in Congress as further failure by the Air Force to support space. The publication *Inside the Air Force* reported that key members of Congress were “concerned about the Air Force’s practice of using the SBIRS program . . . to pay its bills.”<sup>11</sup> Senator John Warner (R-Virginia), Chairman of the Senate Armed Services Committee, called on Defense Secretary William Cohen to cease making any changes to the SBIRS programs until Congress has an opportunity to decide on them.<sup>12</sup> Senator Smith also weighed in. “We’ll hold hearings . . . I’m not going to stand by and let them cut programs like [SBIRS],” he said. “If the Air Force is not interested in the space program, maybe another branch of service is.”<sup>13</sup>

The Air Force, however, is in an almost impossible situation. The Air Force has to meet the threats and obligations that face the military today. The Air Force has a fleet of aging aircraft that must be replaced. Personnel shortages, particularly among pilots, have to be addressed now if the Air Force has any hope of meeting mission requirements next year—making it hard to focus on problems that may be a decade or more away. All the military services have plans and desires for preparing for the twenty-first century. Fiscal realities are preventing these efforts from being fully pursued. In December 1998, responding to the speech by Senator Smith, acting Air Force Secretary F. Whitten Peters said any reshuffling of priorities involving space would require the Air Force to shed large chunks of infrastructure because budgets are so tight.<sup>14</sup> But Senator Smith had already recognized this very fact, “Let’s not sugarcoat this,” he said, “this will mean shedding big chunks of today’s Air Force to pay for tomorrow’s, and it will be very painful.”<sup>15</sup>

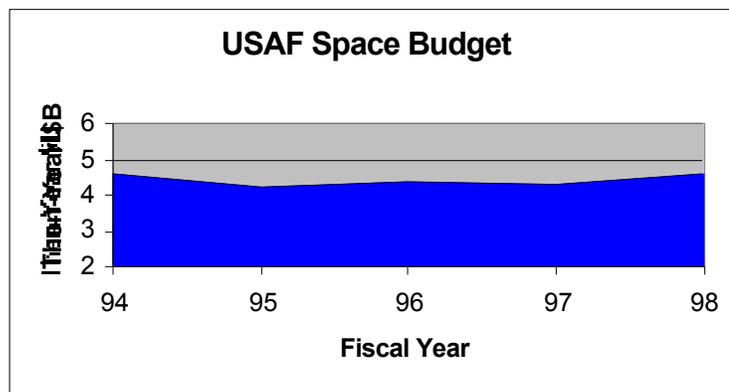


FIGURE 9. Air Force Space Budget for the Fiscal Years 1994 through 1998.<sup>10</sup>

The Air Force knows that space is “sick.” The Air Force also knows it has to meet today’s missions. General Horner expanded on the problem in an interview with the Air Force Times in February 1999—the same interview from which the quote that opened this chapter was taken. He said, “The problem is not that the Air Force ignores space. The crisis is one of money, and robbing the space budget to make up for drastic shortfalls in the air budget.” He went on to say that although he agreed with many of Senator Smith’s criticisms, the problem could not be solved without some drastic changes. The “sickness” of space in the Air Force, the way the budget process currently works can only be made at the expense of air programs.<sup>16</sup> In order to develop systems to deal with the inevitable conflict in space, the Air Force would be forced to give up or alter plans for systems needed to deal with the continuing inevitable conflicts on earth. Deciding which is more important is difficult, if not impossible. As General Myers said in a speech in February of 1999, “We must energize space funding at a national level. It’s more than we can do in the Air Force.”<sup>17</sup>

### **The Current Organization Cannot Effectively Implement the Military Space Program**

The current “organization” responsible for our nation’s military space program is very disjointed and has been for decades. It is not actually a single organization, but a group of organizations each in charge of a different piece of the puzzle. Different aspects of military space have been assigned to different organizations, originally for very good reasons, but it creates confusion today and encourages criticism from a number of sectors.

The Air Force and others have long complained about this complicated organization, but with very little effect. In 1992, the Air Force convened a Blue Ribbon Panel on Space with a charter to look at the entire military space effort and submit recommendations to the Air Force leadership. The panel spent many hours discussing the organizational problems of military space. In various discussions and in their reports, the following were recurring themes.

Space responsibilities today are divided between the Services and DOD organizations. This fragmentation has led to our space capabilities not being fully integrated and applied throughout our nation’s military forces.<sup>18</sup>

Multiple space acquisition organizations . . . have resulted in (1) fragmented responsibilities; (2) duplicate facilities, staffs, and infrastructures; (3) deficiencies in achieving economies of scale, optimizing existing capabilities, and focusing on validated operational requirements; and (4) less effective forces because several organizations are developing space hardware that are not interoperable, thus complicating joint military operations.<sup>19</sup>

Without DOD-wide reform, the Air Force could only implement change internally. In the Air Force alone, different mission areas, as well as operators and acquirers had developed into very segmented communities (stovepipes) that didn’t communicate or cooperate very well. Many of these Air Force problems have since been addressed, but the problem of multiple agencies within DOD responsible for military space remains as complicated as ever.

An incomplete list of the current organizations within the U.S. government currently responsible in some way for military space reveals the following:

- U.S. Space Command and the component commands of the Air Force, Navy, and Army
- National Reconnaissance Office (NRO)
- National Oceanic and Atmospheric Administration (NOAA)
- Central Intelligence Agency (CIA) Office of Development and Engineering
- Central Imagery Office (CIO)
- National Imagery and Mapping Agency (NIMA)
- National Aeronautics and Space Administration (NASA)
- The White House Office of Science and Technology Policy
- Defense Advanced Research Projects Agency (DARPA)
- Ballistic Missile Defense Organization (BMDO)
- FAA’s Office of Commercial Space Transportation
- National Security Agency (NSA)
- Defense Information Systems Agency (DISA)
- Numerous staff agencies in the Department of Defense and the Services

This problem has not gone unrecognized at the highest levels of the administration, the DOD, Congress, and other agencies as well. In 1992 the National Space Council, with direction from the Vice President performed a comprehensive review of U.S. national space policy “in light of the (1) end of the Cold War, (2) decline in defense spending and aerospace industry cutbacks, (3) impact of the federal budget deficits, (4) revolution in space-related technologies, and (5) recognition that space has become a critical element in America’s war-fighting capability.” Three major studies supported this effort: the Fink report on the future of the U.S. space industrial base, the Aldridge report on the future of the U.S. space launch capability, and the Wilkening report on U.S. space policy. The Wilkening report stated that “the four U.S. space sectors—military, intelligence, civil, and commercial—each have their own institutional culture that encourages overlap and discourages cooperation.” One of the major conclusions was the need for fundamental changes in the way government space activities were organized and managed.<sup>20</sup>

In a January 1993 final report to President Bush on the U.S. space program, Vice President Quayle made a series of space policy recommendations to assist the Clinton administration. One of the most critical was “the need for strong White House focus to implement organizational changes to encourage greater cooperation and synergism and less duplication among government space activities.”<sup>21</sup>

The General Accounting Office (GAO) reported on the same issues in 1994. They discussed the continuing fragmentation of responsibilities among the many military space organizations. They criticized the DOD for allowing the Air Force to have too large a share of the military space program. They felt that this was “not in the best interest of the DOD’s diverse set of space users.” They criticized the administration for failing to make the tough decisions to implement change. They called the effects of the organizational problem “a waste of resources as well as detrimental to the effectiveness of joint war-fighting forces.” The GAO suggested that “consolidating of space functions and centralizing management may be warranted.” They recommended consolidating all military space acquisition under a single appropriation managed by a single organization and they believed that merging the requirements and program management functions of the National Reconnaissance Office into this single organization to be “a good idea.”<sup>22</sup>

Although some progress has been made in response to this myriad of recommendations, the situation today has changed very little. U.S. efforts are still very segmented, and no single organization or individual is responsible for all military space. Even the Commander in Chief of CINCSPACE does not have full operational control of all space systems necessary for supporting military operations. During Senate testimony in 1994, Senator Sam Nunn (D-Georgia) queried General Horner with the seemingly straightforward question, “Are you in charge of space?” The only answer CINCSPACE could honestly provide was, “It depends.”<sup>23</sup> The situation for General Richard Myers, the current CINCSPACE, has not improved a great deal.

In the last few years, the Department of Defense has made some significant organizational changes to improve the situation. In 1995, the DOD created the office of the DOD Space Architect. According to Congressional testimony by Dr. Paul Kaminski, then Under Secretary of Defense for Acquisition and Technology, the DOD Space Architect was to be responsible for “developing an integrated defense space architecture and coordinating with his or her counterpart in the intelligence community.”<sup>24</sup> For the next two years, the DOD Space Architect made some progress, publishing a DOD space roadmap, but again, DOD only represented a part of the National Security Space Program. In 1998, the DOD Space Architect evolved into the National Security Space Architect. This organization, for the first time, involved direct participation of both DOD and NRO personnel. Dr. Kaminski felt that the inclusion of both organizations was critical for any real success. He said in a 1997 speech that this new office promised to “help exploit the synergies and delete potential redundancies within the planning between DOD and the Director for Central Intelligence. A far superior complementary relationship is the goal of each organization. Closer integration has begun.”<sup>25</sup>

But significant organizational problems still remain. As discussed earlier, space is becoming a critical fuel for the information age. The pace of change in the realm of information services and technologies is enormous. Military success in the future requires domination of information—obtaining your own and denying it to the enemy. But what is information dominance, what is information warfare, and who is responsible for prosecuting these operations? Right now, the answer is everybody. Every service is developing bits and pieces of information warfare capabilities and every command is developing their unique capabilities as well.

