

DEFENSE SPACE SUPPORT TO CIVIL AUTHORITY:
HOW CAN POLICY BE IMPROVED?

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MASTER OF MILITARY ART AND SCIENCE
Military Space Applications and Homeland Security Studies

by

SEAN P. COAKLEY, MAJ, USA
B.A., Norwich University, Northfield, Vermont, 1999

AD BELLUM PACE PARATI

Fort Leavenworth, Kansas
2010-01

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Name of Candidate: Major Sean P. Coakley

Thesis Title: Defense Space Support to Civil Authority: How Can Policy be Improved?

Approved by:

_____, Thesis Committee Chair
Larry L. Turgeon, M.S.

_____, Member
John C. Mountcastle, Ph.D.

_____, Member
Major Nicholas J. Martin, M.S.

Accepted this 11th day of June 2010 by:

_____, Director, Graduate Degree Programs
Robert F. Baumann, Ph.D.

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ABSTRACT

DEFENSE SPACE SUPPORT TO CIVIL AUTHORITY: HOW CAN POLICY BE IMPROVED? by Sean P. Coakley, 178 pages.

The research question investigates how policy relates to the influence of threats, law, and treaty. It investigates how policy influences strategy, capabilities, resources, and evaluation of policy execution in order to understand how space policy relates to existing conditions and guides strategy. It analyzes documentation from 2006 to 2010 on U.S. space policy and related law, treaty, strategy, capability, and resources across the Department of Defense (DoD) and Department of Homeland Security (DHS). The United States of America continues to have a stake in the defense of aerospace in order to maintain homeland security, support international commerce; simultaneously respond to natural and manufactured threats; and collect and transmit information crucial to support decisions. The 2006 *U.S. National Space Policy* establishes a strong position on preserving U.S. freedom of action in space. Analysis of performance issues with information sharing, dissemination, and funding priorities leads to recommendations on how to improve policy. It is important to review current policy to evaluate whether it provides the guidance needed to defense and security departments to develop informed strategy, produce appropriate capability, and acquire the necessary resources involved in defense space support to civil authority.

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ACRONYMS

AEHF	Advanced Extremely High Frequency satellite
CFR	Code of Federal Regulations
CTBT	Comprehensive Test Ban Treaty
DARPA	Defense Advanced Research Projects Agency
DHS	Department of Homeland Security
DNI	Director of National Intelligence
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Issuance
DSCA	Defense Support to Civil Authority
EELV	Evolved Expendable Launch Vehicle
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GPS	Global Positioning System
HASC	House Armed Services Committee
HSPD	Homeland Security Presidential Directive
IC	Intelligence Community
ISAA	Information Sharing and Access Agreement
ISR	Intelligence, Surveillance, and Reconnaissance
JTF	Joint Task Force
LTBT	Limited Test Ban Treaty
MDA	Missile Defense Agency

MSCA	Military Support to Civil Authorities
MSSS	Maui Space Surveillance System
MUOS	Mobile User Objective System
NASA	National Aeronautics and Space Administration
NDS	National Defense Strategy
NMS	National Military Strategy
NOAA	National Oceanographic and Atmospheric Organization
NPD	National Preparedness Directorate
NPOESS	National Polar-Orbiting Operational Environmental Satellite System
NSS	National Security Strategy
NSSO	National Security Space Office
NSTL	National Security Threat List
OCO	Overseas Contingency Operations
ORS	Operationally Responsive Space
PDD	Presidential Decision Directive
P.L.	Public Law
POES	Polar-Orbiting Operational Environmental Satellites
PPD	Presidential Policy Directive
PPWT	Prevention of the Placement of Weapons in outer space Treaty
QDR	Quadrennial Defense Review
QHSR	Quadrennial Homeland Security Review
RDT&E	Research, Development, Test, and Evaluation
SASC	Senate Armed Services Committee
SATCOM	Satellite Communications

SBIRS-High	Space Based Infrared System-High
SBSS	Space Based Surveillance System
SecDef	Secretary of Defense
SLRS	Space Lift Range System
SSA	Space Situational Awareness
STSS	Space Tracking and Surveillance System
TSAT	Transformational Satellite Communications Satellite
U.S.	United States
UAS	Unmanned Aerial Systems
UAV	Unmanned Aerial Vehicle
USNORTHCOM	United States Northern Command
WMD	Weapons of Mass Destruction
WGS	Wideband Global Satellite Communications

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CHAPTER 1

INTRODUCTION

Policy in Persistent Conflict

A persistent and repeated error throughout the ages has been the failure to understand that preservation of peace requires active effort, planning, the expenditure of resources, and sacrifice, just as war does.

—Donald Kagen, *On the Origins of War and the Preservation of Peace*

The United States (U.S.) of America continues to have a stake in the security of aerospace and its defense; in order to maintain homeland security, support international commerce, simultaneously respond to natural and manufactured threats, and collect and transmit information crucial to support decisions. For the purpose of clarification, the term aerospace refers to an area that comprises the atmosphere of Earth and the surrounding space. Aerospace is not the same as airspace, which defines the physical air space directly above a location on the ground. The limit for where these two areas meet is overlapping.

Due to the persistent threat environment, U.S. policy must anticipate the evil in human nature and appropriately maintain policy that combats it. The nature of security and defense demands a constant vigilance. Because some policy distinguishes between times of war and times of peace, it is difficult to synchronize the priority of resources when the nation is in a persistent conflict. Current situations, such as Overseas Contingency Operations (OCO), draw on executive authority to drive operations not under a congressional declaration of war. Historical examples of this strategy since the 1940s are Korea, Vietnam, the Cold War, and the War on Terror. The War on Terror is now known as part of OCO. Historic policy and strategy drove funding to support

defense functions that related to either a state of war or peace, not both simultaneously. Policy and strategy have evolved to meet a more dynamic globalization; however, there are some remnants of linear approaches and a dichotomy between security, defense, and warfare. The ability of the combined U.S. space system architecture to perform simultaneous missions crosscutting military, civil, commercial, navigational, communication, and weather awareness oriented demands--demonstrates the continual importance of space systems in supporting civil authorities.

The nation's strategy concerning space-system force structure flows from national policy. Strategy must continue to account for what the minimum level or "base force" should be in order to shape capabilities for global operations. The advisor to seven defense secretaries, and an accomplished defense strategist, William W. Kaufmann, defines base force as the "minimum level necessary to protect U.S. interests and continue to play a leading role in shaping international events" (Kaufmann 1993, 7). Funding for space systems must take into consideration the contribution and criticality these systems represent in maintaining the minimum level of security or defense necessary at any point along the spectrum of war. The *Quadrennial Defense Review (QDR)* is the main document defining the U.S. minimum level of defense. This minimum level is interrelated with national security and homeland security minimum levels. Figure 1 depicts the aim point of this thesis.

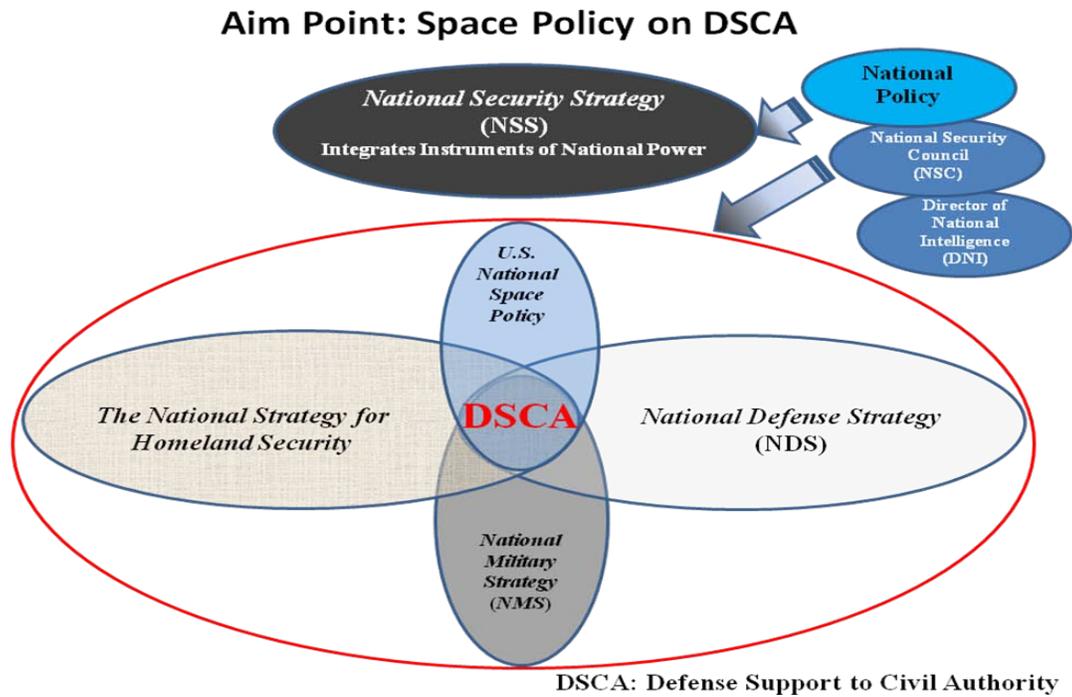


Figure 1. Thesis Aim Point

Source: Created by author.

The information instrument of national power relates to why a government would want to publish policy and strategy. The reason for a thorough investigation of the relationship between policy and strategy directly relates to the importance of updating and disseminating policy, because it is information. Because published policy and strategy are informational instruments of national power, they assist in guiding domestic industry and influencing the international community. In a time where the President is criticizing the intelligence community for information sharing, it is useful that the President demonstrate an example by publishing the most important information he can share to unify action--his national policy on space and his *National Security Strategy* (NSS).

Thesis Question

The thesis question concerns the importance of policy in defense space support to civil authority since 2006. This thesis question centers on nationally established threats, domestic and international laws, international treaties, national policy, national strategy and capabilities, executive requests and congressionally approved resources that affect the development and sustainment of space systems for defense and civil support. These influences are byproducts of the overall national policy and the *NSS*; and directly affect the size and make-up of U.S. space activity. The thesis question is; ‘Defense space support to civil authority: How can policy be improved?’”

The following are subordinate questions to this thesis. What conditions exist that influence U.S. policy, and are they disseminated? This question demands some explanation. The conditions are threats, laws, and treaty. Analysis and dissemination of threat information are particularly important to policymakers. What is the *U.S. National Space Policy*, and how current is it? Does national policy address existing conditions adequately? What is national strategy, and how current is it? How well is national strategy aligned with national policy? Is national strategy developing appropriate capability? What is the national budget for the major departments involved in Defense Support to Civil Authority (DSCA)? How well are U.S. financial resources aligned with national policy? Does spending reflect policy priority? What is the overall evaluation of performance? How well does performance reflect policy goals? How well do the President, Department of Defense (DoD), and Department of Homeland Security (DHS) rate security performance?

This research is significant to the development of U.S. space policy for DSCA. It affects all levels across the instruments of national power: Diplomatic, Informational, Military, and Economic. Ultimately, understanding current policy issues could assist the development of policy for the future. This research will include command and control, integration into civil support, type of space systems developed, research and development spending, and commercial crossover applications. Understanding how space systems affect national security will enable DoD members to better justify required resources and support civil authority. Justification is necessary in the interaction of DoD with the U.S. Congress on issues of the budget and defense policy. This allows the maximized application of space systems to national interests. The thesis will also study identified shortfalls from the 2010 *Quadrennial Defense Review*, 2010 *Quadrennial Homeland Security Review (QHSR)*, and shortfalls identified by the President to highlight the importance of policy in informing strategy.

Assumptions

A critical assumption to the importance of improving space policy for DSCA is that conflict is persistent. Another assumption is that it is dangerous for the U.S. to neglect its responsibility as a major power by not increasing its capability. Neglecting this responsibility would simultaneously allow adversaries to develop their capabilities beyond U.S. capabilities. As G. Harry Stine said, “The United States may well be the most dangerous nation in the world if it permits others to gain the upper hand in space [warfare] capabilities instead” (Stine 1981, 127). The ability to secure the U.S. requires more than just space applications.

Homeland security or defense requires passive measures as well as active measures. Developing deterrents through active and offensive capabilities is valuable in staying ahead of international threats. Maintaining the “upper hand” is a valuable strategy across the instruments of national power. Space policy crosscuts all four instruments of national power and is important in maintaining a national edge in DSCA.

Another critical assumption of this thesis is that creating a dichotomy between homeland defense and homeland security is a fallacy. This thesis considers DSCA to represent a balance tipped towards DHS as the supported agency, rather than to look at DSCA as separate and distinct from ongoing homeland defense activities that cover gaps in homeland security capability. It is critical to analyze and discuss homeland defense when analyzing DSCA, because gaps between the two are where adversaries exploit the seams. This is why policy on defense space support to civil authority cannot submit to a false dichotomy between homeland defense roles and homeland security roles.

