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SPACE AND AIR FORCE: RHETORIC OR REALITY?

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## *Preface*

This paper addresses the key issues required to transition to a Space and Air Force. It does not focus on the issue of whether there should be a separate Space Force, but considers a separate Space Force a possible result of not working the issues outlined in this paper. The Air Force claims it is transitioning to a Space and Air Force. Despite this claim, the Air Force has not made space a priority in terms of education, attitude, leadership, budget, or understanding.

We'd like to thank Major Carmen Perone, a true space warrior, for providing outstanding assistance and guidance.

Though we focused on the application of spacepower, we think the true integration of air and space will come from a combination of spacepower, current airpower, and unmanned combat aerial vehicles controlled remotely through space.

### *Abstract*

The Air Force, as part of its vision for the 21<sup>st</sup> century, claims to be an *Air and Space* Force transitioning to a *Space and Air* Force. In order to reach the goal of becoming a Space and Air Force, or using more recent terminology an Aerospace Force, the Air Force must first understand the need for space and how space can be applied to meet requirements set forth in the National Security Strategy (NSS). Joint Vision 2010, the Air Force's Global Engagement, and several long-range plans all establish requirements that can only be fulfilled through the application of spacepower. To capitalize on the full potential of space, the Air and Space Force must cultivate a complete understanding of the medium (space-mindedness), modify the current National Space Policy and international agreement obligations, develop new space doctrine, and fund and acquire new space systems.

A complete understanding of the space medium or "space-mindedness" can be achieved by educating the American public, the national and military leadership, and the space leadership in particular. Current national space policy must be changed to allow the Department of Defense to defend both national and commercial space assets and ensure the space assets supporting worldwide military operations are protected. Since most of the treaties require a five-year withdrawal period, the U.S. should not wait until a national crisis or space attack occurs to start deploying a national space defense. Nor should it ignore how a force of omnipresent, unmanned, pre-deployed systems would

enhance the Aerospace Expeditionary Force concept with the capability to deliver combat power anywhere in the world within minutes.

New space capabilities will not be cheap or simple. The U.S. must maintain its lead in space by major funding and technology development in space. New space systems must be acquired capable of *fighting* in space and from space, not only operating as a force enhancement to air, land, and sea forces. These new systems must be integrated into the joint arena by proper development of space doctrine, to include space force enhancement, space control and space force application missions. This space doctrine must be included in joint doctrine, then trained and exercised for maximum combat efficiency.

Only by establishing the firm requirements for space systems and overcoming the significant obstacles to spacepower development can the Air Force realize its vision of transitioning to a true Space and Air Force.

## Chapter 1

### Introduction

*The Air Force has identified itself with the air weapon...transformed into an end in itself when aircraft or systems, rather than missions, become the primary focus. The absence of an integrating vision unleashes bad tendencies: weak ties to the institution, loyalties given to airframes or commands, and a focus on systems before missions. Without a unifying theme, there is no basis for tough decisions...*

— Carl H. Builder<sup>1</sup>

At the 1996 Corona Conference, senior Air Force leadership addressed the issue of whether there should be a separate Space Force before 2015. They decided a separate Space Force is not needed *because* the Air Force is already an Air and Space Force and would take the necessary steps to transition to a Space and Air Force.<sup>2</sup> Their decision implies that in the future, spacepower will become even more important than airpower in supporting the National Security Strategy. If implemented, the concept would also negate criticisms by Carl H. Builder (quoted above) by providing a strategic vision of the Air Force as the Space and Air Force of the future. Air Force leaders show *in statement* that the Air Force “institutional leadership” is not “devoted to old means [aircraft] more than the old ends [strategic force application]”<sup>3</sup> as Builder claims. However, the concept of the Space and Air Force outlined by senior Air Force leadership in 1996 is not gaining full support as the service debates “Air and Space” versus “Aerospace” and fails to make the tough budget decisions that would make spacepower credible. Evidence of the failure

of the Air Force to take the necessary steps towards a Space and Air Force can be seen at the highest level of government, therefore Builder's quote is still accurate. Senator Bob Smith, chairman of the subcommittee that funds the defense department's space programs, chastised the Air Force for dedicating its space budget to support air and ground warfare.<sup>4</sup> He recommends either mandating special budget and acquisition authority to U.S. Space Command or creating a new Space Force.<sup>5</sup>

What must the Air Force do to become the Space and Air Force of the future? The question of what unique aspect space brings to meet national security needs must first be answered. This paper will assess the current strategy and vision of spacepower, which leads to the need to create tenants of spacepower.

The Air Force must next force a cultural change in order to set the foundation required for a transition to a Space and Air Force. This "spacemindedness" must include not only a thorough understanding of the space medium, but a revolution in the entire attitude towards spacepower. The creed should not only be "space support to the warfighter," but "space warfighting" and more specifically "space force application." The only way to achieve this revolution is by establishing strong space leadership with the where-with-all to advocate new missions, mentoring the space corps, and funding new systems and concepts to bring them into reality.

The entire idea of "space-mindedness" can not be achieved without first breaking the current limitations set on the use of spacepower—national space policy and international treaty constraints. Once relieved of the limitations of policy and treaties, doctrine development is essential to integrating spacepower into the fight and focusing spacepower requirements for acquisition.

There is a wide range of potential space systems outlined in a variety of studies, but the Air Force has not made the difficult trade-offs required to develop them beyond conceptual studies. It is time to make a concerted effort towards transitioning to the Space and Air Force of the future. The following chapters will address these issues and propose solutions.

### Notes

<sup>1</sup> Carl H. Builder, *The Icarus Syndrome*. New Brunswick: Transaction Publishers, 1994, Ch. 1.

<sup>2</sup> 14 AF/CC's call, MGen Veseley, Summer 1996.

<sup>3</sup> Builder, ch.3.

<sup>4</sup> Peter Grier, "A New Service for the Space Mission." *Air Force Magazine*. January 1999, 14. On statements made by Senator Smith to an Institute for Foreign Policy Analysis Annual Conference.

<sup>5</sup> *Ibid.*, 14.

## Chapter 2

### Spacepower Requirements

*As we have protected national and economic security on land, sea and air for more than 200 years, we must be prepared to defend our interests in space.*

— General Howell M. Estes III

#### Why Spacepower?

Before launching into debate over what is required to transition to a Space and Air Force, one should ask why space is so critical in the first place. General Howell M. Estes III explained the crucial need for protecting America’s investment in space in an article he wrote for Mission HOME (Harvesting Opportunity for Mother Earth – a national initiative for rekindling enthusiasm for U.S. space endeavors).<sup>1</sup> The article is included as Appendix 1, but some of the key points are worth mention.

First, “nearly half of the 600-plus satellites [in orbit] are American. They represent an investment of more than \$100 billion. *U.S. News and World Report* estimates we will spend more than \$250 billion in space by the year 2000, and that another 1,800 satellites will be on-orbit by the end of the next decade.”<sup>2</sup> Not only are space assets essential economically, but the military is becoming more and more dependent upon space assets to enhance their capabilities. Most notable are the force enhancement areas of

navigation, missile warning, surveillance, intelligence, weather, and communications. Few military actions take place without some impact from space assets.

Protecting space for commercial use is just as important as protecting the military use of space. Space is so integrated into American lives, most people fail to realize the impact of satellites on their lives. Americans take for granted their dependence on the free use of space for credit card purchases, bank transactions, television shows, maps, flights, and weather reports. Without the fleets of satellites serving U.S. interests, “Life as we know it would not be possible,” says John Pike, an analyst with the Federation of American Scientists in Washington<sup>3</sup>. As an example, when the GALAXY IV satellite failed in May 1998, the failure knocked out service to 90 percent of the nation’s 45 million pagers. It also shut down communication links to thousands of manufacturers, hospitals, news organizations, and financial companies—including National Public Radio, Ford dealerships, the National Weather Service and the Chicago Board of Trade.<sup>4</sup> If this is the damage caused by *one* failing satellite, imagine the damage a planned attack on several satellites could cause.

The need for protection of space is clear, but what about the offensive use of space? The trends in the Air Force include vast reductions in manpower, fewer forward bases, and increased global responsibilities. The U.S. military must observe and respond globally to any threat—to include use of force. The Air Force developed the Aerospace Expeditionary Force concept to respond to crisis, but it could take as long as 72 hours to deploy. Even then, problems with host nation support and sovereignty rights may preclude deployment of terrestrial based systems in order to apply force when and where needed. Another trend in the nation’s use of the military is to minimize risk to American

warfighters by using superior technological weapons. This is evidenced by the frequent use of Tomahawk Land Attack Missiles (TLAMs) even when manned aircraft could do the job cheaper. Why use TLAMs? Simply put, it keeps Americans out of harms way. Space *could* fill the response void with its “ultimate high ground,” but the U.S. must be willing to invest in developing doctrine and systems to meet the nation’s needs. The initial cost of deploying space assets is high, but once they are in place the cost of keeping them there is low and availability is nearly instantaneous.

The force application that space could “bring to the fight” simply is not available today. In order to get there, current visions and long range plans need to specifically address space goals and build milestones to achieve them.

### **National Security Strategy**

The National Security Strategy’s (NSS) central premises are to *shape* the international environment, *respond* to crises, and *prepare* for an uncertain future while promoting prosperity and democracy. A specific reference to space includes,

“We are committed to maintaining our leadership in space. Uninhibited access to space and use of space is essential for preserving peace and protecting U.S. national security as well as civil and commercial interests. It is essential to our ability to shape and respond to current and future challenges in the international environment. Our space policy objectives include deterring threats to our interests in space and defeating hostile efforts against U.S. space assets if deterrence fails, preventing the spread of weapons of mass destruction to space, and enhancing global partnerships with other space-faring nations across the spectrum of economic, political and security issues.”<sup>5</sup>

The NSS also specifically highlights the need for missile defense and information infrastructure protection—including the need to adapt the Anti-Ballistic Missile Treaty to allow theater missile defense systems. At the strategic level, the NSS supports the need

for maintaining U.S. leadership, defending space assets, and allows weapons of non-mass destruction in space. These tenants of the National Security Strategy however, are limited by the National Space Policy.