Part of the problem is that information warfare is not, at this time, considered a separate mission area. It is not conceived as “analogous to air, land, sea, and space warfare—that is, information as a ‘fifth dimension of warfare.’ But just as the air, land, and sea dimensions have some unique weapons, so too will information warfare.” An analysis by the Air Force Association urged that “organizational issues related to information warfare be resolved quickly in order to exploit the technological opportunities—and avoid the military risks. Given the expanding role of space-based assets to provide communications, an integrated Space and Information Command would be a logical structure to protect those systems and to plan for offensive operations.”<sup>26</sup> General Myers, in talking about this very concept, has said, “There’s a lot of synergy between information operations and space operations. By putting these two together, I think we can build a very powerful capability.”<sup>27</sup>

The Joint Chiefs of Staff (JCS) also see a lack of organization in dealing with information operations and foresee a similar organizational change necessary to deal with this problem. In testimony before the House Armed Services Committee in February 1999, Chairman of the Joint Chiefs General Henry H. Shelton, described the JCS vision for the future (Joint Vision 2010) and how U.S. Forces expect to fight and win on this battlefield. Information Warfare was a key component. He said, “we realize that we must have the accompanying vision for how best to organize our forces to support the joint battle of the future. That conceptual framework, which we call the Unified Command Plan 21, will be included as an annex to the 1999 Unified Command Plan recommendation. The Unified Command Plan 21 will lay out a flexible plan to establish a joint forces command, a space and information command, and a joint task force to deal with the complex issues here within the United States.”<sup>28</sup> In terms of dealing with the information age and in terms of dealing with the future of the military in space, the current organization cannot effectively or efficiently support these critical needs.

Although DOD is moving in the right direction with Unified Command Plan 21 and the National Security Space Architect, many in Congress don’t feel the change is happening fast enough. Led again by Senator Smith from New Hampshire, many in Congress are proposing even more radical organizational changes to “fix the problem.” In his criticism of the Air Force in particular, Senator Smith looked at the entire space organization and found it lacking. He said, “as I look at the way it is organized, trained, and equipped, I do not see the Air Force building the material, cultural, and organizational foundations of a service dedicated to space power. Indeed, in some respects we are moving backward.”

Senator Smith’s vision of the future needs to be explained in more detail—to help provide insight into his concerns, as well as the concerns of other members of Congress. In his November 1998 speech, he based his remarks (on organization, funding, weapons, and the future) on three basic assertions: “first, America’s future security and prosperity depend on our constant supremacy in space; second, while we are ahead of any potential rival in exploiting space, we are not unchallenged, and our future dominance is by no means assured; and third, to achieve true dominance we must combine expansive thinking with a sustained and substantial commitment of resources, and vest them in a dedicated, politically powerful, independent advocate for space power.” Although he encouraged more effort in the cooperation among U.S. civil, commercial, and military space, his primary focus was on the organizational problems in military space.<sup>29</sup>

Senator Smith went on to say, “A better approach to explore might be to vest U.S. Space Command with authority similar to that held by U.S. Special Operations Command—the Major Force Program or MFP structure. MFP-11 gives CINCSOC [Commander in Chief U.S. Special Operations Command] substantial control over development, acquisition, promotions and assignments in this unique mission area. U.S. Space Command is perhaps the only institution within DOD that is developing both the theory and practical plans for space power. But CINCSOC needs the teeth and claws to compete for, and dispense, DOD resources. As a conservative Republican, I am opposed to unnecessary bureaucracy. But space power is every bit as important as special operations—perhaps, like special operations, space power should have its own MFP, and even its own Assistant Secretary of Defense.”

The senator then went on to speak of an even more drastic step. “Ultimately—if the Air Force cannot or will not embrace space power, and if the SOCOM model does not translate—we in Congress will have to establish an entirely new service. This may sound dramatic . . . , but it is an increasingly real option. As I have tried to convey, I want us to dominate space—and frankly, I am less concerned with which service does it than I am committed to getting it done. My colleagues increasingly share this view. Creating a new military service

to exploit a new medium is not unprecedented. Indeed, if any of our services should understand this point of transition, it should be the Army Air Corps . . . I mean the Air Force.”<sup>30</sup>

There are many parallels between the experience of Army Air Corps aviators in their frustration between the two world wars and the frustration of Space Command planners today in achieving the full military advantages of a new medium. Both periods had a strategic pause necessary for such radical thinking and significant change. In the face of an immediate threat, it is very difficult as well as dangerous for the military to make radical changes in doctrine and force structure. Dr. James Tate in his book *The Army and Its Air Corps* discussed in detail many of the frustrations of the air corps in implementing change. He talked not only of problems internal to the Army, but significant inter-service rivalry with the Navy as well—issues also prevalent in the atmosphere of today. He talked of the difficulty of fielding new capabilities in a time of declining defense budgets. “Defense appropriations were cut in the 1920s and 1930s because planners felt the government could not afford anything but a skeleton organization for the military, and also because few in the U.S., even the military, saw any threat to national security.”<sup>31</sup> These conditions are very similar to those of the 1990s. There are indeed numerous parallels and many, including Senator Smith, are beginning to make this case.

According to General Horner, “The Air Force needs to take a step back and ask itself, ‘Are we like the Army was in the 1920s?’ If we continue to hang onto space, are we going to smother it? The Army knew it was time to let go of the Air Force in 1920, but we didn’t get a separate service until 27 years later. People are reluctant to let go. Space is growing by leaps and bounds. It’s probably the fastest growing area in our military arsenal. We have to ask ourselves if space stewardship would be better off as a separate space force. We shouldn’t be afraid of that.”<sup>32</sup>

Criticism of the current military organization ranges all the way from problems with too many players, an inability to properly plan for information age warfare, a failure of the Air Force to be proper stewards of military space, to a potential need for a new military service to deal with space in the next century. Although critics are varied in their approaches, they do tend to all agree that the current military plan for space cannot be effectively implemented by the current military organization.

### **Space is Inherently Different from Air**

Critics charge that combining space and air into a single medium, aerospace only confuses the issue. The U.S. people do not look at space as anything like the air. An individual cannot choose to build a space ship in his shop with his brother and fly off into space. He can build a rocket, but he can’t ride it, and obtaining orbital velocity requires not only ingenuity, but also significant resources. The average citizen cannot yet purchase a ticket to space. Space is still in the early stages of its development as a frontier, and that frontier is inherently different from the frontier of the air.

John Pike provided the most detailed explanation of this criticism in a paper that he authored in November of 1998 entitled *American Control of Outer Space in the Third Millennium*. His words summarize the views of many scientists, scholars, and political figures.

Indeed, over time, it has become increasingly apparent that the fundamental premise of Aerospace Power Doctrine, the unity of the air and space environment, is physically flawed. The operational conditions and possibilities of air and space are radically different, and this difference finds concrete expression in the physical configuration of air and space vehicles. Indeed, the most successful space vehicles, ranging from the spherical Sputnik to the ungainly module that took Neil and Buzz to Tranquility Base, have been utterly unlike aircraft. And those space vehicles that have appeared most like aircraft, such as the Space Shuttle, have been among the most disappointing.

In recent years the debate over the Revolution in Military Affairs has given prominence to the widely abused construct of Information Warfare, which has been taken to encompass a diversity of activities, some of greater actual importance than others. Properly understood as the art of sustaining information superiority over an adversary through dominant battlespace awareness, Information Warfare closely approximates many of the distinguishing features of the contemporary American military advantage relative to others. This dominant battlespace awareness is largely a product of military space systems and closely kindred capabilities. Consequently, Information Warfare provides a rather more useful doctrinal point of departure for conceptualizing military space operations than the tenets of Air Power. Recognition of this fact, however,

would also provide an equally useful point of departure of the military space role from the Air Force into a new separate Space Force.<sup>33</sup>

Pike basically makes the point that the Air Force has promulgated the doctrine of aerospace power only to advance its position as the space force for America. Senator Smith is using a similar argument, as are other members of Congress. What this argument fails to take into account is the similarity of missions between air and space doctrine. Although the actual systems (satellites vs. airplanes) may be completely different, the missions, in many cases, are very much alike. One of the first uses of air breathing platforms was to provide intelligence and reconnaissance for military forces. The same can be said of space platforms. Air covers the entire battlefield. Mastery of the air can allow a military complete access to any location on this battlefield. Space has the potential to provide the same advantage on a global scale. If air supremacy provided the high ground necessary for military victory, space supremacy can offer the same, or even a greater, advantage. This doctrinal similarity is what causes the Air Force to combine air and space into a single medium—not because of the physical similarities, but because of the mission similarities.

The Air Force leadership understands the physical differences of air and space, but believes the doctrinal similarities demand they be treated as a single entity. The Air Force Chief of Staff, General Michael Ryan, summed up the feelings of those who view aerospace as an inseparable domain in the following way: “There are those who would want to separate the aerospace domain. But, that would be like separating the mountains from the valleys or the oceans from the sea—it makes no sense militarily.”

### **Who will Implement the Vision?**

In order to more efficiently operate and save money during times of tight budgets, the military is looking at innovative ways to save money. One of these ways is through increased partnerships with industry and the increased use of commercial capabilities for military purposes. These partnerships allow the military to “outsource” or, more accurately, divest itself of missions that can more efficiently be done by the civil or commercial sector. As General Myers has stated, “Divestiture is especially appropriate in the space business. Because of its substantial impact on both the military and the economy and with the solid partnerships that we’ve established between the two sectors, we often find the same players in the same room talking the same systems. Understandably, the conversation can easily alternate between warfare and market share. When that happens, those in uniform need to take a hard look at the issue and decide if it still fits into a military core competency. If not, it’s a prime candidate for divesting.”<sup>34</sup>

The men and women in uniform have been paying close attention. In 1998, operation of the Defense Meteorological Satellite Program (DMSP) was divested from the military and is now successfully being operated by civilians of the National Oceanic and Atmospheric Administration (NOAA), with significant savings to the country and the military. One of the most significant savings comes from the elimination of more than 200 military space operators. Currently, the space launch ranges on the east and west coasts are prime candidates for a similar divestiture. Many hundreds of military operators, although certainly not all, could be eliminated with great savings and with no significant impact to the military’s access to space.

Significant savings are possible through the divestiture of these missions. It is in the national interest to meet all military requirements in the most effective and efficient ways possible—particularly in the face of tight budgets. This does create a problem, however. Without these hundreds of military space operators, it begs the question, who will be trained and capable of operating the military space systems of the future? The systems described in the military’s long range plan or the systems that clearly fall under the category of warfare? The question of “who?” is being asked in many circles.