There is no such thing as a DHS role for space security in the 2006 *U.S. National Space Policy*. The 2006 policy establishes DoD as the provider of space situational awareness for all. No other organization has this mission. Combining analysis of the *U.S. National Space Policy* and DHS policy, one arrives at the assumption that DHS is not expected to secure or defend aerospace. DHS cannot even adequately, secure airspace without DoD assets. DHS and others rely on a continuous vigilance from DoD to defend and secure the vertical approaches and borders to the nation. DSCA could hardly become more persistent along any discipline than it does in defense space support to civil authority.

Understanding space policy requires dispelling certain common misconceptions. The topic of space evokes many different mental pictures, abstractions, and therefore inspires some futuristic ideas of what space activity actually entails. There are underlying assumptions concerning space systems and their appropriate application. One assumption is that missile threats can all be defeated by sea or land based systems alone. Another assumption is that space defense means Reagan era “Star Wars.” However, a deeper analysis reveals how much broader space defense and security is. A similar assumption is that space systems operate in a linear manner to conduct missions, when in actuality they are simultaneous or multi-tasking in their execution of operations as a platform. A satellite platform can perform multiple functions across multiple disciplines, simultaneously. Another assumption is that satellites are difficult to launch or that they are easy to maintain, or “launch and forget.” A review of applicable space systems will allow an understanding of how policy can improve in defense space support to civil authority. Understanding what capabilities exist will allow an understanding of whether or not the current *U.S. National Space Policy* should be revised.

Limitations

Research on the subject of this thesis will address the period between 2006 with the release of the *U.S. National Space Policy* and *NSS*, to the release of the *QDR* and *QHSR* reports, in February 2010. This thesis is limited to a focus on the realm of aerospace. It will not address the space and universe beyond Earth’s immediate influence for any other reason than familiarization with the origin of existing threats, law, treaty, and policy. The scope of this thesis is limited to policy on defense space support to civil authorities, for the overall purpose of national security. It is also limited to official or

public documents. This thesis cannot measure informal procedures for communicating policy, strategy, or other intent. There are informal methods or channels in government. These methods relate to “access” in the world of Washington, DC politics. This thesis does not address how the government is able to execute policy without formal documents or public record. This thesis does address the difficulty of synchronizing policy execution without formal documents.

Research will focus on U.S. space activity in security and defense; and satellite history from 2006 to present (2010) during periods of war, peace, and disaster. A summarized chronological reference to U.S. space history is in appendix A. During all periods, the protection and preservation of culture and government depend on democracy’s intact survival through countering threats to national interest (Cupp 2002, 6). Space systems affect defense strategy across instruments of national power and are important in understanding how policy guided system employment, since 2006.

CHAPTER 2

LITERATURE REVIEW

The answers you get from literature depend on the questions you pose.
—Margaret Atwood, 1939

Six Areas of Review

The review of literature for this thesis covers six areas, in methodological order, to coincide with the author's six areas of analysis. These areas are threats, law and treaty, policy, strategy and capability, resources, and evaluation. To understand the scope of how space affects defense and security, one must examine these six areas. There is not a singular source of current literature to direct a reader to, on this particular subject. This is primarily a reason for the writing of this thesis. Therefore, the reader must look to several areas of study to acquire opposing and/or confirmatory views, with regard to the subject of this thesis.

Threat

Recent literature on threat includes the 2010 *QDR* and 2010 *QHSR*. These and other official government documents represent a cumulative body of threats through experience and intelligence analysis. Other literature on threats includes the 2007 *National Planning Scenarios* and the Federal Bureau of Investigation's (FBI's) *National Security Threat List*. In studying space policy and DSCA, one must understand what threats might exist to the nation and space systems themselves.

Law and Treaty

In the study of policy, one must understand existing conditions that influence policy formulation. Specifically, the laws and treaties governing space activity. Domestic laws are contained in congressional public law from the 2008, 110th Congress contains mandates for the DoD on the *Space Posture Review* and *Space Protection Strategy*. Federal laws also influence DSCA in the area of Unmanned Aerial Systems (UAS) and collection within the U.S.

International law consists primarily of treaty or agreements. There are five major international space treaties and numerous agreements (see table 12). The U.S. recognizes only four of the five major treaties. Literature on space treaty ranges from extreme to pragmatic. On the topic of active space defense and space weapons, the threat of malicious satellites and ground based anti-satellite weapons is real. Several international incidents support their significance. News articles and other professional literature from the *British Broadcasting Service*, *Reuters*, and the *Plough Shares Monitor* represent the diversity and credibility levels of arguments on this subject.

Policy

Literature on U.S. policy for national security and DSCA are relevant. The basis for U.S. policy on national security is contained in the 2009 *Presidential Policy Directive (PPD-1)*, the 2001 *Homeland Security Policy Directive*, the 2006 *U.S. National Space Policy*, and subordinate directives of DoD and DHS. Another source of DSCA policy directive is the 2009 *Joint Chiefs of Staff Execute Order* from the Chairman, Joint Chiefs of Staff.

A good source of information on the topic of policy and strategy on national security is James Bamford's book, *The Puzzle Palace: Inside the National Security Agency, America's Most Secret Intelligence Organization*. An additional source is Britain's Overseas Development Institute (ODI) and the large body of published material available at their website, under "Governance and Politics."

Strategy and Capability

Literature on strategy for this thesis is in the 2006 *NSS*, 2008 *National Defense Strategy (NDS)*, 2008 *Space Protection Strategy*, and 2004 *National Military Strategy (NMS)*. Literature on military strategy also includes speeches by the Chairman, Joint Chiefs of Staff, and the President of the U.S.

In order to study existing and planned capabilities for DoD and the military, one should reference the 2010 *QDR* and *Military Critical Technologies List*. In order to study relevant civil capabilities, one should reference the 2010 *QHRS*, DHS's 2008 *National Response Framework* (successor to the *National Response Plan*), and its 2008 *Target Capabilities List*. General literature on strategy includes Michael Howard's *Clausewitz: A very short introduction*, Samuel Griffith II's *Mao Tse-Tung: On Guerrilla Warfare*, and various translations of Sun Tzu's *Art of War*.

Resource

Literature on budgetary resources for space, defense, and homeland security cover a spectrum. The spectrum extends from official U.S. department budgets and baseline proposals to professional institute evaluations of budget proposals. There are *Congressional Research Studies (CRS)* and there are department produced performance

reports. The DoD's 2006-2010 *QDR* report and the DHS FY2008-2010 *Annual Performance Report*, provide a relationship of budget to performance. The DoD FY2010 *Green Book*, National Aeronautics and Space Administration (NASA) budget documents, and the Office of Management and Budget (OMB) for all departments, are all good sources on this subject.

Evaluation

The final area of literature review is literature that provides department performance or evaluation reports; and is useful in evaluating overall policy performance. If departments and the President are noticing deficiencies or trends, it is significant to study why and how policy could change this. The 2010 *QDR*, 2010 *QHSR*, and 2009 *APR* are sources on this subject. President Barack Obama's 2009 and 2010 speeches, addressing shortfalls in the 2009 Christmas day bombing, are also good sources. The 2008 Office of the Director of National Intelligence, Inspector General's report, *Critical Intelligence Community Management Challenges*; is a comprehensive source of evaluation on national community intelligence information sharing and budget challenges.

Summary

A large quantity of the literature concerning the thesis topic is concentrated in the last two decades; however, in the last fifty years (1958 to 2009), policy has experienced three major phases. During this period, cold war policy drove research and development of space systems to a high level. After the Cold War, defense spending and perception of security risk dropped. Since 2001 and following the immediate post-Cold War period, a

period of acknowledged terrorism began; and persists. After 11 September 2001, policy and spending on homeland defense and security has increased. This third period in the past three decades renewed interest in improving technological capabilities of existing space systems, but has not necessarily driven development of capabilities to combat broad based threats outside those associated with terrorist or illicit activities. This thesis seeks to affect the current and future period of policy on defense space support to civil authorities.

The process of analyzing the six areas of literature: threats, law and treaty, policy, strategy and capability, resources, and evaluation; allows a thorough understanding of how policy on defense space support to civil authority may be improved. Understanding these six areas seeks to improve the segments that the public can influence: law, treaty, and resources. Focus on this area sets priority for the resources necessary to develop capabilities to combat anticipated threats; resulting in a successful application of national resources to promote U.S. national security.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The research methodology used in this thesis is primarily qualitative, using documentation review. It uses narrative data analysis and interpretation. The type of narrative material studied consists of reports, news articles, and other professional or official material. This allows for a comprehensive interpretation of the facts, opinion, and subject matter expertise concerning the thesis. The information for this methodology already exists and there is no generation or outside collection of external data required. One disadvantage inherent to this method is that there is no external study performed, another is that the source of all documentation and analysis is limited to available unclassified or open source data. Another disadvantage to this method is that the research is restricted to the data that already exists; however, this is negligible since the main sources are either recent publications or widely accepted historical events.

In order to place the thesis within a visual and analytical context, the Ishikawa Fishbone model organized portions of the analysis. The author placed Tangential “bones” to the main thesis in the appendices. The purpose of this is for readers whom wish to explore certain topics in depth. Figures 2 and 3 represent thesis construction, in relation to Ishikawa’s diagram. Figure 2 depicts Ishikawa’s basic model and figure 3 depicts the diagram, as modified for this thesis.

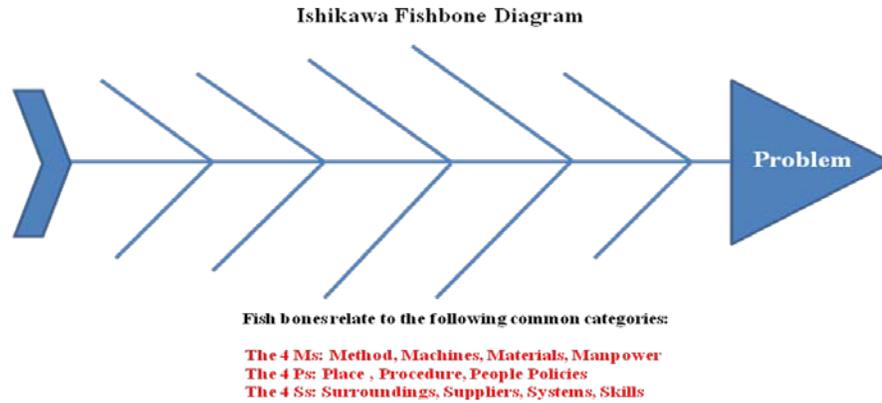


Figure 2. Ishikawa Fishbone Diagram

Source: Created by author from the base construct of the Dr. Kaoru Ishikawa Diagram and the methodology of the Office of Organizational Excellence, North Carolina Department of Environmental and Natural Resources, *Fishbone Diagram: A Problem-Analysis Tool*, 2010, <http://quality.enr.state.nc.us/tools/fishbone.htm> (accessed 5 April 2010).

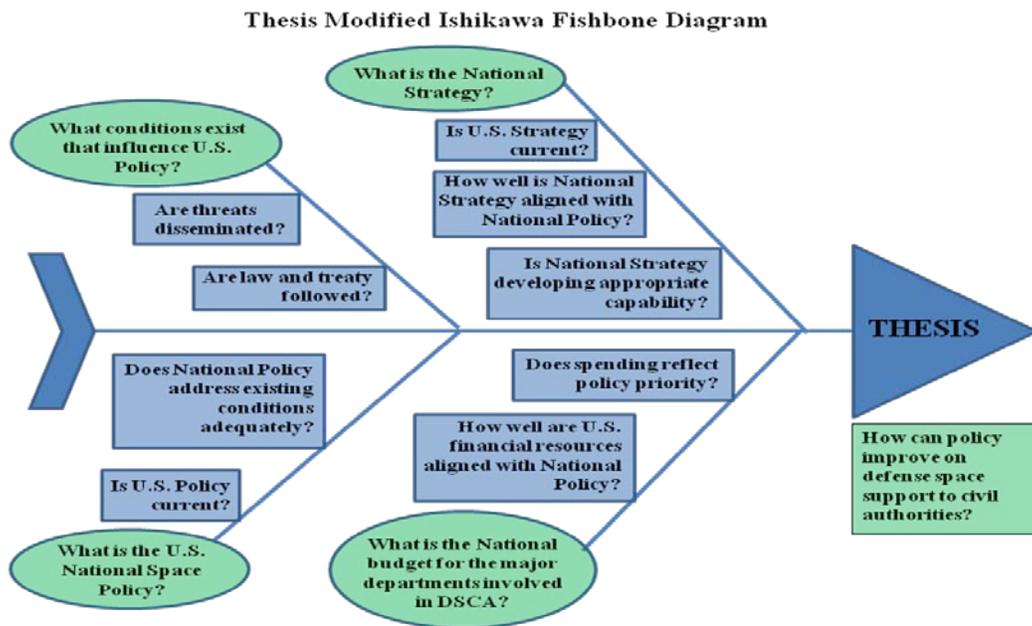


Figure 3. Thesis Methodology: Ishikawa Fishbone Diagram

Source: Created by author from the base construct of the Dr. Kaoru Ishikawa Diagram and the methodology of the Office of Organizational Excellence, North Carolina Department of Environmental and Natural Resources, *Fishbone Diagram: A Problem-Analysis Tool*, 2010, <http://quality.enr.state.nc.us/tools/fishbone.htm> (accessed 5 April 2010).