## **National Space Policy**

“The National Science and Technology Council is the principle forum for resolving issues related to national space policy.”<sup>6</sup> Keeping the control of the National Space Policy under the guise of science and technology limits the military’s influence and, hence, the use of space for national security matters. One of the White House National Space Policy’s primary goals is “to strengthen and maintain the national security of the United States.”<sup>7</sup> It then claims space is for the “peaceful purposes” of mankind. Unfortunately, these are competing goals. Past administrations have emphasized the “peaceful purposes” goal which to date has precluded placing any type of weapon in space. The policy also precludes unity of effort within U.S. space forces by dividing space responsibility between national security and civil space systems. National security space systems are further divided into those overseen by the Secretary of Defense and those overseen by the Director of Central Intelligence. Further complicating matters, all actions taken among and between these departments “shall be consistent with U.S. law, regulations, national security requirements, foreign policy, international obligations, and nonproliferation policy.”<sup>8</sup>

Given these divisions and restrictions (specific restrictions of space treaties are discussed in Chapter 4), the National Space Policy sets out guidelines for national security issues. The general theme is *support* to worldwide military operations primarily through monitoring and intelligence activities. The more specific guidelines of the

National Space Policy discuss such concepts as “assuring hostile forces can not prevent our own use of space,” “defending against enemy attack,” and “countering... space systems and services used for hostile purposes,” and even specifically calls upon the defense space sector to “develop, operate, and maintain space control capabilities,” but then reiterates the need to stay within the restrictive bounds of current space treaty obligations.<sup>9</sup> Absent from all guidelines is any notion of force application from space with the possible exception of systems linked to a ballistic missile defense program.

### **National Military Strategy**

The National Military Strategy (NMS) implements the National Security Strategy and echoes the need to *shape, respond, and prepare*. General Shalikashvili, the former Chairman of the Joint Chiefs of Staff, stresses the global and asymmetric nature of the strategic environment, reiterates the core competence of the armed forces (“*we fight*”) and stresses the need to exploit the technological advances that are changing warfare.<sup>10</sup> In preparing for the future, the need for information superiority (to which space is closely tied) and technical innovation are particularly highlighted. Though space forces are not specified, they do fall in the realm of “new systems and equipment [that] will improve our ability to conduct decisive operations and achieve full spectrum dominance.”<sup>11</sup> Additionally, space control is included among the key strategic enablers, though the NMS does not discuss *how* to conduct space control operations to achieve space superiority. Space systems should not only be considered force enablers, but force capabilities.

If U.S. armed forces exploit the revolution in military affairs to our advantage, space could provide a global platform in which we can deter and ultimately “fight” anywhere, anytime. Space systems could directly contribute to the accomplishment of the military’s

strategic concepts: strategic agility, overseas presence, power projection, and decisive force.

## **Joint Vision 2010**

“Joint Vision 2010 is the conceptual template for joint operations and warfighting in the future.”<sup>12</sup> According to CJCS Instruction 3100.01, 1 Sep 97, Joint Vision 2010 is a long-range vision provided so services can study the emerging threats, technologies, and global changes and their effects on joint doctrine, future force structures, requirements and capabilities. Implementation of the vision results in changes to doctrine, force structure, material, personnel programs and training.<sup>13</sup> Though Joint Vision 2010 does not highlight specific systems and capabilities, the underlying theme of the entire document is towards using technology and information superiority to meet the challenges of a much wider range of global, unpredictable threats. A few of the key concepts included within Joint Vision 2010 are winning engagements while protecting lives and resources, power projection enabled by overseas presence, long-range precision capability combined with a wide range of delivery systems, dominant battlespace awareness, force protection, and the need for greater mobility with increased dispersion. These concepts and others are integrated into four key operational concepts designed to achieve full spectrum dominance: dominant maneuver, precision engagement, full dimensional protection, and focused logistics. Space has unique capabilities that can fulfill these concepts, but the specific capabilities and systems designed to achieve the joint vision are left to the services. For the Air Force, that implementing vision is *Global Engagement*.

## **Global Engagement**

*Global Engagement* reiterates the decision of the 1996 Corona conference by restating the intent to transition from an “*air* force into an *air and space* force on an evolutionary path to a *space and air* force.”<sup>14</sup> The document clearly states the priority of space as a critical new mission in which the Air Force must take a lead role. While the document mentions the limitations on achieving the full potential of space (national policy, international events, and threats), the roles of space control and force application in support of the warfighter are not dismissed. In fact, *space superiority* is included in the stated core competencies of the Air Force: *air and space* superiority, global attack, rapid global mobility, precision engagement, information superiority, and agile combat support. Furthermore, the Air Force vision emphasizes innovation as a critical element in the transition to a space and air force.<sup>15</sup> Giving additional credence to the Air Force position on the importance of space, visionary studies reveal the importance of spacepower in the future.

## **Visionary Studies**

Though the concept of spacepower is surfacing in the current strategy and vision of U.S. armed forces and in that of the Air Force in particular, it is touted in a futuristic sense, or under the caveats of limitations imposed by the National Space Policy and treaty limitations. In the more distant studies analyzing the future of the Air Force, spacepower takes on a more dominant role. According to a 10-month Air University study, *Air Force 2025*, “Space systems are clearly the power investments to be made” and “there is a major increase in the utility of space-oriented systems as opposed to

atmospheric ones.”<sup>16</sup> In fact, 6 of the top 10 capabilities discussed in Air Force 2025 are directly related to advances in space technology.

According to General Michael P. C. Carns, former Air Force Vice Chief of Staff, a similar study chartered by Air University in 1994, SPACECAST 2020, was a conscious effort to improve the linkage between space technology, opportunity, and operational military mission execution.<sup>17</sup> The study was originally chartered to look at required technologies, but quickly became focused on the space realm. SPACECAST 2020 identified three functional areas of space activities: global presence, global reach, and global power. It “makes clear the two paramount military advantages of space—unparalleled perspective and very rapid access to the earth’s surface” and reiterates that if the U.S. is to take advantage of the ultimate high ground, it must invest in key technologies now.<sup>18</sup>

More recently (April 1998) and with a more operational perspective, USSPACECOM unveiled its long-range plan. It calls for assured access to space, space control, strikes from space, and the migration of many surveillance capabilities currently delivered by surface and air platforms to space.<sup>19</sup> In the words of General Howell M. Estes III, former Commander-in-Chief of U.S. Space Command and Commander, Air Force Space Command, “the time has come to address, among warfighters and national policy makers, the emergence of space as a center of gravity for DOD and the nation.”<sup>20</sup>

## **Tenants of Spacepower**

With the requirements for space clearly established at all levels of strategy and within the armed forces’ visions and long range plans, the Air Force must make a concerted effort to develop spacepower employment doctrine and a proper mindset for

spacepower. Air Force basic doctrine has begun to integrate space concepts, but mostly in a supercilious way. A concerted effort needs to be made to develop new tenants of space power that will meet the needs of strategy (recommended for further study). Space can make a significant impact to the key concepts of strategy and vision outlined in Table 1 below.

**Table 1. Key Concepts of Strategy and Vision**

<b>National Military Strategy</b>	<b>Joint Vision 2010</b>	<b>Global Engagement</b>
Strategic Agility	Full Spectrum Dominance	Air and Space Superiority
Overseas Presence	Dominant Maneuver	Global Attack
Power Projection	Full Dimensional Protection	Rapid Global Mobility
Decisive Force	Focused Logistics	Precision Engagement
	Precision Engagement	Information Superiority
		Agile Combat Support

The tenants of spacepower to support these key concepts of strategy and vision can only be generated through the development of space-mindedness and a concerted effort to make spacepower a reality as identified in the next chapters.

### Notes

- <sup>1</sup> General Howell M. Estes III., “Protecting America’s Investment in Space.” 1.
- <sup>2</sup> Ibid., 1.
- <sup>3</sup> Charles Pillar. “Commercial Satellites—Telecom’s Achilles’ Heel.” *Los Angeles Times*, January 17, 1999.
- <sup>4</sup> Ibid.
- <sup>5</sup> The White House, “A National Security Strategy for a New Century.”, May 1997.
- <sup>6</sup> The White House, “National Space Policy: Fact Sheet.”, September 19, 1996.
- <sup>7</sup> Ibid.
- <sup>8</sup> Ibid.
- <sup>9</sup> Ibid.
- <sup>10</sup> The Joint Chiefs of Staff, “National Military Strategy of the United States of America.”, 1997, (introduction).
- <sup>11</sup> Ibid., 18.
- <sup>12</sup> Ibid., 17.

## Notes

<sup>13</sup> Joint Operations Coursebook, “Joint Strategic Planning System: CJCS Instruction 3100.01.”, 1 September 1997, 58-59.

<sup>14</sup> Department of the Air Force, *Global Engagement: A vision for the 21<sup>st</sup> Century Air Force*. Washington, DC, 7.

<sup>15</sup> *Ibid.*, 9.

<sup>16</sup> Air University. *Air Force 2025: Executive Summary*. Maxwell AFB AL: Air University Press. 23 August 1998, 34.

<sup>17</sup> National Security Industrial Association. *SPACECAST 2020 Symposium, Gen Michael P. C. Carnes Closing Remarks*. Washington, D. C., 10 November 1994, 3.

<sup>18</sup> Air University. *Spacecast 2020: Introduction*. Maxwell AFB AL: Air University Press, 20 June 1994, i-ii.

<sup>19</sup> Dudney, Robert S. “The New Space Plan.” *Air Force Magazine*. 22-24.

<sup>20</sup> *Ibid.*

## Chapter 3

### Space Mindedness

*Recently the service announced its vision for the Air Force of the 21<sup>st</sup> century. Central to this vision, the leadership of today's Air Force agrees, is a transition from an air force to an air and space force on an evolutionary path to a space and air force. Clearly, as the service moves in this direction over the coming years, awareness of the roots of the Air Force's space heritage must increase and broaden.*

— General Thomas S. Moorman, Jr.