Senator Smith summed up these criticisms in his November 1998 speech. Among a number of criticisms regarding management of military space personnel, the Senator chastised the Air Force for failing to take the steps to build a “dedicated space warfare cadre of younger officers.”<sup>35</sup> When you combine this observation with the exodus of many young military space operators that has already occurred or is pending because of the policy of divestiture, the concern is even more valid. How is the military going to build the large numbers of space experts necessary to effectively operate the new vision of space for the twenty-first century?

### Space Should Remain a Sanctuary

The desire to keep space free from weapons has existed since the very beginnings of the space program. The desire is not, however, as easily defined as one might think. Two schools of thought have attempted to define the sanctuary concept, and they approach the problem from very different perspectives.

The first school can be referred to as the “traditional” school. It has basically remained unchanged since the Eisenhower and Kennedy administrations first developed the U.S. national space policy. The policy says today, as it has since the 1950s: “The United States is committed to the exploration and use of outer space by all nations for peaceful purposes and for the benefit of all humanity.”<sup>36</sup> The traditional school believes that the introduction of weapons into space will make this policy unachievable.

The second school looks at the preservation of a space sanctuary from a military perspective.<sup>37</sup> In order to understand this school, it is necessary to first differentiate between militarization and weaponization of space. Space was militarized from the very beginning, according to this school. The ability of space systems, through intelligence, reconnaissance, navigation, communications, and so forth to profoundly impact the outcome of military operations on earth, forever “militarized” space and made successful operations in this military medium essential for a successful operation of a military operation on earth. Weaponization would be the introduction of a “space weapon” either ground or space based, that could attack and negate other space systems or their ability to support terrestrial operations.

The case made by this second school is that the United States currently dominates the military use of space. Although other nations use space for military purposes, the United States is the most dependent of any nation on this use of space. It is therefore in the best interests of the United States to maintain space as a sanctuary, free from weapons, in order to preserve the capability of the United States to fully use military space in the future. In other words, an enemy in possession of space weapons would provide more of a threat to U.S. military forces than the threat created to enemy forces by U.S. weapons. It is therefore in the best interest of the U.S. military to keep space free from weapons.

Although the two schools of sanctuary thought are based on different perspectives they both agree that the current military long-range plans are not in the best interests of the United States. Any plans for space weapons are not supported by either sanctuary philosophy. From a strictly philosophical perspective, this is the most powerful argument effecting the current national debate.

All of these criticisms have powerful arguments and powerful proponents. Each must be taken into account when determining the future course for the United States in space. However, these arguments, for the most part, only deal with the military instrument of national power. The other instruments of power (specifically economic and political) also have significant potential to impact the future of the nation.

### Notes

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## Chapter 8

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### Other Instruments of National Power

*We pursue arms control because our citizens and military will be more secure if certain weapons are eliminated or at least kept out of the wrong hands.*

—Madeline Albright  
U.S. Secretary of State<sup>1</sup>

*We've got an agreement that bans the emplacement of weapons of mass destruction in outer space. We think that's enough; we don't anticipate any other problems.*

—Ambassador Robert T. Grey, Jr.  
U.S. Permanent Representative to the UN Conference on Disarmament<sup>2</sup>

In a world of immense change, where technology advances and political alliances change seemingly overnight, it is essential that a nation employ all of the instruments of national power in order to influence the world and achieve its desired goals. The 1997 U.S. National Security Strategy stated that “we must be prepared and willing to use all appropriate instruments of national power to influence the actions of other states and non-state actors.”<sup>3</sup> The potential instruments of national power that can be applied include political, economic, informational, as well as the military. The Pentagon, as discussed in the last two chapters, has developed plans and concepts for applying the military instrument of power to dealing with future conflict in space. Even though there are significant criticisms of these plans, the plans nevertheless address the problems of the next century. Unfortunately, similar thought is not being applied in other areas.

Before proceeding with the details of U.S. efforts to apply the other instruments of national power, it is necessary to briefly describe and define each of these instruments. During this discussion, a number of specific tools that can be employed by a nation's leadership will also be introduced.<sup>4</sup>

#### Political Instrument of National Power

The political instrument of national power is the execution of a nation's foreign policy through diplomatic means. Diplomacy arises out of the “fundamental character of the nation-state system, with its basic assumption that nation-states are sovereign, but divergent in their interests and unequal in their power.”<sup>5</sup> Diplomacy is dependent on the power of persuasion, convincing others to take actions that allow for the successful prosecution of a nation's foreign policy. Rarely, if ever, is diplomacy successful without the strong support of the other instruments of national power as well.

Diplomacy today is largely prosecuted in small, personal sessions out of the public spotlight. Although large diplomatic bodies, like the United Nations, are successful in dealing with some areas of conflict, the vast majority of diplomacy is conducted in smaller, bilateral negotiations. In a world where issues tend to be complicated and multinational, it is easier to reach agreement with single parties. If two nations involved in negotiations have very strong ties on a number of mutually beneficial subjects, it becomes easier to engage in discussions on any subject.

In the United States, the State Department is the primary institution responsible for the execution of diplomacy, although numerous other players, including the DOD, play critical roles. The State Department employs all the nation's official diplomats. They develop all treaties and international agreements on behalf of the U.S. government—more than 14,000 since the end of World War II.<sup>6</sup>

### **Economic Instrument of National Power**

The economic instrument of power is the leveraging of a nation's wealth to influence the behavior of others. The more global the world's economy becomes, the more important the use of economic power becomes—and the more effective. Unlike the ideological conflicts that dominated the world throughout the entire 20<sup>th</sup> century, economic concerns now tend to dominate decisions and priorities.

A nation can choose a variety of methods in applying economic power. Liberal or restrictive trade policies can open up or deny markets to the other nations of the world. Lack of access to U.S. markets can be disastrous for certain industries or countries, and many U.S. industries are viable only through access to international markets. U.S. decisions concerning the changing of financial policy, which not long ago would have primarily impacted the U.S., now impacts the entire world. The loosening or tightening of the U.S. money supply has enormous worldwide implications. The United States has long used foreign aid to entice other nations into taking actions favorable to U.S. interests and applied economic sanctions against enemies of the United States in attempts to influence the behavior of “unfriendly” nations.

Historically, the effectiveness of the economic instrument of national power has not been very good—particularly in cases of dealing with dictatorships or rogue states. In these cases, the withdrawal of foreign aid or the application of economic sanctions often failed to impact the intended targets. A nation's population might have been impacted, but the leadership was left largely untouched. It is rare that a government has actually changed its policy based on the application of economic power alone—but in combination with the other instruments of national power, economics can be a very effective tool.

### **Informational Instrument of National Power**

The informational tool of national power is the collection and denial of information about the world or an adversary combined with the ability to disseminate this information. The role of the U.S. national intelligence community is to gather valid and current information about potential adversaries and disseminate this information to the appropriate decision makers. It is the responsibility of the decision makers to act on this information. The United States also maintains an intensive security apparatus to protect critical information from being obtained by these same adversaries. And finally, the use of “propaganda” vehicles like the Voice of America and Radio Free Europe allows the United States to spread the message of democracy to people who would otherwise be denied this information.

Until recent times, information has almost been an ancillary instrument of national power, augmenting other efforts of the government. Now information itself is becoming critical for both economic growth and military success in operations. The role of space as a fuel for the information age, and as a tool for providing and controlling information, has already been thoroughly discussed. The role of the economic and political instruments of national power has not been discussed yet and both have the ability to play an enormous role in defining space in the next century.

The current U.S. National Space Policy talks about applying all the instruments of national power. In the introduction it states, “For more than three decades, The United States has led the world in the exploration and use of outer space. . . . We will maintain this leadership role by supporting a strong, stable and balanced national space program that serves our goals in national security, foreign policy, economic growth, environmental stewardship and scientific and technical excellence. Access to and use of space is central for preserving peace and protecting U.S. national security as well as civil and commercial interests.” In his national policy, the President has called for a balanced approach to dealing with the issues concerning the future space—balanced in that it exercises all the instruments of national power.

In terms of political opportunities, in terms of diplomatic initiatives, the National Space Policy is short and succinct in defining the overall effort.

The United States will consider and, as appropriate, formulate policy positions on arms control and related measures governing activities in space, and will conclude agreements on such measures only if they are equitable, effectively verifiable, and enhance the security of the United States and our allies. The Arms Control and Disarmament Agency (ACDA) is the principal agency within the Federal government for arms

control matters. ACDA, in coordination with the DOD, DCI, State, DOE, and other appropriate Federal agencies, will identify arms control issues and opportunities related to space activities and examine concepts for measures that support national security objectives.<sup>7</sup>

ACDA has recently been integrated into the State Department, placing responsibility for all international arms control efforts under a single federal agency. All arms control initiatives and public diplomacy efforts are now under the direct control of the Secretary of State.<sup>8</sup> ACDA has, however, been preserved and is still responsible for coordinating arms control activities within the State Department. In 1997, the ACDA annual report, a full chapter was spent discussing the subject of negotiating and implementing arms control. In this entire report, space is not mentioned in a single instance.<sup>9</sup> It is possible that negotiations were taking place out of the public eye, or that new initiatives have since been undertaken. However, the 1998 *Arms Control Today* interview with Ambassador Grey clarified the U.S. position, that no negotiations on space were being contemplated.

As U.S. permanent representative to the Conference on Disarmament (CD), Ambassador Grey is uniquely positioned to understand the full spectrum of U.S. arms control initiatives. The CD is “the single, multilateral arms control negotiating forum.”<sup>10</sup> When questioned about U.S. opposition to the Chinese ambassador’s strong call for establishing an ad hoc committee for the prevention of an arms race in outer space, he responded:

In our view, it’s not an issue that deserves a major share of the time and effort the CD has available for negotiating arms control agreements. Outer space work is certainly not one of our priorities in the CD. There is no arms race in outer space . . . . As long as there is no threat of an arms race in outer space it is far from clear what the CD would gain by addressing it.

