

National Department of Space

A Monograph

by

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Abstract

NATIONAL DEPARTMENT OF SPACE by Lt Col Kristine M. Shaffer, USAF, 69 pages.

Man has always been fascinated by the heavens. Not until late in the 19th and early 20th Centuries did man finally have the technology to reach the moon. Currently, the heavens abound with satellites as well as a manned space station. Throughout the past century, the formation of numerous organizations provided for the nation's space needs. Today, however, these same organizations lie at the very center of what hinders the development, operation and exploitation of space. If the nation is serious about space, it should consider making a "drastic" change or transformation of the current space program. The current status quo program with multiple organizations with multiple missions without a single focus and a single "belly button" is hindering and strangling America's space direction, domination and development.

To that end, the most straightforward and effective solution is to fuse the service- and agency-fragmented pieces into an independent organization. This monograph recommends the development of a single organization to provide singular support to meet the nation's requirements and demands for the 21st Century.

The space community as it exists compiled with a number of factors creates a liability for the nation. This monograph examines two key documents, which have shaped the Space Community over the last decade and will continue to shape the next. Throughout the research, a myriad of factors emerged that effect the nation's forays into space. The factors presented in this monograph include organization, policy, rivalries, Defense Community, budget, capabilities, human capital, culture, organizational structure, the medium, and weaponization. Each factor presented in and of itself creates problems, but compounded the factors create an even greater and more complex problem. The Space Community is not failing, but nation's policy and the intertwined, yet independent factors represent additional hindrances and evidence of organizational mismanagement and inappropriate organizational design and structure. This monograph looked to the business community for insights. The principles of management as well as the functions of management were used as the criterion to analyze the factors and the recommendation.

The National Department of Space can reinvigorate the U.S.'s space programs and correct the atrophy in order to move ahead in the 21st Century. The NDS provides the nation singular support. Drastic change is required to elevate the importance of space within the nation, to enable the nation to better prioritize space-related activities, to promote greater coordination on space-related activities and to reduce redundant systems and capabilities while promoting interoperability with space- and non-space national and international communities.

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Introduction

Today, manned spaceflight is a norm and satellites are common. The capabilities provided by satellites are so transparent most forget or are unaware how space interweaves throughout the fabric of their daily lives. Even while so commonplace and unassuming, the space above the earth continues to challenge, change and captivate us. People the world over *spoke* of the "Space Age" as beginning with the launching of the Russian Sputnik on 4 October 1957.¹ Sputnik caught the world's attention and the American public off-guard.² Yet, the history of space started long before the launch of Sputnik. The world's current space programs owe their very existence to the science fiction writer, Jules Verne. His book, *From the Earth to the Moon* written in 1866, inspired a number of individuals such as Tsiolkovsky, a Russian; Oberth and von Braun, Germans; and Goddard, an American, to find a way to the moon. It is a truly remarkable story of human ingenuity combined with the science and technology of the past as in decades and centuries. Their work (*on rockets*) galvanized Russia, Germany and the United States to earnestly explore military and peaceful operations in space.³ Their life-long research, development, and experiments on rockets and the subsequent developments of the atomic bomb, intercontinental ballistic missiles and nuclear fusion systems paved the way for the mid-20th Century space programs. It also paved the way for the fierce competition between the United States and the Soviet Union. Not to be outdone and to correct the perceived unbalance of power, the Cold War began in earnest and with it the creation of numerous organizations to counter national security concerns and to further the peaceful exploration of space.

¹ Constance McLaughlin Green and Milton Lomask, *Vanguard: A History*, (Washington, DC: Smithsonian Institution Press, 1971), <http://history.nasa.gov/sputnik/chapter1.html> (accessed 18 November 2007)

² Steve Garber, "Sputnik and The Dawn of the Space Age," NASA Webpage, (10 October 2007), <http://history.nasa.gov/sputnik/> (accessed 27 October 2007)

³ Cliff Lethbridge, "History of Rocketry," Spaceline, Inc., (2000), <http://spaceline.org/rockethistory.html> (accessed 30 October 2007)

Technology, science, innovation, motivation, art and creativity have always been the hallmarks of the United States. Through the works of individual citizens, the military, civil and commercial organizations, the United States has developed, operated and exploited space for more than nine decades. The numerous and varied organizations operating in space have planned, developed, and funded their programs both independently and in cooperative efforts. Throughout our history of space, what once started out as peaceful became military; and what once was military became peaceful. Yet, these same organizations draw the line in the sand and take the view that their satellite systems are purely military or purely civil and the two shall not meet. However, the line between “pure” military and civil systems to include commercial satellite systems has always blurred due to science and technology, innovations in hardware and software and the capabilities, data and output of the satellite systems. The line between the “pure” military and independent space organizations has also blurred. Space organizations and their respective satellite systems are heavily reliant on each other and have never been fully and purely independent of each other. Space has always been a complex system of complex systems. This system of systems provides capabilities, which interweave and intersect throughout the civilian, military, civil and commercial communities. No one from any of these communities wants to be left behind without the capabilities provided through space, yet each one continues to create policies, plans, programs, budgets and executes as if they are “pure” stand-alone systems operating independently of each other and in no way reliant on each other.

Inevitably, this has led to inter-agency, intra-agency, inter-service and intra-service rivalries and competitions which in turn tears the space community apart instead of bringing it closer together. Various space organizations and satellite systems have undergone organizational and structural changes to close some of the gaps. However, the choice of change has been to apply minor, short-term fixes vice finding major, long-term solutions to bridge the gap between organizations, the satellite systems and the needed capabilities. While our dependence and

interest in space capabilities continues to grow at an exponential rate, the space community needs to take a step back and consider how to better cooperate and close these gaps lest they continue to open additional ones.

This monograph discusses an array of factors, which from a business perspective; hinder the development, operation and exploitation of the nation's space capabilities. Today's space community, as it exists and in light of the presented factors, cannot meet the nation's requirements and demands for the 21st Century. Only a single organization with a national strategy and one leader provide the singular support to the United States.

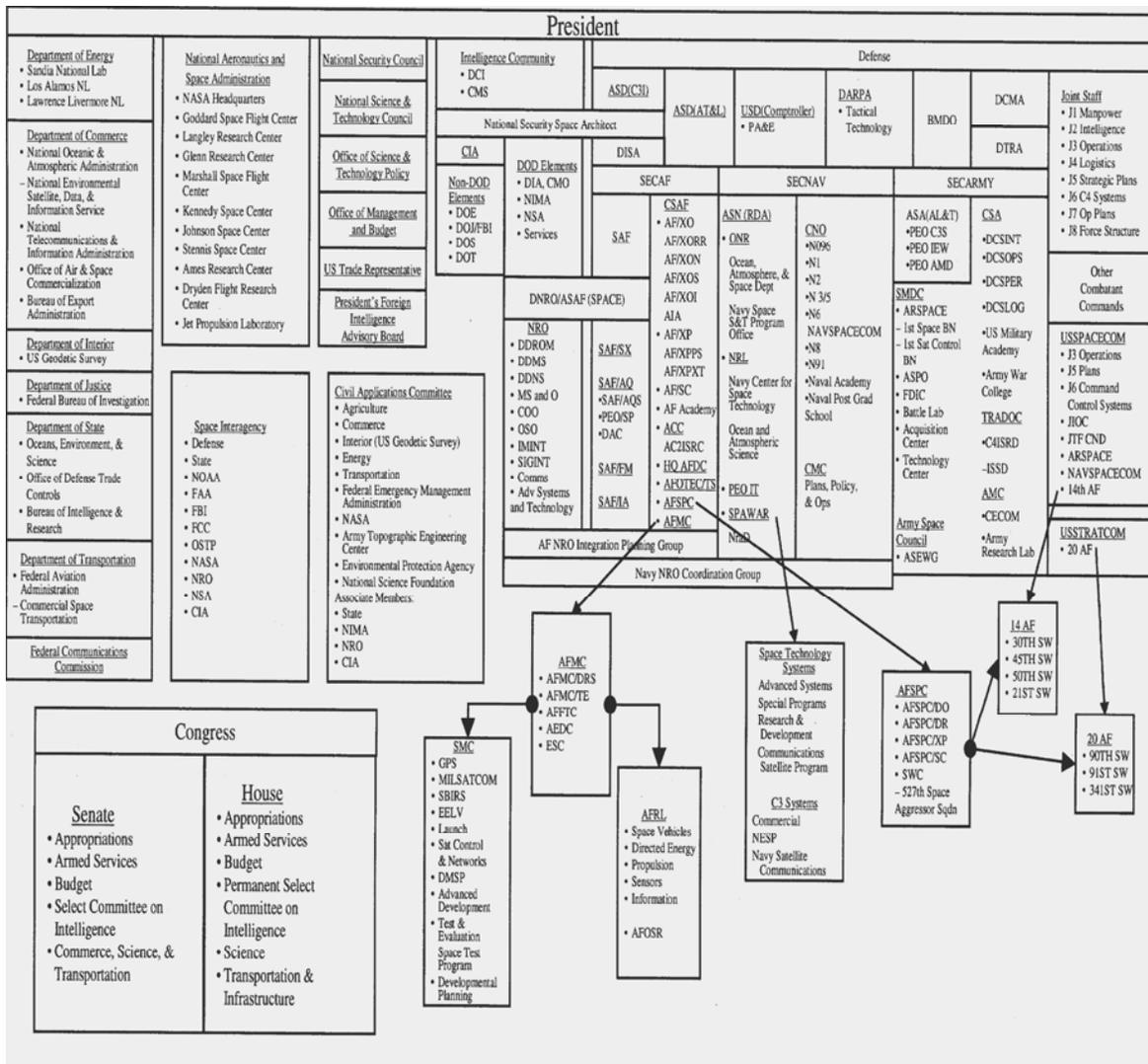
THE SPACE COMMUNITY

The Who

Before beginning, the reader must have a general understanding of who is in the Space Community to gain a better awareness of how large and how complicated it is. The Space Community is a vast array of organizations and one of organizations within organizations. It is similar to a puzzle, knowing it is made up of many pieces, but not knowing if the pieces belong to one puzzle or many.

Refer to Figure 1 on the next page. It depicts the roles and responsibilities of the White House, Congressional government agencies, Department of Defense (DoD) and information organizations in the conduct of policy formulation, implementation, planning and resource allocation, requirements determination, development of procurement, and operation of national security space capabilities at the time the Space Commission convened.⁴ One does not need to analyze Figure 1 for long to imagine the many challenges and issues that the Space Community faces in developing, operating and exploiting space. Since 2001, changes have occurred within the Space Community to include realignments--USSPACECOM to USSTRATCOM, between DoD and the Intelligence Community (IC); naming conventions—National Intelligence Mapping Agency (NIMA) to National Geo-Spatial Intelligence Agency (NGA), AF/XO to AF/A3, etc.; and several others. This monograph will not go into any details regarding the changes, but does want the reader to understand that the overall Space Community continues to evolve.

⁴ COL Kurt S. Story, "A Separate Space Force: An Old Debate with Renewed Relevance," Research Paper, Carlisle Barracks, PA., U.S. Army War College, (9 April 2002), 18.



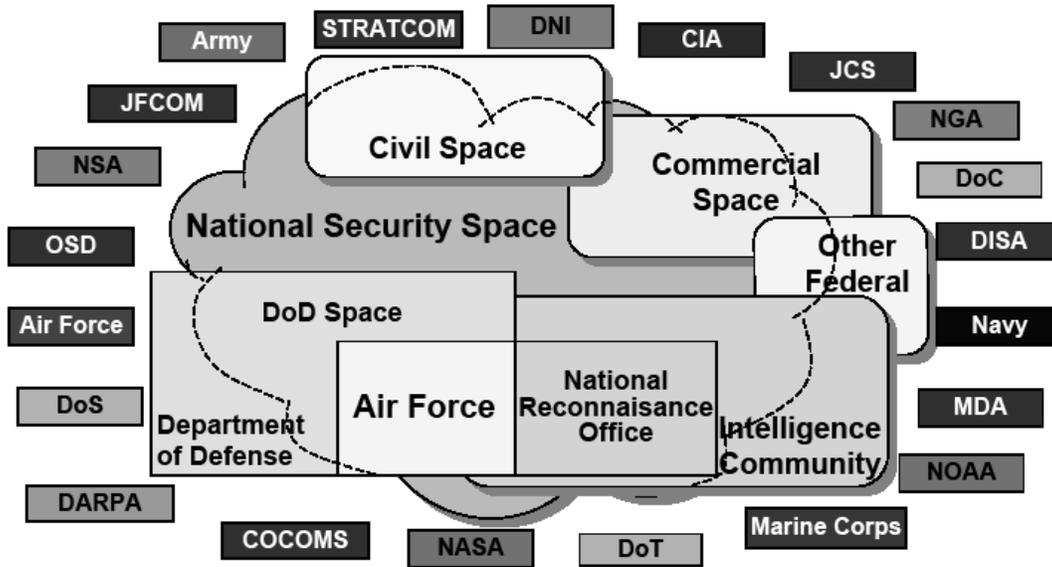
Source: Data from U.S. Congress, Senate and House, Committee on Armed Services. Commission to Assess United States National Security Space Management and Organization: Executive Summary, Report pursuant to Public Law 106-65, the National Defense Authorization Act for Fiscal Year 2000, Section 1622, (Washington, DC: Government Printing Office, 11 January 2001), 3.

Figure 1. The National Space Community

Below in Figure 2 is another way to see who is involved within the Space Community.