#### General Billy Mitchell Correlation

General Billy Mitchell spent a good part of his career advocating for a separate air service in an attempt to gain air power credibility and acceptability throughout the Department of Defense. He believed the unique aspects of air warfare required a distinct class of air operators.<sup>1</sup> It was this “community of airman” and its “air-going people” who experienced and therefore understood the medium of the air.”<sup>2</sup> In General Mitchell’s view, these men possessed what he called “airmindedness” and he thought they should have full control over its operation. However, Mitchell went even further. Because he had a difficult time gaining acceptance for his air theories through Department of Defense channels, Mitchell tried to gain the support of the American public. Mitchell knew the American public had a fascination with their new airplane and in a way had their own form of “airmindedness.” He believed the public would understand it was the

airplane that would not only autonomously protect the United States and achieve an independent victory in war, but would also do it more cheaply and more effectively than either the Army or the Navy.<sup>3</sup>

So what does “airmindedness” have to do with space? There is direct correlation. Billy Mitchell wrote his theory of air power at a time when the U.S. was just beginning to use the medium of air. There were very few who understood the medium other than what they read in the newspaper. The U.S. leadership, both political and military, were unwilling to spend precious dollars to develop “*flying machines*” based on the theories of a few air zealots. In Mitchell’s view, the leadership couldn’t see past their clouded vision and therefore would not benefit from exploitation of air. They were too fixated on fighting future wars using old theories and old technologies. General Howell M. Estes III said it best in a briefing he presented at the Air Force Association National Symposium in Los Angeles: “These commanders, though conscientious and capable, did little more than view the airplane as an extension of the Army’s ability to fight the infantry, or artillery, or the mechanized armor. They did not have the expertise, the vision, or incentive to view the airplane in any other way. To discern its awesome offensive striking power or its ability to be decisive in its own right was simply never considered.”<sup>4</sup> Not giving up, Mitchell took his argument to the general population but from a different angle. Instead of arguing his theories based on an offensive approach, Mitchell softened his approach to a more palatable defense theory. He argued that the nation would benefit more by using the faster and more efficient airplane to defend its littorals.

## Old Aerospace Theory

The U.S. Air Force today has the same lack of awareness and vision of the space medium that the Army had of the air medium in the first half of the 20<sup>th</sup> century. Under General Fogleman, the Air Force vision was to transform from an Air Force to an Air and Space Force and eventually to a Space and Air Force. Clearly, his vision was first, an understanding that space was obviously a different medium than air, and second, that space would become increasingly more important in winning our nation's battles. General Fogleman had "spacemindedness." Much like General Mitchell's "airmindedness," someone with "spacemindedness" is an individual who understands the space medium and can visualize its potential. Within the Air Force there is a small "community of airman" that truly understand the opportunities in space. General Fogleman understood that in the near future, the benefits from exploiting space would outweigh the benefits from exploiting air.

Under the guidance of the new Air Force Chief of Staff, the Air Force vision is "Aerospace Force." The problem with this vision is it shows a lack of understanding in the uniqueness of the two mediums and it reverts back to an old vision we had during the Eisenhower administration. The term "aerospace" first appeared in Air Force doctrine in the year 1957.<sup>5</sup> On 29 November 1957, Chief of Staff General Thomas D. White said, "As airpower had provided the means to control operations on land and sea, so in the future whoever has the capability to exert control of space will likewise possess the capability to exert control of the surface of the earth."<sup>6</sup> Clearly, General White had "spacemindedness" beyond his years had he stopped there, however, he didn't. He went on to say, "I want to stress that there is no division, per se, between air and space. Air

and space are an indivisible field of operations to provide proper national security.<sup>7</sup> Although this may have been an Air Force ploy for control of the space mission, it did show a serious lack of “spacemindedness.”

Why are the mediums of space and air so different? Frankly, the answer is very basic and one a person with some degree of “spacemindedness” must understand. The difference has everything to do with matter. That is, the air medium has matter and the space medium does not. That basic difference makes operating in each of the mediums completely different. In air, gravity works against or for the aircraft and the atmosphere aids its propulsion. In space, the spacecraft has no gravity (relatively speaking) working for or against it and the medium provides no matter to aid the propulsion. Once a spacecraft is in motion, it stays in motion in one precise direction and is unable to tactically maneuver. This difference in matter results in many dissimilar capabilities. For sake of explanation, this paper concentrates on the differences in range, speed of response, and time on target. Since a spacecraft continually orbits the earth and operates anywhere from 300 to 22,300 nautical miles above the earth, its range of operation is much broader than an aircraft and it can respond in a moment’s notice, 24 hours a day, relatively anywhere on the surface of the earth. Lastly, relative to an aircraft, a spacecraft can loiter over a target much longer (or revisit a target more frequently) and can do so without putting an airman in harms way.

### **The American Public**

As the commercialization of the space medium grows exponentially, the American public’s “spacemindedness” will undoubtedly increase. However, as of today there is a serious lack of knowledge of our capabilities and vulnerabilities associated with space.

According to the October 1998, National Security Strategy, “Over 500 United States companies are directly involved in the space industry, with 1996 revenues of \$77 billion projected to reach \$122 billion by 2000.”<sup>8</sup> (A conservative estimate compared to the *U.S. News and World Report* estimate of \$250 billion described in Chapter 1.) With such a large investment in space the American public needs “spacemindedness.” A prime example, as mentioned earlier in this paper, is the GALAXY IV satellite failure. Because of a lack of “spacemindedness” and a fear of the unknown, this failure caused a temporary panic worldwide. The majority of Americans have become complacent and apathetic with their day-to-day use of space technology. However, even the smallest interruption in the use of that technology can cause panic and national attention. The space medium definitely provides a better quality of life and economic well being for the American population, yet their lack of “spacemindedness” keeps them totally unaware of its serious vulnerabilities. As of this day, the U.S. military is unable to defend from an attack on one of our commercial or national satellites. Will it take a national crisis to force the public to increase their “spacemindedness?”

### **Air Force Leadership**

Much of the blame for a lack of “spacemindedness” throughout the space community leadership is a direct result of a lack of “spacemindedness” among our past Air Force and national political leadership. In 1962, John Rubel, then-Deputy Director of Defense for Research and Development said, “...space represented a mere continuum of the atmosphere.” He saw, “no useful purpose in such theories that suggested the vacuum of outer space would become the next battleground, or that “control” of space, whatever that implied, meant control of the earth...”<sup>9</sup> Until 1982, when Air Force Space Command

was established, Air Force leadership failed to realize the potential for “operating” in the space medium. From 1982 to present, the command continues to inherit people, missions and equipment from a number of sources. The community is so fractionalized that pulling it together under one centralized authority has been a major undertaking filled with political and structural problems. In 1983, Strategic Air Command (SAC) gave up control and operations of “fifty space and missile warning systems, bases, units, and upgrade projects...in 1984, SAC relinquished four major space (satellite) systems.”<sup>10</sup> Up until 1990 (although some still remain today), Air Force Systems Command maintained control of most of the space launch functions. It wasn’t until 1993 that Air Force Systems Command turned over all satellite operational functions to include the Air Force Satellite Control Network. As of 1960 and still today, “The National Reconnaissance Office (NRO) managed project CORONA, the sensitive reconnaissance satellite program.”<sup>11</sup> As David N. Spires noted in his book *Beyond Horizons*, “Even former Commander-in-Chief U.S. Space Command, General Charles A. Horner noted that when he assumed command of United States air forces during Desert Storm, ‘most of us over there were ignorant of the contributions of space assets.’”<sup>12</sup>

## **Space Leadership**

Can leadership in the space community be blamed for a lack of “spacemindedness” within Space Command? Yes, like in any typical large organization leadership should definitely share some of the burden. In his Air War College research report, Lieutenant Colonel Tom Clark studied high level leadership within Space Command. He found that as of the end of 1996, “From a purely “space” perspective, Air Force Space Command (AFSPC) leaders had only spent 14% of their careers in the space business with a

majority of that time spent in staff positions.”<sup>13</sup> In addition, he indicated, “from the low number of years spent in space assignments, an average of 4.1 years, AFSPC leadership has not had the opportunity to broaden within the space business. None, in fact, have “stick” time in the basic space operations systems – launch, surveillance/warning, and satellite command and control.”<sup>14</sup> Over the past two years Space Command hired the majority of its group and wing commanders from within the command, therefore “space” experience levels among the space community leadership are up fractionally, but it is important to note the experience level is on a rise and not declining.

Lieutenant Colonel Clark argues that someone had to operate this equipment prior to the establishment of Space Command in 1982. He says that, “regardless of the organizational structure within the Air Force, someone operated the systems under Strategic Air Command (SAC) and Air Force Systems Command guidance.” He asks, “so where have all those space operators gone?”<sup>15</sup> There is a difference between the people who operated the equipment prior to 1982 and those that operated after 1982. The primary difference is that technically there were no “space operators” prior to 1982. Those that operated the equipment prior to 1982 operated it under a whole different structure and had a whole different mindset than those “space operators” who operated the equipment after 1982. As David N. Spires writes in *Beyond Horizons*, “...without an Air Force major command for space, officer career progression suffered.”<sup>16</sup> Where did those that had experience with the equipment go? Many left the service or retired. Some went back into a career field where they had grown up and felt more comfortable with the system. A few tried to conform to a whole new set of rules and regulations that forced them to change their mindset and become operators. Some were successful, yet many

were not. Among the very few that remained to become “space operators,” few of them (as in any career field) apparently had what it took to become executive leadership within this new command. They are the “space operators” who had the “spacemindedness” to lead the command through the significant changes to come. As a consequence, the individuals that remained with Space Command after it was established were fairly new to the Air Force. For purpose of illustration, the average level of experience was probably less than 5 years, for a total now of approximately 22 years in the Air Force. Where have those operators gone? They are probably fairly new colonels to the Air Force and are just entering the executive leadership realm. The point is there is nothing wrong with the system, as Lieutenant Colonel Clark suggests. Those “space operators” with the most “spacemindedness” are just beginning to mature to a level where they will make the most impact. It just takes time.