The interviewer then went further and queried, “If there is no arms race in outer space, wouldn’t it be in the U.S. interest to negotiate a treaty that would freeze the status quo so there would be no possibility of an arms race?” Ambassador Grey responded with the statement that opened this chapter, “We’ve got an agreement that bans the emplacement of weapons of mass destruction in outer space. We think that’s enough; we don’t anticipate any other problems.”<sup>11</sup>

So, although the National Space Policy directs the consideration and formulation of arms control policies regarding space, it is also clear, at the present time, that the current administration policy is that it is not appropriate to be discussing political solutions to a problem that doesn’t exist. The current State Department position is there is currently no “arms race in space” and no threat of such a race beginning.

With regards to the use of the economic instrument of power, the decade of the 1990s has been a period of enormous opportunities and challenges for using economic policy with regards to space as an effective tool for international cooperation. The National Space Policy clearly states that “the fundamental goal of U.S. commercial space policy is to support and enhance U.S. economic competitiveness in space activities while protecting national security and foreign policy interests.”<sup>12</sup>

In the early stages of the Clinton presidency, the administration implemented programs to allow U.S. companies to aggressively pursue commercial and economic interests in the international space marketplace. In 1996, the administration established a strategic vision for the future of GPS with the goal of making GPS the baseline navigation system worldwide. The administration also established general conditions and a detailed review process to allow U.S. companies to compete in the growing business of providing remote sensing (imagery) from space. This policy set up a process of licensing companies to operate private imagery satellites and offer the products for sale. Technology for this capability had formerly been almost entirely controlled by the government. As with most of the administration policies, economic growth was one of the highest priorities.<sup>13</sup>

In 1998, after many years of effort, the Congress passed and the President signed into law the Commercial Space Act. This act allowed for a number of improvements in government policy that would support the development of commercial space in the United States. Among the initiatives were: allowing the use of residual intercontinental ballistic missiles (ICBMs) as space launch vehicles; requiring the government, in the future, to procure commercial sources for space transportation services rather than government operated systems; encouraging the administration to take action to ensure that GPS continues to be the world navigation standard; encouraging increased use of commercial products on the space station; and authorizing the transportation

Department to license the re-entry of reusable space transportation systems.<sup>14</sup> There were a number of issues that were not included in the final legislation, concerning imagery for example, but the bill did provide improved direction in many areas.

One of the most complicated issues for the administration has been that of export control. With the explosion of commercial space in global markets, customers who just over a decade ago had no choice but to turn to the United States for most space services, now have the opportunity to choose from a variety of providers—the United States, Russia, the European Space Agency, international consortia, Japan, or China. If U.S. companies were prohibited from competing because of fear of transferring critical technologies to potential enemies, these customers would just go elsewhere. This is the dilemma; a need to allow U.S. companies to compete fairly without allowing a loss of critical technologies.

A number of laws and policies govern how U.S. companies can compete in foreign markets with critical technologies. The State Department, in coordination with other federal agencies, has historically assumed the prime responsibility for controlling the transfer of military arms and technologies overseas. In the late 1980s, International Traffic in Arms Regulations were the guiding policies for transfer of all arms, including satellites, outside the United States. The 1989 Missile Technology Control Regime (MTCR) was entered into to prevent the proliferation of missile technology around the world, and the 1991 Arms Export Control Act was passed authorizing sanctions against any companies that allowed the transfer of critical technologies in violation of the MTCR.<sup>15</sup> The challenge continued to be to encourage U.S. commercial competitiveness while preventing export of critical technology.

Just before President Clinton took office, the Bush administration made a decision to transfer the responsibility for export control of purely commercial communications satellites from the State Department to the Department of Commerce. However, if the satellite proposed for export included any of nine specific technologies specifically identified as militarily critical, a license from the State Department was also required. In 1996, the Clinton administration decided that this multiple approach for licensing was inefficient and slowed down the process unnecessarily. Therefore, it was decided that all licenses for communications satellites would be granted through one agency, the Department of Commerce, with other agencies coordinating on the process. There was also one additional issue that further complicated economic policy concerning space—China. A law implementing sanctions on China following the Tiananmen Square massacre in 1989 requires the President to issue a “national interest waiver” before any license may be issued for the export of a satellite to China. This is in addition to the normal export licenses that must be obtained.<sup>16</sup>

### Criticisms

Much in the way that plans for using the military instrument of power in space have been criticized, the efforts regarding the use of the political and economic instruments of power have also come under heavy fire from numerous sources. Criticism has come from both within the United States and from the international community as well.

#### Criticism 1

*Now is the time to negotiate treaties to keep space weapons-free, and the United States is the only country unwilling to participate.* Canada, one of the closest allies of the United States, has been one of the leading critics in this area. In 1998, at the Conference on Disarmament, Canada proposed the following:

That a CD Ad Hoc Committee on Outer Space be established with the mandate to negotiate a convention for the non-weaponization of outer space. Under Article IV of the Outer Space Treaty, States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any kinds of weapons of mass destruction . . . or station such weapons in outer space in any other manner. There is no current multilateral agreement banning the deployment of weapons other than weapons of mass destruction in outer space. There is thus a need for the international community to address this problem, and to do so multilaterally, particularly in view of the growing number of states with the capacity or near-capacity to place objects into orbit. We acknowledge that there is currently no arms race in outer space. We accept the

current military uses of outer space for surveillance, intelligence gathering and communications. Our focus is on the non-weaponization of outer space, i.e. no positioning of actual weapons in outer space.<sup>17</sup>

The United States blocked the formation of such a committee, but the Canadians have not been alone in their desire to pursue the formation of such a committee in the pursuit of multilateral treaties. In 1995, the Chinese government published a white paper on arms control and disarmament. In the paper, they clearly stated, "China opposes the arms race in outer space." They went further in discussing the history of their opposition. Since 1984, the paper went on, China has time and again proposed to the United Nations and the Conference on Disarmament resolutions to prevent an arms race in outer space. China maintains that outer space "belongs to all mankind and should be used for peaceful purposes. No country should develop any kind of weapon to be used in outer space: outer space should be kept "weapon free."<sup>18</sup>

In August of 1998, H.E. Mr. Li Changhe, Ambassador of Disarmament Affairs of China gave a long, impassioned speech to the plenary meeting of the CD entitled "Prevention of an Arms Race in Outer Space." In the speech, he said there "seemed to be a view" that an arms race in outer space did not exist and therefore the subject should not be a topic for the CD. He then said, "the Chinese delegation cannot agree with this opinion." He went on to explain how a series of activities in recent years concerning the development and plans for testing of space weapons have given rise to concerns among countries all over the world. Facing such efforts, it has become an actual and urgent issue to prevent an arms race in outer space."<sup>19</sup> A resolution to form a committee during the 1999 session and pursue a treaty or treaties to prevent an arms race in outer space was subsequently submitted to the United Nations by Chile, China, Cuba, Egypt, India, Indonesia, Iran, Malaysia, Myanmar, Nigeria, Sri Lanka, and Sudan.<sup>20</sup> The effort to form such a committee in the CD was again blocked by the United States. Bilateral approaches have also been attempted. In 1997, as reported in the *Washington Times*, Russian President Boris Yeltsin in a letter to President Clinton proposed a new round of U.S.–Russia talks to prevent the development of anti-satellite (ASAT) weapons.<sup>21</sup> Again, at least visibly, there has been no U.S. response.

The Secretary General of the United Nations, Kofi Annan, also entered into the debate in statements to the CD and the press in early 1999. He urged the CD to address the issue of outer space quickly because more than 30 countries already have space programs. "One concept which is now widely shared is that of maintaining outer space as a weapons-free environment," Annan said.<sup>22</sup>

Friends, allies, and potential adversaries have all attempted to engage the United States in negotiations to preserve space for "peaceful purposes." The United States continues to avoid the subject.

## Criticism 2

*Administration policy has damaged national security in pursuit of economic growth.* Throughout the decade of the 1990s, U.S. companies, seeking to take advantage of the booming space marketplace and encouraged by both the Bush and Clinton administrations, moved boldly into foreign markets providing space services all over the world. One of the most lucrative new markets was China.

In 1995, a Chinese Long March rocket exploded destroying a multimillion-dollar Hughes communications satellite in the process. In 1996 a similar rocket explosion destroyed a multimillion-dollar Loral satellite. In both cases Hughes and Loral engineers worked with the Chinese in their accident investigations hoping to ensure that such expensive disasters could be avoided in the future. This assistance has created enormous concern that it could have helped the Chinese improve their ballistic missile technology at the same time. It is not clear, from open sources, exactly how much, if any, technology was actually transferred to the Chinese. Congress began looking into the problem, but during that time, export licenses, with Tiananmen waivers, continued to be approved allowing U.S. satellites to continue to be launched on Chinese rockets. In February 1998, the President approved a waiver that allowed Loral to proceed with another Chinese launch of a Loral satellite despite numerous warnings about continuing Loral transfer of technology. Congressional criticism became even more severe, and the House of Representatives formed a special panel to investigate the entire matter. The administration cooperated with the investigation and in remarks at the White House about the February 1998 waiver, President Clinton said, "I think the decision was a correct one . . . based on what I thought was in the national interest and supportive of our national security."<sup>23</sup>

As part of the Strom Thurmond 1999 National Defense Authorization Act, Congress passed legislation (in October of 1998) to transfer jurisdiction for the licensing of satellites from the Commerce Department back to the State Department. This was done “in light of concerns that recent exports of U.S. commercial communications satellites for launch by the People’s Republic of China (PRC) may have damaged U.S. national security.”<sup>24</sup> President Clinton had threatened to veto this bill if it contained this direction, but in the end he signed it into law, with reluctance. In a statement released at the signing of the bill in October of 1998, he said:

I am strongly opposed to a provision that, effective March 1999, will transfer the jurisdiction over satellite exports from the Department of Commerce to the Department of State. This change is not necessary to ensure effective control of United States exports of satellites and could hamper the United States satellite industry. The Congress repeatedly supported the transfer of the satellite licensing jurisdiction to the Department of Commerce long before I ordered the transfer in 1996. I strongly urge the Congress to demonstrate its support for a strong domestic satellite industry by passing remedial legislation to halt this transfer of jurisdiction.<sup>25</sup>

In December 1998, the special House committee investigating the incidents, reported that both Hughes and Loral had damaged U.S. national security when they provided technical data that could have assisted the Chinese in their ballistic missile program. The special committee, in a bipartisan 9–0 vote, agreed to endorse the secret 700-page report and send it to both Congress and the Administration.<sup>26</sup> The transfer of export powers from Commerce back to State occurred in March of 1999 without the remedial legislation called for by the President.