What is the relationship between the organizations? Are they formal? Are they informal? Both charts exclude the “dotted and straight line” relationships. The chart creators may have attempted to draw the lines, but likely found it impossible. Many authors writing on organizational research agree that the absence of clear and concise lines is a sign of problems, muddled thinking,

compromises, frustrations, mediocre performances, and ultimately it creates unsatisfactory solutions through the organization. In this case, the organization is the Space Community.



Source: Data from Hal Hagemeyer, National Security Space, Briefing, National Security Space Office, (21 March 2005), 5.

Figure 2. The National Space Community.

As stated earlier, the Space Community is a conglomeration of many organizations. In Aug 2007, the *Air Force Magazine* published the 2007 Space Almanac. It includes a synopsis of the major military commands and service components with space functions, major agencies with roles in space and major civilian satellites in U.S. military use to include overall missions. Appendix One and Two provide the reader with excerpts of the 2007 Space Almanac for a better familiarization of some of the Space Community organizations.

Before leaving “the who” of the Space Community, the DoD and the IC should be recognized for their attempt to resolve and reconcile problems and create solutions. The National Security Space Organization (NSSO), created in 2004 by combining the National Security Space Architect, the National Security Space Integration, and the Transformational Communications, assumed responsibility for “consolidating space missions and systems, eliminating vertical stovepiping, integrating acquisition and future operations, and thereby improving space support to

military operations.”⁵ The NSSO has as its primary mission the enablement of National Security Space decision-making as well as the facilitation of the integration and coordination of defense, intelligence, civil and commercial space activities. The NSSO can seek to influence the performance of other organizations but has no actual authorities nor can it establish priorities for the DoD or the IC which carries grave risks fiscally and operationally. Priorities and the likes remain internally and separately at the hands of each organization.

The above briefly discussed “the who,” and an insight into the overall problems faced by the internal Space Community. External to the Space Community are the business persons, government representatives and the average U.S. citizens who barely conceive what the Space Community provides. Space has become so embedded and fundamental in our lives that it is taken for granted. Space the “Final Frontier” is out of sight and out of mind. All need a not so gentle reminder of what space brings to the table.

The What

Ultimately, the Space Community provides space power. Space power is defined “as the total strength of a nation’s capabilities to conduct and influence activities to, in, through and from space to achieve objectives.”⁶ Space power broadens civilian and military leadership options at both the strategic and operational levels and enables the use of all instruments of national power, not just military power, with greater precision, timeliness and effectiveness.⁷ People disagree about the contribution of space in its role as an instrument of national power, the ways to use it and even more so, the capabilities it provides.

⁵, Dr. Joan Johnson-Freese, “Transitioning to a Space & Air Force: Moving Beyond Rhetoric?” Research Paper, USAF INSS, Colorado Springs, CO., USAF Academy, (4 January 1998).

⁶ U.S. Department of Defense, Joint Publication 3-14 *Joint Doctrine for Space Operations*, (9 August 2002), GL-6.

⁷ John B. Sheldon, “Selling US space power short,” *The Space Review*, (4 September 2007), <http://www.thespacereview.com/article/948/1> (accessed 7 Sep 2007)

Nowhere within any government document are capabilities defined. The term is nebulous at best, but the Space Community uses it as if it has a true definition. Webster's dictionary defines capabilities in two ways: one, as having attributes (an inherent characteristic or a physical or mental power) required for performance or accomplishment; and two, the facility or potential for an indicated use or deployment (to spread out, utilize or arrange for a deliberate purpose.) With that in mind, here forth, capabilities will be defined as data, functions, information and goods and services which we can use, convey and provide an avenue for all to accomplish, perform or respond for personal, national and international reasons and situations. Actions or decisions that do not protect the nation's space power and capabilities will have the potential to cause great harm to the whole nation.

The Space Community to include the international community provides a wide array of capabilities. Following are the generally accepted categories of capabilities (not all inclusive):

Communications:

- Types: EHF, SHF, UHF tactical, EHF polar, Ka-band, X-band
- Mobile Communications
- Broadcasting
- Entertainment

Environmental Monitoring:

- Storm Monitoring and Tracking
- Meteorological Research
- Remote Sensing
- World-wide Environmental Forecasting
- Extended Weather Forecasting

Intelligence, Surveillance and Reconnaissance:

- Data Imagery and Video
- Infrared Space Surveillance
- Track Moving Ground Targets
- Infrared Ground Surveillance
- Remote Sensing
- Scientific Research

Position, Velocity, Time and Navigation:

- World-wide Navigation
- Precise Time Transfers

Strategic and Tactical Missile Launch Detection:

- Early Warning
- Missile Defense

National security issues and concerns have made civil, intelligence and military government officials nervous about the “dual use” capabilities provided by their respective satellites. The military believes they will lose control of “their” satellites and the civil community believes theirs will become “militarized.” When in reality and from a national perspective, satellite systems provide essential economic, commercial, military and scientific capabilities regardless whether civilly- or militarily-controlled.⁸

Yet, no one owns space and no one can go it alone. It is a region with increasing opportunities for national and international commercial, civil and military investments. There is a “unanimous perception that the public and many service members” along with wider defense and policy community “lack an understanding of the world’s dependency on space” and how it enhances our national instruments of power.⁹

Space capabilities allow the U.S. government to monitor events around the world, to ability to shape them and the options to provide assistance while keeping a low profile in certain, sensitive situations. Many of the capabilities provided are given to the world free and assist in assuring allies. Space is a subset of foreign policy.¹⁰ Developed as an area of competition between the United States and the Soviet Union, space has fostered international cooperation and technical and scientific achievement among many states via civil space programs such as the International Space Station.

⁸ Mark E. Harter, “Ten Proposition Regarding Space Power,” *Air & Space Power Journal* (Summer 2006), <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj06/sum06/harter.html> (accessed 6 Aug 07)

⁹ Carl Bergquist, “Interest in Space Wanes Despite America’s Space Dependency,” *Spacemart* (11 Oct 2007), under National Security Space Institute Space News, NSSI Space News Services (For the Week Ending 19 October 2007).

¹⁰ Dr. Joan Johnson-Freese, *Space as a Strategic Asset*, (New York: Columbia University Press, 2007), 256.

Space capabilities through the information instrument of national power are not discounted, but cannot be specifically pulled out as “information per se” due to how information is so intricately interwoven throughout the use of space.

Under the military instrument of national power, the Defense Department categorizes their capabilities under four primary mission areas: space control, force enhancement, space support and force application. The mission areas are defined below with military-specific items italicized.

Space Control – Operations to ensure freedom of action in space for the US and its allies, *and when directed, deny an adversary freedom of action in space.*¹¹

Space Force Enhancement – *Combat* support operations to improve the effectiveness of military forces as well as support other intelligence, civil, and commercial users.¹² Operations multiply *joint force* effectiveness by enhancing *battlespace* awareness and providing needed *warfighting* support. There are five force enhancement functions: intelligence, surveillance and reconnaissance; *integrated tactical warning and attack assessment*; environmental monitoring; command, control and communications; and position, velocity, time, and navigation.¹³

Space Support – Operations to deploy and sustain *military and intelligence* systems in space. The space mission support area includes launching and deploying space vehicles, maintaining and sustaining spacecraft on-orbit, and deorbiting and recovering space vehicles, if required.¹⁴

*Force Application – Operations consist of attacks against terrestrial-based targets carried out by military weapons systems operating in or through space. Currently there are no space force application assets operating in space.*¹⁵

The majority of the functions and capabilities originally stemmed from the military, but are no less applicable to the civil, commercial and multi-national space organizations. One exception, the integrated tactical warning and attack assessment (missile warning), will remain a sole

¹¹ U.S. Department of Defense, Joint Publication 3-14 *Joint Doctrine for Space Operations*, (9 August 2002), GL-6.

¹² U.S. Department of the Air Force, Air Force Doctrine Document 2-2 *Space Operations*, (27 November 2006), 55.

¹³ U.S. Department of Defense, Joint Publication 3-14 *Joint Doctrine for Space Operations*, (9 August 2002), I-2.

¹⁴ *Ibid.*, GL-6.

¹⁵ *Ibid.*, x.

military function in that it has no commercial or civil counterpart. Whether the military likes it or not, it has evolved to provide national economic interests and investments.

Just as space power and its capabilities have enhanced all the instruments of national power, the economic instrument and the economy, itself, have undergone an unknown magnitude of benefits and growth. Many commercial and economic ventures are entirely dependent on space capabilities for modern commercial and economic growth and operations. It goes beyond the military, government agencies and the IC. The use of space ensures the efficient and safe functioning of most the world's major transportation networks in the air, at sea and on land. The capabilities provide for the prediction of weather and environmental disasters such as hurricanes, typhoons, tsunamis, forest fires, flooding and blizzards and the after-affect assessments; global mapping for accurate terrain and elevation maps, population assessments; finance and banking; agricultural planning and reports; global communications; entertainment and radio broadcasts; scientific research and development; space exploration; and emergency services. "These activities may not have inspired the imaginations of 40 years ago, but they are central to our way of life in the contemporary space age."¹⁶

It is extremely important for the U.S. public to understand the who of space, what capabilities are provided by space, what effects the U.S. can achieve within our nation and internationally and the affect it has on our personal lives.

Space Commission

"It is not the future of military space that is critical to the United States—it is the continued national development of space that will provide continued strength critical for our great

¹⁶ Jessica West, "Back to the future: The Outer Space Treaty turns 40," *The Space Review* (15 October 2007), under National Security Space Institute Space News, NSSI Space News Services (For the Week Ending 19 October 2007).

country in the decades ahead.”¹⁷ Two key documents have shaped the Space Community over the last decade and will continue to shape the next. The first is the *Report of the Commission to Assess United States National Security Space Management and Organization, Executive Summary* released January 2001 and the *United States National Space Policy* dated 31 August 2006.

The Commission’s charter was to assess the organization and management of space activities within the national security sector, the DoD and the IC. The report also included an assessment of civil and commercial activities in relationship to the DoD and the IC. The Commission concluded that it was in the best interest of the nation to promote the peaceful use of space; use space power to support the national instruments of power; and to deter and defend against hostile attacks.

Even though the comments primarily focused on the Defense Community, the DoD and the IC, it is apparent they meant the Space Community at large. The Commission highlighted a number of general problems regarding the organization and the management of the Space Community. They continually repeated that the responsibility and accountability for space activities were too broadly diffused among the many departments and agencies. They deemed this as less than ideal. This arrangement has not, does not and cannot provide the focused attention to space matters that is needed.¹⁸ Many others who have reviewed the Commission Report concluded the same thing, that the Space Community is too fragmented and lacks unity of effort due to decades of stovepiped, agency-focused projects and barriers between the military,

¹⁷ Col Michael C. Whittington, *A Separate Space Force: An 80-Year-Old Argument*, (Maxwell AFB, AL: University Press, May 2000), 12. <http://www.au.af.mil/au/awc/awcgate/maxwell/mp20.pdf> (accessed 23 May 05)

¹⁸ U.S. Congress, Senate and House, Committee on Armed Services, *Report of the Commission to Assess United States National Security Space Management and Organization: Executive Summary*, Report pursuant to Public Law 106-65, the National Defense Authorization Act for Fiscal Year 2000, Section 1622, (Washington, DC: Government Printing Office, 11 January 2001), xx. http://www.au.af.mil/au/awc/space/space_commission/index.htm (accessed 23 May 05)

intelligence and civil sectors. It is clearly not arranged or focused to meet the national space needs of the 21st century. Specific to the military, the Commission observed that the services do not treat space equally despite official doctrine calling for the integration of space. The Defense Community has adjusted and the changes have not been a failure, but they have not been wholly successful either. The Commission declared a more comprehensive approach was required to further the nation's space needs.

The Commission went into further detail regarding the management functions of the community. "There is no single individual other than the President who can provide the sustained and deliberate leadership, direction and oversight of national space policy that is needed."¹⁹ The Commission recognized the Space Community needed specific guidance and direction from the very highest levels of government. They recommended the President set national space policy and ensure that senior officials from the commercial, civil, defense and intelligence sectors cooperate. They also noted that Cabinet-level officials must place a more concentrated focus on space. This is a very tall order for the President and other officials given they have more on their plate than space.

The Commission then followed up with a review of the problems implied by the multitude of organizations within the Space Community. The Commission observed that the organizations suffered three main difficulties due to a combination of no higher-level guidance, direction and the bureaucratic inertia within the organizations themselves. First, the span of control is too broad. Internal to each organization and between organizations, the interagency process is inadequate for the volume and complexity of today's space issues. Second, only the most pressing issues get attention. "Influence on the planning, programming and budgeting...are

¹⁹ Ibid., xix.

too far removed and too late to have a substantial effect on processes.”²⁰ Third, space matters are left, on a day-to-day basis in the hands of middle managers who have insufficient influence within the departments and interagency arenas. Within yesterday’s and today’s structure, “it is not possible for senior officials outside their own communities to identify a single, high-level individual who has the authority to represent their agency on space-related matters.”²¹ The vast array of organizations within the Space Community and the numerous methods they employ to plan, program and budget creates a lack of visibility and essential accountability due to the watered-down effect.

In the Report and today, the continued watered-down effect continues to mean space capabilities do not receive a commensurate level of funding nor are they prioritized by relative importance to the nation. The investment plans to maintain legacy and develop future generational capabilities are spread too thinly and a single plan does not exist for the nation as a whole. The Commission noted there is no single appropriation that identifies and aggregates funding for the Space Community, which continues to exacerbate the many problems. Space funding spreads across and throughout all departments and agencies, nationally and internationally. The investment in science and technology and facilities is important, but the Report mentioned that people, human capital, was even more important.