Threat Analysis

The first step in this methodology is to analyze the requirement or need for space applications in DSCA. One must analyze the need and requirements that drive policy. Is the national defense environment the same as the homeland security environment? What are the threats and what are the resources to defend against them? Some of these threats include asymmetric threats (terrorist, non-state actors), rogue entities, weapons of mass destruction (WMD), Toxic Industrial Chemicals and Materials (TICS/TIMS), ballistic missiles, and intentional collisions by state or non-state actors in an irregular attack. Some of these include relatively ordinary threats caused by natural or physical factors. These natural/physical factors include weather within the atmosphere, space weather (solar flares, cosmic radiation, meteors, and space debris), accidental collisions from other satellites, and eventual de-orbiting due to the operation of natural forces such as friction (ionic drag) and gravity.

Law and Treaty Analysis

The second step is to analyze the domestic and international laws governing space systems. The difference between law and treaty must also be analyzed, and its implications. The public has an ability to influence domestic, and to a small extent international law and treaty. Law and treaty represent existing conditions that influence policy formulation. If the U.S. were to sign the Comprehensive Test Ban Treaty (CTBT), U.S. policy might have to change regarding freedom of action. This would then cause a resulting change to supporting defense strategy in the form of a new *NDS*.

Policy Analysis

The third step in this methodology is to analyze the current policy. What is the priority for which the U.S. government appropriates funds to space systems and activity? How does crisis influence decisions on policy and funding? How does crisis affect federal laws surrounding space activity? Answering these subordinate questions, allows a recommendation for space policy revision.

Strategy and Capability Analysis

The fourth step in this methodology is to analyze current strategy of the President, DoD, and DHS. What are the actual requirements for space systems in the 2006 *NSS*, *NDS*, and *NMS*? How does the strategy and policy compare to the threats that space systems will face in defense or homeland security? Analysis of strategy and its desired capabilities provides an evaluation tool. This tool may decide if strategy is producing the capability appropriate to policy.

Resource Analysis

The fifth step in this methodology is an analysis of the resources available to build and maintain capabilities. The public has an influence through Congress on funding approval. Analysis of federal budgets and appropriations will highlight how appropriate they are in relation to policy priorities. If policy is out of date, resources may be inappropriately applied. Analysis will attempt to answer questions about resource allocation. What actors and activities influence the funding, building, launching, maintaining, and disposing of space systems? What is the relationship of the House

Armed Services Committee (HASC) and Senate Armed Services Committee (SASC) to resources?

Evaluation

The sixth step in this methodology is to investigate how efficient the Government has been in meeting requirements based on major capabilities available as a national resource in time of need. Efficiency affects budgetary requirements and ultimately space system defense/security structure. The functions to investigate include *Congressional Research Studies*, the 2010 *QDR*, 2010 *QHRSR*, and 2009 *APR*. Overall, analysis will focus on whether policy is successful, by looking at the performance of the departments executing policy.

Conclusion and Recommendation

The seventh and final step, in this methodology, is conclusion and recommendation. Findings, and recommendations from these findings, stem from what future policy on defense space systems and DSCA should look like. Policy recommendations are the result of thesis analysis on reviewed documents. Recommendations may include the capabilities of future satellites, as well as policy on integration of DSCA in homeland security. Other recommendations may include restrictions necessary to sustain space system feasibility.

This research methodology should present a complete and non-biased view of the factors affecting policy on defense space systems, and their support to civil authority. The thesis statement requires a complete and thorough search of published historical data, since 2006, in order for complete analysis to occur. This analysis should provide

predictive aspects, based on historical examples. The goal of this research is to make recommendations for policy on defense space support to civil authorities.

Accomplishment of thesis goals relies upon analysis of what requirements drive policy, analysis of current policy, and historical analysis of policy effectiveness in order to recommend future policy.

CHAPTER 4

ANALYSIS

Introduction

The experiences of the past several years have deepened the realization that state and non-state adversaries, alike, may seek to attack military and civilian targets within the United States. Protecting the nation and its people from such threats requires close synchronization between civilian and military efforts. Although many efforts to protect the United States are led by other federal agencies, including the Department of Homeland Security (DHS), the role of the Department of Defense in defending the nation against direct attack and in providing support to civil authorities, potentially in response to a very significant or even catastrophic event, has steadily gained prominence.

— Department of Defense, 2010 *Quadrennial Defense Review*

The analysis of the thesis on how policy can be improved on defense space support to civil authority is analyzed in this chapter. Policy is “a definite course or method of action selected from among alternatives and in light of given conditions” (Merriam-Webster 2010). The given conditions are the threat environment and existing laws or treaties.

This thesis studies six components to the larger whole of policy and Defense Support to Civil Authority (DSCA), in order to analyze the effectiveness of The 2006 *U.S. National Space Policy* on DSCA. The six components are (1) threats; (2) laws, and treaties for which, (3) policy is formulated to establish guidelines for which, (4) the strategy is developed to create the desired capabilities; where upon, (5) resource allocation is requested to create desired capabilities; and (6) an evaluation or assessment must be made on overall effectiveness to refine policy guidance.

The analysis will include both qualitative documentation review and quantitative budget analysis. Analysis will include material written on U.S. space policy, DSCA,

homeland security, and space activity since 2006. The quantitative analysis will include the same period across a range of national space budget, defense space budget, homeland security, and other budget data. Where possible, the same current year dollar value is used. There are some different values depending on the year used in the analysis, due to data availability. Any slight differences in the overall comparison between different value year's dollars will not affect the conclusions or statements derived from the quantitative analysis.

In a documentation review, a good starting point is the most recent actions and material written on the subject in question. For the stated thesis, this occurred with the release of DoD's *QDR* report, in February 2010. This report, along with DHS's *Annual Performance Report*, forms the most comprehensive source for how these departments assess their own performance. These documents mandated by law, are the product of threat conditions, laws, policy, and strategy on how to apply resources. Analysis of each area aids in the context of these documents with relation to the 2006 *U.S. National Space Policy*.

Threat

In part, threat condition informs policy. The 2006 *U.S. National Space Policy* relies on existing and anticipated threats known at the time of its publication. Only technology and imagination limit the list of threats. This thesis will not attempt to list or describe every existing threat. It is important; however, to understand what the main threat condition or environment is, in order to evaluate how current policy was established; and whether it is appropriate today. The purpose of this is to aid in formulating recommended changes in policy; preparing the nation for any newly

anticipated threats. A thorough analysis of threats affecting space systems, homeland security, and homeland defense is in appendix B.

Law and Treaty

The next portion of existing conditions analyzed is law and treaty. Existing condition informs policy. The first condition addressed was the threat condition. Law is the second condition, and treaty is the third condition. Law and treaty represent a limitation for the policymaker. A moral policymaker will define a policy to guide decisions that account for the amorality of several factors. These factors are potential threat, existing law, treaty, and the morality of the nation that must execute the policy. Figure 4 depicts the relationship of treaty to policy. Appendix C contains a thorough analysis of law and treaty affecting policy, space, homeland defense, and homeland security.

Existing Conditions Influence on Policy

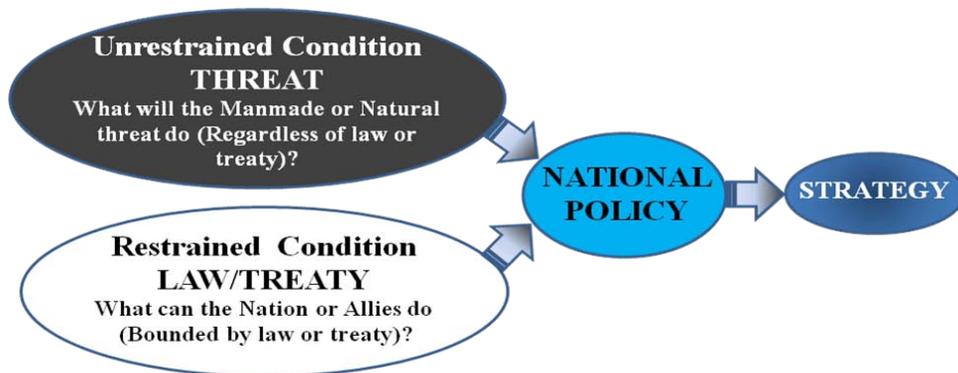


Figure 4. Condition Influences on Policy

Source: Created by author.

Policy

Having explored existing conditions in depth, the next step is to analyze policy developed under these existing conditions. In order to approach any complex problem, it is critical to define important terminology. The very foundation of this thesis rests upon an understanding of what policy is and what role it plays in defense space support to civil authority. “Policy: a definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions: a high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body” (Merriam-Webster 2010). A common frame of reference is now established by defining policy as guiding and determining present and future decisions; and establishing goals and acceptable procedures. The 2006 *U.S. National Space Policy* and other significant policies evaluate against this definition.

U.S. National Space Policy

In 2006, President George W. Bush issued the *U.S. National Space Policy*. This policy is still in effect, as of 2010, under the President Obama Administration. Since this policy’s 2006 approval, numerous events occurred. These events changed some of the conditions that existed at the time of the 2006 *U.S. National Space policy*’s publication. Now, it is important to analyze this policy to determine if it still provides the guidance needed to develop strategy and capability for present and future threats. History is very useful in developing or analyzing policy. Former President and General, Dwight Eisenhower said of history, “Neither a wise man nor a brave man lies down on the tracks of history to wait for the train of the future to run over him.” Relying on old policy or failing to analyze current policy, can be equivalent to laying on the tracks of history. In a

lecture on professional history, Edward Bowie said, if there was anything to learn from the study of history, it is that “professional history focuses on the future” (Bowie 2010a). It is a goal of this thesis to use this philosophy as the reason for evaluating how well U.S. current space policy prepares its DoD to support civil authorities for future threats. This is a crucial matter of national security. In the 2006 *U.S. National Space Policy*, it 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 capability” (Office of the President of the United States 2006, 1).

The 2006 *U.S. National Space Policy* supersedes Presidential Decision Directive (PDD)/National Security Council 9/NSC-49), National Science and Technology Council (NSTC-8), National Space Policy, dated 14 September 1996. It maintains that the conduct of U.S. space programs and activities shall be a top priority guided by seven principles. The seven principles are:

1. The U.S. is committed to space exploration for peaceful purposes while allowing defense and intelligence-related activities to pursue national interests.
2. The U.S. rejects claims to sovereignty by any nation over outer space and rejects any limitations on the U.S. to operate in and acquire data from space.
3. The U.S. seeks to cooperate in the peaceful use of space and to protect and promote freedom.
4. The U.S. considers space systems to have rights of passage and operations in space without interference. The U.S. considers purposeful interference with its space systems as infringement on its rights.

5. The U.S. considers space capabilities (including ground and supporting components) vital to national interest; and preserves its rights, capabilities, and freedom of action in space. It will dissuade or deter others from impeding rights or developing capability to do so. If necessary, the U.S. will deny adversaries the use of space capabilities that are hostile to U.S. national interests.

6. The U.S. will oppose restrictions and arms control agreements that seek to impair U.S. rights to use space for U.S. interests.

7. The U.S. is committed to the commercial space sector; and will maximize the use of commercial space capabilities, when practical for national security.

Following the seven principles, the 2006 *U.S. National Space Policy* establishes seven policy goals. These goals are:

1. Strengthen space leadership and ensure capability is available in time to further national security, homeland security, and foreign policy objectives.

2. Enable unhindered operations in space to defend national interest.

3. Implement and sustain human and robotic exploration to extend human presence across the solar system.

4. Increase the benefits of civil exploration, science, and environmental activities.

5. Enable a dynamic and globally competitive domestic space sector to protect national, homeland, and economic security.

6. Enable a robust science and technology base supporting national security, homeland security, and civil space activities.

7. Encourage international cooperation on mutually beneficial space activities as well as those that advance national security, homeland security, and foreign policy objectives.