### **New Space Leadership**

Based on the calculations above, the individuals with the most “spacemindedness” will not be ready for the senior leadership positions within the space community until after the year 2001 (approximately 23–25 years experience). So where does the space community get individuals to fill their senior leadership positions? Up until just recently the Air Force drew flag officers from the rated community. Although these leaders didn’t bring “spacemindedness” to the space community, they did bring something the community needed desperately. These flag officers brought with them an ingrained knowledge of what it took to be an effective operator and warfighter. After the merger with the missile community in 1992, the space community inherited another source for valuable leadership experience. Although lacking in “spacemindedness” missile

leadership brought with it a keen sense of structure and maturity that the space community seriously lacked. Just prior to 1992, the missile community was starting to mature to a point where their homegrown leaders were starting to enter the flag officer ranks. Much to the consternation of the space community that trend continues and these same individuals are beginning to develop their own “spacemindedness.” The space community should applaud the missile community’s success in growing flag officers. Not only are they more like space operators than the rated operators, but space is just now becoming mature enough to grow its own flag officers and the success of the missile community is just around the corner for the space community.

### **Summary**

In General Mitchell’s view, the airman of his time possessed what he called “airmindedness” and should have had full control over its operation. General Mitchell coined the phrase “airmindedness” to ensure those that controlled the air medium had a full appreciation of its uniqueness. The same goes for the space medium. It is essential that those that control the space medium have “spacemindedness.” There are several obstacles to “spacemindedness.” First, there is a lack of awareness of the differences in the air and space mediums. Second, the Air Force reverted back to an old “aerospace” mindset it had during the Eisenhower administration. Third, the nation as a whole has little knowledge of our capabilities and vulnerabilities associated with space. Fourth, the past Air Force and national political leadership lacks “spacemindedness.” Lastly, because Air Force Space Command is so young, the space community has a lack of “spacemindedness” among its senior leadership.

## Notes

<sup>1</sup> Lt Col Mark A. Clodfelter, "Molding Airpower Convictions: Development and Legacy of William Mitchell's Strategic Thought," *The Paths of Heaven*, 90.

<sup>2</sup> *Ibid.*, 90.

<sup>3</sup> *Ibid.*, 99.

<sup>4</sup> General Howell M. Estes III, Briefing to Air Force Association National Symposium, Los Angeles, California, 14 Nov 97.

<sup>5</sup> David N. Spires, *Beyond Horizons, A Half Century of Air Force Space Leadership* Maxwell Air Force Base AL: Air University Press, 1998, 54.

<sup>6</sup> *Ibid.*, 54.

<sup>7</sup> *Ibid.*, 54.

<sup>8</sup> The White House, *A National Security Strategy for a New Century*. Washington DC: US Government Printing Office, October 1998, 25.

<sup>9</sup> Spires, 115.

<sup>10</sup> Spires, 211.

<sup>11</sup> Spires, 272.

<sup>12</sup> Spires, 284.

<sup>13</sup> Lt Col Tom D. Clark, *The Transition to a Space and Air Force: Proposed Solutions to the Dilemma*. Air War College. Maxwell AFB AL: Air University Press, April 1997, 25.

<sup>14</sup> *Ibid.*, 27.

<sup>15</sup> *Ibid.*, 29.

<sup>16</sup> Spires, 177.

## Chapter 4

### Space Policy and Doctrine

*If the Soviets control space they can control the earth, as in past centuries the nation that controlled the seas dominated the continents...We cannot run second in this vital race. To ensure peace and freedom, we must be first.*

— Senator John F. Kennedy

Of all the obstacles to becoming an Air and Space Force none are as significant as the national space policies. Although it may take some time, the nation can increase its “spacemindedness.” Although it may be costly, the U.S. has the resources and technologies to put a weapon in space. Although the U.S. lacks experience with space force application in warfare, the military could develop space warfighting doctrine. So why hasn’t the military taken advantage of the space medium? Pure and simple, it is in conflict with the U.S. national space policy. The U.S. national space policy is the crucial obstacle to space weapon development and is a remnant of space policies developed during the Cold War. Changing these policies is controversial and complex, but the Air Force should begin to develop doctrine for using offensive weapons from the space medium.

## Cold War Legacy

The U.S. current national space policies are based on the Cold War. The National Command Authorities (NCA) began a build up of Intercontinental Ballistic Missiles (ICBMs) in the late 1950s and the Soviet Union fought to do the same. Both nations feared one or the other would gain an advantage and the winner's ideology would dominate the world. There was no stopping the huge momentum in the build up of ICBMs, but the threat from space systems was just around the corner. As David N. Spires said in *Beyond Horizons*, "In a sense, the Air Force entered the space age on the coattails of intercontinental ballistic missile (ICBM) development and President Dwight D. Eisenhower's determination to protect the nation from surprise attack." Eisenhower was determined not to let the build-up of ICBMs spill over into a build-up of weapons in outer space.

Air Force leaders, on the other hand, saw space as an untapped territory and one in which the U.S. could gain an advantage if they exploited it well. Much to their disappointment, the Air Force leadership soon learned that Eisenhower downplayed military space activities and prohibited deployment of weapons in space.<sup>1</sup> In fact,

"four days after Sputnik, General Putt, Deputy Chief of Staff for Development, and Vice Chief of Staff General Curtis E. LeMay met with Deputy Secretary of Defense Quarles to apprise him of the state of the military reconnaissance program and potential for satellite offensive operations. Quarles readily supported the Advanced Reconnaissance Program, which became the government's most important space project. Yet, when the two officers advocated an offensive space role to forestall potential Soviet satellite weapon carriers, Quarles terms directed that the Air Force leaders continue to find the policy of "peaceful uses of outer space" embraced the development of reconnaissance systems but never offensive weapon systems. Weapons in space threatened the reconnaissance assets judged vital to national security."<sup>2</sup>

## **Eisenhower Administration**

President Eisenhower did not weaponize space; however, he eagerly encouraged exploration and peaceful uses of space. Space was a new frontier and one he was willing to exploit peacefully despite disagreement from the Soviet Union over satellite overflight. The Soviet Union wanted to extend the current “air medium” overflight rules, which restricted aircraft flying over another nation’s sovereign territory without prior consent. Eisenhower on the other hand said outer space was no country’s sovereign territory and could therefore be explored and exploited peacefully. Eager to formalize his space policy, President Eisenhower signed the 1958 National Space Act. “The government formally established a dual space program comprising separate civilian scientific and military application projects. Both were directed to “peaceful,” or scientific, defensive, and non-aggressive purposes.”<sup>3</sup>

## **Kennedy Administration**

Under President Kennedy, the military saw hope for weaponizing the space medium. Space was obviously a hot topic for the 1960 presidential campaign because of the hype behind the launch of Sputnik. The Soviet Union gained a huge psychological advantage by being the first nation to launch an orbiting object into space. Kennedy was quick to highlight what the American public perceived was a Soviet advantage in his 1960 presidential campaign. “Referring to Soviet ‘firsts,’ he cautioned that if the Soviets control space they can control the earth, as in past centuries the nation that controlled the seas dominated the continents...we cannot run second in this vital race. To ensure peace and freedom, we must be first. He called for an accelerated space program.”<sup>4</sup> However, by 1961 Kennedy found his hopes for an accelerated space program, which included

offensive capabilities, were a very complex situation. Much to the military space community's disappointment, although he understood the nation was in a race for space supremacy, he did not alter the Eisenhower policy of "space for peaceful purposes."<sup>5</sup>

The tensions between the U.S. and the Soviet Union grew worse when in 1960 Soviet surface-to-air missiles shot down a U.S. U-2 spy plane. The Russians captured CIA agent pilot Francis Gary Powers with his electronic sensing equipment and Washington admitted to sending aerial reconnaissance flights over Soviet territory.<sup>6</sup> Although the incident happened towards the end of the Eisenhower administration, Kennedy inherited the complex problems of interpreting the overflight rules. The National Space Act President Eisenhower had signed restricted space reconnaissance for anything other than peaceful purposes, however Kennedy wanted to continue receiving reconnaissance photographs of the Soviet ICBM build-up. "Kennedy strictly curbed publicity on the subject (reconnaissance satellite program)...The earlier openness of reconnaissance information was cloaked in veil of secrecy that evolved to a total news blackout which Kennedy hoped would defuse the political situation. Military and government officials could not refer to reconnaissance satellites...U.S. public policy was that a reconnaissance program never existed."<sup>7</sup> In other words, Kennedy compartmentalized the space program, which resulted in fragmentation and stove piping of the entire space community. In addition, he cancelled the Satellite Interceptor (SAINT) program because it called for docking, inspecting, and if necessary neutralizing satellites. President Kennedy cancelled the program development to avoid sparking an offensive space system race.<sup>8</sup> These actions contributed to the lack of "spacemindedness" within the military from 1960 to present.

## **Space Treaties**

In the late 1960s, one of the space community's first leaders emerged on the scene with some rather bold statements. General Schreiver declared the "space for peace" slogan inhibited the space business and drew an arbitrary division between the Department of Defense and NASA.<sup>9</sup> His words drew some attention, but could not change the fragmented structure or policy of the U.S. Instead, the U.S. ratified two treaties of lasting implications to weaponizing space. First, "the United Nations passed a resolution banning weapons of mass destruction from orbiting in space. Later, in 1967, fear of a nuclear arms race in space had diminished to the point where negotiators, using the 1963 resolution as a basis for concluding a more comprehensive arrangement, succeeded in reaching agreements on an Outer Space Treaty that prohibited weapons in space."<sup>10</sup> Shortly after came the Anti-Ballistic Missile Treaty (ABM) which according to Article V, "Each Party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based. This proviso would seriously challenge the legality of President Ronald Reagan's Strategic Defense Initiative (SDI)."<sup>11</sup>

## **Carter Administration**

Although space technologies continued to progress, no significant military space policy change occurred until "under President Carter's Presidential Directive 37 made public for the first time national space principles beyond ideological intent. The directive supported the development and operation of space reconnaissance systems and the pursuit of related military support activities to strengthen national defense."<sup>12</sup> The U.S. came out of the "secrecy" closet on its space reconnaissance capabilities against the

Soviet Union. Ironically, this demonstrated more openness to the U.S. public than it did to the Soviet Union. In 1977, based on President Carter's space policy, the Air Force adopted three space policy tenets:

1. The Air Force affirms that among its prime responsibilities, are military operations in space, conducted by the letter and spirit of existing treaties and in accordance with international law.
2. As DOD executive agent for liaison with NASA, the Air Force affirms its responsibility for close coordination on projects of mutual benefit.
3. The Air Force affirms its responsibility for maintaining the freedom of space by providing needed space defense capabilities."<sup>13</sup>

Combining Carter's Directive 37 and the Air Force's new space policy, the Air Force admitted to surveillance of the Soviet Union, but within acceptable bounds of ratified treaties and for defensive purposes only.