“Since its inception, a hallmark of the U.S. space program has been world-class scientists, engineers and operators from academic institutions, industry, government agencies and the military services.”²² In order to meet the nation’s space needs, the pool of personnel resources must expand and the Space Community must play an active and deliberate role for human talent serves as the base for innovative and revolutionary ideas. Not only were

²⁰ Ibid., xx.

²¹ Ibid., xxi.

²² Ibid., xviii.

suggestions offered to build a professional space cadre, but to also change lines of communication and chains of command.

One suggestion aligned and modified the jurisdictions of the Congressional committees and subcommittees to the changes recommended at the Presidential level that would lead to a more streamlined process. They also concluded that a number of disparate activities should merge because present institutional arrangements did not reflect the nation's dependence on space and the opportunities provided from space. Institutional changes "may well...call for the creation of a Space Corps or a Space Department to organize, train and equip forces for sustained operations in space."²³ While the Commission found that a new department would provide a strong advocacy for space and serve as a one-stop shop, they concluded that it was not the proper time for such a move. They did not state when the proper time might be, but also specifically noted that nothing should be done that might "preclude the eventual evolution toward a Space Department, if that proves desirable."

In summary of the above, the Commission Report recommended that a successful approach to organization and management for the future must²⁴:

- Provide for national-level guidance that establishes space activity as a fundamental national interest of the United States.
- Create a process to ensure that the national-level policy guidance is carried out among and within the relevant agencies and departments.
- Ensure the government's ability to participate effectively in shaping the domestic and international rules and policies that will govern space.
- Create conditions that encourage the peaceful use of space.
- Create conditions that encourage the development of revolutionary methods for collecting intelligence from space.
- Provide the strategic plan to provide the nation's space objectives, actions, resources and implementation with priorities and oversight
- Account for the increasingly important role played by the commercial and international space sectors in the nation's domestic and global economic and national security affairs.
- Develop a cadre of space professionals

²³ Ibid., 93.

²⁴ Ibid., xxx.

Provide an organizational and management structure that permits officials to be agile in addressing the opportunities, risks and threats that inevitably will arise.

The Commission's Report not only focused on the national security side of space, but also took into account the space missions and functions identified in President Clinton's 1996 *National Space Policy*. A decade after the 1996 Policy and five years after the Commission Report, the President (Bush) authorized the second document shaping the beginning of the 21st Century's role in space.

Space Policy

The *U.S. National Space Policy* states, "In order to increase knowledge, discovery, economic prosperity, and to enhance the national security, the United States must have robust, effective and efficient space capabilities."²⁵ A complete copy of the 2006 *U.S. National Space Policy* can be found in Appendix Three. It is included so the reader has the ability to scan, observe, and review how heavily weighted it is towards the Defense Community with little regard for the civil and commercial space sectors. At an initial glance, the fundamental goals of the policy appear positive and committed towards peaceful purposes. Yet after a more thorough read, the terms of national security, homeland security, to defend, to protect, to advance security reside in five of the seven goals. As stated earlier, the Commission Report defined national security as the activities related to the DoD and the IC.

In some aspects it closely resembles the Space Commission Report and follows at least one of the recommendations of providing "direction and guidance" in the form of the "shall" do statements. In order to achieve the policy goals, four general guidelines were provided to the departments and agencies. Once again, Figure 1 defines the departments and agencies of the Space Community. Below are a few examples of what the vast array of organizations "shall do:"

²⁵ President George W. Bush, *United States National Space Policy*, (Washington, DC: 31 August 2006), 1. <http://www.ostp.gov/html/US%20National%20Space%20Policy.pdf> (accessed Sep 2006)

Establish standards and implement activities to Develop Space Professionals.
Create a common understanding of realistic and stable requirements, set and maintain realistic and stable funding to Improve Space System Development and Procurement.
Capitalize on opportunities for dynamic partnerships to Increase and Strengthen Interagency Partnerships.
Ensure future space systems to achieve new and improved capabilities, ensure the availability of space-related industrial capabilities in support of critical government functions to Strengthen and Maintain the U.S. Space-Related Science, Technology and Industrial Base.

The policy states that the U.S. government shall take these actions, yet the Space Community is not taking these actions as a whole, but independently and in a separate manner.

The policy goes into great depth and detail regarding the guidelines provided to the DoD and the IC. The guidelines provided on the Civil Space Community are not as detailed or defined in comparison to the National Security Community space guidelines. Most citizens recognize that the National Aeronautics and Space Administration is part of the Space Community. However, the laymen and most military members do not know that the Department of Commerce (through the National Oceanic and Atmospheric Administration) and the Department of the Interior (through the U.S. Geological Survey) also develop, operate and exploit space capabilities. It also provides no guidelines for the commercial space community in regards to such issues as frequency management or dealing with non-commercial space organizations. However, it does provide the government departments and agencies what they “shall and shall not do” with the commercial sector.

The two key documents show a failure of both the Space Commission and the *Space Policy* “group” to comprehend and understand that space is more than the military. The nation’s space capabilities provide both prosperity and security to and from the President to the common man. “While the rest of the world seeks to increase its ability to use space assets for information linkages required for economic growth in a globalized world, the United States sees much of the

technology they are seeking as military sensitive and, consequently, is trying to stop its spread.”²⁶
The time is now for the U.S. to look at the big picture and determine a better future and course of action.

The examination of the Space Community, “the who” and the what, the Commission Report and the *Space Policy* has just begun to scratch the surface. The next section provides a myriad of additional factors hindering the development, operation and exploitation of the nation’s space capabilities. Each factor in and of itself creates problems, but compounded the factors create an even greater and more complex problem.

²⁶ Eve Lichtgarn, “Review: Space as a Strategic Asset,” *The Space Review*, (23 July 2007).
<http://www.the-spacereview.com/article/913/1> (accessed 7 September 2007)

THE FACTORS

Policy

The nation has a policy, but it means nothing if not adhered to. The vast array of organizations continues to lead the U.S. down a multitude of pathways. The main path has long washed away. The nation's space capabilities are less effective, evidenced by diffuse management responsibilities; failure to fully participate in requirements; formulations of "unique" and specified-organizational capabilities; irregular and decreasing support of research, development, technology and demonstrations; and lack of integrated management of human resources. In 1994, the Government Accounting Office (GAO) issued a report under the heading of *National Space Issues: Observations on Defense Space Programs and Activities*. The report identified a number of problems with the then current policy. The same problems occur today within our own policy. The report stated the policy did not have:

- a mechanism to implement strong management at a high level;
- to establish and monitor requirements;
- a process for centralizing oversight;
- decision-making coordination and cooperation;
- a process to eliminate duplication;
- a funding mechanism to maintain program stability;
- a process to meet the government's affordability challenges;
- a way to determine needed resources and annual spending priorities; and
- a way to measure the progress of the investments.

Policy begets strategy. Space provides critical capabilities to all sectors of our society. Strategy provides a single roadmap. However, the Space Community aggressively pursues several different roadmaps. "Developing a comprehensive space strategy for the US, one that would still stress space security but on a broader basis, it would take rigorous analysis by people from many disciplines and areas of interest. This has not been done yet, and in some areas seems

to have been deliberately avoided.”²⁷ It would take real government leadership to break down the barriers of bureaucracy. It would also require the National Security Council; the Department of Defense, State and Commerce; NASA, other government organizations; aerospace industries, academia; advocacy groups; and others to work together. The Space Community requires more than the President as the leader. It requires someone with ability, objectivity and national awareness to lead and organize the community at large.

Rivalries

Space history is rife with examples of the roadmaps we have followed, continue to follow, discarded and disregarded. Our past not only haunts us, but has caught up with us. “As interest and dependence on space grew, other services and agencies created space commands and organizations to develop and exploit space capabilities. This action inevitably fueled inter-service and inter-agency rivalries and competitions; it also led to fragmentation of military space programs, operational capabilities and authorities.”²⁸ The Space Community with its many organizations, programs and cultures has produced divergent communities, fractious relations, competing visions and different directions, concepts and approaches for operating and employing capabilities. “Space is a frontier of seemingly unlimited horizons, yet one that has been parceled into the worst kind of stovepipes.”²⁹ One finds serious fragmentation and dilution of authorities and responsibilities. The perceptions of separate agendas, divided loyalties and lack of direction exacerbate the already inherent difficulties within and between organizations. It is ironic that as systems and operations become increasingly interdependent of each other, they become more

²⁷ Dr. Joan Johnson-Freese, *Space as a Strategic Asset*, (New York: Columbia University Press, 2007), 238.

²⁸ Lt. Gen. Michael Hamel, “Building Space Power for the Nation: Air Force Achievements, Challenges, and Opportunities,” *Air & Space Power Journal* (Summer 2006). <http://www.airpower.au.af.mil/airchronicles/apj/apj06/sum06/hamel.html> (accessed 22 September 2007)

²⁹ Dr. Joan Johnson-Freese, *Space as a Strategic Asset*, (New York: Columbia University Press, 2007), 258.

stovepiped and vice versa. Dependence on support from other organizations is taboo and a situation that most avoid at all costs. While the demand grows for space capabilities, the “stovepipe-setting” conditions inevitably affect other needs and priorities of the different organizations. Organizational mission sets become incompatible with each other. It then requires trade-offs internally and externally at the cost to the other roles and missions within the organizations. The distrust and competition between organizations is rampant and illustrated daily through commission reports, hearings, media reports and the news. This also manifests itself within the changes in funding and policy priorities of several space programs, which indicate a growing rivalry in space. “That initial clash of ambitions is further exacerbated by the parallel emphasis that the United States places on expanding its space superiority to space dominance.”³⁰

Defense Community

Each organization struggles to optimize space utilization in order to support its mission. Within the Defense Community, parochial thinking keeps it from maximizing the return on its space investments. The organizations have child-like behavior of “mine, mine, I don’t have to share. It’s mine!” The Joint Chiefs of Staff need to suppress service parochialism in order to meet the broader Space Community’s requirements and needs. The individual services wrestle with the most effective means to use space to increase their own efficiency.³¹ This then creates additional frictions within the Defense Community over the use and priorities of the capabilities. Several generals from different Service components have made comments that DoD guidance is

³⁰ Eve Lichtgarn, “Review: Space as a Strategic Asset,” *The Space Review*, (23 July 2007). <http://www.spacereview.com/article/913/1> (accessed 7 September 2007)

³¹ Maj Jeffrey R. Swegel, “A Fork in the Path to the Heavens: The Emergence of an Independent Space Force,” Monograph, Ft Leavenworth, KS., School of Advanced Military Studies, U.S. Army Command and General Staff College, (AY 01-02), 44.

all over the map. The military victimizes itself by confusion over missions, hamstrung by its inability to define clear and prioritized objectives, which catches it in a morass of overspending.

Even though the Air Force provides most military space capabilities, it is not the major user of them. Within the Air Force and to include the National Reconnaissance Organization element, “shifts in responsibilities, organizations, and culture created significant rifts and frictions among the space communities...leading to internal conflicts and dilution of space expertise across the Air Force community.”³² The GAO also recognized that the predominance of a single service is not in the best interest of a multi-varied set of users needs because their needs could be detrimentally affected by the single service budget decisions. The DoD places its internal focus on the Air Force to set the Defense Community’s priorities on programs, science and technology, funding, requirements and education. The Air Force then ultimately pays the price for “DoD’s” space decisions. This creates an additional dilemma for the Air Force. While it tries to simultaneously advocate and fund three (air, space and cyberspace) disparate sets of technologies and capabilities, it ends up diluting and fragmenting all three. While all the Services are required to do more with less, the Air Force continues to add more and more to its plate, with less ability and resources to plan, program and budget for the additions. Ultimately, the Air Force as the Executive Agent for Space does not work. It is “not due to any malfeasance or corruptions or lack of good will, but simply because the Air Force has other [*conflicting*] priorities.”³³ Have the DoD and the Air Force lost sight of its original mission to “fly, fight and win?”

The other Services similar to the Air Force are making efforts to develop their space components. However, they do so through their own respective service-specific views and

³² Lt Gen Michael Hamel, “Building Space Power for the Nation: Air Force Achievements, Challenges, and Opportunities,” *Air & Space Power Journal* (Summer 2006), 3. <http://www.airpower.au.af.mil/airchronicles/apj/apj06/sum06/hamel.html> (accessed 22 September 2007)

³³ Taylor Dinerman, “United States Space Force: sooner rather than later,” *The Space Review*, (27 February 2006). <http://www.spacereview.com/article/565/1> (accessed 12 September 2007)

concepts. Even though each Service recognizes they need to work with each other to maximize capabilities and minimize duplication, they accept the additional costs at the expense of other programs in order to fulfill their own “unique” space requirements. The individual Services resource the “direct,” but are less willing to resource the “indirect” space capabilities that contribute to their primary mission. The military has sheltered and nurtured space and has definitely reaped its benefits. “Military space...constitutes a separate and distinct mission arena in its own right, one which promises, over time to become as costly as the land, maritime, and air arenas today.”³⁴ However, Space has outgrown the confines of the military. This outgrowth to the realms of diplomacy, information/communication and to the economic well-being of the nation will create troubles for the whole Defense Community for the foreseeable future.

Budget

With that in mind, individual space organizations are doing their very best to keep pace, but budget constraints, compounded by temptation to fund “the latest and greatest” impedes the overall Space Community. Congress has expressed concern over the apparent inability or unwillingness of the Community to coordinate their space efforts that has delayed program implementation and has created budget overruns. Disagreements occur over funding levels and clashes over who should be in charge of the funding for development. Of course no one will dispute that money, funding and the budget is a significant key factor that most constrains the nation and the Space Community.