### Criticism 3

*Congress and the Administration are making it difficult for U.S. companies to compete in the global space marketplace.* Part of this criticism is the corollary to the previous criticism. Industry leaders are highly critical of U.S. policies that restrict them from competing in overseas markets, including China. They make a good case that if they are prevented from competing, other world industries, particularly Europe, will gladly take that business, provide a very similar service as well as technology, and the only difference will have been the loss of business by U.S. companies. The Electronic Industries Association, a trade group, summed up industry concerns about the Chinese investigation and the Congressional report with the following comment, “If the report takes steps to take export laws back to times like the Cold War, that’s a mistake.”<sup>27</sup>

In late February 1999, the White House announced that it was rejecting (for the first time) a license that would have allowed Hughes to proceed with a \$450 million satellite deal with China. The license was denied for national security reasons. According to news reports, the Commerce Department had favored granting the license, but both State and Defense had recommended against it. The Satellite Industry Association (SIA), the lobbying group for the satellite industry, complained that the rejection of the license was for purely political motives. The Chinese foreign ministry expressed “strong resentment” and issued a protest over the action. Hughes hoped that the decision could be overturned.<sup>28</sup> China continues to present strong challenges for both economic and national security reasons, but this is not the only criticism of U.S. policy and limitations on industry.

U.S. policy governing remote sensing continues to be an item of concern for industry. Currently the United States now imposes numerous restrictions, particularly concerning resolution and timeliness, on U.S. companies seeking to compete in providing overhead satellite imagery in the world marketplace. The United States is concerned about two things: that potential enemies may be able to obtain intelligence damaging to the United States, and concerns from foreign countries that the availability of such imagery could be obtained by their enemies as well. Industry complains that this policy is not allowing them to compete with European and Russian commercial efforts and has been lobbying hard to change the policy. The Commercial Space Act passed in 1998 originally included provisions to relax these restrictions, but the rest of the legislation was being held up because of disagreement over exactly what to do. Revising policy to allow U.S. industry to better compete remains an unresolved issue.<sup>29</sup>

Commercial enterprises are also criticizing the current government efforts of providing and controlling the imagery that does exist on the market. The House Science Committee heard testimony in late 1998 that

criticized the government itself for providing unfair competition for private industries. “Industry continues to be concerned that competition from both civil and national security agencies . . . remains the most pervasive and unfair form of competition faced by the remote sensing community.”<sup>30</sup> Although the size of the remote sensing market is the subject of enormous debate, there does appear to be a market for commercial imagery from satellites—and the market seems to be growing rapidly. U.S. companies are concerned that unless they are allowed to enter the marketplace now, they will be left behind.

#### Criticism 4

*The government has no organizational structure capable of dealing with the myriad of space policy issues.* During the late 1980s and early 1990s, the National Space Council, under the direction of the Vice President, developed U.S. space policy within the government. Upon taking office President Clinton disbanded the council and placed these responsibilities under the National Science and Technology Council (NSTC). According to the National Space Policy, the NSTC is “the principal forum for resolving issues related to national space policy.”

This decision has come under fire in a number of circles. James Hackett, former acting director of the Arms Control and Disarmament Agency, stated in an editorial that when the decision was made to kill the White House Space Council, it also killed the only mechanism the government had for coordinating government space policy.<sup>31</sup> But criticism of the current space policy structure has not only been limited to editorials. Individuals from industry have also expressed similar frustration with the current organization. In late 1998 Dr. Robert Butterworth of Aries Analytics Incorporated, testified before a joint hearing of the House Subcommittees on Space and Aeronautics, Military Research and Development, and Military Procurement of the Committees on Science and National Security. In discussing commercial space operations, he stated that the government’s current organization made it very difficult to resolve problems. He blamed the abolition of the Space Council and the placement of policy within the NSTC. According to Dr. Butterworth, “market developments have outstripped this approach: space is no longer exclusively an issue of science and technology. An office focused on those issues would not today be the natural venue for resolving questions about markets and security and investment and operations. Rationalizing government with commercial activities, in other words, is more than a process of acquisition reform. It requires strategic direction, the realignment of goals and resources—serious organizational change.”<sup>32</sup>

The current governmental organization for dealing with space policy is as diverse and spread out as the military organization described in the previous chapter. The State Department, the Commerce Department, the NSTC, the Department of Defense, the National Security Council, the CIA, and many others all have roles to play in determining how policy is developed and implemented regarding the future of space.

The future of space is enormously complicated and changing all the time. There are so many issues and so many players, that it is difficult to determine a clear path to the future. There are, however, a number of steps that can be taken that could allow for a clearer path.

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## Chapter 9

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### An Integrated National Strategy

*We are at the dawn of a new century. Now is the moment to be farsighted as we chart a path into the new millennium.*

President Bill Clinton  
*A National Security Strategy for a New Century*<sup>1</sup>

With regards to the nation's future in space, the United States currently lacks a long-term vision.

In the early 1960s, the Kennedy Administration recognized the need for integrating all the aspects of national policy in order to develop an effective space program. President Kennedy provided the overall vision and direction as demonstrated by the words and deeds described earlier in this study. Senior officials in his cabinet implemented the specifics of vision.

On 8 May 1961, Secretary of Defense Robert McNamara and NASA administrator James Webb delivered a memorandum to the President articulating both the need for and the specifics of a coherent national space program integrating all the elements of national power.<sup>2</sup> This national space program was clearly developed in response to the activities of the Soviet Union and the overall strategy stayed quite consistent throughout the Cold War. The space initiatives in the various segments of government—military, civil, and commercial—varied greatly over these three decades, but their goals remained consistent. National security and national prestige were the primary forces driving much of the space program. Numerous other forces impacted the program, ranging from science to economics, but they were minor factors when compared to the focus on national security, prestige, and relative standing with the Soviet Union.

The collapse of the Soviet Union changed this focus. Without a rival providing an immediate threat to the United States, the need for an integrated space program lessened. The result has been the development of separate military, civil, and commercial space programs driven by different priorities. The military space program has continued to be driven by national security concerns. The civil space program, NASA, has focused increasingly on science—on research and development. Exploration and discovery have again become the primary forces behind NASA initiatives. Most significantly, the commercial space sector has been allowed to flourish. Competition and profit are clearly the driving factors behind the commercial space industry.

The results of these separate programs have been positive in many ways. NASA has accomplished great things when allowed to focus on streamlined discovery and exploration rather than operations orchestrated by a massive government bureaucracy. The success of the commercial space sector has *not* been driven by government direction, but by the enormous potential to generate income and make a profit. The military has developed remarkable capabilities to support terrestrial operations by maintaining a clear focus on national security. The problem is, however, that as each of these segments moved out into the future, they did so in response to different visions—different directions. Without a threat like the Soviet Union, U.S. policy has encouraged these different directions.

The 1996 National Space Policy provided very top-level guidance for each of the nation's space sectors—civil, commercial, and military. It did not fully integrate the nation's space program and did not provide a long-term vision for the future. Just over two years after its publication, it is already out of date. If conflict in space were not inevitable, such an approach would be not only acceptable, but also appropriate. These divergent approaches, however, make it difficult to deal with the inevitable conflict of the future.

The military is fully convinced that weapons will be needed to deal with this conflict. Other nations and many within this nation see such a plan as disastrous and are calling for the United States to negotiate treaties, bilateral and multilateral, to prevent this from taking place. Despite requests from numerous nations around the world, new space treaties are not currently being considered. The administration has determined that the current limits on placing weapons of mass destruction in space are all that is needed right now. The administration

clearly sees a need for space control; however, it does not see the need for developing a full spectrum of weapons that can influence space systems. Current national space policy is disjointed and confusing. Even on the issue of anti-satellite (ASAT) weapons, the administration has sent mixed signals.

In the fall of 1997, the Clinton administration allowed the testing of the U.S. Army's Mid-Infrared Advanced Chemical Laser (MIRACL) against an orbiting Air Force satellite. The objective of the test was as follows; "to collect data that will help us improve computer models used in planning protection measures for U.S. satellite systems." The decision to test a high powered laser against an object in space was viewed by many as an ASAT test. It came under heavy criticism from Russian President Yeltsin, many members of Congress, and many in the scientific community as well—but the test was allowed to proceed. The satellite was indeed illuminated by the laser.<sup>3</sup> Almost at the same time President Clinton used the line item veto to implement policy for the first time (an action since ruled unconstitutional) when he vetoed three programs with the potential for exploring technology for space weapons—the Clementine II micro-satellite program, the Army's kinetic energy ASAT system, and the Military Space Plane. The administration explained that MIRACL test was not an ASAT demonstration, that space control could be performed without weapons, and that the three programs in question were not needed for our future defense. The resultant perception in the media and in the world was that the administration did not have a clear policy for space control.<sup>4</sup>

In dealing with the commercial aspects of space, neither Congress nor the administration has been able to clearly deal with the growth of the space business and its impact on national security. Even though the Congress finally passed the Commercial Space Act in 1998, the critical issue of remote sensing (imagery) was left unresolved. The true impact of global satellite communications from satellite constellations like Iridium and Globalstar has not been fully addressed. Again, the commercial sector has a tremendous potential for impacting national security—not only the U.S. sector, but the international as well. Every new step that is taken into the frontier of space has tremendous impacts throughout society. Decisions regarding commercial, civil, and military space systems cannot be effectively made without considering the full impact across the sectors.

In looking at the current U.S. space strategy and policy, it is interesting to compare them with Chinese efforts for planning their future in space. The Chinese have consistently pursued a balanced strategy that effectively integrates all their instruments of national power. This coherent strategy has allowed them to improve their ability to pursue their national interests while the United States seems to struggle with basic questions of policy, vision, and the future.