## **Reagan Administration**

In 1980 President Reagan began a modernization campaign within the military. He was the first to advocate weaponizing space not only in terms of philosophical support, but also with the funding to support technology. In 1982, President Reagan's updated national space policy established "basic defense objectives [that] would embrace strengthening the nation's security, creating a Defense Department-NASA cooperative effort to ensure the Shuttle's use for national security and accord such missions launch priority, and deploying an operational anti-satellite weapon. The new Defense Department space policy complemented the President's national policy by stressing the need for a warfighting capability in space, and it had as its major theme the view of space as a theater of operations rather than a mission."<sup>14</sup> "He clearly emphasized the national security goal through a number of initiatives. President Reagan added increased military control of activities in space and increased private sector involvement in space ventures.

He also initiated further study of national anti-satellite capabilities and introduced SDI.”<sup>15</sup> “SDI called for space based weapons in accordance with U.S. national interests...the systems goal was the elimination of the strategic nuclear missile threat. Space was envisioned as the primary meeting ground between offensive missiles and defensive technology.”<sup>16</sup> Unfortunately the SDI concept was well ahead of its time and would run into some difficult technology, cost overrun, and treaty violation problems. Eventually SDI was cancelled, but not before providing a new understanding and vision for the space community. The military now recognized the importance of occupying and controlling the space medium. In addition, the nation as a whole had increased their “spacemindedness.”

### **Bush Administration**

Desert Storm is often considered the first “space war.” The amount of force enhancement provided from space became clear, but force application from space remained absent. The intelligence community used the national satellites to give instantaneous reports to and from the theater. Weather forecasters used military weather satellites to provide near real time and accurate forecasts. Space Command also provided timely warning of Scud launches in the theater from its infrared warning satellites. Even after Desert Storm, the space community continued to run into policy that would not allow weaponization of space. In *Beyond Horizons*, historian David N. Spires said, “The force application area confronted similar roadblocks to the use of military weapons in space. The element comprised fire support operations from space against enemy forces by means of ballistic missile defense and “power projection” operations against terrestrial

targets. The latter represented only a theoretical application, and no plans existed to include power-projection space weapons in the force structure.”<sup>17</sup>

### **Clinton Administration**

Although President Clinton showed signs of supporting weaponization of space, Eisenhower’s “space for peaceful purposes only” still remains the cornerstone for the U.S. national space policy. In establishing the Clinton Administration’s policy on space the National Command Authority (NCA) clearly identified “force application” as a key part of the policy. The White House National Space Policy directs the Department of Defense to “maintain the capability to execute the mission areas of space support, force enhancement, space control, and force application.” However, in a more pointed statement, the NCA rebuked weaponization of space by adding, “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. These policy statements cannot be construed to mean President Clinton emphatically endorses space weapons...his (President Clinton’s) administration has consistently demonstrated an aversion to such systems.”<sup>18</sup> Force application has made its way into the policy, but there remains an unwillingness to put technologies in place that apply force from the space medium.

Although the National Space Policy continues to be the biggest obstacle to space weaponization, more support is growing for space weaponization in the current Congress and among senior defense leadership.

“Their case is built around two basic convictions. First, proponents believe space is too central to America’s center of gravity. Soon after assuming command of the US Space Command, General Estes noted that

‘we are the world’s most successful space-fairing nation...One of the major reasons the United States holds its current position in today’s league of nations. But, we are also the world’s most space-dependent nation thereby making us vulnerable to hostile groups or powers seeking to disrupt our access to, and use of, space. For this reason, it is vital to our national security that we protect and safeguard our interests in space. The ability of our potential adversaries to affect our advantage in space is growing. We, in military space, are just now beginning to consider and deal with these threats. As a second basic conviction, American space weapons proponents believe that adversaries will unilaterally develop space systems in pursuit of greater relative power.’”<sup>19</sup>

## **National Security Strategy**

The U.S. national space policy toward weaponizing space will not change until the NCA is convinced the U.S. needs to control the space medium. As General Estes (CINCUSSPACECOM) said in February 1997 “we...support whatever decisions our elected leadership may arrive at with regard to space control and the weapon systems required.”<sup>20</sup> In the October 1998 version of the National Security Strategy, the NCA defined a national vital interest as “those of broad, overriding importance to the survival, safety and vitality of our nation. Among these are...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>21</sup> So, what do critical infrastructures have to do with the space medium? The NSS defines critical infrastructures as “the physical and information systems essential to the operations of the economy and government.”<sup>22</sup> The NSS also specifies, “but advances in information technology and competitive pressure to improve efficiency and productivity have created new vulnerabilities to both physical and information attacks as these infrastructures have become increasingly automated and interlinked. If we do not implement adequate protection measures, attacks on our critical infrastructures and

information systems by nations, groups or individuals might be capable of significantly harming our military power and economy.”<sup>23</sup>

In May 1998, President Clinton signed Presidential Directive 63, which made it “U.S. policy to take all necessary measures to swiftly eliminate any significant vulnerability to physical or informational attacks on our critical infrastructures, especially our information systems.”<sup>24</sup> Is the time right to weaponize space? Despite what President Clinton said upon entering the office, he made some pretty bold statements in the newly released NSS: “We are committed to maintaining our leadership in space. Unimpeded access to and use of space is essential for protecting U.S. national security, promoting our prosperity and ensuring our well-being in countless ways.”<sup>25</sup> President Clinton may be posturing for a policy change to place a weapon in outer space to protect the quality of life for the American people.

### **National Military Strategy**

The Chairman of the Joint Chiefs of Staff (CJCS) supports the NSS by issuing the National Military Strategy (NMS) based on what the NSS indicates are the threats to the U.S. national security. The NMS mentions that there is a threat from the space medium, but the response to the threat is not adequately addressed. The first mention of space related warfare is listed as “other challenges” under the “Asymmetric Challenges” heading on page 9.<sup>26</sup> The “other” section mentions “exploiting commercial and foreign space capabilities, threatening our space based assets, and interrupting the flow of critical information.”<sup>27</sup> The NMS later mentions, “we must increase our capabilities to counter these threats and adapt our military doctrine, training and equipment...” That’s it. It

doesn't say the nation will use whatever force necessary to counter threats to these critical assets and it doesn't say how critical space assets are to the new battlefield.

When the NMS addresses Joint Vision 2010, it says that information superiority is a "key enabler" of future forces.<sup>28</sup> Furthermore, in order to have "full spectrum dominance," the military must first have information superiority.<sup>29</sup> Again, there is no mention of any space-related weapons, but it does indicate we must deny the enemy the capability to gain information superiority.<sup>30</sup> It seems to imply that the joint forces in the theater of operations will be able to deny the enemy the capability to have information superiority, however, the enemy forces employing information superiority will undoubtedly not be in the line of sight for joint forces. More than likely it will take weapons based in space to fully achieve information superiority. The final assessment is that the current (1997) version of the NMS provides little or no vision for current or future capabilities from space related assets and it totally disregards offensive capabilities from the space medium.

### **Air Force Space Doctrine**

Despite a general lack of guidance on how to apply offensive space power, Air Force Doctrine Document 1 does, at least, mention that in the future the U.S. must have space superiority in order to "fight and win" decisively. Air Force Doctrine Document 1 (AFDD 1) says, "Air and space doctrine is a statement of officially sanctioned beliefs and warfighting principles that describe and guide the proper use of air and space forces in military operations. It is what we have come to understand based on our experience to date...doctrine evolves from military theory and experience and addresses how best to use military power."<sup>31</sup> So why is the Air Force's doctrine an obstacle to weaponizing

space? First, the Air Force has never experienced an offensive threat nor have they applied offensive power from space, therefore space superiority doctrine is only based on theory. Second, the current doctrine only states we must gain and maintain space superiority, but never does it mention using an offensive space weapon to do so.

According to AFDD 1:

“It (air and space superiority) is an important first step in military operations...it provides freedom to attack as well as freedom from attack. Success in air, land, sea, and space operations depends upon air and space superiority...like air superiority, space superiority provides the freedom to conduct operations without significant interference from enemy forces. Although we have not yet had to fight for space superiority, in future conflicts other nations may have a variety of space based capabilities, from force application and information warfare to sophisticated imaging and communications systems.”<sup>32</sup>

AFDD 1 concedes that the U.S. has no experience with space superiority and therefore, one could assume it bases the importance and execution of space superiority on air superiority theories and experience. AFDD 1 says Offensive Counterair (OCA) consists of “operations to destroy, neutralize, disrupt, or limit enemy air and missile power as close to its source as possible and at a time and place of our choosing.”<sup>33</sup> Furthermore, Offensive Counterspace (OCS) consists of “operations to destroy or neutralize an adversary’s space systems or the information they provide at a time and place of our choosing through attacks on the space, terrestrial, or link elements of space systems.”<sup>34</sup> In the air medium, it would be inconceivable for the military not to employ an offensive weapon to effectively accomplish OCA. Yet having said that space doctrine is based on air doctrine, AFDD 1 makes no mention of employing a weapon from the space medium to successfully accomplish OCS. In fact, it only suggests attacking the facilities or payloads before they are launched into space or jamming the uplink or downlink. The only other mention of an offensive weapon in space is in a short

paragraph in Air Force Doctrine Document 2-2 (AFDD 2-2) (Space Operations Doctrine). Under the heading of Application of Force, AFDD 2-2 says, “Currently, there are no force application assets operating in space, but technology and national policy could change so that force application missions could be performed from platforms operating in space...such space systems will be used when it is consistent with national policy and they are the best methods to achieve the military objectives.”<sup>35</sup> The Air Force appears to have conceded that until national policy changes, it would be a moot point to develop doctrine to conduct offensive operations from the space medium.