The U.S. does not have an aggregated space budget nor does it fund programs and capabilities in aggregate so that it can compare space funding to its total budget, make decisions about priorities, or even conduct future analyses. The Space Community is fully aware of this

³⁴ Benjamin S. Lambeth, “Footing the Bill for Military Space,” *Air Force Magazine* 86, no. 8 (August 2003). <http://www.afa.org/magazine/Aug2003/0803milspace.asp> (accessed 21 July 2007)

and the prevailing attitudes and modus operandi of the individual organizations will “re-allocate” funding to core missions at the expense of the non-core missions. The failure of the nation to have a single budget for space means less visibility into how space is funded and the inability to formulate an overall investment strategy. This allows each organization the latitude to do what it will in each of their organizations. An example which is prevalent throughout the Space Community as reported by the GAO is “the current decentralized approach of funding satellites from one budget and terminals from another’s can result in disconnects and duplication.”³⁵

The DoD has maintained a “virtual” major force program (vMFP) in order to provide the planning, programming, budgeting, execution and oversight of space. However, it is not an aggregate of the “real” bottom-line of the DoD’s space budget. The DoD organizations pick and choose what they consider “space-funded” and roll it into the vMFP budget. The creation of the vMFP, how it is administered and used is a monograph in itself and will not be further discussed here. What the organization considers as “space-funds” may or may not include full or partial funding transferred outside of the DoD, transferred into the DoD from other space and non-space organizations, research and development, science and technology, contracts, communication networks, contract funding and/or civil and military salaries. This past fall, the House Appropriations Committee directed a reordering of the DoD’s budget to provide greater visibility on space programs.³⁶ The Secretary of Defense is to establish space as a true major force program similar to that of U.S. Special Operations Command and no longer as a “virtual” major force program. Theresa Hitchen, director of the Center for Defense Information and an expert in

³⁵ U.S. General Accounting Office, *Military Space Operations: Planning, Funding, and Acquisition Challenges Facing Efforts to Strengthen Space Control*, Report to the Secretary of Defense, (Washington, DC: Government Printing Office, GAO-02-0738, September 2002), 11. <http://www.gao.gov/new.items/d02738.pdf> (accessed 23 May 05)

³⁶ Jason Sherman, “Pentagon directed to raise profile of space funding in five-year plan,” *Inside the Air Force* (6 Aug 2007), under National Security Space Institute Space News, NSSI Space News Services (For the Week Ending 10 August 2007).

military space policy, said, “I think it is a good governance issue” and most believe it will improve congressional oversight of how much is spent on space.³⁷ The new designation does not “fence” funds nor will it likely raise a more effective profile of space spending. The House and Senate may see nothing different unless they provide detailed instructions on what they consider “space-funded.” Least to say, the DoD is not the only guilty party in the manipulation or laundering of space funds. Congress needs to intervene, fence off all programs and look at the totality of the nation’s space resourcing. Until such time, there is no motivation for any government organization to relinquish funding or programs to competing organizations. Monies lost from one program will not return to the same organization to use on another program. An additional example provided by the GAO regarded an integrated program office under a convergence implementation plan. Under the plan, the program office acquires, operates and manages the converged system. “The plan “adopted” a multi-agency funding approach whereby the program office would prepare a single budget.”³⁸ In actuality, a number of organizations, which receive their funds from several different congressional authorization and appropriation committees, fund the single budget request. The report concluded the multi-funding efforts present a myriad of challenges to the converged system. Is there any question then that space organizations will step up their efforts to more closely guard their budgets and funds.

Capabilities

The Center for Strategic and International Studies released *Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era, Phase 2 Report*. They stated that “declining government funding for...space projects raises profound questions about how the

³⁷ Ibid.

³⁸ U.S. General Accounting Office, “*National Space Issues: Observations on Defense Space Programs and Activities*,” Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, and House of Representatives, (Washington DC, Government Printing Office, GAO/NSAID-94-253, April 1994), 28. <http://archive.gao.gov/t2pbat2/152311.pdf>

United States should organize for civil space, national security space and military space,” as well as “market-based approaches might not be adequate even for proving the capabilities needed...” were noted.³⁹ Budget reductions and the misuse of funds have meant losses in human resources, design, development, manufacturing, integration and testing. The demands of meeting growing needs and maintaining current capabilities far exceed available resources. In order to exploit space, it requires not only technological innovations, but also the development of operational concepts, undertaking organizational adaptation, training and experimentation to transform. The requirements to maintain legacy systems inhibit the Space Community’s capacity to convert leading edge research and new technologies into innovative operational systems. Many of these legacy systems were purchased decades ago and instead of realizing the “sunk” costs of old buys, organizations continue to modify and re-furbish these legacy systems at costs a magnitude if not higher than the new systems. This increases the risks of inoperability and redundancy within and between the Space Community. The duplication of efforts also wastes resources and time. Numerous GAO reports written over the last decade and a half concerning one space organization or another could have been written about the Space Community at large. Nothing has changed. Everything has more or less remained or undergone superficial changes only. In summary, the reports noted multiple space organizations result in fragmented responsibilities; duplicate facilities, staffs and infrastructure; deficiencies in achieving economies of scale, optimizing existing capabilities and validating requirements; less effective force; inoperability; and complicated formal and informal communication structures.⁴⁰ Even research and development

³⁹ Clark A. Murdock, and Michèle A. Flournoy, Kurt M. Campbell, Pierre A. Chao, Julianne Smith, Anne A. Witkowsky, Christine E. Wormuth, “Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era,” Center for Strategic and International Studies, 28 July 2005. http://www.csis.org/media/csis/pubs/bgn_ph2_report.pdf (accessed 18 August 2007)

⁴⁰ U.S. General Accounting Office, “*National Space Issues: Observations on Defense Space Programs and Activities*,” Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, and House of Representatives, (Washington DC, Government Printing Office, GAO/NSAID-94-253, April 1994), 11. <http://archive.gao.gov/t2pbat2/152311.pdf>

organizations need merged and efforts coordinated to ensure interoperability for future space capabilities.

Human Capital

Today, numerous space organizations and relational structures do not provide essential intellectual, human and leadership capital for the nation to realize its full potential as an instrument of vital importance to our future space capabilities. Space education and training are performed in a disjointed manner. Each organization provides their independent version of education and does so with little overlap. The DoD has a similar problem. It is not guided by any common standards or curricula. Space has different properties from land, sea and air environments. Those outside the Space Community cannot expect to understand or fully comprehend the nature of space. The small number of space cadre that is slowly coming into existence will, without a doubt, never likely produce a Service Chief of Staff or even a Civil Administrator within the Space Community. “Perhaps America’s space warriors should just accept their fate and learn to live with their relatively low status.”⁴¹ “Problems, in terms of organizational culture come through loud and clear, for the present and the future as military space operators read the career handwriting on the wall and opt to leave the military for jobs in the private and civil sector offering better advancement opportunities, as well as personal appreciation.”⁴²

Culture

Of the four space sectors—military, intelligence, civil and commercial—each has their own institutional cultures that encourages overlap and discourages cooperation. Parochialism

⁴¹ Taylor Dinerman, “United States Space Force: sooner rather than later,” *The Space Review*, (27 February 2006). <http://www.the-spacereview.com/article/565/1> (accessed 12 September 2007)

⁴² Dr. Joan Johnson-Freese, “Transitioning to a Space & Air Force: Moving Beyond Rhetoric?” Research Paper, USAF INSS, Colorado Springs, CO., USAF Academy, (4 January 1998), 18.

exacerbates, culture differentiates and subsequently inhibits integration efforts at the inter- and intra- organizational levels. Institutional culture has had and continues to hinder space in its quest for equality with the space and non-space pieces of the organizations. It is difficult to rise above the embedded culture when decisions and choices must be made that concern more than one organization and even more so with organizations within organizations. The majority of the parent institutions of the space organizations preclude a strong space culture that is essential to the growth of space because it provides the intellectual nutrients to ensure the growth of space leaders and professional cadre development, training and advancement. “Cultural dilemmas will lead to the delay of our national preparations for the comprehensive roles that space will play in the 21st century.”⁴³

Our political captains and decision makers should concern themselves with the cultural dilemma. It creates inter- and intra-organizational frictions and rivalries, which have slowed efforts to optimize the use of space. The debate and running feud between the Space Community organizations is not only that of which one gets to be the lead organization, but which one gets to develop the capability and which one gets to employ the capability. This puts the Space Community at odds with each other as well as with the nation. Obviously, the nation’s goal should take precedence, but then the question arises on who set the priorities. The current organizational structure allows the one with the loudest voice and the biggest stick to win which normally means the DoD.

Organization

Congress has requested reports and studies throughout the years to assess a variety of management and organizational issues relating to space activities. Several completed around

⁴³ Franz J. Gayl, “Time for a Military Space Service,” *U.S. Naval Institute Proceedings* 130 (July 2004), 48. <http://search.ebscohost.com/login.aspx?direct=true&db=mth&AN=13699316&site=ehost-live> (accessed 23 Aug 07)

1993 did not find organization to be a problem. They deemed other means could achieve the recommended changes. Yet, later reports conclude the “other means” have only partially worked or not at all. Studies related the need for “fundamental changes in the way government space activities are organized and managed.”⁴⁴ The most defining statements consist of “a number of disparate space activities should be merged, organizations realigned, lines of communication opened and policies modified to achieve greater responsibility and accountability.”⁴⁵ The reports also claimed the need for the national leadership to elevate space interests to the national-level agenda. The military recognizes the negative aspects of stovepiping, seeks to change, but finds it difficult. It creates waves and disrupts the status quo, which normally promotes safety and comfort. External and internal challenges call for adjustments to the structure to ensure efficient and optimum handling of the nation’s strategic priorities and operational activities.

“Organizational reform can represent a major attempt to introduce change or a mechanism for deflecting real change.”⁴⁶

“Dramatic organizational change is the antithesis of tradition...this sets up an almost approach-avoidance situation...where marginal changes satisfy...the need for change while protecting the entity as a whole from change it does not really want.”⁴⁷ The current structure appears to gridlock the status quo and supplants space in favor of the more traditional roles and

⁴⁴ U.S. General Accounting Office, “*National Space Issues: Observations on Defense Space Programs and Activities*,” Report to the Chairman, Subcommittee on Defense, Committee on Appropriations, and House of Representatives, (Washington DC, Government Printing Office, GAO/NSAID-94-253, April 1994), 8. <http://archive.gao.gov/t2pbat2/152311.pdf>

⁴⁵ U.S. General Accounting Office, *Military Space Operations: Planning, Funding, and Acquisition Challenges Facing Efforts to Strengthen Space Control*, Report to the Secretary of Defense, (Washington, DC: Government Printing Office, GAO-02-0738, September 2002), 4. <http://www.gao.gov/new.items/d02738.pdf> (accessed 23 May 05)

⁴⁶ Joan Johnson-Freese and Roger Handberg, “Searching for Policy Coherence: The DOD Space Architecture Experiment,” *Joint Force Quarterly* 16 (Summer 1997), 92. <http://www.fas.org/spp/eprint/1716pgs.pdf> (accessed 22 September 2007)

⁴⁷ Dr. Joan Johnson-Freese, “Transitioning to a Space & Air Force: Moving Beyond Rhetoric?” Research Paper, USAF INSS, Colorado Springs, CO., USAF Academy, (4 January 1998), 11.

cultural preferences. Other reports have recommended the White House focus to implement organizational changes to encourage greater cooperation and synergism and less duplication among government space activities. The Commission report even stated “organization, of whatever form, must accomplish the following functions: high-level guidance...and education, collectively.”⁴⁸ Collectively is the key word. Operational responsibilities, expertise, mission advocacy, requirements, acquisitions and budgets still occur independent and not as a collective. Despite minor adjustments and superficial changes, a more comprehensive overhaul might be required. The approach-avoidance method warns organizations to not only be cautious against the pitfalls of marginal organizational changes, but to be cognizant that dramatic change is likely inevitable. So in essence, the ineffective and insufficient changes within the Space Community call for a dramatic change. It may well require the Space Community to turn into the “Borg” or something equivalent to a “United States Space Force.” In a statement singling out the Air Force, but wholly applicable to the Space Community, Senator Bob Smith (R-NH) claimed the Air Force’s refusal to fully embrace space and its stewardship supported the creation of a separate Space Force. He went on to state “if the Air Force cannot or will not embrace space power, we in Congress will have to drag them there, kicking and screaming, if necessary, or perhaps establish an entirely new service. Drastic as that sounds, it is an increasing real option that may be necessary to put this nation on a course toward space power.”⁴⁹ While the Community acknowledges that the current arrangements are inadequate, it also lambasts the creation of a new organization on the basis that new organization would divert scarce financial resources from

⁴⁸ U.S. Congress, Senate and House, Committee on Armed Services, *Report of the Commission to Assess United States National Security Space Management and Organization: Executive Summary*, Report pursuant to Public Law 106-65, the National Defense Authorization Act for Fiscal Year 2000, Section 1622, (Washington, DC: Government Printing Office, 11 January 2001). http://www.au.af.mil/au/awc/space/space_commission/index.htm (accessed 23 May 05)

⁴⁹ COL Kurt S. Story, “A Separate Space Force: An Old Debate with Renewed Relevance,” Research Paper, Carlisle Barracks, PA., U.S. Army War College, (9 April 2002), 5

critical items to non-value added functions such as the new bureaucracy itself, its personnel systems and so forth. This fully circles back to the budget that the organizations rightly assume will create reductions in their funding.