As they have for many centuries now, through the rise and fall of different dynasties and now as the last great communist power on earth, the Chinese have worked hard to strike a balance between peaceful solutions and economic prosperity (*wen*) and the use of military power (*wu*). Development of the frontier of space for China has been pursued by a combined application of these two basic principles. They realize that they remain significantly behind the rest of the world, particularly the United States, when it comes to taking advantage of space—for both military and commercial pursuits. They also realize that they must aggressively develop space if they are going to be able to compete in the global information age of the next century. A world without any threats to space systems would make their development efforts much easier. It would enable them to expand their military and commercial space industry without having to worry about threats from other nations. They would gladly give up any benefits they could achieve from future space weapons to be allowed to freely develop the information potential of space (navigation, reconnaissance, communications, and so forth) They also realize that they cannot afford to get into an arms race in space with the United States. Therefore, their diplomats have been working aggressively in pursuit of treaties that would ban space weapons.

Mindful of more than a thousand years of history, China has also sought to avoid a total emphasis on *wen* without *wu*. Therefore, the Chinese are apparently pursuing the development of advanced technology space weapon systems. In late 1998 just after the Chinese ambassador had pleaded with the United Nations to begin pursuit of treaties to prevent the weaponization of space, newspapers in Asia and the United States, citing Pentagon and other sources, reported that China was developing a high power laser ASAT capability to allow them to effectively conduct "information warfare."<sup>5</sup> China, in recent months has also been accused of obtaining critical ballistic missile and nuclear weapons technology from U.S. companies and from national laboratories. It

is interesting to note that the Chinese government has vehemently denied the news reports accusing them of spying, but has made no comments whatsoever on the reports of their laser ASAT development.

It seems clear that the Chinese are pursuing an integrated national strategy with regard to space that will allow them to both expand economically and improve their own national security. Such a strategy is being pursued within the constraints of their overall defense and economic programs. The United States, even with a vastly superior economy and enormous resources, is not pursuing such a coherent approach. Should the United States pursue and implement such a strategy? What would such a strategy look like? Does the future demand such a strategy, or are the threats of conflict benign enough to allow for the continued development of space based on divergent goals and direction?

The next century in space will be primarily driven by global economics. The military use of space will be critical to the overall national security of the United States, but it will be a minority partner in the overall space program. The civil space program will focus increasingly on science, and this science, for practical and political reasons, will become even more international in scope. The global nature of the marketplace and international partnerships in the future exploration and development of space will be the primary factors defining the development of space over the coming decades. This creates a difficult problem for the Pentagon.

Earlier in this study, space was described as both a frontier and a fuel. Even though still early in its overall development as a frontier, significant military and economic pressures are already beginning to generate conflicts that require responses from the nations of the world. As a fuel, space is growing at an enormous rate, helping to drive the information age, and has already reached a point where it can be described as a vital national interest. These two analogies, frontier and fuel, provide useful insights into two different aspects of the development of space, but they still fail to provide a comprehensive description of the environment of space from a national and international perspective. Such a description is necessary in order to determine the need for and the specifics of a coherent U.S. strategy for space.

The environment of space has reached the point where it can be referred to as a “commons.” Commons is defined as an area that can be used by the community as a whole, or more specifically, as a legal term, an area where one nation has the right to use the same area as another nation without interference.<sup>6</sup> As a frontier, space is a commons because it is available for exploration to any nation with the desire and wherewithal. As a fuel, it is a commons because there are no national restrictions limiting how space can be exploited. The only restrictions on space as both a frontier and a fuel are international in scope—applicable to the community of nations as a whole, not any single nation. Therefore, areas of conflict, such as geo-stationary spacing or spectrum allocations, must be dealt with from the viewpoint of the commons, as well as from the viewpoint of individual nations.

The international nature of space, as a commons, is what makes the problem of dealing with conflict so difficult. The military, as a minority player in space and in the absence of a coherent national strategy, is finding it increasingly difficult to develop the means to deal with conflict in space in the next century. Therefore, it is impossible for the military alone to effectively plan for and deal with all the elements of space as it relates to national security. It is a national problem and must be dealt with in a coherent manner by the executive branch—integrating all the elements of national power into a coherent policy.

As a commons, space will demand continued engagement in the international arena for the foreseeable future. With regards to commercial and economic expansion, laws, treaties, and agreements must continue to be explored and updated in order to allow for effective growth while minimizing conflict. The United Nation’s ITU is perfectly positioned to deal with many of these multinational issues, through peaceful negotiations. Similar to the commons of the sea, however, disagreements and conflicts will continue to occur whenever one nation achieves a distinct advantage over others, and the others want to challenge this advantage. As the nations of the world explored the sea, new international laws were developed, treaties among nations for fishing rights and defense were established, and a new legal framework was developed to resolve conflict. However, these did not always work, and nations had to be prepared to defend their rights to the seas with military power.

With regard to the commons of the sea, strategic military advantages and economic advantages are easily discernable. Ships of war and ships of commerce are, for the most part, completely different. In space, particularly in the future, satellites of war and satellites of commerce may be one and the same. The national

response to a threat from a ship of war is clear. The national response to a satellite that has a military and commercial “dual-use” is not so clear. The twenty-first century in space will be driven by dual-use technologies, and these technologies will greatly impact future conflict. If the military desires to maintain an advantage in space, the nation must pursue ways to effectively deal with these technologies. Again, the military cannot do it alone.

The United Nations again offers opportunities to advance U.S. national interests in dealing with dual use technologies. The Conference on Disarmament (CD) and numerous other UN committees looking at commerce and outer space are excellent forums for raising these issues among all nations. Possibilities exist for exploring negotiated agreements for the controls of these kinds of systems and technologies. By engaging other nations within the structure of the United Nations, progress is possible in at least defining some of the additional laws and agreements necessary to operate in the commons of space.

The United Nations and other arenas for peaceful negotiations should not be looked at as a panacea. The United States has the opportunity, because of its current competitive advantage, to continue to commercially develop the commons of space and continue to be the primary provider for space services around the world—from telecommunications, to navigation, to remote sensing, to whatever space industry arises in the coming years. It is essential that the U.S. government not take any action or implement regulations that would encourage other nations to develop a particular space market instead of U.S. industry. This raises continuing conflicts with national security interests and again stresses the need for an integrated approach from the U.S. government.

With regard to national security, each nation, the United States included has certain national interests that are unique to that nation in space. At the moment, the United States is probably the most heavily dependent nation in the world on space. The United States must, therefore, be prepared to respond to threats to these national interests if negotiations cannot achieve their objectives. Threats to these national interests in the next century may come from a variety of sources. These sources could develop the capability to directly or indirectly threaten U.S. space systems, develop the ability to deny commercial space capabilities to the United States, develop indigenous space capabilities to threaten U.S. forces or citizens, or take advantage of international space capabilities to provide their own strategic advantage. Each of these threats is significantly different, and each must be considered by the nation in developing a strategy for the next century. Some threats may be effectively controlled via political and economic means, others may require military intervention. Military intervention may consist of non-lethal action (for example, jamming), lethal action confined to terrestrial targets, or ultimately, lethal action against targets in space. A response to a purely commercial conflict would most likely be handled through non-lethal means while the only time lethal space weapons would be required would be when U.S. lives or property was threatened by space systems. There are numerous scenarios that may occur in the future, and the United States needs to be prepared to respond to any of them. This is why it is critical that the United States integrate all the elements of national power in developing a coherent, integrated strategy for the future in space.

### **Conclusion and Recommendations:**

#### **The United States Critically needs an Integrated National Strategy for Space.**

An integrated national strategy must be pursued that effectively addresses and integrates all the elements of national power. Conflict in space is inevitable, and without an integrated national strategy, the United States will not be able to make the most effective decisions necessary to fully take advantage of the future of space.

The United States is indeed in a unique position in history—a lone superpower with no aspirations for further conquest and expansion. The lack of any immediate threat allows the country a period of “strategic pause” in which the nation can take the time to develop not only the technologies, but also the policies that will allow the nation to prosper in a period of relative security. Space is a critical element of the future. It will play an essential role in allowing for economic growth and enhancing national security. In order to take full advantage of this future, however, the United States must integrate all the elements of national power into an effective, integrated national strategy. The following recommendations are specifically formulated to respond to the complicated new environment of space in the twenty-first century.

### **Recommendation 1**

*The Administration should reconstitute the National Space Council.* The National Science and Technology Council (NSTC) is “the principle forum” for resolving issues related to national space policy.<sup>7</sup> Unfortunately, very few of the critical decisions that need to be made regarding the future of space are issues of science and technology. They are issues that cross the boundaries of many agencies in government and impact everything from national security to economic prosperity. Addressing these issues in the context of science and technology gives them the wrong focus. What has resulted is the development of disparate visions and plans (Commerce, Defense, State, NASA, and so forth) for dealing with the future of space without an integrated assessment of their impact on the other instruments of national power. Science and technology plans are integrated, but the overall national policy is unclear.

What is clear is that the problem must be handled in the executive branch of government. Congress is beginning to legislate different elements of the problem, but by its very nature, Congress will have a difficult time attempting to integrate the different elements of foreign and economic policy that mostly lie within the executive branch.

The original National Space Council effectively integrated the different elements of the executive branch and allowed the development of coherent strategies. Having the council chaired by the Vice President gave it the authority needed to make the tough decisions. Having a new National Space Council chaired by the Vice President may be politically obsolete, but it would need to be chartered with the power and authority to make critical policy recommendations to the President. It would have to include senior representatives from all the impacted segments of the government—state, defense, commerce, CIA, NRO, NASA, the National Security Council, to name but a few. Its first order of business should be to define the overarching space policy of the nation that must contain a clear vision for the next century. This vision must be more than simply being committed to “the exploration and use of outer space by all nations for peaceful purposes.”

### **Recommendation 2**

*The United States develop and publish a new National Space Policy that clearly delineates a common vision for the future of the nation in space.* As stated earlier, the current National Space Policy is out of date. The issues that need to be addressed are so complicated that only a national body within the executive branch, such as a National Space Council, could possibly consolidate the various positions and integrate the policy. The new policy must effectively encompass all the instruments of national power—allowing continued economic expansion, pursuit of vigorous research and exploration, while at the same time protecting U.S. national security.