The Air Force can learn from the German efforts after their defeat in WWI. After the Allies disarmed the German military and placed heavy restrictions on them, the Germans were forced to concentrate on developing doctrine and strategy. The Germans used the opportunity to develop their doctrine for “mobile warfare with tanks,”<sup>36</sup> then as the restrictive barriers dropped, the Germans built their tanks to match their new doctrine. The Air Force seems to be in a very similar situation, but instead chooses to wait for the policy barriers to drop before it starts doctrine development. The Air Force should instead view the restrictive national space policy not as an obstacle, but as an opportunity to develop doctrine for offensive weapons in space. As the policy barriers drop, the Air Force will be prepared to begin technological development to match the doctrine.

## **Summary**

The U.S. current national space policies are based on the Cold War. Eisenhower would not weaponize space, however he eagerly encouraged exploration and peaceful uses of space. Space was a new frontier and one he was only willing to exploit peacefully. He coined the term “space for peaceful purposes.” Although President

Kennedy understood the military advantages of weaponizing space, he succumbed to pressures and refused to change the “space for peaceful purposes” policy.

In the 1960s the U.S. ratified two treaties of lasting implications to weaponizing space. First, the United Nations passed a resolution banning weapons of mass destruction from orbiting in space. This resolution led to the Outer Space Treaty, which prohibited weapons in space. Shortly after came the Anti-Ballistic Missile Treaty (ABM) which according to Article V, each party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based.

Under the Carter administration, the Air Force admitted to surveillance of the Soviet Union, but within acceptable bounds of ratified treaties and for defensive purposes only. President Reagan recognized the importance of occupying and controlling the space medium, which resulted in SDI. In addition, because of SDI the nation as a whole increased their “spacemindedness.”

With President Clinton, force application has made its way into the national space policy, but there remains an unwillingness to put technologies in place that apply force from the space medium. In the NSS, President Clinton has indicated the U.S. will do whatever it must, even militarily, to protect its critical infrastructures and part of the critical infrastructures are the U.S. national and commercial assets located in space.

The nation is very close to a space policy change, however the current (1997) version of the NMS provides little or no vision for current or future capabilities from space related assets and it totally disregards offensive capabilities from the space medium. Unfortunately, the Air Force appears to have conceded that until national policy changes,

it would be a moot point to develop doctrine to conduct offensive operations from the space medium.

### Notes

<sup>1</sup> David N. Spires, *Beyond Horizons, A Half Century of Air Force Space Leadership* Maxwell Air Force Base AL: Air University Press, 1998, xv.

<sup>2</sup> Ibid., 55.

<sup>3</sup> Ibid., 64.

<sup>4</sup> Ibid., 86.

<sup>5</sup> Ibid., 93.

<sup>6</sup> *The People's Chronology* is licensed from Henry Holt and Company, Inc. Copyright ©1995, 1996 by James Trager. rights reserved

<sup>7</sup> Gunnar E. Andersson, B.Sc., J.D., P.C., *Space and Law Policy*, Webster University Course book (Date Unknown), 10 and 11.

<sup>8</sup> Ibid., 13.

<sup>9</sup> Spires, 101.

<sup>10</sup> Ibid., 110.

<sup>11</sup> Ibid., 179).

<sup>12</sup> Andersson, 26.

<sup>13</sup> Spires, 192.

<sup>14</sup> Ibid., 206.

<sup>15</sup> Andersson, 30.

<sup>16</sup> Ibid., 34.

<sup>17</sup> Spires, 251.

<sup>18</sup> Maj David W. Ziegler, *Safe Havens, Military Strategy and Space Sanctuary Thought*, (Maxwell Air Force Base, AL, June 1998), 21.

<sup>19</sup> Ibid., 22.

<sup>20</sup> Ibid., 2.

<sup>21</sup> The White House, *A National Security Strategy for a New Century*, October 1998, 5.

<sup>22</sup> Ibid., 20.

<sup>23</sup> Ibid., 20.

<sup>24</sup> Ibid., 20-21.

<sup>25</sup> Ibid., 25.

<sup>26</sup> Joint Chiefs of Staff, *National Military Strategy of the United States of America, Shape, Respond prepare Now: A Military Strategy for a New Era*, September 1997, 9.

<sup>27</sup> Ibid., 9.

<sup>28</sup> Ibid., 17.

<sup>29</sup> Ibid., 17.

<sup>30</sup> Ibid., 18.

<sup>31</sup> Secretary of the Air Force, *Air Force Doctrine Document 1, Air Force Basic Doctrine*, September 1997, 1.

## Notes

<sup>32</sup> Ibid., 29.

<sup>33</sup> Ibid., 46.

<sup>34</sup> Ibid., 47.

<sup>35</sup> Secretary of the Air Force, *Air Force Doctrine Document 2-2, Space Operations*, 23 August 1998, 11.

<sup>36</sup> Peter Paret, *Makers of Modern Strategy From Machiavelli to the Nuclear Age*, (Princeton University Press, Princeton, New Jersey 1986), 557.

## Chapter 5

### Technological and Budgetary Challenges

*Even though the Air Force is the lead military agency for space, space systems will be competing for aircraft roles and missions, posing difficult tradeoffs in budgets and force structure. In the absence of a larger, integrating vision, space becomes a competing faction, devoted to space power, and without much loyalty to the Air Force as an institution.*

— Carl H. Builder<sup>1</sup>

*Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur.*

— Italian Air Marshal Giulio Douhet<sup>2</sup>

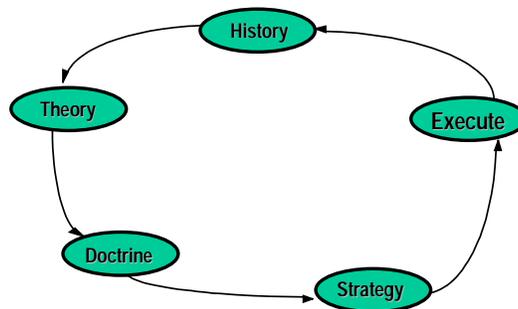
### Harnessing the Revolution

“Sooner or later, leading military powers will exploit available and emerging technologies, making major changes in the way they prepare and conduct operations in war and realizing dramatic gains in military effectiveness.”<sup>3</sup> In his article, *The Military-Technical Revolution: A Preliminary Assessment*, Andrew Krepinevich outlines the concepts behind achieving a revolution in military affairs (RMA). History is filled with examples of how failure to understand and leverage changes in technology or doctrine led to tragic loss, while those who took advantage of the changes ensured great victory. The tragic loss of the French—or great victory of the Germans—during the onslaught of the Blitzkrieg in World War II is a classic example of what can happen when only one side

of a conflict fully exploits a revolution in military affairs. In his briefing on RMAs given to ACSC class of '99, Matt Caffrey, War Theory instructor, discussed what is needed to exploit an RMA<sup>4</sup>:

1. Scientific/technical advance
2. Item (weapon, vehicle, communications) that exploits that advance
3. Tactics, operational concept that best employs item
4. Organization that facilitates tactics/ operational concepts

Matt Caffrey continued his discussion of RMA by describing a history to application cycle as shown in Figure 1 below. In order to take advantage of the RMA, the Air Force must develop theory, doctrine and strategy, develop the systems to employ and execute (through wargames and tests), then adjust theory, doctrine and strategy based on the results of history.



**Figure 1. The History to Application Cycle**

Returning to the issue of how to exploit an RMA, the first step has been achieved. The technological advances made in the realm of space made possible numerous new concepts and systems. In his briefing, *The Promise of Technology in the 21<sup>st</sup> Century*, Mr. Joe Sciabica from the Air Force Research Lab outlined the possibilities. His claim is “superior utilization of space in the 21<sup>st</sup> century will change the face of warfare —

*military* space systems will significantly control the fog of war and accelerate the tempo of war providing global vision, knowledge on demand, global strike and space supremacy.”<sup>5</sup> His concepts include aerospace fighters, global precision optical weapons, and “spears” from space or kinetic munitions. His bottom line: all the systems are technically possible given the national will and the budget to achieve them.

What the Air Force has not done is invest in the development of systems to exploit space, the tactics to employ space, and the proper organization to facilitate the advance of tactics and operational concepts. Chapter 4 outlined the need to develop doctrine and policy to support spacepower, it follows that doctrine needs systems to employ.

### **Potential Space Force Application Systems**

*Weapons form 99 percent of victory. Consequently the general staff of every army should be composed of mechanical clairvoyants, seers of new conditions, new fields of war to exploit, and new tools in this exploration.*

— J.F.C. Fuller<sup>6</sup>

A review of the “space almanac edition” of Air Force Magazine reveals no proposals or projects to support the military functions of space control and force application (Missions assigned to USCINCSpace in the Unified Command Plan).<sup>7</sup> The service with 90 percent of the space assets is the Air Force and is the lead to “organize, train, and equip” in order to meet these military functions. Unfortunately, the Force Application division of Air Force Space Command is limited in its efforts to developing concepts (Space-Based Laser, Conventional Ballistic Missile, and Space Operations Vehicle) due to national space policy limitations. To see potential space weapon systems, one must turn again to futuristic studies and laboratory proposals.