If the nation retains the current, inadequate structure longer than necessary and does not undergo a dramatic change, it will continue to stifle and impair the growth and development of the nation's space capabilities. On-going organizational fragmentation is a waste of resources as well as detrimental to the nation. It represents a loss of both a U.S. space-industrial economy and a critical sovereign national asset that cannot easily rejuvenate after continuous reductions. Structure is the main contributor to the slow development, limited advocacy of a single space budget and the overall development of capabilities and human resources. Organizational effectiveness becomes more critical than ever in times of shrinking budgets. The Space Community's vast array of organizations is not properly arranged to meet future challenges nor does the structure correspond to an optimum environment for the development of the nation's space capabilities for the 21st Century.

Medium

In 1997, the U.S. Space Command released *Vision 2020*, explicitly stating, "during the early portion of the 21st century, space power will also evolve into a separate and equal medium of warfare. The military community is so focused on the military space force becoming an equal medium in relation to the air, land and sea that they have lost sight that military space and the military are just one fraction of the nation's instruments of national power. By its very nature, space capabilities belong to the nation at large. The military needs to recognize that space is already a separate and equal medium. Its distinction is proclaimed by space's very nature and what it provides the nation.

Weaponization

Even though an equal medium, the military community does not consider military space forces to be warfighters. Oh and how the “flying” Air Force, more so than the actual military space forces, laments that fact. Thus, the Air Force approaches ways not only to defend against, but also to attack potential space adversaries to justify and validate that it is a warfighter, but this approach has also shifted military space’s focus. This monograph does not debate the legal and political ramifications associated with the militarization and weaponization of space, but on what may be best to execute the nation’s space capabilities. The unrelenting militarization and weaponization of space has blinded and gotten in the way of providing the goods and services, capabilities, the nation as a whole requires. The military’s “priorities admittedly lie elsewhere and space represents an exploitable asset rather than an end itself.”⁵⁰ There is no unity even among military strategists who believe “they are driven by a military impulse to build advantage into domination, and a political impulse to put domination to the service of an activist global vision.”⁵¹ What the military envisions may not fit the conditions or the vision of the nation. Do the national strategists require space capabilities that support all or do they require space capabilities that support war? The continuous movement towards space weapons further exacerbates the dysfunction between the nation’s political captains and the military. While one’s rhetoric states we are not weaponizing space, the other touts we are. The political captains have been caught up in the military’s fervor that to become a true, great space power the nation must militarize and weaponize space. This further reinforces the perception that the U.S. is a rogue

⁵⁰ Joan Johnson-Freese and Roger Handberg, “Searching for Policy Coherence: The DOD Space Architecture Experiment,” *Joint Force Quarterly* 16 (Summer 1997), 92. <http://www.fas.org/spp/eprint/1716pgs.pdf> (accessed 22 September 2007), 93.

⁵¹ Wade L. Huntley, “The Weaponization of Space: U.S. Strategy in Global Context,” Presentation, ISU Space & National Security Theme Day, University of British Columbia, Canada, (26 July 2005), 5. <http://www.ligi.ubc.ca/sites/liu/files/Publications/theweaponizationofspace.pdf> (accessed 22 August 2007)

nation by skirting international laws, inadequately supporting international treaties and leanings towards preemption and unilateralism.⁵² In order to place a greater emphasis on national and international soft power, most political strategists believe an essential component is a purposeful, peaceful presence in space. What is missing, and what is required, is a clear objective that space provides a different “way” vice a different “means” of enhancing the nation’s instruments of national power. “We are in a defining moment of history with regard to space power. Do we transition from a space-enabling medium to a space-fighting medium?”⁵³ The space vision is integrally linked to what vision, war or peace, the nation pursues. Which ever the nation pursues, the reality, the true potential of the nation’s space power will only come to fruition when space and all its related capabilities are created; complete with a policy to support the nation, its own space-competent leadership to develop strategy for the future and the organization to enable it.

⁵² Eve Lichtgarn, “Review: Space as a Strategic Asset,” *The Space Review*, (23 July 2007). <http://www.the-spacereview.com/article/913/1> (accessed 7 September 2007)

⁵³ Maj Jeffrey R. Swegel, “A Fork in the Path to the Heavens: The Emergence of an Independent Space Force,” Monograph, Ft Leavenworth, KS., School of Advanced Military Studies, U.S. Army Command and General Staff College, (AY 01-02), Abstract.

CRITERIA

From the discussion above, the reader should have a clearer understanding what hinders the nation's development, operation and exploitation of space. The Space Community, itself, is the primary hindrance. The nation's policy and the intertwined, yet independent factors represent additional hindrances and evidence of organizational mismanagement and inappropriate organizational design and structure. It is evident that space must be maximized through leadership, management, organizational design, efficiency to name a few. At this point, the reader needs to allow that the Space Community is inherently a business. A business is normally defined as an entity or activity concerned with supplying and distributing commodities. A commodity defined as a good or a service. The Space Community is then a business by the fact that it provides and receives goods and services, internally and externally. The Center for Strategic and International Studies also viewed the Space Community as a business. They further postulated the possibility that consolidation (of the community) could achieve, through an independent organization, the necessary and logical economies and efficiencies the 21st century requires. The independent organization, the space provider, would then supply the programs, goods and services to meet the needs of the DoD, the Intelligence Community and civil space "customers."

If we deem the Space Community a business, it opens additional doors through which "outside" expertise can be brought in to analyze and offer solutions to both, identified and unidentified "hindrance" factors. This monograph looks at the business community for insights. The business community and its theorists have spent years researching and examining what makes a business successful. They have hypothesized, formulated and defined the most common symptoms of an inadequate business structure as well as a set of principles a business should follow for success. Overall, the general business community accepts these findings. Figure 3 identifies some of the most common symptoms of an inadequate organizational structure.

- (a) Lack of opportunities for general management development.
- (b) Insufficient time devoted to strategic thinking due to: too much concentration on operational issues; excessive decision making at the top; or overwork key personnel.
- (c) Intensive antagonistic working climate. An antagonistic climate may be signaling a problem of balance between structure and process.
- (d) Lack of definition in business planning, neglect of special markets and inappropriate setting for growth. These are among the clearest evidence of an organizational structure which cannot accommodate the strategic positioning of the firm.
- (e) Lack of coordination among divisions. This points to a failure of integration.
- (f) Excessive duplication of functions in different units. Differentiation among units is not well established.
- (g) Excessive dispersion of function in one unit.
- (h) Poor performance and low return expectations. The organizational structure cannot escape a major revision in a situation like this. The firm should examine its strategy and adopt an organization structure suitable for the implementation of the strategy.

Source: Adapted from Arnold C. Hax and Nicholas S. Majluf. "Organizational Design: A Survey and an Approach." *Operations Research* Vol. 29, no. 3 (May – Jun 1981): 445.

Figure 3. Common Symptoms of an Inadequate Organizational Structure

The Space Community will deny that they are a business. Yet the origins of the organizations were built from a business construct. As such, they too in one-way, shape, form or another have defined their own success criteria. Each organization defines success for their organization only and not for the whole Space Community. One example provided from the National Security Space Organization lists the five criteria of Inclusive, Responsive, Objective, Accountable and Efficient as their guiding principles for success. However if the organizations, themselves, and the Space Community, as a whole, are achieving their criteria for success, why do we find a number of factors which belie that success?

The Space Community is not failing, but the nation's policy and the shown factors obviously and blatantly reflect the signs and symptoms of an inadequate organizational structure. The symptoms in Figure 3 were used as a basis for analyzing the current Space Community as well as Fayol's 14 Classical Principles of Management.⁵⁴ Fayol (1845–1921) was a French management theorist and is still considered one of the most influential contributors to the

⁵⁴ Henri Fayol, *General and Industrial Management*, Translated by Constance Storrs. (London: Pitman Publishing, 1949).

concepts of modern management. Figure 4 shows Fayol's 14 management principles to include a brief description and meaning.

1	Division of Labor	Allow high levels of specialization
2	Authority and Responsibility	Delegation of sufficient authority to carry out assigned responsibilities
3	Discipline	Resulting from good leadership, fair agreements and judiciously enforced
4	Unity of Command	Each person has one and only one boss
5	Unity of Direction	Activities with the same objective should be directed by one manager
6	Subordination of individual to general interests	Interests of the organization take precedence over the interests of the individual
7	Fair Remuneration	Based on achievement of assigned objectives
8	Centralization	Authority should be delegated in proportion to responsibility—proper balance should be chosen
9	Scalar Chain	A clear and graded scale should exist from which all directives and communications flow
10	Order	Clearly defined and understood and its relationship to other jobs
11	Equity	Established rules and agreements should be enforced fairly
12	Stability of Personnel	Encouraged to establish loyalty to the organization and to make a long-term commitment
13	Initiative	Encouraged to exercise independent judgment within the bounds of delegated authority
14	Esprit de corps	Encouraged to define personal interests with those of the organization and thereby achieve unity of effort.

Source: Data adapted from James H. Donnelly, James L. Gibson and John M. Ivancevich, *Fundamentals of Management*, 6th ed. (Texas: Business Publications, 1987), 85.

Figure 4. Fayol's 14 Classical Principles of Management

Many other books dealing with business call the principles of management, the principles of organization. They roll up Fayol's 14 principles to five; highlighted (1-5) in Figure 4.⁵⁵ Along with the principles of management, Fayol also proposed the existence of five management functions consisting of planning, organizing, controlling, coordinating and commanding. Others

⁵⁵ James H. Donnelly Jr., James L. Gibson and John M. Ivancevich, *Fundamentals of Management*, 6th ed. (Texas: Business Publications, 1987), 182.

recognize four by retaining planning and organizing, combining coordinating with controlling and calling commanding, leadership. The principles of management as well as the functions of management were used as the criterion to analyze the recommendation in the proceeding section.

RECOMMENDATION

If the nation is serious about space, it should consider making a “drastic” change or transformation of the current space program. The current status quo program with multiple organizations with multiple missions without a single focus and a single “belly button” is hindering and strangling America’s space direction, domination and development. The organizations will merely look on space as an auxiliary and not as a principal business. To that end, the most straightforward and effective solution is to fuse the service- and agency-fragmented pieces into an independent organization. Given the depth and breadth of space, there exists a clear opportunity and the absolute need to establish one organization and one responsible leader to provide the national and global requirements, needs and capabilities, all day, every day.

The endeavors of the U.S. require “a force that will ensure that United States space interests are protected, that national security space objectives are met and that this great nation achieves its full potential in space.”⁵⁶ Joint, military doctrine even points out, “It is imperative for the U.S. to view space and space capabilities in an integrated fashion. To achieve optimal support from space, all space capabilities and systems (military, civil, commercial and multinational), must be integrated into military planning.”⁵⁷ The Space Community organizations continue to turn bad strategy into a parody of bad management and bad management into a parody of bad strategy. Again, it requires one organization and one leader to convey the authority, responsibility and accountability to fully develop the nation’s space vision, concepts and capabilities. This organization can enhance capabilities via the synergy effect and by reducing numerous redundancies. Here after, the new organization will be called the National Department of Space, NDS for short.

⁵⁶ COL Kurt S. Story, “A Separate Space Force: An Old Debate with Renewed Relevance,” Research Paper, Carlisle Barracks, PA., U.S. Army War College, (9 April 2002), 25.

⁵⁷ U.S. Department of Defense, Joint Publication 3-14 *Joint Doctrine for Space Operations*, (9 August 2002), I-1.

Current and rapidly expanding U.S. dependence on space demands that the President and his cabinet-level members recognize space as a top national priority and a top national security priority. All political members must have a sophisticated understanding that space adds to both the hard (military) and soft (diplomacy, information and economic) instruments of national power. Since space is such a small part of government activities, a coherent strategy must exist and must focus on soft power. Space goods and services have an increasingly larger effect on soft power, but the nation continues to wield the military usage of space, the hard power. “That initial clash of ambitions is further exacerbated by the parallel emphasis that the United States places on expanding its space superiority to space dominance.”⁵⁸ The White House has the power to integrate all aspects of U.S. space power. Only with Presidential leadership and a massive push can the civil, defense and intelligence space sectors work to ensure the nation’s needs for the 21st Century.

Presidential leadership then provides a policy. Policy must emanate from the national level for the nation and not one for any particular business, department or agency. The purpose of policy is to achieve consistency and direction and to protect the reputation of the organization.⁵⁹ Even with the recommendation for the National Department of Space, policy remains dependent on the President and policy makers for national guidance and direction. Policy precedes strategy.