In order to achieve its objectives, the 2006 *U.S. National Space Policy* establishes four policy guidelines directing the U.S. Government to: (1) develop space professionals, (2) improve space system development and procurement, (3) increase and strengthen interagency partnerships, and (4) strengthen and maintain the U.S. space-related science, technology, and industrial base. The policy further specifies functions that the Secretary of Defense (SecDef) and Director of National Intelligence (DNI) will perform for the executive branch. It also directs civil and commercial applications and provides guidance to all applicable government departments involved in space. There is no specific mention of the Secretary of Homeland Security; however, it does specifically mention many of the other departmental secretaries. The policy goes on to allow nuclear power in space with limitations. The policy addresses radio frequencies, space debris, and a statement on U.S. space photoreconnaissance.

Presidential Policy Directives

President Obama has issued one PPD and one Presidential Study Directive (PSD). The February 2009 *PPD-1*, directs the organization of the National Security Council (NSC) system. Policy Directives have gone by several names, but the basic purpose remains the same.

Presidential Directives, better known as Presidential Decision Directives or PDD are a form of an executive order issued by the President of the United States with the advice and consent of the National Security Council. As a National Security instrument, the PDD articulates the executive's policy, carries the “full force and effect of law.” (Moss 2000)

Because most of the Presidential Directives are matters of national security, they are accordingly classified. Steven Aftergood, of the Federation of American Scientists, estimates that President George W. Bush issued approximately 54 directives. Of those 54 directives, approximately one third of the national security policy directives (roughly eighteen) are public. A list of Presidential Directives, in the nuclear age, is contained in appendix D, table 13; and covers a period from the Truman Administration through the Obama Administration.

Defense Directives

The SecDef derives executive authority from the President as Commander-in-Chief. The DoD establishes directives in order establish or describe policy, programs, and organizations; define missions; provide authority; and assign responsibilities (Department of Defense 2010c). It is useful to describe the organization of the DoD. There is no better way to do this when discussing directives than to use an actual directive.

Department of Defense (DoD) (DoD Directive 5100.1) is responsible for providing the military forces needed to deter war and protect the security of the United States. The major elements of these forces are the Army, Navy, Air Force, and Marine Corps. Under the President, who is also Commander-in-Chief, the Secretary of Defense exercises authority, direction, and control over the Department which includes the Office of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, three Military Departments, nine Unified Combatant Commands, the DoD Inspector General, fifteen Defense Agencies, and seven DoD Field Activities. (Department of Defense 2010c)

This thesis focuses on DSCA and therefore, it is necessary to establish where defense assets derive their authority. DODD 5100.1 provides this clarity for military assets, but the wording leaves room for interpretation on non-military DoD assets. Under the Code of Federal Regulations (CFR), 32 CFR, *National Defense*, §185, *Military Support to Civil*

Authorities (32 CFR 185); DoD codifies its authority to give subordinate defense commanders an authority to use their assets to save lives and property.

Title 10 § 809(e) gives military commanders an inherent authority to protect lives and property, pursuant to precedent set in *Cafeteria Workers v. McElroy* and *Mitchell v. Harmony*. This authority to conduct DSCA [formerly known as Military Support to Civil Authorities (MSCA)], is under the public law authorities to conduct Military Assistance to Civil Authorities (MACA). The 32 CFR 185 language referencing MSCA is current, as of mid 2010. DoD proposes revision of this section to be titled DSCA instead of MSCA. The current DoD Directive concerning Immediate Response Authority is DoDD 3025.15.

Military Assistance to Civil Authorities (DoD) (DoD Directive 3025.15) Many DoD components and agencies are authorized to respond to save lives, protect property and the environment, and mitigate human suffering under imminently serious conditions, as well as to provide support under their separate established authorities, as appropriate. This is called Immediate Response Authority (IRA) for these situations. (Department of Defense 2010b)

The DoD also has directives specifically for space. The DoDI S-3100.15, *Space Control Policy*; DoD I 3100.12, *Space Support*, spacecraft end-of-life actions; and Strategic Command Instruction 550-4, *Satellite Disposal Procedures* are some examples.

Space Control Policy

Department of Defense Directive (DoDI S-3100), *Space Control Policy*; establishes authority, in keeping with the *U.S. National Space Policy*, on U.S. preservation of freedom of action. It directly relates to the President's fifth principle that discusses U.S. preservation of rights to freedom of action in space, and a commitment to take actions necessary to protect space capabilities. It establishes space capabilities (including terrestrial components and links) as vital to national interest. In order to

achieve the *U.S. Space Policy Goals*, the *U.S. National Space Policy*'s fifth DoD directive authorizes it to "deny freedom of action to adversaries" (Office of the President of the United States 2006).

Space Support and Satellite Disposal Procedures

Department of Defense Directive (DoDI 3100.12), *Space Support*, spacecraft end-of-life actions; and Strategic Command Instruction 550-4, *Satellite Disposal Procedures*; establish procedure for safeguarding the civilization and environment by prescribing how to terminate a satellite. Due to matters of national security, environmental hazards, risk to impact areas, and management of space debris, proper satellite service termination is critical.

Strategy and Capability

With an understanding that policy informs strategy, it is necessary to analyze the existing strategy formulated from the 2006 *U.S. National Space Policy* and other policies. Strategy establishes desired capabilities, and it is useful to review some of the existing capabilities. The purpose is to evaluate whether strategy is appropriate in its execution of policy.

Separating Strategy from Policy

The next step is to review strategy and some of the capabilities available to counter or neutralize the identified threats within the restrictions of existing law, treaty, and guidance of policy. Before this can occur, the relationship between policy, strategy, and capability is established. Good policy should establish guidelines to drive decisions

and strategy on the development and procurement of capabilities that prepare the nation for anticipated threats, disaster, or other crisis.

The terms strategy and policy can often be used too loosely; therefore, it is important to define these terms as the strategy and resulting capabilities of the DoD are analyzed. By definition, strategy is subordinate to national policy. Merriam-Webster defines strategy as, “the science and art of employing the political, economic, psychological, and military forces of a nation or group of nations to afford the maximum support to adopted policies in peace or war” (Merriam-Webster 2010).

Wording about strategy affording “maximum support to adopted policies” defines strategy’s subordination to policy. Therefore, Presidential Directives (as policy) may supersede the last *NSS* if there is a conflict. President Barack Obama has not issued a new *NSS* or *U.S. National Space Policy* since 2006 when President George W. Bush last published these two documents. It is significant to establish the hierarchy here before subordinate strategy analysis.

The U.S. uses an alignment of strategy to translate the *NSS* down to the *NDS* and then down to the *NMS*. Figure 5 depicts the U.S. alignment of strategy.



Figure 5. Alignment of U.S. National Strategies
 Source: Created by author.

Space Protection Strategy

Congressional public law requires a *Space Protection Strategy*. On 28 January 2008, Congress directed the creation of a *Space Protection Strategy*. “The Secretary of Defense, in conjunction with the DNI, shall develop a strategy, to be known as the Space Protection Strategy, for the development and fielding by the United States of the capabilities that are necessary to ensure freedom of action in space for the United States” [P.L. 110-181, div. A, title IX, Sec. 911(b)].

The 110th Congress law begins by identifying areas that the *Space Protection Strategy* must cover such as identification of the threats to, and the vulnerabilities of, the national security space systems of the U.S. It continues by requiring that the following areas be included in the strategy: existing capabilities, to include hardware and software;

assessment of current capabilities; investment and procurement, and descriptions of processes for Office of the Secretary of Defense and DNI integration. Significant to this law, is its definition of capabilities. “The term ‘capabilities’ means space, airborne, and ground systems and capabilities for space situational awareness and for space systems protection” (P.L. 110-181, div. A, title IX, Sec. 911(e)).

While P.L. 110-181, div. A, title IX, Sec. 911(e), authorizes an unclassified publication with classified annex, only a classified document was produced by DoD. The 2010 *QDR* makes reference to the 2008 *Space Protection Strategy* (Department of Defense 2010a, 34); unfortunately, that document is not publicly available. A public search of published and unclassified DoD documents, has not revealed the *Space Protection Strategy* as of May 2010.

National Defense Strategy

The *NDS* is the result of an assessment of the current and future strategic environment. The *NDS* is a product of the Office of the Secretary of Defense. June 2008 is the most current date of the *NDS*. It flows from the *NSS* issued in March 2006. The *NDS* informs the *NMS*. Since the 2010 *QDR* release in February 2010, it is anticipated that the *NSS* may be released as soon as June 2010 or as late as the Administration requests. The *NDS* and *NMS* will not likely be revised until the *NSS* is released; however, the current *NDS* was released following the 2006 *QDR*. Therefore, it is possible for the *NDS* to be revised again, before a new *NSS* is ever released.

The *NDS* has five objectives: (1) defend the homeland, (2) win the long war, (3) promote security, (4) deter conflict, and (5) win our nation’s wars. The *NDS* outlines five ways to achieve its objectives: (1) shape the choices of key states, (2) prevent adversaries

from acquiring or using WMD, (3) strengthen and expand alliances and partnerships, (4) secure U.S. strategic access and retain freedom of action, (5) integrate and unify our efforts. Space capabilities are used in each of these areas.

National Military Strategy

The *NMS* flows from the *NDS*. It establishes a role for the military in congruence with the *NSS* and *NDS*. It identifies the security environment with respect to a wide range of adversaries, a more complex and distributed battle space, and technology diffusion and access (Department of Defense 2004, vii). The *NMS* establishes national military objectives to protect the U.S., prevent conflict and surprise attacks, and prevail against adversaries. It outlines the desired attributes, function, and capabilities of the joint force for mission success. The functions and capabilities are: (1) applying force, (2) deploying and sustaining military capabilities, (3) securing battle space, and (4) achieving decision superiority. The *NMS* also prescribes force design, size, and assessment to maintain capability (Department of Defense 2004, 21). Finally, the *NMS* establishes joint vision for future warfighting, to include full spectrum dominance and other initiatives.

In relation to homeland defense and support to homeland security or DSCA, the *NMS* prescribes strategy for protecting strategic approaches and defensive actions at home, under the national military objectives. Protecting strategic approaches requires securing the air, sea, land, and space approaches the U.S. through persistent surveillance (Department of Defense 2004, 10). Defensive actions at home are those, which defend the U.S. from air and missile attacks, terrorism, and other direct attacks. The military must be prepared to operate in a homeland defense role or a defense support to civil authority role.

Department of Defense Capabilities

The *NDS* addresses capabilities in a broad context. It lists the following as its capabilities: people, strategic communications, intelligence and information sharing, technology and equipment, organization, alliances, and partnerships. People represent the large labor force DoD can bring to bear, civilian or military. As one of the largest Departments in man-power and budget, DoD represents an incredible force. Strategic communications represents a vast capability through a unified U.S. government effort.

The *NDS* criticizes its own ability in this category, but notes plans for increased communication with the Department of State. Intelligence and information sharing represents a wide spectrum from technology enhanced collection, analysis, and dissemination--to the sharing of information domestically and internationally for the benefit of national security. At its heart, information sharing is inherently subject to human nature, personalities, and other subjective factors. Intelligence analysis and information sharing are identified shortfalls.

Technology and equipment represent a broad inventory of hardware and software research, development, acquisition, training, employment, maintenance, and sustainment. Western warfare is reliant upon technology as a key component of warfare (Knox and Murray 2001). In future warfare, the U.S. may combat Eastern warfare as practiced by the Chinese. The *NDS* use of the term “organization” represents an effort to harness the people, equipment, and technology of the DoD into a unified effort that totals more than the sum of its parts. The very nature of DoD’s mission focused organization has often been replicated by other government organizations. Alliances and partnerships represent both an international and domestic ability to multiply force in areas where relationships

have fostered capability. This can come in the form of political, military, security force, or interagency alliances or partnerships nested with the Department of State and Executive Office policy and/or strategy.

The 2010 *QDR* is the most recent DoD guidance on defense strategy. “The *QDR* gives solid direction on developing capabilities that counter the proliferation of anti-access and area-denial threats, which present an increased challenge to our maritime, air, space, and cyber forces” (Department of Defense, 2010a, 103). The 2010 *QDR* also prescribes force size for specific capabilities such as work force, units, and equipment. Under the title “Rebalancing the Force,” the 2010 *QDR* demands “more robust space-based assets” (Department of Defense 2010a, 18). Under the title “Balancing for a Complex Future,” the 2010 *QDR* identifies Air Force space capability goals for “3 command and control wings and 5 fully operational air and space operations centers (with a total of 27 primary mission aircraft) 10 space and cyberspace wings” (Department of Defense 2010a, xvii).

DoD derives capability from a broad inventory of people, equipment, and technology. Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (ISR) is another way DoD refers to critical capabilities. It is important to note that DoD sees capability in a broad sense. It extends to people, administrators, logisticians, health care, and all of the capabilities that allow DoD to do its mission. This means that security partnerships are also considered a capability; and that is why DoD focuses on these partnerships. Partnerships can extend to the realm of international space capability as well.