## Air Force 2025

From numerous studies and white papers, Air Force 2025 (AF2025) selected 10 systems as those with the “highest value for their contribution to achieving air and space dominance in 2025.”<sup>8</sup> Four of these systems are space weapons systems:

**“Global Area Strike System:** The Global Area Strike System (GLASS) consists of a high-energy laser (HEL) system, a kinetic energy weapon (KEW) system and a transatmospheric vehicle (TAV). The HEL system consists of ground-based lasers and space-based mirrors, which direct energy to the intended target. The KEW system consists of terminally guided projectiles with and without explosive enhancers. The TAV is a flexible platform capable of supporting maintenance and replenishment of the HEL and KEW space assets, and could also be used for rapid deployment of special operations forces. Target definition and sequencing is managed externally using the global information management system.”<sup>9</sup>

**“Space-Based High-Energy Laser System:** The space-based high-energy laser system is a space-based, multimegawatt, high-energy chemical laser constellation that can operate in several modes. In its weapons mode with the laser at high power, it can attack ground, air, and space targets. In its surveillance mode, it can operate using the laser at low power for active illumination imaging or with the laser inoperative for passive imaging. Worldwide coverage could be provided by a constellation of 15-20 HELs. The system provides optical surveillance by active or passive imaging and has counterspace, counterair, force application, and weather modification uses.”<sup>10</sup>

**“Solar-Powered High-Energy Laser System:** The solar powered high-energy laser system is a space-based, multimegawatt, high-energy, solar-powered laser constellation that can operate in several modes. In its weapons mode with the laser at high power, it can attack ground, air, and space targets. In its surveillance mode, it can operate using the laser at low power levels for active illumination imaging, or with the laser inoperative for passive imaging.”<sup>11</sup>

**“Piloted Single-Stage-to-Orbit Transatmospheric Vehicle:** This system provides space support and global reach from the earth’s surface to low earth orbit (LEO) using a combination of rocket and hypersonic air-breathing technology. The transatmospheric vehicle envisioned takes off vertically, is refuelable in air or space, and can land on a conventional runway. It has a variable payload capacity (up to 10,000 lb) and performs as both a sensor and weapons platform. Alternate missions include satellite deployment and retrieval from LEO and deployment of anti-satellite (ASAT) weapons.”<sup>12</sup>

Two of the remaining systems described in AF2025 with “high value” contributions include space as an integral part of the concept including a Global Information Management System (GIMS—a comprehensive intelligence fusion center), Global Surveillance, Reconnaissance, and Targeting System (GSRT—a space based sensor, processing and dissemination system). Two more systems, the uninhabited combat air vehicle and the uninhabited reconnaissance aerial vehicle, would work in conjunction with space-based capabilities and, in many cases, would be controlled through space links.

### **SPACECAST 2020**

As described earlier, SPACECAST 2020 was a conscious effort to improve the linkage between space technology, opportunity, and operational military mission execution. A complete operational analysis “was conducted to determine which of the SPACECAST 2020 systems concepts showed the greatest potential for enhancing space operations, and which of their embedded technologies have the highest leverage in making high-value systems a reality.”<sup>13</sup> The study revealed seven systems that stood out as systems with the greatest promise of increasing operational effectiveness:

1. Transatmospheric Vehicle (TAV)
2. Space-Based High Energy Laser (HEL)
3. Global Surveillance, Reconnaissance, and Targeting (GSRT) System
4. Orbit Transfer System (OTV)
5. Kinetic Energy Weapon (KEW) System
6. High Powered Microwave (HPMW) System
7. Particle Beam (PB) Weapon System<sup>14</sup>

Of these systems, the TAV and the HEL clearly offered the most potential. “The TAV contributed to virtually all space missions because it made access to space easier. The HEL scored well because it could fulfill a variety of important force application and

space defense missions, and its optical system could also provide a surveillance capability.”<sup>15</sup>

## **USSPACECOM LONG RANGE PLAN**

USSPACECOM has been assigned responsibility for space in the Unified Command Plan (UCP). USCINCSPACE is to integrate and synchronize component space forces and execute assigned missions including space support to all CINCs. The missions assigned to USSPACECOM include space control, space support, force application, force enhancement, integrated tactical warning/attack assessment, ballistic missile defense and to advocate the other CINC’s requirements for space.<sup>16</sup> In order to ensure mission success now and in the future, “Unified Commands and Services must coordinate to provide the capabilities and organizations that will make operations successful.”<sup>17</sup> “USSPACECOM’s Long Range Plan (LRP) focuses on operational capabilities (supported by the components’ systems and candidate technologies), CONOPS, and organizations.”<sup>18</sup> “Just as the Unified Commander’s Integrated Priority List (IPL) guides the Services in the near term, this LRP provides guidance on material, doctrine, and organizations out to 2020.”<sup>19</sup>

The LRP is based on the USSPACECOM vision for 2020, which in turn, is based on Joint Vision 2010. The LRP demonstrates how spacepower is vital to attaining the operational concepts in Joint Vision 2010 (See Table 1, chapter 2), then derives four operational concepts for *USSPACECOM’s Vision for 2020*. The “four operational concepts from an examination of the Unified Command Plan’s assigned missions, the Joint Vision 2010 operational concepts and the anticipated strategic environment” include control of space, global engagement, full force integration, and global partnerships.<sup>20</sup>

Each of these concepts is expanded upon in detail to unveil critical systems and technologies needed to accomplish the missions of the future. (This is an outstanding source for additional reading).

The Global Engagement operational concept includes systems for integrated focused surveillance, missile defense, and force application. The LRP acknowledges the National Space Policy and treaty limitations, but emphasizes the need to continue development and research as follows: “At present, the notion of weapons in space is not consistent with national policy. Global Engagement provides a plan that will provide alternatives to civilian leaders if a decision is made that this capability is in the national interest.”<sup>21</sup> Systems outlined in the LRP that could meet the capabilities required for missile defense and force application in the future include:

1. Ground-Based Interceptors
2. Space Operations Vehicles
3. Common Aero Vehicles
4. Space-Based Lasers
5. Space-Based High-Powered Microwaves
6. Conventional Ballistic Missiles
7. Space-Based Platforms<sup>22</sup>

AF 2025, SPACECAST 2020, and the USSPACECOM LRP all outline similar capabilities required to meet the missions of the future. The USSPACECOM LRP adds in a consideration for cost. “USPACECOM recognizes that we must prioritize warfighting capabilities within space and across all of DOD because we can’t afford everything. Over time, tradespace analyses, and alternative funding sources must shape decisions that will lead to future force structures.”<sup>23</sup> Though “we can’t afford everything” the Air Force must make funding new space systems a priority if the transition to a Space and Air Force is to become reality.

## Funding Space Systems

*The new budget does not address a number of major and urgent requirements, such as the multibillion dollar costs of new capabilities in space, which conventional wisdom regards as affordable within the present limits only by massive diversions from other elements of the already strained Air Force budget.*

— John T. Correll, *Air Force Association* Editor in Chief<sup>24</sup>

Unfortunately, for the future of the Space and Air Force, the Department of Defense or the current Air Force is not funding space research, development and procurement at a level to make the new systems and capabilities required for spacepower a reality. “Our commitment to use space for more than support and peripheral roles—much less to dominate space in wartime—is hedged and under-funded.”<sup>25</sup> Part of the reason is that with post cold war budget cuts and force reductions, the services are fighting for the dwindling share of the DOD budget. Parochialism and congressional oversight have led to a three-way division of the defense budget between the Army, Navy, and Air Force. Since the Air Force is the lead service component to “organize, train, and equip” for space systems, they must fund and procure *both* space and air with their “one-third cut.” The Air Force chose not to cut traditional aircraft programs in order to fund space. There is currently no space force application or space control system included in Air Force major programs or major Air Force systems.<sup>26</sup> The only space systems included are upgrades to current space support capabilities or space force enhancement capabilities.

A review of the Legislative Updates also provide interesting insight into the future of new space systems, namely, they’ll remain concepts and studies unless a drastic change is made not only in international policy, but fiscal policy as well.

In his thesis “The Transition to a Space and Air Force: Proposed Solutions to the Dilemma,” Lieutenant Colonel Clark estimates a \$30 billion budget required to build spacepower capabilities and make a Space and Air Force a reality.<sup>27</sup> Current AFSPC budget is \$1.7 billion.<sup>28</sup> In today’s budgetary environment, how could the Air Force ever fund such a program? Senator Bob Smith offers some solutions: “The Air Force must truly step up to the space power mission or cede it to another organization.”<sup>29</sup> One solution is to follow the U.S. Special Operations Command (USSOCOM) model and endow USSPACECOM with congressional authority to control development, acquisition, promotions, and assignments in its mission area.<sup>30</sup> “Ultimately—if the Air Force cannot or will not embrace spacepower and if the USSOCOM model does not translate—we in Congress will have to establish an entirely new service.”<sup>31</sup>

The bottom line is best underscored by General Howell M. Estes III, “The time for rhetoric has passed and we must replace it with action. We will never become an Air and Space Force if we do not begin to invest greater sums in space. It is not enough to maintain the given, fixed percentage of Air Force total obligation authority for space. Space must expand and become a larger part of the Air Force budget every year. It has to be this way because it is unlikely anyone is going to give the Air Force a bigger slice of the pie to cover our expansion into space.”<sup>32</sup>

Again, according to Senator Bob Smith, “Space dominance is simply too important to allow any bureaucracy, military department, service mafia, or parochial concern to stand in the way!”<sup>33</sup>

## Notes

<sup>1</sup> Carl H. Builder, *Icarus Syndrome*. New Brunswick: Transaction Publishers. 1994, Ch. 1.