With strategy, the issue of leadership is essential. The NDS requires a single, unifying civilian leadership structure. For the recognition and full potential of space to materialize, the nation needs charismatic, experienced senior space leaders whom will lead the NDS, serve our nation by educating the public and political members on the grave importance of space and

⁵⁸ Eve Lichtgarn, “Review: Space as a Strategic Asset,” *The Space Review*, (23 July 2007). <http://www.the-spacereview.com/article/913/1> (accessed 7 September 2007)

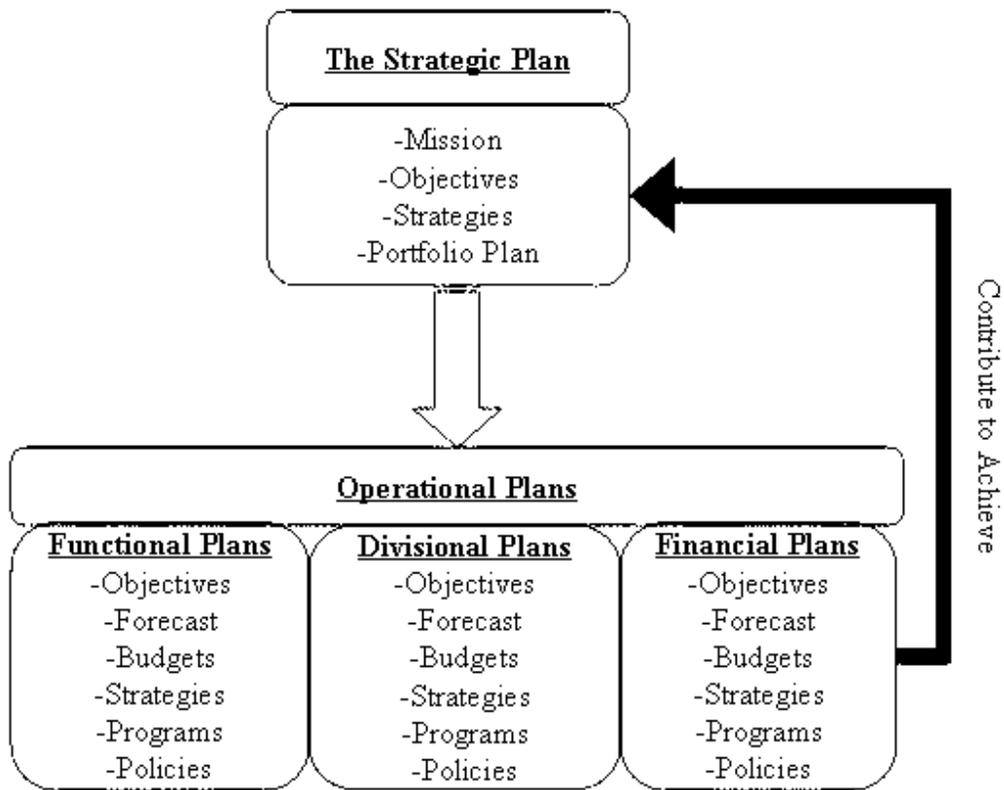
⁵⁹ James H. Donnelly Jr., James L. Gibson and John M. Ivancevich, *Fundamentals of Management*, 6th ed. (Texas: Business Publications, 1987), 795.

provide the strategy for today and tomorrow. To the modern world, the term strategy means top-level decision-making that stipulates the long-term relationships between the organization and the environment.⁶⁰ The NDS leadership takes the national policy and then uses a “planning process that deals with long-range goals, selection of activities to achieve those goals and the allocation of resources to those activities.”⁶¹ In other words, the leadership provides a strategic plan or strategy. The NDS strategic plan reviews the requirements, architectures, implantation plans, costs and operational analyses of plausible alternatives to provide the nation a space strategy. Real strategic planning and leadership requires a continuous assessment of the organization’s mix of goods and services, with an open mind towards changing the mix or the organization itself should it become necessary.

The current Space Community has a policy, but no strategic plan except at independent organizational levels. The Space Community has operational-level strategies that do not contribute to a strategic-level strategy. The relationship between an organization’s strategic plan to an operational plan is as follows in Figure 5.

⁶⁰ H.R. Smith, Archie B. Carroll, Asterios G. Kefalas and Hugh J. Watson, *Management: Making Organizations Perform*, (New York: Macmillan Publishing, 1980), 160.

⁶¹ James H. Donnelly Jr., James L. Gibson and John M. Ivancevich, *Fundamentals of Management*, 6th ed. (Texas: Business Publications, 1987), 798.



Source: Data adapted from James H. Donnelly Jr., James L. Gibson, and John M. Ivancevich, *Fundamentals of Management*, 6th ed., (Texas: Business Publications, 1987), Figure 5-7.

Figure 5. The Relationship of the Strategic Plan to the Operational Plan

The mission of the NDS ties into policy, which should be generic at best, with a recommendation of providing the nation the safety and prosperity of space. It should not be tied primarily or directly to the military. The military does not lose anything. It has the potential to gain under the objectives of the NDS's strategic plan. The objectives are integral because they specify future conditions that the leadership deems satisfactory and necessary to achieve the mission.⁶² The preferred means of achieving the objectives are by specifying courses of actions. The strategic plan reviews these courses of actions against resource constraints. The review of resources then specifies the kinds, amounts and budgets required as well as the potential sources and allocations

⁶² James H. Donnelly Jr., James L. Gibson and John M. Ivancevich, *Fundamentals of Management*, 6th ed. (Texas: Business Publications, 1987), 92.

of those resources.⁶³ The strategic plan prioritizes the actions in accordance with mission priorities and resources. While doing this, the leadership continues to determine whether the strategy chosen remains appropriate.

Six, very generic, hard hitting criteria surface when assessing the organization to the strategy and the strategy to the organization:⁶⁴

- Internal consistency of strategy.
- Consistency of strategy with the environment.
- Strategy's appropriateness in light of available resources.
- Satisfactory degree of risk.
- Appropriateness of the time horizon.
- Workability of the strategy.

The focus of leadership and the accompanying strategy is development. The strategic decisions select the portfolio and the long-term development of the individual “businesses” within the NDS. It requires recognition of the businesses in which the organization is engaged in and further segmentation into manageable units. Strategy assigns the implementation and direction to carry out the formulated plan. Just as the leadership continues to assess the overall organization, leadership will forecast to determine what level of activity can be expected during the planning period, what current shortfalls occur, what the future may hold and what level of resources will be available to support the short-, mid- and long-term projected space requirements and needs.

One of the already mentioned GAO reports also concluded that the nation required an investment plan that would set priorities and help make decisions on meeting the priorities; establish accountability mechanisms to make sure funding was targeted at the priorities; provide the level of detail needed to avoid the disconnects and duplications in existence; and carry out the

⁶³ Ibid., 92.

⁶⁴ H.R. Smith, Archie B. Carroll, Asterios G. Kefalas and Hugh J. Watson, *Management: Making Organizations Perform*, (New York: Macmillan Publishing, 1980), 166.

nation's goal and space plan in their respective time frames.⁶⁵ The strategic plan is the nation's investment plan for space. Only with the appropriate senior-level leadership, when properly managed and with the right priorities will the investment plan of U.S. space both deserve and attract the funding that is needed. The current spread of distinctive missions and technological identities have placed great strains on the Space Community organizations. It is evident minor changes to the current organization will not reduce the strains. "With the numerous array of space organizations, the U.S. is caught in a situation of uncoordinated acquisition efforts for its space capabilities."⁶⁶ Investments in the organizational best interests are not in the best interests of the nation. Investment in all resources from the conceptual to the technical is essential if the U.S. is to maintain its lead. A drastic change, as in the NDS, could alleviate the strains by reorganizing and realigning the blurred missions, blurred technologies and the blurred investment plans into a more distinctive investment plan. The NDS would provide direction and hold those accountable for implementing the nation's priorities.

The NDS would naturally devote all its resources to its missions. Other organizations would be able to count on the NDS' full-time support without having to worry about organizations favoring their own organizations. "Are we advocating for the right programs because out of these three—policies, programs, procedures—only programs ultimately matter since this is where the money is applied?"⁶⁷ A separate organization would allow space to compete for funding within the entire budget, lessening the unfair pressure on the DoD and other

⁶⁵ U.S. General Accounting Office, *Military Space Operations: Planning, Funding, and Acquisition Challenges Facing Efforts to Strengthen Space Control*, Report to the Secretary of Defense, (Washington, DC: Government Printing Office, GAO-02-0738, September 2002), 12. <http://www.gao.gov/new.items/d02738.pdf> (accessed 23 May 05)

⁶⁶ Maj Jeffrey R. Swegel, "A Fork in the Path to the Heavens: The Emergence of an Independent Space Force," Monograph, Ft Leavenworth, KS., School of Advanced Military Studies, U.S. Army Command and General Staff College, (AY 01-02), 50.

⁶⁷ Victor P. Budura, "The Next Force," *Air and Space Power Chronicles*, (June 1998). <http://www.airpower.au.af.mil/airchronicles/cc/budura.html> (accessed 23 Aug 07)

organizations to make most of the trade-offs, and protecting the funds from being siphoned from internal programs to other internal programs. The trade-off decisions would be made earlier in the planning process in conjunction with already established priorities of the nation and the NDS. The budget would be submitted as a whole versus submitted in pieces and parts from all over the current Community. The current methods obscure the way the nation's space money is spent and reported. Articles, auditing reports and the like allude to funding space requires withdrawals from the U.S. budget as a whole, not from the single organizational entities limited funding allocations. One advantage of such a solution, as the NDS, is budget centralization, which would bring clarity for the first time to overall space funding. The NDS would provide a single budget mechanism. "It would foster greater transparency in the tracking and management of multi-service space procurement programs."⁶⁸ In the case of the NDS, multi-service programs would fall under the space strategy portfolio plans. One funding line would improve the nation's management and oversight of the national budget in regards to space activities. The NDS would bring about better efficiencies and more cost effective plans. The NDS would streamline the acquisition process that would better enhance the procurement, development and fielding of space assets to meet the nation's requirements. The result of long-term efficiencies and savings would overcome short-term expenditures of the NDS.

Under one organization and its own budget, the NDS can concentrate on providing all government and non-government agencies the best space-based support and capabilities possible. DoD and others will not have to worry about "institutional favoritism."⁶⁹ The space budget would emphasize space potential versus space inertia and serve to establish a more economical way of doing business.

⁶⁸ Benjamin S. Lambeth, "Footing the Bill for Military Space," *Air Force Magazine* 86, no. 8 (August 2003). <http://www.afa.org/magazine/Aug2003/0803milspace.asp> (accessed 21 July 2007)

⁶⁹ Taylor Dinerman, "United States Space Force: sooner rather than later," *The Space Review*, (27 February 2006). <http://www.the-spacereview.com/article/565/1> (accessed 12 September 2007)

The above are just a few justifications why the Space Community should undergo a drastic change. Various debates on space as a separate force or wholly independent unanimously voice that drastic change has the potential to garner potential cost efficiencies, better achieve national objectives, lessen the risk of retarding space growth, improve funding, use space in a “correct” manner, and boost research and development as well as science and technology. Briefly, the NDS sets up a more focused process and ensures a better balanced review of space. The NDS will foster new capabilities needed which will require the appropriate investments and resources to fund and to establish while maintaining the “legacy” and current systems until such time as deemed obsolete or redundant. The decisions will be based on the need to keep a healthy American presence in space and on the ground. In order to keep the nation’s space industry in existence, the NDS will have the authority and responsibility to cooperate and liaise with other military, government, civil, scientific, commercial and multi-national corporations who deal with the space industry. It is vital to keep these services intact. The space industry and the services they provide also suffer from the spillovers created by the unhealthy, internal strife of the Space Community. Combining the Space Community under one umbrella can “reduce the fractious infighting, if you will between various organizations” that now mars space, and to create “a more coherent framework for assuring the future of U.S. space.”⁷⁰

Today the development of a space culture and its professionals remains in individual and separate organizations. Some foster space, some do not. The NDS can place a higher emphasis on the needed talent and experience, the human capital, the nation as a whole requires. The NDS can nurture the foundation of a single, strong space profession and culture, and not one of many divisions and weaknesses. People in research, development, science and technology are an equally important part of the overall culture. The NDS will then set the standards and define the

⁷⁰ Andy Pasztor, “Air Force Seeks Greater Control Over Military Space Satellites,” *New York Times* (7 November 2007), under National Security Space Institute Space News, NSSI Space News Services (For the Week Ending 16 November 2007).

requirements of space knowledge, expertise, performance and the leadership. The nation can realize a true unity of effort and understanding of space capabilities and limitations, if it establishes the NDS who would have its own promotion ladder, training and “doctrine.” A separate, single organization would create an incentive for people to develop “space” skills and a promotion pathway to retain those same people. The NDS could offer advancement opportunities for those who want to advance and a place for those who just want to perfect their craft. The current Space Community, primarily the military community, only has one environment. It is one of up-or-out regardless if their human capital wants to advance or not, or even if they are a generalist or a specialist. These professionals are not lost to other government organizations, but to the commercial industry at a great loss to the overall Space Community. Only through the space professional can the U.S. fully optimize the nation’s involvement in space.

It is stated, “Space is the newest exploitable environment; organizations are in a constant state of evolution.”⁷¹ The evolution of space in the U.S. has produced the Space Community with its many organizations, plans, budgets and capabilities that which has not boded well for the nation. This monograph has presented a number of factors from policy to weaponization that hinder the development, operation and execution of space. It has also identified how one organization, the National Department of Space, could facilitate the optimization of space into the 21st Century. What has not been discussed is the structure or the design of the organization itself. How does the nation through the National Department of Space and its leadership consolidate the many organizations of the Space Community into one?

Just as policy begets strategy, strategy begets the design of the organization. The organizational design must support the implementation of the strategy. Organizational design is a fairly modern term that implies there are choices to make in the structuring of an organization,

⁷¹ Maj Norman W. Berber, MAJ Richard J. Douglas and MAJ John D. Dumond, “Why Space Should Be a Separate Service,” Monograph, Norfolk, VA., Joint Forces Staff College, Joint and Combined Staff Officer School, (6 September 2002), 14.

and as an architect, they must examine all of the variables that might bear on design decisions. One variable might focus on individual alternative strategies of innovation, horizontal and vertical integration and/or acquisitions. Each of these alternatives creates a different set of requirements that must be recognized in the design of an organization. An organizational design then provides the organization its actual structure. It should support the implementation of the organization and permit the day-to-day operational activities. An organizational structure should also facilitate the allocation of resources to include administrative, financial matters and the assignment of human, physical and technological assets.⁷² It should allow the leadership to adapt or flex in response to the changing environment. “This is not easy since there is a tendency for an organization to lock itself into a form that favors its current set of business.”⁷³ Organizational design is an integral part of the strategic positioning of the organization. It should bring about the development and the implementation of the long-term directions of the organization.