Department of Homeland Security Capabilities

DHS operates under the 2007 *National Strategy for Homeland Security* (Department of Homeland Security, 2007b). In February 2010, the first *QHSR* report defined the relationship between policy, priority, capability, and resources.

The *QHSR* has set the stage for detailed analyses of homeland security capabilities and requirements across the homeland security enterprise. Stakeholders must now work to prioritize and identify the capabilities needed to achieve the goals, objectives, and outcomes identified in the *QHSR*, tie these requirements to resource allocation priorities, set performance criteria, and validate the allocation of roles and responsibilities. (Department of Homeland Security 2010a, 77)

The 2007 *National Preparedness Guidelines* contain the *Target Capabilities List (TCL)*.

The *TCL* contains the capabilities that DHS wants to train, as well as maintain, in order to be prepared. It plans on threats or incidents similar to the ones consistent with the 2007 *National Planning Scenarios*. Table 1 contains the complete *TCL*.

Table 1. Department of Homeland Security <i>Target Capabilities List (TCL)</i>	
Common Mission Area	Respond Mission Area
Communications Community Preparedness and Participation Planning Risk Management Intelligence/Information Sharing and Dissemination	Animal Health Emergency Support Citizen Evacuation and Shelter-in-Place Critical Resource Logistics and Distribution Emergency Operations Center Management Emergency Public Information and Warning Environmental Health Explosive Device Response Operations Fatality Management Fire Incident Response Support Isolation and Quarantine
Prevent Mission Area	
CBRNE Detection Information Gathering and Recognition of Indicators and Warnings Intelligence Analysis and Production Counter-Terror Investigations and Law Enforcement	
Protect Mission Area	Respond Mission Area (continued)
Critical Infrastructure Protection Epidemiological Surveillance and Investigation Food and Agriculture Safety and Defense	Mass Care (Sheltering, Feeding, and Related Services) Mass Prophylaxis Medical Supplies Management and Distribution Medical Surge Laboratory Testing Onsite Incident Management Emergency Public Safety and Security Response Responder Safety and Health Emergency Triage and Pre-Hospital Treatment Search and Rescue (Land-Based) Volunteer Management and Donations WMD/Hazardous Materials Response and Decontamination
Recover Mission Area	
Economic and Community Recovery Restoration of Lifelines Structural Damage Assessment	

Source: Department of Homeland Security, *National Preparedness Guideline: National Planning Scenarios, Target Capabilities List* (Washington, DC: Government Printing Office, September 2007).

DHS presides over the Federal Emergency Management Agency (FEMA). Under FEMA, the National Preparedness Directorate (NPD) provides direction. In the 2009 *Annual Operating Plan*, the NPD defines itself. “Established on April 1, 2007, the NPD provides strategy, policy, and planning guidance to build prevention, protection, response, and recovery capabilities among all levels of government” (National Preparedness Directorate 2009, 3). The NPD establishes a preparedness cycle consisting of: planning, organizing and equipping, training, exercising, and evaluating, and improvement planning. The NPD establishes ten goals that it nests under FEMA’s four goals. Table 2 describes and depicts the relationship of the FEMA goals to the NPD goals.

Table 2. FEMA and NPD Goals Relationship	
FEMA Goal	NPD Goal
FEMA GOAL 1: LEAD AN INTEGRATED APPROACH THAT STRENGTHENS THE NATION’S ABILITY TO ADDRESS DISASTERS, EMERGENCIES, AND TERRORIST EVENTS.	NPD Goal 2: Implement preparedness programs and initiatives through the FEMA Regions, and ensure coordination of activities with external stakeholders.
	NPD Goal 3: Develop and implement a national planning system that links Federal, regional, State, and local planning efforts.
	NPD Goal 4: Sponsor a national program for training, exercises, and lessons learned.
	NPD Goal 6: Maintain and integrate a variety of preparedness-related prevention initiatives.
	NPD Goal 7: Increase awareness of and compliance with various preparedness and response guidance materials.
FEMA GOAL 2: DELIVER EASILY ACCESSIBLE AND COORDINATED ASSISTANCE FOR ALL PROGRAMS.	NPD Goal 9: Enhance the preparedness of individuals, families, and special needs populations through awareness planning and training.
	NPD Goal 10: Prepare communities surrounding nuclear plants and chemical stockpiles facilities.
FEMA GOAL 3: PROVIDE RELIABLE INFORMATION AT THE RIGHT TIME FOR ALL USERS.	NPD Goal 5: Develop a comprehensive assessment system to determine Federal, State, and local preparedness levels.
FEMA GOAL 4: FEMA INVESTS IN PEOPLE AND PEOPLE INVEST IN FEMA TO ENSURE MISSION SUCCESS.	NPD Goal 1: Attract, retain, and develop qualified and motivated employees for the NPD.
FEMA GOAL 5: BUILD PUBLIC TRUST AND CONFIDENCE THROUGH PERFORMANCE AND STEWARDSHIP.	NPD Goal 8: Develop and document effective and efficient business processes to provide the foundation on which programmatic activities can thrive.

Source: Created by author from data contained in the National Preparedness Directorate, *Annual Operating Plan* (Washington, DC: Government Printing Press, April 2009).

Space-Specific Capabilities

In the context of this thesis, the areas where space applications can support civil authority are expansive. U.S. military space operations are comprised of four main mission areas (1) space force enhancement, (2) space support, (3) space control, and (4) space force application. Space force enhancement consists of primarily passive capabilities aimed at collecting data in the form of measurements and signals. It encompasses mapping, imagery, weather tracking, missile launch detection, non-proliferation compliance monitoring, and communications.

Space support consists of active capabilities to conduct logistical, transportation, maintenance, and sustainment operations. Space control includes active and passive capabilities to maintain awareness to make decisions on national security, defend freedom of action, and to neutralize threats. DoD Instruction (DoDI) 3100.13 *Space Force Application* governs force application as a combat function in through and from space; influencing the course or outcome of a conflict (Department of Defense 2009, 196). Table 3 summarizes the mission areas of U.S. military space operations.

Mission Area	Mission
Space Force Enhancement	Intelligence, Surveillance, and Reconnaissance (ISR)
	Missile Warning
	Environmental Monitoring
	Satellite Communications
	Positioning, Navigation, and Timing (PNT)
Space Support	Space Lift Operations (launch and deployment)
	Satellite Operations (maintaining, sustaining, and rendezvous and proximity)
	Reconstitution of Space Forces (replenishing lost or diminished satellites)
Space Control	Offensive Space Control
	Defensive Space Control
	Space Situational Awareness
Space Force Application	Space Force Application

Source: Created by author from information contained in the Department of Defense, Joint Publication (JP) 3-14, *Joint Doctrine for Space Operations* (Washington, DC: Government Printing Office, 2009).

In order to maintain space capability, the U.S. has commercial and military space systems. The 2003 *U.S. Commercial Remote Sensing Policy* directs the use of commercial assets to aid in military space force enhancement, and conforms to the 1992 *Land Remote Sensing Act*. Examples of commercial assets that relate to space force enhancement are Iridium and Inmarsat communication satellites, and Digital Globe commercial imaging satellites.

Weather and Global Positioning Systems (GPS) are not commercialized. GPS did not become a part of civilian purview until approximately 1993. Commercial applications also augment or replicate space support operations. Some examples are the launching of commercial satellites and their maintenance. Commercial capabilities are not robust in the mission areas of offensive space control and space force application. Commercial

companies must perform some defensive space control in order to avoid collisions or maintain position and orbit.

Resource

Secretary Robert Gates explains the relationship between strategy, capability, and budget resources, in a section titled, “DoD Capabilities and Means,” of the 2008 *NDS*. “Implementation of any strategy is predicated on developing, maintaining and, where possible, expanding the means required to execute its objectives within budget constraints” (Department of Defense 2008). His acknowledgment of strategy being predicated on budget constraints, serves to highlight how money or other resources define where an organizations main effort is.

A way to analyze how an organization truly prioritizes is to look at where it commits resources. If the 2006 *U.S. National Space Policy* says, “Freedom of action in space is as important to the United States as air power and sea power” (Office of the President of the United States 2006, 1), then it stands to reason that the budget of these three things should be relatively equal. Is this, in fact, the case? The *U.S. National Space Policy* also states, “The conduct of U.S. space programs and activities shall be a top priority” (Office of the President of the United States 2006, 1).

If this really is a top priority, there ought to be a direct correlation to budget requests; demonstrating that space programs and activities are funded as a top priority. A reality is that the U.S. Congress and Senate have a vote in resourcing through the HASC & SASC. The current administration has already cut budget requests to support NASA manned space exploration to the moon by 2020; however, the NASA budget is still scheduled to grow overall through 2011 (Klotz 2010). Congress has the option to

supplement NASA if it chooses to see value in manned space flight funding, even if it is not the President's priority.

Analysis on budgetary resources is inherently quantitative. In many cases, it is difficult to compare evenly across services and departments because programs do not maintain the same name or function across the years; and money is converted to current dollars in order to make an accurate comparison. Some aspects of accuracy are sacrificed due to these factors and the author's own limitations in certified public accounting practices.

Where there are any shortfalls, the author has relied on the documentation and analysis of professional research institutes or internal and external government financial performance reports, to bridge the gap between budget analysis and meaningful qualitative comparison. Data concerning budgets is from official or professional reports and analysis; and do not represent the author's calculations unless required to fill a gap or omission in the source. Analysis of how the DoD programs its budget is extremely useful in evaluating how effective the 2006 *U.S. National Space Policy* is. It allows an evaluation of what is or is not in alignment with policy and strategy.

National Defense Budget

On 7 May 2009, President Obama and the DoD submitted the FY2010 defense budget to the U.S. Congress. The request totaled \$663.8 billion, to include \$130 billion for overseas contingency operations. The base budget of \$533.8 billion is a \$20.5 billion increase since the FY2009 defense request. After adjustment for inflation, this represents a 2.1 percent increase from FY2009 to FY2010 requests (Mazol 2009, 1).

The total budget for “space based and related systems” was \$11.1 billion. This means that the request for FY2010 space related defense budget represents only two percent of the overall base defense budget, and a three percent increase over the FY2009 space related request. Initial qualitative analysis does not characterize two percent as representative of a top priority, as mentioned in the 2006 *U.S. National Space Policy*. The \$11.1 billion is broken down into \$7 billion for satellites, \$2.7 billion for space support services, and \$1.4 billion for space launch services (Department of Defense 2009b, 3-52). Appendix F contains a thorough analysis of resources involving space based and related systems in the DoD.

Department of Homeland Security Budget

The DHS budget has grown from \$54.8 billion in FY2006 to \$68.5 billion in President Barack Obama’s FY2011 request. There are 16 major DHS funding programs and directorates. It is not within the scope of this thesis to conduct comprehensive analysis of the DHS budget. As the supported organization in DSCA, it is the DoD’s responsibility to bring its resources to bear. In the event that a homeland defense scenario occurred, DoD would be the supported organization and it would be more significant to analyze all of DHS’s resources. Tables 4 and 5 give a useful comparison of the DHS and DoD budgets. Compare the DHS FY2010 request of \$74.6 billion to the DoD FY2010 request of \$533.5 billion (not including \$130 billion for overseas contingency operations).

Table 4. DHS Budget FY2006-2010 (Revised and Enacted)						
DHS Budget FY2006-2011						
	Fiscal Year					
	In Billions of Dollars (Revised Enacted)					Proposed
	FY06	FY07	FY08	FY09	FY10	FY11
DHS Total Adjusted Budget Authority	54.8	58.3	64.1	70.6	74.6	68.5

Source: Created by author from Department of Homeland Security, *Budget-in-Brief: Fiscal year 2011* (Washington, DC: Government Printing Office, 2010).

Table 5. DoD Budget FY2006-2010 (Includes Supplemental and OCO)					
DoD Budget FY2006-2010					
	Fiscal Year				
	In Billions of Dollars				
	FY06	FY07	FY08	FY09	FY10
DoD Total Adjusted Budget Authority	411	432	480	480	534
Overseas Contingency Operations (OCO)	116	166	187	66	130
Supplemental/Stimulus	8	3		7	
Total Base Plus Supplemental and OCO	124	169	187	73	130

Source: Created by author from data contained in the *Department of Defense FY2010 Budget Request Summary Justification* (Washington, DC: Government Printing Press, 2009).