The new National Space Council, if implemented, would still have a difficult time in developing a fully coherent strategy without assistance. It is also recommended therefore that the council, as one of its first actions, commission a study to be performed by a group of experts drawn from all the nation’s space communities that would explore all pertinent issues and present recommendations that would form the basis of a new vision and policy.

All of the instruments of national power must be effectively utilized and this requires new and specific direction. The remainder of this chapter will identify some of the challenges that exist in each of the instruments of national power and recommend broad guidance and direction needed to begin the development of this new national policy. These remaining recommendations will first address the political aspects of the problem, followed by the military, and finally the economic.

### **Recommendation 3**

*The new National Space Policy should declare space to be a vital national interest of the United States.* For numerous military and economic reasons, space is already a vital national interest of the United States. However, failure to specifically declare it as such leaves doubt in the minds of both the world and U.S. citizens, exactly how the United States would respond should U.S. interests in space be threatened. The

declaration of space as a vital national interest would remove this doubt. It would also help to answer other difficult questions that need to be addressed in the areas of commercial and national security policy.

#### **Recommendation 4**

*The United States should enter into bilateral negotiations with other nations and multinational negotiations within the United Nations concerning the broad issue of space in the future.* This does not mean the United States should immediately support or sign a blanket treaty to “preserve space for peaceful purposes” or eliminate all future weapons in space. It is not clear whether this is in the best interest of the United States. Other nations need to understand that the United States does not claim any sovereign right to space, rejects any nation’s claim to such sovereignty, desires space be available for use by all humanity, but at the same time considers the use of space to be a vital national interest of the United States—an interest the U.S. will be willing to protect if called upon. The United States currently achieves such a tremendous strategic advantage from the use of space, that signing such a treaty would effectively result in a unilateral decision to level the playing field. The United States would not want to take this step unless other nations could ensure some maintenance of the status quo (U.S. strategic advantage) into the future. Preserving this strategic advantage should be a guiding principle behind any future U.S. initiatives.

Space has long been militarized, but in order to keep it from being weaponized, other nations would have to give up some of their own potential to use space for military purposes. Other nations need to understand that if they use space systems to target, exploit, or attack U.S. citizens or resources, these systems will be attacked in return. Such a response could occur through an attack on the ground segment or the communication links, but could if necessary, require the use of space weapons. A negotiating position for the United States could be: if the world desires the United States not to develop space weapons, other nations must make concessions that will allow for the status quo in the current use of military space systems to support terrestrial operations. Without maintaining the status quo, U.S. military forces will become increasingly vulnerable around the globe from the indirect military use of space systems. It is not clear whether other nations would desire to negotiate based on these interests, but U.S. refusal to negotiate ignores the possibility for mutually beneficial, peaceful solutions to conflict. The current administration’s foreign policy is based on a concept of international engagement. By engaging around the world, it is often possible to find common ground and mutual interests that can improve the situation for both (or many) countries. The same opportunity to engage is available in space. The nation needs to take advantage of this opportunity.

#### **Recommendation 5**

*The U.S. military must be prepared, across the spectrum of conflict, to take all prudent actions necessary to achieve space superiority.* Just as all operational plans today consist of military campaigns to achieve air superiority, each of these plans must also include campaigns to achieve space superiority. Unless space superiority is achieved, the nation’s political and military leaders need to be cognizant of the fact that U.S. forces would operate under greater risk if committed into such a theater of operations. Space superiority plans should consist of ground, air, and information attacks necessary to ensure the availability of space for U.S. and allied forces and the denial of the use of space for enemy forces.

Space superiority, like that of air superiority or sea superiority, is not something that exists all the time. Rather, it is something that must be achieved only when dealing with a specific conflict, and then must be maintained for the duration of that conflict only. Space differs from air and sea superiority because of its unique physical characteristics. In conflict, air and sea superiority can be achieved over the limited geographic area involved in the conflict (for example, air superiority over the Persian Gulf, or sea superiority in the Mediterranean Sea). Space presents a more complicated problem. Orbiting space systems have the potential to impact an enormous portion of the globe, and therefore, space superiority must be evaluated from the perspective of all of space, not just a limited theater of operations.

In its efforts to achieve space superiority, even for the limited duration of some future conflict, the United States must, therefore, consider the overall impact of its actions on the overall commons of space. If the United States impedes on the commons, establishing superiority for the duration of a conflict, part of the exit strategy

for that conflict must be the return of space to a commons allowing all nations full access. This requires two approaches: (1) the development of a complete spectrum of military options (non-lethal to lethal), and (2) the development of doctrine and concepts of operation that will employ the military option least threatening to the commons—thus allowing a better peace following the conflict.

### **Recommendation 6**

*The United States should begin an aggressive development and test program for a spectrum of capabilities necessary for space control.* As history has demonstrated, a concentration on political means without the proper preparation to use military force will almost certainly result in failure. It should therefore be the goal of the United States to aggressively pursue development and test programs for space weapons that will allow future decision makers options to deny, disrupt, degrade, and, if necessary, destroy space systems that could threaten U.S. interests in the next century. Space superiority can, at least for some time, be achieved *without* the use of space weapons. There is currently no specific threat demanding the *deployment* of such weapons. Therefore, the United States need not make a decision on the need to deploy such weapons at this time. It is possible that through negotiations, peaceful solutions to future threats may be achieved. It is also possible that through the use of terrestrial and air-breathing forces, space superiority can be achieved well into the future. The future threat in space may be handled in a progressive pattern of response that focuses on denial and disruption without having to degrade or destroy. However, at some time in the future, if peaceful negotiations fail, and military planners cannot develop terrestrial means to ensure space superiority, the only alternative may be the deployment of some types of space weapons. If this scenario occurs, the United States must be prepared to respond.

A full spectrum of capabilities is needed to allow decision makers options for resolving conflict at the lowest level possible. The only way to be fully prepared is to have fully developed and tested the critical systems and technologies necessary to field such capabilities.

Failure to fully develop and test such capabilities and such weapons could make the United States vulnerable to surprises from other nations in the future. Gen. John L. Piotrowski, former commander of the U.S. Space Command said, on many occasions, that when it came to space weapons the one thing the United States couldn't afford to be was second.<sup>8</sup>

A robust program developing capabilities for space control should be laid out to explore new technologies, integrate them into new weapons systems, and fully test them both in laboratory and field demonstrations. Since the goal would be not to deploy such weapons until absolutely required (and when that time would come is unknown), an urgent "crash" program is *not* needed. However, unless aggressive programs (in terms of funding and schedules) are developed, little progress will be made. In this time of strategic pause, programs can be implemented that are aggressive, but take the necessary time—time to fully explore different technologies and thoroughly test and check out systems when developed. If the systems actually reach maturity, and there is still no pressing need for deployment, they can be set aside until such a situation arises.

At the same time, the military needs to more fully develop the doctrine necessary to operate and use space control capabilities. The concept of space superiority is still relatively new for military planners. Significant work still needs to be done on how to effectively and efficiently achieve space superiority for today's military. Otherwise, when and if the day arrives where space weapons are needed, the transition will be confused at best. Understanding concepts and doctrine will allow military leaders to give political leaders sound advice on how to achieve space control as well as when space weapons need to be deployed and used.

The same approach should be applied for the development and use of space weapons for missions other than space control—specifically missile defense and force application. Again, when a threat emerges in the world that cannot be handled through either peaceful means or with traditional military methods, and a space weapon can handle such a threat, the time will have arrived to deploy such weapons.

Methods for better characterizing potential attacks and defending current space assets also need to be pursued. Improved space surveillance capabilities are needed to ensure better knowledge of future activities in space. Improvements are needed on future satellites to better indicate when and if they are being jammed or attacked. An anomalous event on a satellite can be caused by many reasons: the impact of the space

environment, system anomalies on board the spacecraft, or by the intentional efforts of an enemy. Distinguishing between these events is difficult, but the correct response depends on knowing the specific cause. Satellites today have a poor capability to identify these causes, and this capability needs to be improved to better identify problems and conflict.

The deployment of space weapons should be treated as a last resort by this nation—but not as an unthinkable option. United States policy has long been to believe in the concept of employing force only as a last resort, but U.S. presidents have used military force when the situation demanded. The same should be true of space weapons. The United States should make every effort, political and otherwise, to create a future in space where weapons are not required. The deployment of such weapons will create the need on the part of future enemies to attempt to respond in some way to such a step—and how they respond is difficult to predict. It would be better to control the future through peaceful agreements that are in the mutual interests of all parties involved. At the same time, the United States should be prepared to deal with conflict in space if these other means fail. This means developing and testing a broad spectrum of space weapons.

### **Recommendation 7**

*The Department of Defense should create a new organization responsible for all military operations dealing with space and information.* The current U.S. Space Command organization is fundamentally flawed—and the current proposal from Unified Command Plan 21 for a U.S. Space and Information Command doesn't go far enough. The current organization fails to take full advantage of the unique attributes of either space or information. Responsibilities for military space operations are spread out through numerous government agencies and the responsibilities for information are just as confusing. The future in space and information will only become more complicated. Now is the time to take action to consolidate responsibilities for these areas into a single organization.

Unified Command Plan 21 (UCP 21) takes a step in the right direction, but until the Commander in Chief of the U.S. Space and Information Command can sit in front of Congress with the responsibility for all space and information operations related to national security, the organization will be flawed. The critical concept of unity of command is necessary for effective and efficient military operations—one mission, one commander. The new U.S. Space and Information Command must therefore assume responsibility for all national security space and information operations—including many of the current functions of the current U.S. Space Command, the National Reconnaissance Office, the Defense Information Systems Agency, and so forth. The focus of the new command should be on operations, not on acquisition or development. This organization could begin to develop and understand its unique missions while they are still in their early stages. Many organizational difficulties (for example, the role of the CIA and numerous agencies currently involved in information warfare) block an immediate transition. The current Space Command organization is also not conducive to such drastic change. The reorganization proposed in the UCP might be a good first step, as long as a longer-term goal of more drastic change is clear. The sooner a more complete change can be implemented, the better the nation's security will be in the long run.