Hax and Majluf in their article on “Organizational Design: A Survey and an Approach” noted “that two distinct steps should be recognized in the organizational design process”—the basic organizational structure and the detailed organization structure. The basic organizational structure is defined as “only the primary echelons of the organizational chart, which are ultimately linked to the strategic positioning of the firm” and the detailed is “the basic organizational structure fleshed out with the numerous specific details that pertain to the operational domain of the business.”⁷⁴ Hax and Majluf identify four steps in the design of a basic organizational structure. Figure 5 provides an adapted version and a brief synopsis of their steps

⁷² Mary Jo Hatch, *Organization Theory: Modern Symbolic and Postmodern Perspectives*, (New York: Oxford University Press, 1997).

⁷³ Arnoldo C. Hax and Nicholas S. Majluf, “Organizational Design: A Survey and an Approach,” (*operations Research* 29, no. 3 (May – Jun 1981), 427. [http://links.jstor.org/sici?sici=0030-364X\(198105%2F06\)29%3A3%3C417%3AODASAA%3E2.0.CO%3B2-H](http://links.jstor.org/sici?sici=0030-364X(198105%2F06)29%3A3%3C417%3AODASAA%3E2.0.CO%3B2-H) (accessed 13 October 2007)

⁷⁴ *Ibid.*, 437.

on the left, accompanied by examples on the right, giving examples the NDS should consider in the design of the new organization.

<p>Identify and List Critical Dimensions</p> <ul style="list-style-type: none"> • Products • Markets – industrial, manufacturing • Clients/Customers • Functions - production, marketing, engineering • Technologies • Locations - facilities 	<p>Examples/Decisions NDS must review/design</p> <ul style="list-style-type: none"> • Imagery, Weather, Navigation • Launch, Operations, Exploration • Government, Commercial • Admin, Finance, Personnel • Academia, Labs, Capabilities • Established, New, BRAC
<p>Focus Alternatively on Critical Dimensions</p> <ul style="list-style-type: none"> • Divisional-structured around outputs • Functional – structured around inputs 	<ul style="list-style-type: none"> • Capabilities • Sensors, Programs
<p>Rank the Critical Dimensions</p> <ul style="list-style-type: none"> • Based on strategy and priorities • Most Important to Least Important • Trade-Offs 	<ul style="list-style-type: none"> • National Policy, Strategy • Peace, War • Allocation of Resources
<p>Define Structures</p> <ul style="list-style-type: none"> • Chart • Weigh the pros and cons of the different structures • Implications 	<ul style="list-style-type: none"> • Organizational Chart • Homogenous, Mixed, Matrix • Status Quo, Flexible, Adaptable

Source: Adapted from Arnold C. Hax and Nicholas S. Majluf, "Organizational Design: A Survey and an Approach," *Operations Research* Vol. 29., no. 3 (May – June 1981), 438-439.

Figure 6. Steps in the Design of Basic Organizational Structure

One of the more advantageous benefits of a new organization would be the off-loading of the “space” infrastructure, operations and maintenance. The organizations could then focus on their core missions and competencies, would no longer be accused of parochialism, and find support through one organization and not many. All the current organizations could be relieved of budgeting, acquisition and operation of space capabilities. The National Department of Space would open old and new doors for space and for the other organizations.

A new organization, the National Department of Space, would most certainly have initial costs, but a thorough review and audit by the GAO on the Space Community as a whole may not find the costs to be as extensive as most will think. The merging, consolidating and flattening the current Space Community into one also benefits the taxpayer and the nation. It is recognized that the military must maintain access, not necessarily control over, certain defense-specific space

goods and services (I.e. missile warning and some communications capabilities). The Space Community organizations can no longer and should no longer rely solely upon their internal-owned and operated space missions. This recommendation requires a great deal of thought and reflection by the Space Community and the nation's policy makers. There will never be a good time to make drastic or minor changes. Someone will always counter with one or more excuses that they "can't" or they "won't" or "the time is just not right."

SUMMARY

The National Department of Space can reinvigorate the U.S.'s space programs and correct the atrophy in order to move ahead in the 21st Century. The NDS provides the nation singular support. Drastic change is required to elevate the importance of space within the nation, to enable the nation to better prioritize space-related activities, to promote greater coordination on space-related activities and to reduce redundant systems and capabilities while promoting interoperability with space- and non-space national and international communities.

It has been said that growing an organization in the government is hard. True, but it is even harder when the current bureaucracies, agencies and organizations are stunted, failing and falling further behind. The nation can ill-afford nor continue to allow the current Space Community's failure to capitalize on space and its ever-evolving capabilities. Access to space and other technologies within the commercial and international sectors will drive forward to gain any and all advantages, relevance and application from the space medium. Poor organizational structures, too many "leaders" and organizations, not enough guidance and direction, weak national policy and strategies, lack of coordination and integration hinders the development, operations and exploitation of space today and will for the remainder of the 21st Century unless something is done, not tomorrow, but now. Does the Space Community plan to sit by and watch? Will Space fall like the Great Wall? Will the nation acknowledge the signs and symptoms only after an unforeseen change or crisis occurs? "In the mean time, evolution will substitute for revolution, and there will be no magic bullet, and no quick fix to substitute for time."⁷⁵

⁷⁵ Dr. Joan Johnson-Freese, "Transitioning to a Space & Air Force: Moving Beyond Rhetoric?" Research Paper, USAF INSS, Colorado Springs, CO., USAF Academy, (4 January 1998), 23.

APPENDIX ONE

Major Military Commands with Space Functions

The Unified Command - US Strategic Command

Headquarters: Offutt AFB, Neb. **Established:** June 1, 1992

Cmdr.: Gen. J.E. Cartwright, USMC

MISSIONS

Establish and provide full-spectrum global strike; space, computer network and information operations; strategic warning; integrated missile defense and global C4ISR

Combat weapons of mass destruction

Provide specialized expertise to the joint warfighter

The Service Components

Naval Network Warfare Command

Headquarters: Norfolk, Va. **Established:** July 11, 2002

Cmdr.: Vice Adm. H. Denby Starling II

MISSIONS

Operate and maintain Navy's space, network and information operations systems and services

Support warfighting operations and command and control of naval forces

Promote innovative technological solutions to warfighting requirements

Air Force Space Command

Headquarters: Peterson AFB, Colo. **Established:** Sept. 1, 1982

Cmdr.: Gen. Kevin P. Chilton

MISSIONS

Defend the US through control and exploitation of space

Provide strategic deterrence operating, testing and maintaining ICBM forces for STRATCOM

Operate and employ space forces for strategic and tactical missile warning, battlespace characterization, environmental monitoring, satellite communications, precision navigation and timing, spacelift, and space control

Acquire, launch and sustain space systems for USAF and DOD

Develop tactics, techniques, and procedures to integrate capabilities with air, land and sea forces

Develop space professionals

Army Space & Missile Defense Command

Headquarters: Huntsville, Ala. **Established:** Oct. 1, 1997

Cmdr.: Lt. Gen. Kevin T. Campbell

MISSIONS

Serve as service component command to US Strategic Command

Serve as specified proponent for space and ground-based midcourse missile defense

Serve as Army's operational integrator for global missile defense

Oversee space- and missile-related R&D and acquisition for Army Title 10 responsibilities

Source: Data from Tamar A. Mehuron and Staff, "2007 Space Almanac," *Air Force Magazine* 90, no. 8, (August 2007), 80-81. <http://www.afa.org/magazine/aug2007/0807space.pdf> (accessed 8 September 2007)

APPENDIX TWO

Major US Agencies with Roles in Space

National Reconnaissance Office

Headquarters: Chantilly, Va. **Established:** September 1961

Director: Donald M. Kerr

Mission: **Design**, build, and operate reconnaissance satellites

Acquire innovative technology

Provide systems engineering

Support monitor arms control agreements, military activities, natural disasters and other worldwide events of interest to the US

National Security Agency

Headquarters: Ft. Meade, Md. **Established:** November 1952

Director: Lt. Gen. Keith B. Alexander, USA

Mission: **Protect** US communications

Produce foreign signals intelligence

Central Intelligence Agency

Headquarters: McLean, Va. **Established:** 1947

Director: Gen. Michael V. Hayden, USAF

Mission: **Provide** national security intelligence to senior US policy-makers

Direct Space Role: **Support** NRO in designing, building and operating reconnaissance systems

National Geospatial-Intelligence Agency

Headquarters: Bethesda, Md. **Established:** Nov. 24, 2003

Director: Vice Adm. Robert B. Murrett

Mission: **Provide** geospatial intelligence (analysis and depiction of Earth's physical features and geographic references) to aid national security operations

Other Civilian Organizations Operating in Space

Commercial

Globalstar L.P.

Space Imaging, Inc.

Iridium L.L.C.

DigitalGlobe

SPOT Image S.A.

Loral Skynet

International Maritime Satellite Organization

International Telecommunications Satellite Organization

Civil

NASA

Department of Commerce/NOAA

Department of Interior/USGS

Source: Data from Tamar A. Mehuron and staff, "2007 Space Almanac," *Air Force Magazine* 90, no. 8 (August 2007), 80, 89-90.

APPENDIX THREE

U.S. National Space Policy

U.S. National Space Policy

The President authorized a new national space policy on August 31, 2006 that establishes overarching national policy that governs the conduct of U.S. space activities. This policy supersedes Presidential Decision Directive/NSC-49/NSTC-8, National Space Policy, dated September 14, 1996.

1. Background

For five decades, the United States has led the world in space exploration and use and has developed a solid civil, commercial and national security space foundation. Space activities have improved life in the United States and around the world, enhancing security, protecting lives and the environment, speeding information flow, serving as an engine for economic growth, and revolutionizing the way people view their place in the world and the cosmos. Space has become a place that is increasingly used by a host of nations, consortia, businesses and entrepreneurs.

In this new century, those who effectively utilize space will enjoy added prosperity and security and will hold a substantial advantage over those who do not. Freedom of action in space is as important to the United States as air power and sea power. In order to increase knowledge, discovery, economic prosperity, and to enhance the national security, the United States must have robust, effective and efficient space capabilities.

2. Principles

The conduct of U.S. space programs and activities shall be a top priority, guided by the following principles:

- The United States is committed to the exploration and use of outer space by all nations for peaceful purposes, and for the benefit of all humanity. Consistent with this principle, “peaceful purposes” allow U.S. defense and intelligence-related activities in pursuit of national interests;
- The United States rejects any claims to sovereignty by any nation over outer space or celestial bodies, or any portion thereof, and rejects any limitations on the fundamental right of the United States to operate in and acquire data from space;
- The United States will seek to cooperate with other nations in the peaceful use of outer space to extend the benefits of space, enhance space exploration, and to protect and promote freedom around the world;
- The United States considers space systems to have the rights of passage through and operations in space without interference. Consistent with this principle, the United States will view purposeful interference with its space systems as an infringement on its rights;
- The United States considers space capabilities -- including the ground and space segments and supporting links -- vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either impeding those rights or developing capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests;
- The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit U.S. access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations or other activities in space for U.S. national interests; and

- The United States is committed to encouraging and facilitating a growing and entrepreneurial U.S. commercial space sector. Toward that end, the United States Government will use U.S. commercial space capabilities to the maximum practical extent, consistent with national security.

3. United States Space Policy Goals

The fundamental goals of this policy are to:

- Strengthen the nation's space leadership and ensure that space capabilities are available in time to further U.S. national security, homeland security, and foreign policy objectives;
- Enable unhindered U.S. operations in and through space to defend our interests there;
- Implement and sustain an innovative human and robotic exploration program with the objective of extending human presence across the solar system;
- Increase the benefits of civil exploration, scientific discovery and environmental activities;
- Enable a dynamic, globally competitive domestic commercial space sector in order to promote innovation, strengthen U.S. leadership, and protect national, homeland, and economic security;
- Enable a robust science and technology base supporting national security, homeland security, and civil space activities; and
- Encourage international cooperation with foreign nations and/or consortia on space activities that are of mutual benefit and that further the peaceful exploration and use of space, as well as to advance national security, homeland security and foreign policy objectives.

4. General Guidelines

In order to achieve the goals of this policy, the United States Government shall:

- **Develop Space Professionals.** Sustained excellence in space-related science, engineering, acquisition and operational disciplines is vital to the future of U.S. space capabilities. Departments and agencies that conduct space related activities shall establish standards and implement activities to develop and maintain highly skilled, experienced and motivated space professionals within their workforce.
- **Improve Space System Development and Procurement.** United States space systems provide critical capabilities to a wide range of civil, commercial and national security users. The primary goal of space system development and procurement must be mission success. Achieving this goal depends on effective research, development, acquisition, management, execution, oversight and operations. Toward that end, departments and agencies shall create an environment that enables mission success, including, but not limited to, creating a common understanding of realistic and stable requirements and operational concepts; clearly identifying and managing risks, including system safety; setting and maintaining realistic and stable funding; delivering space capabilities on time and on budget; and providing acquisition managers with the tools, responsibility, budget flexibility, and authority to achieve this goal.
- **Increase and Strengthen Interagency Partnerships.** The challenges of the 21st century require a focused and dedicated unity of effort. Interagency partnerships provide opportunities to jointly identify desired effects, capabilities and strategies. Departments and agencies shall capitalize on opportunities for dynamic partnerships — whether through collaboration, information sharing, alignment or integration.
- **Strengthen and Maintain the U.S. Space-Related Science, Technology, and Industrial Base.** A robust science, technology and industrial base is critical for U.S. space capabilities. Departments and agencies shall: encourage new discoveries in space science and new applications of technology; and enable future space systems to achieve new and improved capabilities, including incentives for high-risk/high-payoff and transformational space capabilities. Additionally, departments and agencies shall: conduct the basic and applied research that increases capability and decreases cost; encourage an innovative commercial space sector, including the use of prize competitions; and ensure the availability of space related industrial capabilities in support of critical government functions.