DHS is responsible for homeland security from the sky, borders, coastline, and international boundaries; totaling approximately 24,897 surface level, statute miles (Beaver 2006, 1-5); and approximately three million square miles of airspace (Rogers, 2001). DHS does not focus on space security. DoD is the lead for missile defense and space security. Therefore, DHS relies on a continuous relationship of defense support in order to detect threats to the homeland from space such as meteors, missiles, malfunctioning satellites, and immediate airspace fighter response. DHS also relies on DoD's combat support agency, the National Geospatial-Intelligence Agency (NGA) for

mapping and imagery needs to monitor homeland infrastructure, boundary monitoring, and environmental monitoring.

The majority of this ongoing defense support to civil authority to DHS occurs through U.S. Northern Command (USNORTHCOM), North American Aerospace Defense Command (NORAD), and USNORTHCOM’s standing Joint Task Forces (JTF). Some examples are JTF North and JTF National Capitol Region. Unfortunately, an operation by DoD like *Operation Noble Eagle* is expensive and difficult to sustain. The operation cost DoD approximately \$3 billion per year (Bolkcom 2006, 2). Defending airspace is necessary; however, DHS is not resourced with a civil air patrol capable of securing homeland airspace, or conducting ballistic/cruise missile defense. Additionally, efficient use of integrated air defense between detection methods, targeting and re-direction, and the aircraft; defies current DHS resourcing. However, DoD is resourced for these functions. Figure 6 depicts DHS resourcing for FY2006-2011.

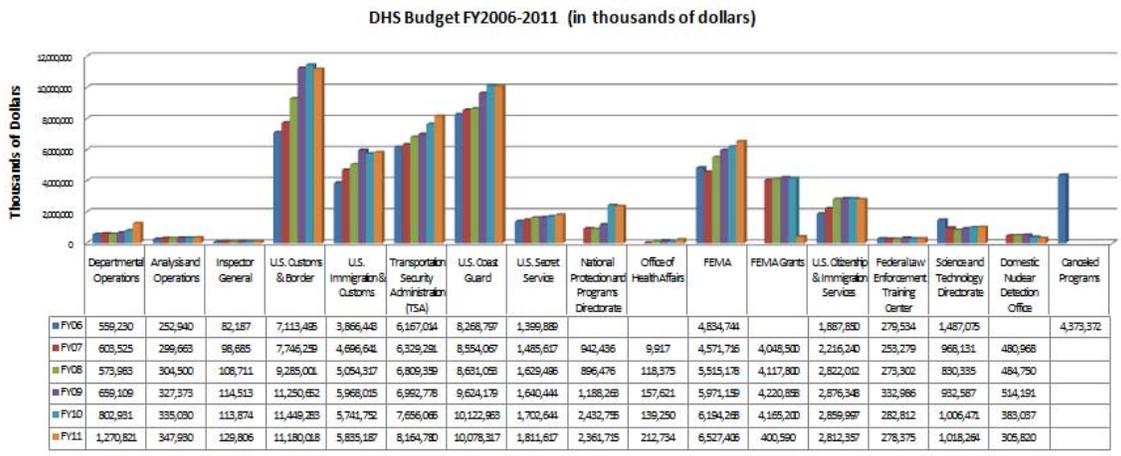


Figure 6. DHS Budget FY2006-2011

Source: Created by the author from data contained in the Department of Homeland Security, *Budget-in-Brief: Fiscal year 2011* (Washington, DC: Government Printing Office, 2010).

Evaluation and Comparison

Threats, law and treaty, policy, strategy, capability, and resource analysis lead to evaluation. With this background, it is possible to analyze these factors as a whole to determine if policy is having the desired effect. By looking at how the President, DoD, and DHS evaluate performance, it is possible to make recommendations. The U.S. government uses a performance system to hold departments accountable.

The Government Performance and Results Act of 1993 seeks to shift the focus of government decision making and accountability away from a preoccupation with the activities that are undertaken - such as grants dispensed or inspections made - to a focus on the results of those activities, such as real gains in employability, safety, responsiveness, or program quality. Under the Act, agencies are to develop multiyear strategic plans, annual performance plans, and annual performance reports. (Government Accountability Office 2010)

Analyzing documents produces recommendations for strategy change, within existing policy guidelines, or changes to policy itself.

Quadrennial Defense Review

The DoD published its *QDR* report in February 2010. The report highlights two objectives: (1) further rebalance capabilities of U.S. armed forces to deal with the threats of today and tomorrow, and (2) further reform DoD institutions and processes to better support the warfighter's needs. "Using the *QDR* as its foundation, the Department will continually examine its approach--from objectives to capabilities and activities to resources--to ensure its best alignment for the nation, its allies and partners, and our men and women in uniform" (Department of Defense 2010, iii). The *QDR* also discusses the complex environment and impacts of globalization on technology distribution to non-state actors, weapons proliferation, and disease and environmental threats.

QDR Objective Areas

The *QDR* establishes objective areas between which it balances resources and risk: (1) prevail in today's wars, (2) prevent and deter conflict, (3) prepare to defeat adversaries and succeed in a wide range of contingencies, (4) and preserve and enhance the all-volunteer force. The *QDR* makes recommendations to rebalance the force in order to meet its objectives. In the area of defending the U.S. and supporting civil authorities at home, the *QDR* made the following recommendations: improve the responsiveness and flexibility of consequence management response forces, enhance capabilities for domain awareness, accelerate the development of standoff radiological/nuclear detection capabilities, and enhance domestic capabilities to counter improvised explosive devices (Department of Defense 2010a, vii).

In the two areas of enhancing domain awareness and radiological/nuclear detection, there appears to be the most room for space assets to conduct civil support. Domain awareness is explained in the *QDR* as a capability in which DoD and its interagency partners can improve to "comprehensively monitor the air, land, maritime, space, and cyber domains" (Department of Defense 2010a, 19) for potential direct threats to the U.S. Space is involved with all of these domains. Radiological/nuclear detection is another area where space capabilities are already used and can be improved.

Defense Support to Civil Authority (DSCA) Activities

The 2010 *QDR* did not specifically mention all the DSCA functions that the DoD performed in the last four years; however, the Office of the Secretary of Defense does maintain a world wide web site that identifies major DSCA activities performed since 2003.

DoD has continued its long tradition of DSCA while maintaining its primary mission of fighting and winning the nation's wars. In 2003, DoD acted on 75 requests for assistance from more than 20 civilian agencies. In 2004, DoD acted on 99 requests for assistance from domestic civilian agencies. During the response to Hurricane Katrina, DoD acted on more than 90 hurricane-related requests for assistance from civil authorities requiring a broad range of military capabilities. In addition to Hurricane Katrina, DoD acted on more than 140 requests for assistance in 2005, including responses to hurricanes Dennis, Ophelia, and Rita, and the provision of UAV support to DHS border security activities. (Department of Defense 2010c).

Reading the list of DSCA activities the DoD has performed, one might think the only thing DoD has done is use Unmanned Aerial Vehicles (UAVs) and UAS. Appendix G contains further study of UAVs and UAS operations on the topic of DSCA.

Space Posture Review

The intent of the congressionally mandated *Space Posture Review* is very similar to the intent of this thesis. “The Space Posture Review is also analyzing the relationship among military space policy; national security space policy; national security space objectives; arms control policy; export control policy; and industrial base policy” (Department of Defense 2010d).

Mandated under Public Law (P.L.) 110-417, § 913, the *Space Posture Review* must be complete by 1 December 2009 in an unclassified format with classified annexes. The online web site for the *Space Posture Review* (Department of Defense 2010d) describes the review, but provides no online document or link to a *Space Posture Review*. The context of all wording on this official government web site is active, as though everything is currently in-progress, and not yet complete. Wording from the 2010 *QDR* is the most helpful in understanding how DoD sees the relationship of the *Space Posture Review* and 2008 *Space Protection Strategy* to national security. While lengthy, the

excerpt is included in its entirety in order to demonstrate the interrelation between several components that have been the subject of this thesis before the 2010 *QDR* was published.

The Department, through the implementation of priorities from the Space Posture Review, will explore opportunities to leverage growing international and commercial expertise to enhance U.S. capabilities and reduce the vulnerability of space systems and their supporting ground infrastructure. The Department will broaden and deepen relationships with other nations and private firms to create mutually beneficial partnerships to share capabilities, systems, technology, and personnel, while ensuring that we also protect sensitive sources and methods. Working both bilaterally and multilaterally, the Department will promote spaceflight safety. Air Force investments in space situational awareness will support U.S. efforts by enhancing the ability to attribute actions in space and gain greater understanding of events in space. Ongoing implementation of the 2008 Space Protection Strategy will reduce vulnerabilities of space systems, and fielding capabilities for rapid augmentation and reconstitution of space capabilities will enhance the overall resiliency of space architectures. (Department of Defense 2010a, 33-34)

Gaps between policy and strategy within the U.S. Government serve to highlight the significance of unifying U.S. policy and strategy for DSCA and national security at large. Implications of these gaps are contained in Chapter 5.

Department of Homeland Security Reports

For FY2010, DHS released two reports, the 2010 *QHSR* report and the 2009 *Annual Performance Report: Fiscal Years 2008-2010*. Both of these reports evaluate performance and make recommendations. These reports represent the first, in a line of future reports designed to comply with Section 2401 of the *Implementing Recommendations of the 9/11 Commission Act of 2007*. It amends Title VII of the *Homeland Security Act of 2002*, to require the Secretary of Homeland Security to conduct a *QHSR* every four years, beginning in 2009.

Quadrennial Homeland Security Review

The 2010 *QHSR* establishes missions, goals, objectives, and strategic outcomes for the homeland security enterprise. It establishes five core missions: preventing terrorism and enhancing security; securing and managing our borders enforcing and administering our immigration laws; safeguarding and securing cyberspace; and ensuring resilience to disasters. It also establishes goals for each mission and objectives for each goal (see table 6).

Table 6. DHS Missions and Goals (2010 <i>QHSR</i>)		
DHS Missions and Goals		
Mission		Goals
Preventing Terrorism and Enhancing Security	Goal 1.1	Prevent Terrorist Attacks
	Goal 1.2	Prevent the Unauthorized Acquisition or Use of Chemical, Biological, Radiological, and Nuclear Materials and Capabilities
	Goal 1.3	Manage Risks to Critical Infrastructure, Key Leadership, and Events
Securing and Managing Our Borders	Goal 2.1	Effectively Control U.S. Air, Land, and Sea Borders
	Goal 2.2	Safeguard Lawful Trade and Travel
	Goal 2.3	Disrupt and Dismantle Transnational Criminal Organizations
Enforcing and Administering Our Immigration laws	Goal 3.1	Strengthen and Effectively Administer the Immigration System
	Goal 3.2	Prevent Unlawful Immigration
Safeguarding and Securing Cyberspace	Goal 4.1	Create a Safe, Secure, and Resilient Cyber Environment
	Goal 4.2	Promote Cybersecurity Knowledge and Innovation
Ensuring Resilience to Disasters	Goal 5.1	Mitigate Hazards
	Goal 5.2	Enhance Preparedness
	Goal 5.3	Ensure Effective Emergency Response
	Goal 5.4	Rapidly Recover

Source: Created by author from data contained in the Department of Homeland Security, *Quadrennial Homeland Security Review* (Washington, DC: Government Printing Press, 2010).

There are two critical areas addressed in the 2010 *QHSR*: enhancing community resilience, and greater federal support of state and local fusion centers (totaling approximately 72). Fusion centers are the lynchpin to information sharing. Unity of effort

and information sharing are in the DHS 2009 *Annual Performance Report (APR)* Goal 5, strengthen and unify DHS operations and management. Information sharing also relates to the sixth mission area of the 2010 *QHSR*.

The sixth DHS mission area is maturing and strengthening the homeland security enterprise. This area appears as a non-core DHS mission area. It has four major components: (1) establishing a framework for information sharing on risks and threats; (2) improving the capacity of communities to respond to disruptions; (3) building a unity of effort between DHS and its federal, state, and local partners; and (4) increasing the use of science and technology to prevent terrorism (Nelson 2010). President Barack Obama criticized unity of effort in his 5 January 2010 speech regarding the 2009 Christmas day bombing. He cited intelligence analysis and dissemination as the root cause (information sharing), not collection efforts. A significant finding of present and past incidents appears to be that a lack of unity caused critical information not to reach those who needed it.

Department of Homeland Security *Annual Performance Report*

The DHS *Annual Performance Report* (2009 *APR*). This report is a part of a performance and accountability report pilot program for the Office of Management and Budget (OMB), and the 1993 Government Performance and Results Act. The document's strategic goals and objectives are established in the 2008 DHS strategic plan entitled, *One Team, One Mission, Securing Our Homeland* (see table 7). The plan covers the period of 2008-2013.