### **Recommendation 8**

*The military services, particularly the Air Force, must continue to meet the responsibilities for funding the military space program.* A separate service to execute current space missions is not required. The three services today (Army, Navy, and Air Force) are in the process of effectively integrating space into their warfighting capabilities. Looking toward the future, space doctrine is indeed a natural progression from Air Force doctrine, and the Air Force is the logical organization to lead the effort in further development of these concepts and ideas. A robust Space and Information Command would solve many of the organizational problems by assuming operational control of all national space and information systems. The military services should retain the responsibility to organize, train, and equip these forces.

However, the perception that the services have not fully supported the development of space during the last few years is real and must be addressed. Faced with severe budget pressures the services have all sacrificed

future space programs to help pay other critical funding requirements. Congress has taken note and has been severely critical.

Delaying the Space Based Infrared System (SBIRS), the highest priority military space program, for two years is viewed by space proponents as a decision equivalent to the Army delaying deployment of the M-1 tank because the M-60 could last a couple more years; or the Air Force delaying the development of the F-22 fighter because the F-15 could last a couple more years; or the Navy delaying their newest carrier because their oldest could last a couple more years. It is not just about how long a system lasts, but the need to update out-of-date technology and take advantage of new capabilities. Failure to treat space systems with equal importance to other military programs sends the wrong message.

The Air Force needs to support SBIRS as one of its highest priorities—as important to the Air Force as the F-22. The other services need to support further development of space as well—at the expense of their own infrastructure if necessary.

There may be a day in the future when the United States determines a need to deploy space weapons. At that time, warfare will be conducted in the actual medium of space, and there may be a need for a separate space service. That would be a logical point to make such a decision. Making that decision now would be a mistake. Space does not currently require such oversight and nurturing—if the Air Force and the other services can meet the actual *and perceived* need to be good stewards of military space. If the current military services fail to step up to this challenge, a decision for a space service could result well before its time and well before many of the critical policy and doctrine questions have even been addressed.

### **Recommendation 9**

*The United States should structure its laws and regulations governing the commercial use of space to ensure U.S. companies remain or become the leaders in the global marketplace.* All space industries are global in nature. Navigation, weather, imagery, communications—all were developed in the United States. The U.S. space industry, once a free world monopoly, now faces increasing competition from around the world. Complicating matters even further, every one of these commercial developments inherently has significant military capability within it. Commercial navigation, commercial weather, commercial imagery, and commercial communications can all be used to help a potential enemy close the gap with the information dominant United States.

Any action that the U.S. government takes that prevents U.S. companies from competing in international markets is a threat to national security. If U.S. companies are the leaders of the industry, and the world comes to them for a particular space service, the United States as a nation at least maintains some insight and control over this service in times of conflict or crisis.

At the same time, any action that U.S. companies take to transfer critical technologies overseas is also a threat to national security. Even if the technology is “only” for communications satellites, that technology still advances the state of the art overseas and allows international companies to provide improved capabilities in competition with the United States.

In a global economy, however, it is impossible for a nation to isolate itself and still be able to compete. The United States must trade overseas with space services, and therefore, industry must be allowed some leeway in the exchange of technical information.

In March 1999, the State Department, in order to comply with the 1999 National Defense Authorization Act, assumed responsibility for satellite export controls. However, according to John Holum, acting Undersecretary of State for Arms Control and International Affairs, they are having extreme difficulty in staffing this critical function. Shortly after assuming responsibility for this function, he stated, “Congress mandated new staff . . . but there wasn’t any money provided for that.”<sup>9</sup> International customers responded negatively. In its 5 April 1999 issue, *Space News* reported that “three large satellite operators from Canada, Europe, and Asia said new U.S. technology-transfer regulations will make it difficult, and perhaps impossible, for them to purchase U.S. satellites.”<sup>10</sup> It was clearly implied that these operators, previous U.S. customers, would go to other international markets to obtain these services.

Given these sets of circumstances, the national space policy should direct the following: remove restrictions that prevent U.S. industry from maintaining a leadership role in the space marketplace, enter into agreements with industry to allow some control over international services in times of international crises, and allow industry to enter into export agreements when it can be demonstrated that no threat to national security will be created. The state department is the best place to coordinate these export licenses. A new joint agency group under the state department should be fully funded and designated responsible for processing these licenses in a much more expeditious manner. The United States cannot afford to miss out on international opportunities because of government bureaucracies. If these actions can be implemented, the issues concerning difficult and controversial subjects like remote sensing and imagery resolution should be easier to resolve, and the United States should be able to capture the majority of the space business in the twenty-first century—good for business, good for national security.

The United States has an amazing opportunity to implement a vision that will help shape the world in the twenty-first century. Space is only one of many places where this opportunity presents itself, but space is unique in many ways. Space envelops the earth and reaches to the stars. Space has the ability to effect, in some way, every person's life on this planet. Without a peer competitor, the United States has the opportunity now to take advantage of the unique attributes of space, but the nation has not yet stepped up to the challenge.

Conflict in space is inevitable. No frontier exploited or occupied by humans has ever been free from conflict, but the United States now has a remarkable chance to mold and shape how these conflicts will be resolved in the future.

There is no threat right now that demands the deployment of space weapons. Opportunities exist in the Conference on Disarmament and through bilateral negotiations to make progress in eliminating the future need for such weapons. At the same time the United States cannot afford to be caught off guard in the future—the nation cannot afford to be second in the deployment of space weapons. The only way to ensure this happens is through a robust development program for an entire spectrum of space control capabilities—deferring the decision to deploy space weapons until a clear requirement exists.

If the United States remains strong, if space is a clear vital national interest, if we negotiate openly with the nations of the world, if we allow our industry to fully exploit space and become the unquestioned leader of the information age, and if we develop the means and methods to effectively deal with the inevitable conflicts that will occur in space in the next century, perhaps President Kennedy's new ocean could remain primarily a "sea of peace."

If, however, the United States continues without an integrated national strategy, if we fail to define a vision of space for the future, if we decide to develop space weapons in a vacuum apart from the rest of the space community, if we refuse to negotiate with other nations, or if we fail to fully establish a comprehensive commercial space policy, then the ocean will undoubtedly become "a terrifying new theater of war."

The opportunity exists now, but it won't last forever. It requires a vision, and it requires decisions. It requires a national debate on the issues. It requires a desire to eliminate space weapons in the future, while at the same time developing the very same weapons. It requires an understanding that, if a threat does appear in the future, the United States may very well have to deploy these weapons. It requires an understanding of a wide variety of very complex issues, but most importantly, it requires an integrated national strategy.

In his first annual address to Congress, the first state of the union address, President George Washington addressed Congress about its most important duties. The date was 8 January 1790 and President Washington said:

Fellow Citizens of the Senate and House of Representatives . . . Among the many interesting objects, which will engage your attention, that of providing for the common defense will merit particular regard. *To be prepared for War is one of the most effectual means of preserving peace.*<sup>11</sup>

In the 209 years since these remarks were spoken, little has changed. If the United States desires to preserve peace in space in the next century, the nation must be prepared for war. Such preparations do not demand the deployment of space weapons, but they do demand their development. In order to fully exploit the tremendous riches and opportunities in space, the United States must be willing to effectively combine all the instruments

of national power in a concerted effort toward the realization of a future vision. If the nation prepares now, the vision has no limits. If we fail to prepare, that vision will be defined by others—and not likely in a way the United States would prefer.

### Notes

1. The White House, *A National Security Strategy for a New Century*, May 1997.
2. Robert McNamara and James Webb, Memorandum to the President, 8 May 1961. A copy of this memo was presented at a conference at the Woodrow Wilson Institute, Washington D.C. on 25 March 1999, by Professor John Logsdon, Space Policy Institute, George Washington University.
3. Kenneth Bacon, Pentagon spokesman, regular Thursday briefing to the media, 24 October 1997.
4. See transcripts of Kenneth Bacon's Thursday briefings to the media September and October 1997, press release by Senator Tom Harkin (D-Iowa) criticizing administration ASAT policy and the MIRACL test in particular, 10 October 1997 and numerous criticisms from arms control organizations published on the Internet. See <[www.armscontrol.org/ACT/oct97/miraclact.htm](http://www.armscontrol.org/ACT/oct97/miraclact.htm)> or numerous citations at <[www.fas.org](http://www.fas.org)>.
5. "China Building Laser, A Key Weapon," *Hindustan Times*, New Delhi, India, 4 November 1998. See <[www.hindustantimes.com/nonfram/041198/detFOR05.htm](http://www.hindustantimes.com/nonfram/041198/detFOR05.htm)>. Also see Los Angeles Times and Washington Post reports located at <[www.wichitaeagle.com/news/military/docs/laser1129\\_txt.htm](http://www.wichitaeagle.com/news/military/docs/laser1129_txt.htm)>.
6. *The American Heritage Dictionary of the English Language*. American Heritage: New York, 1969, 268. Commons: n. A tract of land belonging to or used by a community as a whole, or the right of a person to use the lands or waters of another, as for fishing or grazing cattle.
7. The White House, National Science and Technology Council, *Fact Sheet: National Space Policy*, 19 September 1996, 2. A copy can be found at <[www.hq.nasa.gov/office/oss/spacepol.htm](http://www.hq.nasa.gov/office/oss/spacepol.htm)>.
8. The author heard General Piotrowski make these kinds of remarks on numerous occasions in the 1990s. In most instances, General Piotrowski was specifically referring to a Space Based Laser (SBL) when he stated that "the one thing the United States could not afford to be was second."
9. Warren Ferster, "Satellite Export Licensing Caught in Budget Dispute," *Space News*, 29 March 1999, 1.
10. Peter B. de Selding, "Satellite Buyers Blast United States Rules: American Firms Faceirate Customers," *Space News*, 5 April 1999, 1.
11. George Washington, *The Writings of George Washington*, ed. John C. Fitzpatrick, 30 (Washington D.C.: United States Government Printing Office, 1939), 491.



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