## Notes

- <sup>2</sup> United States Air Force Academy. *Contrails*, volume 29. 1983-1984, 256.
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- <sup>4</sup> Matthew Caffrey. “*Revolutions in Military Affairs.*” *Briefing to ACSC AY1999 class, Fall 1998.*
- <sup>5</sup> Joe D. Sciabica. *The Promise of Technology in the 21<sup>st</sup> Century.* Briefing to ACSC Space Elective Class, AY1999.
- <sup>6</sup> Charles Messinger. *The Blitzkrieg Story.* Charles Scribner’s Sons of New York, 1976, (Extract from ACSC War Theory Coursebook, 158).
- <sup>7</sup> Correl, John T. “Destiny in Space.” *Air Force Magazine.* August 1998, 28-35.
- <sup>8</sup> Air University. *Air Force 2025: Executive Summary.* Maxwell AFB AL: Air University Press, August 1996, 36.
- <sup>9</sup> *Ibid.*, 36.
- <sup>10</sup> *Ibid.*, 36.
- <sup>11</sup> *Ibid.*, 37.
- <sup>12</sup> *Ibid.*, 38.
- <sup>13</sup> Air University. *Spacecast 2020: Operational Analysis.* Maxwell AFB AL: Air University Press, 20 June 1994, 1.
- <sup>14</sup> *Ibid.*, 1-2.
- <sup>15</sup> *Ibid.*, 1.
- <sup>16</sup> 14<sup>th</sup> Air Force. *Command and Control of AFSPACE Forces (Draft)*, section 3.1.
- <sup>17</sup> United States Space Command, *Long Range Plan.* 3.
- <sup>18</sup> *Ibid.*, 2.
- <sup>19</sup> *Ibid.*, 3.
- <sup>20</sup> *Ibid.*, chapter 2, 6.
- <sup>21</sup> *Ibid.*, ch. 6, 2.
- <sup>22</sup> *Ibid.*, ch 6., 17, 21.
- <sup>23</sup> *Ibid.*, 3.
- <sup>24</sup> John T. Correll, “What the Budget Does—and Doesn’t.” *Air Force Magazine*, March 1999, 2.
- <sup>25</sup> John T. Correll, “Boren-Rudman Takes Its Turn.” *Air Force Magazine*, December 1999, 2.
- <sup>26</sup> Tamar A. Mehuron, “The Defense Budget at a Glance.” *Air Force Magazine*, April 1998, Internet: <http://www.afa.org/magazine/chart/0498chart.html>.
- <sup>27</sup> Lt Col Thomas D. Clark, “*The Transition to a Space and Air Force, Proposed Solutions to the Dilemma.*” Maxwell AFB AL: Air University Press, April 1997.
- <sup>28</sup> Space Almanac, *Air Force Magazine*, August 1998, 29.
- <sup>29</sup> Peter Grier. “A New Service for the Space Mission?” *Air Force Magazine.* January 1999, 14.
- <sup>30</sup> *Ibid.*
- <sup>31</sup> *Ibid.*
- <sup>32</sup> James Kitfield, “The Space and Air Force.”, *Air Force Magazine.* February 1998, 39, quoting Gen. Howard M. Estes III, “At a Crossroad.”

## Notes

<sup>33</sup> Peter Grier, “A New Service for the Space Mission?” *Air Force Magazine*. January 1999, 14.

## Chapter 6

### The Way Ahead

*What if you could know all the events in the battlespace, find, fix, track, target and engage any militarily significant target anywhere on earth, rapidly halt an invasion so we do not have to spend the blood of our sons and daughters in a protracted counter offensive? If we can envision it, we can make it happen.*

— General Donahue

America's future security and economic prosperity depends on free access and use of space. The U.S. now leads in space, but must take a proactive role in ensuring its continued lead and the ability to defend its space assets. The key obstacle to pursuing this objective is the National Space Policy, which precludes use of space for other than "peaceful purposes." It makes the errant assumption that space will always be a sanctuary. In their book *War and Anti-War*, Alvin and Heidi Toffler make the assertion that the way a nation makes wealth, reflects how they make war.<sup>1</sup> With more nations "making their wealth" in space, it is only a matter of time before space becomes another medium of warfare. With the current U.S. dependency on space, it must prepare now to fight and defend itself in and from space for the future.

In order to break through the obstacles to achieving true spacepower, the nation needs an advocate to pursue spacepower much the same way General Mitchell pursued airpower. The Air Force took on this role in 1996 when its vision called for a transition to a *space and* air force, but it has since backed off with the "aerospace force" concept

where space is seen only as a force enhancement. Senator Bob Smith is a current advocate fighting against the White House and military malaise toward the development of spacepower, but the appropriate realm to advocate spacepower in the defense of the nation is the military. Air Force support for spacepower to this point is more rhetoric than action, but it can and should return to its original vision of a *space and* air force. Internally, the Air Force should develop a space corps with the “spacemindedness” required to develop doctrine and educate. It could then team with the congressional advocates to change the National Space Policy, remove the treaty limitations, and fund development of new space systems to include space force application systems. Only in this way will the Space and Air Force of the future become a reality and be prepared to defend the nation’s interests when called upon.

#### **Notes**

<sup>1</sup> Alvin and Heidi Toffler, “War and Anti-War: Survival at the Dawn of the 21<sup>st</sup> Century. New York: Little, Brown and Company, 1993, xv.

## Appendix A

### Protecting America's Investment in Space

**By General Howell M. Estes III, U.S. Air Force**

Space. The possibilities are endless – but there are dangers there. As we explore the fullest promise of space, we must also get ready to protect our interests and freedom there.

When President Kennedy made his famous pledge to put a man on the moon, we had no idea how far space would take us. Today, we are exploring the outer planets and building an international space station, while hundreds of satellites circle the globe.

Nearly half of those 600-plus satellites are American. They represent an investment of more than \$100 billion. *U.S. News and World Report* estimates we will spend more than \$250 billion in space by the year 2000, and that another 1,800 satellites will be on-orbit by the end of the next decade. This “skyrocketing” investment must be protected—from natural and man-made threats, accidental and intentional threats.

Beyond economics, we in uniform came to fully appreciate the value of space during the Gulf War. We used Global Positioning System (GPS) satellites to guide precision weapons and navigate in an unfamiliar, often featureless, land. Satellites with infrared telescopes saw the faint heat of SCUD missiles from more than 22,000 miles away, so we could warn our troops and allies. Weather,

communications, and intelligence satellites contributed in many, invaluable ways to the success of our operations halfway around the world.

Satellites do far more today than just help us defend American interests. Commercial communications satellites keep our financial institutions connected... and beam the Super Bowl into our homes. Weather satellites tell us when violent storms threaten our homes and loved ones... and when to plan the family picnic. Imagery satellites monitor climate changes...and help farmers best use their land to grow food for our tables. The same GPS satellites that tell our military forces exactly where they are anywhere in the world also keep airliners on course...and map out directions for drivers on our highways.

Space provides us with so many services that we are now reliant on it. Simply put, space is becoming a vital national interest—in the information age we are entering, no less important than oil is to our world today. And just as availability of oil was used against this country during the oil embargo of the 70's, this new source of national strength also could become a vulnerability.

Any threat to our use of space is a threat to our nation's security. Here's where the United States military must play an important role: as we have protected national and economic security on land, sea and air for more than 200 years, we must be prepared to defend our interests in space tomorrow.

We need to develop ways to protect our investment in space from rapidly developing threats. From computer hackers tampering with satellites, to electronic jamming of satellite signals, to actual anti-satellite weapons—man-made methods already exist to challenge America in space.

Our satellites also face a different threat—space debris. There are more than 8,000 objects orbiting the Earth at 17,000 m.p.h. Ninety percent of it is junk. Today we can see and track objects about the size of a softball or larger. As the number of satellites grows, costly damage from collisions between expensive, working satellites and worthless space junk is inevitable.

The first step in protecting our satellites must be to improve our ability to see what's happening in space. We need to detect and monitor objects less than half the size of what we can see now. Our satellites need to be designed to survive collisions with the debris we can't see—and maneuver out of the path of debris we can see. Today, the first indication we would get that a satellite has been damaged would be when it quits working. We need to build in sensors that can tell us if satellites have been damaged by solar flares, debris, or someone on Earth.

For us to protect our space assets and ensure we receive the bounty of space, the military, civil, commercial, and international space communities must work together. We've all tasted the fruit of space systems and we have developed a voracious appetite for them. But none of us has a checking account big enough to pay the bill alone.

With the military, other government agencies, the business world, and our allies working together as partners, we can leverage each others' investments to reduce the cost of space for everyone. This will allow *all* of us to do far more than *any* of us could do alone.

We must, and we will, continue to explore and develop space—bringing the benefits home to help us here on Earth. But while we do so, we shouldn't forget to allocate some limited resources—not unlike buying an insurance policy—into protecting our investment.

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General Howell M. Estes III is the commander in chief of the North American Aerospace Defense Command and the United States Space Command and is the commander of Air Force Space Command headquartered at Peterson Air Force Base, Colo. He authored this article at the invitation of Mission HOME (Harvesting Opportunity for Mother Earth), a national initiative to rekindle enthusiasm for U.S. space endeavors. For more information on the benefits of space, visit.

[www.missionhome.org](http://www.missionhome.org)

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## *Glossary*

ABM	Anti-Ballistic Missile
ACSC	Air Command and Staff College
AEF	Aerospace Expeditionary Force
AF	Air Force or Aerospace Force
AFSPC	Air Force Space Command
AFIT	Air Force Institute of Technology
AFRL	Air Force Research Lab
ASAT	Anti-Satellite
AWC	Air War College
CBM	Conventional Ballistic Missile
CINC	Commander in Chief
CINCSPACE	Commander in Chief, United States Space Command
CJCS	Chairman of the Joint Chiefs of Staff
CONOPS	Concept of Operations
DCI	Director of Central Intelligence
DOD	Department of Defense
GE	Global Engagement
GIMS	Global Information Management System
GLASS	Global Area Strike System
GSRTS	Global Surveillance, Reconnaissance, and Targeting System
HEL	High Energy Laser
HOME	Harvesting Opportunity for Mother Earth
HPMW	High Powered Microwave
ICBM	Intercontinental Ballistic Missile
IPL	Integrated Priority Lists
JV 2010	Joint Vision 2010
KEW	Kinetic Energy Weapon
LEO	Low Earth Orbit
LRP	Long Range Plan

NASA	National Aeronautical and Space Administration
NCA	National Command Authority
NMS	National Military Strategy
NPR	National Public Radio
NRO	National Reconnaissance Office
NSP	National Space Policy
NSS	National Security Strategy
OTV	Orbit Transfer System
PB	Particle Beam
RBA	Revolution in Business Affairs
RMA	Revolution in Military Affairs
SAC	Strategic Air Command
SBHELs	Space-Based High Energy Laser System
SPHELs	Solar Powered High Energy Laser System
SBL	Space Based Laser
SDI	Strategic Defense Initiative
SecDef	Secretary of Defense
SF	Space Force
SOV	Space Operations Vehicle
SSTO	Single Stage to Orbit
TAV	Transatmospheric Vehicle
TLAM	Tomahawk Land Attack Missile
UCAV	Unmanned Combat Aerial Vehicle
URAV	Uninhabited Reconnaissance Aerial Vehicle
UCP	Unified Command Plan
US	United States
USSOCOM	United States Special Operations Command
USSPACECOM	United States Space Command

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