Table 7. DHS Annual Performance Report Strategic Goals and Objectives

DHS Annual Performance Report		
Strategic Goal	Objective Number	Strategic Objective
Protect our Nation from Dangerous People	Objective 1.1	Achieve effective control of our borders
	Objective 1.2	Protect our interior and enforce immigration laws
	Objective 1.3	Strengthen screening of travelers and workers
	Objective 1.4	Improve security through enhanced immigration services
Protect our Nation from Dangerous Goods	Objective 2.1	Prevent and detect radiological/nuclear attacks
	Objective 2.2	Prevent, detect, and protect against biological attacks
	Objective 2.3	Prevent and detect chemical and explosive attacks
	Objective 2.4	Prevent the introduction of illicit contraband while facilitating trade
Protect Critical Infrastructure	Objective 3.1	Protect and strengthen the resilience of the nation's critical infrastructure and key resources
	Objective 3.2	Ensure continuity of government communications and operations
	Objective 3.3	Improve Cyber Security
	Objective 3.4	Protect Transportation sectors
Strengthen our Nation's Preparedness and Emergency Response Capabilities	Objective 4.1	Ensure Preparedness
	Objective 4.2	Strengthen Response and Recovery
Strengthen and Unify DHS Operations and Management	Objective 5.1	Improve department governance and performance
	Objective 5.2	Advance intelligence and information sharing
	Objective 5.3	Integrate DHS policy, planning, and operations coordination

Source: Created by author from data contained in the Department of Homeland Security, *Annual Performance Report 2008-2010* (Washington, DC: Government Printing Office, 2009).

The performance trend reported in DHS's 2009 *APR* is not impressive. As of FY2008, the 2009 *APR* reported that it DHS routinely met 65 percent or higher of its performance goals, since its 2002 inception (Department of Homeland Security 2009a, 10). What it does not highlight is that it never exceeded 70.2 percent. A performance of 65 percent is a failing grade in most circumstances, or at least probation. Since FY2003, DHS has underperformed itself. In a generally declining trend, DHS performance fell from 70.2 percent to 66.4 percent. The highest performance reported during this period

was 73.9 percent in FY2004. The report mitigates these results by identifying the targets were “ambitious performance targets” (Department of Homeland Security 2009a, 10). Of the targets missed, there were at least improvements over the previous year (for FY2008).

The 2009 *APR* summarizes its performance by goals, further divided into supporting objectives to each goal. Of the 17 objectives, only three: Objective 1.2: Protect our interior and enforce immigration laws; Objective 2.1: Prevent and detect radiological/nuclear attacks; and Objective 4.1: Ensure preparedness; were rated above 75 percent by DHS. As of 15 January 2009, DHS rated Goal 1: Protect our nation from dangerous people, as its highest performing goal (Department of Homeland Security 2009a, 11). Eleven months later, on Christmas day 2009, another dangerous person threatened the nation with an attempted airplane bombing near Detroit, Michigan.

The 2009 *APR* identifies corrective actions for underperforming objectives. Objective 3.3: improve cyber security, was reported at below 50 percent performance. Command, control, and interoperability of science and technology were cited for this objective’s poor performance. Corrective action listed was acquisition of memorandums of understanding. Overall, this document is not a good source to find a written recommendation for institutional improvements; it focuses on specific aspects of funded programs. Analysis of the document yields important insight into DHS performance.

DHS’s 2009 *APR*, Goal 5: Strengthen and unify DHS operations and management, was an identified weak area. Objective 1.1: Improve Department governance and performance is defined as “improving and integrating Department structure, processes, leadership, and culture” (Department of Homeland Security 2009a, 94). In the 2009 *APR*, DHS rated Goal 5 as performing at the low end of 50 to 74 percent.

That means that out of five goals, Goal 5: Strengthen and unify DHS operations and management; and Goal 2: Protect our nation from dangerous goods, are the lowest performing goals in DHS. This performance might be insignificant if it were not for a very important fact. Under Goal 5 is Objective 5.2: Advance intelligence and information sharing. The outcome desired from Objective 5.2 is, “Reducing the risk of emerging terrorist threats through intelligence and information sharing” (Department of Homeland Security 2009a, 99). Months after the DHS *APR*, on 25 December 2009, a terrorist threat emerged on an airplane bound for Michigan.

Comparison of the 2009 *APR* and 2010 *QHSR* yields some important issues within the DHS evaluation system. The DHS 2009 *APR* and 2010 *QHSR* are not mutually supporting. Analysis and comparison of the stated missions, goals, objectives, and strategic outcomes yields no nexus for meaningful comparison or continuity of performance measures (see tables 6 and 7). While there are some related functions between the goals and objectives of these documents, there is not a clear unity. One has to assume the FY2010-2011 *APR* will align itself with the 2010 *QHSR*, whose guidance post-dated the 2009 *APR*.

Space and the Department of Homeland Security

Studying DHS for an evaluation of its integration of space assets into homeland security, results in limited material beyond cyberspace. Under the 2007 *National Response Framework's* Emergency Response Functions, the Department of Transportation is responsible for aviation and airspace under Emergency Response Function 1 (Department of Homeland Security, 2010b, A-9).

The secretary of transportation collaborates with DHS on all matters relating to transportation security and transportation infrastructure protection and in regulating the transportation of hazardous materials by all modes (including pipelines). The Secretary of Transportation is responsible for operating the national airspace system. (Department of Homeland Security, 2010b, A-4)

Since there is no mention of aerospace or space security, DoD is relegated to the sole proprietor of space defense and security. Under Mission 2: Securing and managing our borders, the 2010 *QHSR* defines the importance of borders.

A simple word find of the entire document does not find “space” as a reference except in referring to office space or DoD responsibility for space defense, in its appendix A. It does not designate responsibility to any DHS owned organization for the security of aerospace or airspace approaches to the homeland. “A safe and secure homeland requires that we maintain effective control of our air, land, and sea borders... First, we must achieve effective control of the physical borders and approaches to the United States” (Department of Homeland Security, 2010b, 24).

While the 2010 *QHSR* notes there must be an evolution in thinking towards border security, it does not aspire to address how to secure air borders in depth, nor does it prescribe how to integrate air, land, and maritime security.

The inclusion of border security and management in its entirety represents an evolution of thinking in homeland security, beyond simply border security. This approach to border security and management also recognizes that while aviation security, maritime security, and land border security are all critical elements of homeland security, we must consider these elements together as an integrated set of concerns, so as not to allow stovepipes and divisions to develop between our security approaches within each of these domains of activity. (Department of Homeland Security, 2010b, 25)

Presumably, fusion centers will be the method of integration to prevent stove piped information flow and integration of interagency capability and knowledge. Fusion centers are already an indentified shortfall of DHS. Based on the President’s comments on 5

January, concerning collection, analysis, and dissemination of intelligence, there is still a long way to go in the area of integration.

The nation has many fusion centers, but there is still not a good system to fuse all of the fusion centers. As early as 1994, a PDD (*PDD-14*) established Joint Inter-Agency Task Forces (JIATFs) in order to facilitate DSCA for counter-drug operations. The problem of aligning agency goals and flattening the communication/dissemination environment has improved greatly. However, recent events like the 2009 Christmas day bombing highlight where there are still issues--significant enough to draw public reprimand from the President (Office of the President of the United States, 2010a).

Performance

The subordinate thesis questions, analyzed in each previous section of this analysis, led to performance analysis. Ratings were derived based on a purely subjective evaluation of performance (see figure 7). Additional weight applied to how current a strategy was, and how important a particular strategy was to achieving appropriate capability. The necessity of a particular strategy to determine resources for desired capabilities was also a factor.

The continued production of capabilities and subordinate strategies in the government, suggests that there is an issue. In absence of updated policy and strategy, capability is still produced and resourced. Without updated policy and strategy, there can be inefficient production of capability; and subsequently, requested resources.

Differences between HASC & SASC recommendations and Presidential recommendations highlight how this disparity manifests itself. The overall rating is that policy performance is moderately adequate. Analysis of components, demonstrates that

the basic framework and concepts are adequate. What is lacking overall is a unified vision and direction that guides all parties in a common prioritized direction.

Policy Performance Evaluation			
Subordinate Thesis Question	Supporting Question	Individual Rating	Total Performance Rating
What conditions exist that influence U.S. Policy?	Are threats disseminated?	A	A
	Are laws and treaty followed?	G	
What is the U.S. National Space Policy?	Is U.S. Policy current?	R	A
	Does National Policy address existing conditions adequately?	A	
What is National Strategy?	Is U.S. Strategy current?	R	R
	How well is National Strategy aligned with National Policy?	A	
	Is National Strategy developing appropriate capability?	R	
What is the National budget for the major departments involved in DSCA?	How well are U.S. financial resources aligned with National Policy?	A	A
	Does spending reflect policy priority?	A	
How well does performance reflect policy goals?		Total	A

KEY		
Adequate	Green	G
Moderately Adequate	Amber	A
Inadequate	Red	R

Figure 7. Policy Performance Results

Source: Created by author.

Figure 7 serves to illustrate how the author subjectively rates applicable department performance, based on the subordinate thesis questions. Reasoning for individual and overall ratings, and how weight was placed on individual ratings will be explained. Each was rated, subjectively, on an adequacy scale from adequate, to moderately adequate, to inadequate. To avoid confusion with similar first letter abbreviations, a color system of Green, Amber, and Red was used. Corresponding, respectively, to: Adequate, Moderately Adequate, and Inadequate. An example is that “Red” represents “Inadequate.” How well document and/or historical analysis supported

performance, determined a rating of “Adequate.” Moderate adequacy was determined by combined ratings that determined performance as less than adequate, but greater than inadequate. A combined rating that determined performance as less than adequate, or moderately adequate, resulted in a rating of “Inadequate.”

An example is threat dissemination. It rated as “Moderately Adequate” because significantly more attacks on the U.S. are defeated than are successful, as a direct correlation to the volume of intelligence and information disseminated on threats that successfully defeated attacks. These circumstances would earn a rating of overall adequacy. However, the weight placed on dissemination by the President and the DHS 2009 *APR* modifies the rating. This is due to identified shortfalls in information sharing; causing dissemination to receive a combined rating of “Moderately Adequate.” This is because dissemination is not meeting desired goals, results, or objectives.

When combining the results of subordinate ratings, deference was given by rounding up to the positive; leaning towards the higher rating of adequacy. For example, if two ratings of “Inadequate” and “Moderately Adequate” were combined, the overall rating would be “Moderately Adequate” (or “A” for “Amber”). An exception to this formula is when two ratings are not of equal weight. An example of this is the dissemination of threats (rated as “Moderately Adequate”) over the following of law and treaty (rated as Adequate). They equaled a combined rating of “Moderately Adequate.” Threat dissemination is directly related to information and intelligence sharing. The President’s 5 January 2010 remarks on the importance of intelligence dissemination and analysis were used as additional weight on the importance of this Presidential homeland

security guiding principle. Therefore, when these two ratings are combined, their rating was rounded down, due to the weight placed on information sharing.

Conclusion

Policy forms under existing conditions that include threats, law, and treaty. Conflict from threats is persistent, often unpredictable, and focused on its opponent's weaknesses. Policy guides decisions and establishes procedure that flow to strategy. Strategy formulates a way to achieve objectives and establishes appropriate capability to meet those objectives. Strategy establishes force structure. Capability derived from strategy necessitates resources to create the capabilities. Resources apply to achieve prioritized capabilities. Resources apply against priority set at the highest level. A disconnect between national priority, could mean resources are not be applied appropriately; because, requests stemming from an unsynchronized strategy will appear incongruent.

Space policy states that space is a top priority; however, resource allocation does not reflect this guidance. UAS were identified as a DSCA activity, but UAS are restricted to rural airspace and very few exceptions have been issued for operation within the U.S. DHS has good system for performance evaluation; however, its strategic goals, missions, and objectives are not uniform or mutually supporting between the 2009 *APR* and the 2010 *QHRSR*. DHS relies on DoD for all space, missile defense, and security; and their integration. Overall policy is moderately adequate, but it is integration and unity of effort that are inadequate. Recent terrorist incidents repeatedly support the conclusion that information is not shared, analyzed, nor disseminated adequately.

Despite the appointment of a DNI, Intelligence is not fused to the point that it is accessible to those who need to consume it. The President had to reprimand the security community for poor analysis and dissemination, in public. This illustrates a primarily human weakness and not an entirely policy driven weakness. The new *NSS* and other national documents mentioned in this thesis will be published, but the significance of this thesis is in demanding public accountability of those future documents related to this subject. The importance is in evaluating whether the new and future documents apply recommendations from this thesis; and whether or not they address historical gaps of the previous documents. Time will decide how well the security and defense community responds to the President's 5 January 2010 reprimand.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This thesis covered a broad and complex topic. Analysis discovered several findings and recommendations not all directly related to the thesis because of the path necessary to study the topic. Findings and recommendations related to threats, law, treaty, and resources are located in the respective appendices for these subject areas, and can be referenced by those interested in these areas (see appendices B and C). Policy, strategy, and their evaluation remain in this chapter, due to their interrelation to recommendations on the 2006 *U.S. National Space Policy*.