5. National Security Space Guidelines

United States national security is critically dependent upon space capabilities, and this dependence will grow. The Secretary of Defense and the Director of National Intelligence, after consulting, as appropriate, the Secretary of State and other heads of departments and agencies, and consistent with their respective responsibilities as set forth in the National Security Act of 1947, as amended, Title 10, U.S.C. and Title 50 U.S.C., the National Security Intelligence Reform Act of 2004, and other applicable law, shall:

- Support the President and the Vice President in the performance of Executive functions, and senior Executive Branch national security, homeland security, and foreign policy decision makers; other Federal officials, as appropriate; and the enduring constitutional government operations and infrastructure;
- Support and enable defense and intelligence requirements and operations during times of peace, crisis, and through all levels of conflict;
- Develop and deploy space capabilities that sustain U.S. advantage and support defense and intelligence transformation; and
- Employ appropriate planning, programming, and budgeting activities, organizational arrangements, and strategies that result in an operational force structure and optimized space capabilities that support the national and homeland security.

To achieve the goals of this policy, the Secretary of Defense shall:

- Maintain the capabilities to execute the space support, force enhancement, space control, and force application missions;
- Establish specific intelligence requirements that can be met by tactical, operational or national-level intelligence gathering capabilities;
- Provide, as launch agent for both the defense and intelligence sectors, reliable, affordable and timely space access for national security purposes;
- Provide space capabilities to support continuous, global strategic and tactical warning as well as multi-layered and integrated missile defenses;
- Develop capabilities, plans and options to ensure freedom of action in space, and, if directed, deny such freedom of action to adversaries;
- Have responsibility for space situational awareness; in this capacity, the Secretary of Defense shall support the space situational awareness requirements of the Director of National Intelligence and conduct space situational awareness for: the United States Government; U.S. commercial space capabilities and services used for national and homeland security purposes; civil space capabilities and operations, particularly human space flight activities; and, as appropriate, commercial and foreign space entities; and
- Establish and implement policies and procedures to protect sensitive information regarding the control, dissemination and declassification of defense activities related to space.

To achieve the goals of this policy, the Director of National Intelligence shall:

- Establish objectives, intelligence requirements, priorities and guidance for the intelligence community to ensure timely and effective collection, processing, analysis and dissemination of national intelligence;
- Ensure that timely information and data support foreign, defense, and economic policies; diplomatic activities; indications and warning; crisis management; treaty compliance verification; appropriate civil, homeland security, and law enforcement users; and perform research and development related to these functions;
- Support military planning and satisfy operational requirements as a major intelligence mission;
- Provide intelligence collection and analysis of space related capabilities to support space situational awareness for: the United States Government; U.S. commercial space capabilities and services used for national and homeland security purposes; civil space capabilities and operations,

particularly human space flight activities; and, as appropriate, commercial and foreign space entities;

- Provide a robust foreign space intelligence collection and analysis capability that provides timely information and data to support national and homeland security;
- Coordinate on any radio frequency surveys from space conducted by United States Government departments or agencies and review, as appropriate, and approve any radio frequency surveys from space conducted by the private sector, State, or local governments; and
- Establish and implement policies and procedures to: classify, attributable, collected information and operational details of intelligence activities related to space; protect sensitive activities; and declassify and release such information when the Director determines that protection is no longer needed.

6. Civil Space Guidelines

The United States shall increase the benefits of civil exploration, scientific discovery and operational environmental monitoring activities. To that end, the Administrator, National Aeronautics and Space Administration shall: execute a sustained and affordable human and robotic program of space exploration and develop, acquire, and use civil space systems to advance fundamental scientific knowledge of our Earth system, solar system and universe. The Secretary of Commerce, through the Administrator of the National Oceanic and Atmospheric Administration, shall in coordination with the Administrator, National Aeronautics and Space Administration, be responsible for operational civil environmental space-based remote sensing systems and management of the associated requirements and acquisition process as follows:

- The Secretary of Commerce, through the National Oceanic and Atmospheric Administration, in collaboration with the Secretary of Defense through the Secretary of the Air Force, and the Administrator, National Aeronautics and Space Administration will continue to consolidate civil and military polar-orbiting operational environmental sensing systems in accordance with current policy direction;
- The Secretary of Commerce, through the National Oceanic and Atmospheric Administration, shall continue a program of civil geostationary operational environmental satellites with support from the National Aeronautics and Space Administration; and
- The Secretary of Commerce, through the National Oceanic and Atmospheric Administration, and the Administrator, National Aeronautics and Space Administration shall ensure to the maximum extent possible that civil space acquisition processes and capabilities are not duplicated.

The Secretary of the Interior, through the Director of the U.S. Geological Survey, shall collect, archive, process, and distribute land surface data to the United States Government and other users and determine operational requirements for land surface data.

The United States will study the Earth system from space and develop new space-based and related capabilities to advance scientific understanding and enhance civil space-based Earth observation. In particular:

- The Administrator, National Aeronautics and Space Administration shall conduct a program of research to advance scientific knowledge of the Earth through space-based observation and development and deployment of enabling technologies; and
- The Secretary of Commerce and the Administrator, National Aeronautics and Space Administration, and other departments and agencies as appropriate, in support of long-term operational requirements, shall transition mature research and development capabilities to long-term operations, as appropriate.

The United States will utilize government and commercial space-based and related capabilities wherever feasible to enhance disaster warning, monitoring, and response activities; and take a leadership role in international forums to establish a long-term plan for coordination of an

integrated global Earth observation system and promote the adoption of policies internationally that facilitate full and open access to government environmental data on equitable terms.

7. Commercial Space Guidelines

It is in the interest of the United States to foster the use of U.S. commercial space capabilities around the globe and to enable a dynamic, domestic commercial space sector. To this end, departments and agencies shall:

- Use U.S. commercial space capabilities and services to the maximum practical extent; purchase commercial capabilities and services when they are available in the commercial marketplace and meet United States Government requirements; and modify commercially available capabilities and services to meet those United States Government requirements when the modification is cost effective;
- Develop systems when it is in the national interest and there is no suitable, cost effective U.S. commercial or, as appropriate, foreign commercial service or system that is or will be available when required;
- Continue to include and increase U.S. private sector participation in the design and development of United States Government space systems and infrastructures;
- Refrain from conducting activities that preclude, deter, or compete with U.S. commercial space activities, unless required by national security or public safety;
- Ensure that United States Government space activities, technology, and infrastructure are made available for private use on a reimbursable, non-interference basis to the maximum practical extent, consistent with national security; and
- Maintain a timely and responsive regulatory environment for licensing commercial space activities and pursue commercial space objectives without the use of direct Federal subsidies, consistent with the regulatory and other authorities of the Secretaries of Commerce and Transportation and the Chairman of the Federal Communications Commission.

8. International Space Cooperation

The United States Government will pursue, as appropriate, and consistent with U.S. national security interests, international cooperation with foreign nations and/or consortia on space activities that are of mutual benefit and that further the peaceful exploration and use of space, as well as to advance national security, homeland security and foreign policy objectives. Areas for potential international cooperation include, but are not limited to:

- Space exploration; providing space surveillance information consistent with security requirements and U.S. national security and foreign policy interests; developing and operating Earth-observation-systems.

The Secretary of State, after consultation with the heads of appropriate Departments and Agencies, shall carry out diplomatic and public diplomacy efforts, as appropriate, to build an understanding of and support for U.S. national space policies and programs and to encourage the use of U.S. space capabilities and systems by friends and allies.

9. Space Nuclear Power

Where space nuclear power systems safely enable or significantly enhance space exploration or operational capabilities, the United States shall develop and use these systems. The use of space nuclear power systems shall be consistent with U.S. national and homeland security, and foreign policy interests, and take into account the potential risks. In that regard:

- Approval by the President or his designee shall be required to launch and use United States Government and non-government spacecraft utilizing nuclear power sources with a potential for criticality or above a minimum threshold of radioactivity, in accordance with the existing interagency review process;

- To that end, the Secretary of Energy shall: conduct a nuclear safety analysis for evaluation by an ad hoc Interagency Nuclear Safety Review Panel which will evaluate the risks associated with launch and in-space operations; assist the Secretary of Transportation in the licensing of space transportation; provide nuclear safety monitoring to ensure that operations in space are consistent with the safety evaluation performed; and maintain the capability and infrastructure to develop and furnish nuclear power systems for use in United States Government space systems; and
- For government spacecraft, the head of the sponsoring Department or Agency shall request launch approval and be responsible for the safe operation of the spacecraft in space.
- For the launch and use of non-government spacecraft utilizing nuclear power sources, the operator will be responsible for the safe operation of the spacecraft in space, including nuclear power sources. To that end:
 - The United States Government shall designate a point of entry and develop procedures for reviewing non-governmental missions that use space nuclear power systems;
 - The Secretary of Transportation shall be the licensing authority for U.S. commercial launch activities involving nuclear materials, including a payload determination, subject to the requirements described above;
 - The Nuclear Regulatory Commission will license activities prior to launch that involve utilization facilities and nuclear materials not owned by the Department of Energy;
 - The United States Government will conduct safety analysis, evaluation, and nuclear safety monitoring on a fee-for-service basis, to the extent allowed by law, where the operator will fully reimburse the United States Government entity for services provided; and
 - The Secretary of Energy shall establish and implement policies and procedures to protect sensitive information regarding the control, dissemination and declassification of space-related nuclear activities.

10. Radio Frequency Spectrum And Orbit Management And Interference Protection

The use of space for national and homeland security, civil, scientific and commercial purposes depends on the reliable access to and use of radio frequency spectrum and orbital assignments. To ensure the continued use of space for these purposes, the United States Government shall:

- Seek to obtain and protect U.S. global access to the radio frequency spectrum and orbital assignments required to support the use of space by the United States Government and commercial users;
- Explicitly address requirements for radio frequency spectrum and orbit assignments prior to approving acquisition of new space capabilities;
- Consistent with current approaches, assure, to the maximum practical extent, that U.S. national security, homeland security, civil, and commercial space capabilities and services and foreign space capabilities and services of interest to the United States Government are not affected by harmful interference; and
- Seek spectrum regulatory status under U.S. domestic regulations for United States Government owned and operated earth stations operating through commercial satellites, consistent with the regulatory status afforded commercial operations and with the allocation status of the satellite service.

11. Orbital Debris

Orbital debris poses a risk to continued reliable use of space-based services and operations and to the safety of persons and property in space and on Earth. The United States shall seek to minimize the creation of orbital debris by government and non-government operations in space in order to preserve the space environment for future generations. Toward that end:

- Departments and agencies shall continue to follow the United States Government Orbital Debris Mitigation Standard Practices, consistent with mission requirements and cost effectiveness, in the

procurement and operation of spacecraft, launch services, and the operation of tests and experiments in space;

- The Secretaries of Commerce and Transportation, in coordination with the Chairman of the Federal Communications Commission, shall continue to address orbital debris issues through their respective licensing procedures; and
- The United States shall take a leadership role in international fora to encourage foreign nations and international organizations to adopt policies and practices aimed at debris minimization and shall cooperate in the exchange of information on debris research and the identification of improved debris mitigation practices.

12. Effective Export Policies

As a guideline, space-related exports that are currently available or are planned to be available in the global marketplace shall be considered favorably.

Exports of sensitive or advanced technical data, systems, technologies and components, shall be approved only rarely, on a case-by-case basis. These items include systems engineering and systems integration capabilities and techniques or enabling components or technologies with capabilities significantly better than those achievable by current or near-term foreign systems.

13. Space-Related Security Classification

The design, development, acquisition, operations, and products of intelligence and defense related space activities shall be classified as necessary to protect sensitive technologies, sources and methods, and operations, consistent with E.O. 12958, E.O. 12951, and applicable law and regulation as amended.

- The Secretary of Defense and the Director of National Intelligence shall establish and implement policies and procedures to protect, disseminate, and appropriately classify and declassify activities and information related to their respective responsibilities outlined in this policy. Where appropriate, they shall coordinate their respective classification guidance. The following facts are unclassified:
 - The United States Government conducts: satellite photoreconnaissance that includes a near real-time capability; overhead signals intelligence collection; and overhead measurement and signature intelligence collection; and
 - United States Government photoreconnaissance is used to:
 - Collect intelligence; monitor compliance with arms control agreements; collect mapping, charting, and geodetic data that is used to support defense and other mapping-related activities; collect scientific and environmental data and data on natural or man-made disasters; and the foregoing categories of information can be provided to authorized federal agencies;
 - Provide information for indications and warning and the planning and conduct of military operations; and
 - Image the United States and its territories and possessions, consistent with applicable laws, for purposes including, but not limited to, homeland security.

Source: Data from President George W. Bush, *United States National Space Policy*, (Washington, DC: 31 August 2006), 1-102-7.

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