Policy

The 2006 *U.S. National Space Policy* is the most current published policy on U.S. space activity. Coupled with the 2010 *QDR* and 2008 *NDS*, the 2006 policy drives the use of space applications in DSCA. Since 2006, the policy has been important in maintaining the U.S. position on freedom of action in space. It has allowed diplomats to address new test ban treaties while simultaneously guiding how the U.S. reacts to malfunctioning satellites. The 2006 policy is still valid today. Issues concerning implementation of the policy mainly stem from human factors and prioritization.

Relevance

The 2006 *U.S. National Space Policy* establishes space as a number one priority that is as important as land, sea, or air (Office of the President of the United States 2006, 1). Resourcing has not, and does not reflect this priority. This leaves two main options for the current administration. One option is to adjust the policy to specify the actual priority

space should represent. For example, if it is not number one in priority, then policy should state what priority it is. Then, the policy should compare it to other priorities such as transportation infrastructure, healthcare, surface border security, or surface maritime security.

The second option is to enforce the current policy, if space really is the number one priority. The President the one who sends the DoD budget request to Congress. This is his opportunity to vote on priority with his budget. Based on DoD budget requests from FY2006 to FY2010, both administrations did not request to fund space as their number one priority. DoD's *Department of Defense FY2010 Budget Request Summary Justification* dedicated \$210.1 billion to "major weapons systems" (Department of Defense 2009c, 3-1). Of this amount, \$11.1 billion was requested for "space based and related systems" (see figure 8).

The requested \$11.1 billion for space, represents only two percent of the total \$664 billion (includes Base Authorization, OCO, and Supplemental). Two percent is not representative of a top priority. Shipbuilding represented \$22.4 billion, and aircraft represented \$53.6 billion of the \$210.1 billion requested for "major weapons systems." These requested amounts do not reflect space as being as important as sea or air to national security. This disparity contradicts official policy.

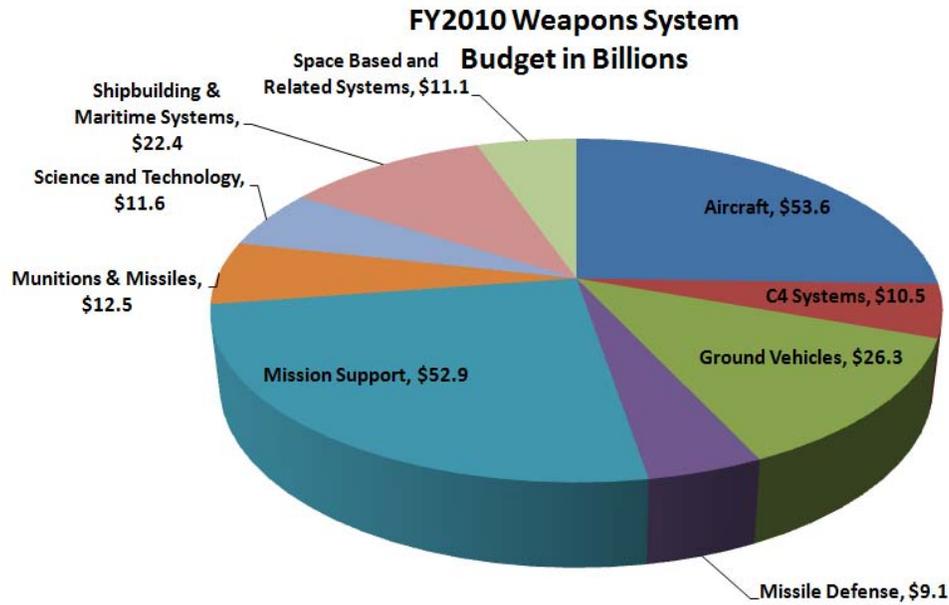


Figure 8. DoD Weapons System Budget FY2010

Source: Created by author from data contained in the *Department of Defense FY2010 Budget Request Summary Justification* (Washington, DC: Government Printing Press, 2009).

Congress mandates both an unclassified *Space Protection Strategy* and *Space Posture Review*. Neither of these public documents is readily available more than six months after their mandated completion dates. The absence of these completed documents hinders comprehensive integration of space applications to DSCA within the spirit of current space policy and public law. DHS acknowledges that their Goal 5: Strengthen and unify DHS operations and management, is performing at a near 50 percent performance rating (Department of Homeland Security 2009a, 11). Under DHS 2009 *APR*, Goal 5, Objective 5.2: Advance intelligence and information sharing, DHS also rates its performance between 50 to 75 percent. DHS also acknowledges that under Goal 5, Objective 5.3: Integrate DHS policy, planning, and operations coordination;

performs below 50 percent (Department of Homeland Security 2009a, 99-100). That means DHS policy, planning, and operations are some of the poorest performing objectives in their 2009 report (Department of Homeland Security 2009a, 101-102). This self-evaluation might explain some of the issues facing DHS in overall performance and integration into an already difficult information-sharing environment.

If an ability to integrate policy, planning, and operations exists in DHS and a strategy beyond that of the 2008 *NDS* and 2010 *QDR* is not complete, then there exists an important gap between national space policy and DSCA. This gap is evident in the performance evaluation of the supported DSCA department, DHS. It is important that national policy address issues with policy implementation in order to refine guidance. Spending, procurement, and launches continue for space and other capabilities in the absence of an updated policy and strategy. An inefficient situation exists when there is not a unified strategy. The strategies cannot be aligned or even properly without a published strategy by all elements.

In his lecture, "Professional Military Elite," Edward Bowie warns of the historical danger that the professional military elite pose to civil authority. If the DoD is one of the only departments concerned with strategy, as evidenced by the importance Secretary Robert Gates placed on quickly releasing his 2008 *NDS*, it may be possible that civil authorities are being outpaced by defense strategy. If there is not an *NSS* soon, the idea that defense strategy is outpacing civil strategy may be all the more credible. There are also examples contrary to this idea as evidenced by the lack of a public *Space Protection Strategy* from DoD. It is relevant to note that there appears to be less focus on strategy in a period after 11 September 2001, due to a reactionary and tactical posture towards

terrorism. Envisioning where the nation must be through policy and strategy is vital in shaping the future rather than reacting to the past.

There are significant international issues like the CTBT proposal that seeks to limit U.S. and other nations from freedom of action in space. Amendment of the 2006 *U.S. National Space Policy* on the subject of freedom of action, is significant and relevant. Since DoD controls the vast majority of all U.S. space systems relevant to homeland defense and security, policy on freedom of action is very relevant to DSCA. The language in the 2006 *U.S. National Space Policy* guides the U.S. to avoid signing the CTBT as it is currently constructed. Based on analysis of existing threats, the 2006 *U.S. National Space Policy* is very appropriate in declaring U.S. protection of freedom of action in space.

While treaties can be suspended in time of war, capabilities cannot be produced as quickly as the treaties can be suspended. This means that it takes longer to develop and procure capabilities than it does to suspend a treaty. Failing to develop capabilities needed for war, and signing treaties that prevent their creation leaves the nation in a vulnerable spot. If the U.S. were to forego the capability of freedom of action in space, it would be vulnerable to anticipated threats. Relying on freedom of action, gambles on a paradigm of the quick and the dead; betting that the U.S. can remain quick and technologically superior. Acceptance of a CTBT or other limitations on freedom of action, gambles on a paradigm of diminishing conflict. Signing a CTBT allows a margin for unscrupulous entities to develop offensive space capabilities. It leaves nations disadvantaged to neutralize global or domestic threats.

Thesis Question

Defense space support to civil authority: How can policy be improved? The thesis question concerns the importance of policy in defense space support to civil authority since 2006. This thesis question centered on nationally established threats, domestic and international laws, international treaties, national policy, national strategy and capabilities, executive requests and congressionally approved resources that affect the development and sustainment of space systems for defense and civil support. These influences are byproducts of the overall national policy and the *NSS*; and directly affect the size and make-up of U.S. space activity.

The thesis has subordinate questions that are, what conditions exist that influence U.S. Policy, and are they disseminated? What is the *U.S. National Space Policy*, and how current is it? Does national policy address existing conditions adequately? What is national strategy, and how current is it? How well is national strategy aligned with national policy? Is national strategy developing appropriate capability? What is the national budget for the major departments involved in DSCA? How well are U.S. financial resources aligned with national policy? Does spending reflect policy priority? What is the overall evaluation of performance? How well does performance reflect policy goals? How well does the President, DoD, and DHS rate security performance? Study of these questions occurred in the analysis phase of the thesis and unanswered questions are discussed in areas for further study.

Findings

Based on documents reviewed since 2006, the *U.S. National Space Policy* is appropriate in its principles, goals, and general guidelines. However, in the area of

National Security Space Guidelines, it neglects DHS. The common thread to preserve U.S. freedom of action, with respect to space systems, is the best-unified message of the 2006 *U.S. National Space Policy*. This unified message is resonated by DoD freedom of action guidance, in its strategy. It is also in foreign policy on the signing of treaties that would deny U.S. freedom of action in space.

Implementation, re-evaluation, and revision of policy are areas for improvement. The 2006 *U.S. National Space Policy* does not specify any responsibilities for DHS, while specifying several responsibilities for the other civil government departments. It is not surprising that DHS is not resourced or organized well to integrate space intelligence or capability. DHS's failure to achieve its goal number five in the 2009 *APR* is not surprising because DHS is not directed to integrate it, by any national policy. The President has identified that the 2009 Christmas day bombing represents an example of where the Intelligence Community was not fused or unified. He acknowledged that the U.S. has the skills and capabilities to collect, but lacks analysis and dissemination of the collected data. Human factors in execution of policy; those related to cooperating and sharing information, seem to be root causes--not poor policy.

Outlined below are other findings associated with policy on defense space support to civil authority. These findings take into consideration the subordinate thesis questions regarding threats, law, treaty, policy, strategy, capability, resources, and evaluation. These findings are not all encompassing and in some cases, the finding recommends further study into an area that requires more analysis.

Policy

1. It is a finding of this thesis that the current administration lacks a written, policy that unifies a national vision. The lack thereof is not unique. Analysis in the evaluation section of this thesis studied shortfalls identified by the President and subordinate departments between the DoD and the DHS. Most interesting on the topic of DSCA, and information sharing, is the identification of shortfalls in interagency cooperation for information sharing. These are identified in different forms by the President, DoD, and DHS. The analysis makes one wonder if these shortfalls are because of policy, its execution, or some other issue of competing priorities.

Another issue one might identify in any organization is leadership. An organizations leadership is ultimately responsible for ensuring that results are achieved. Leaders address variables of policy and priority to reach an end state or mission completion. If policy is unclear, proactive leaders seek further guidance. In absence of available guidance, leaders establish a strategy to accomplish their mission by ordering the priorities of work and effort. The President made his guidance clear on information sharing. In his *National Guiding Principles* on Homeland Security, the third principle is improving intelligence capacity and information sharing (below terrorism and biological/nuclear security). There is not a question of the President's leadership ability, as evidenced in the analysis of this thesis. DoD has a demonstrated record of executing space policy and sharing information. The leadership situation with DHS is a different case, based on performance reporting.

2. DHS appears to be, the organization in DSCA that has not yet reached its full potential. This finding relates to its management and leadership, as reported by its self-

evaluation of DHS ability to strengthen and unify DHS operations and management in Goal 5 of the 2009 *APR*. As a natural progression to the Department of Justice's 2003 *National Criminal Intelligence Sharing Plan* and the combined Department of Justice and DHS 2005 *Fusion Center Guidelines*, the two departments established policy on information sharing and a mechanism to fuse information. To date, not all states or the federal government have a fully functioning fusion center.

At the federal level, the most significant issue regarding information fusion and sharing is under the DNI and its National Counterterrorism Center (NCTC). There are numerous examples of success and failure in national fusion. This thesis does not provide an exhaustive list of findings on successes and failures within the DNI. Biometric standardization, the Christmas day bombing, and other incidents where information existed but could or would not be shared--does exist. On the average, the U.S. defeats more attacks than it misses. Empirical evidence exists to support that the U.S. information sharing system is not broken, but it does require improvement.

3. It is a finding of this thesis that the 2006 *U.S. National Space Policy* does establish roles for defense space support to civil authority. While the 2006 *U.S. National Space Policy* does not use DSCA in its language, it does direct DoD to be the equivalent of an executive agent for space situational awareness.

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.” (Office of the President of the United States 2006, 4)

The policy goes on to identify the DNI as the one to establish objectives, intelligence requirements, priorities and guidance for the Intelligence Community (IC) to ensure timely and effective collection, processing, analysis, and dissemination of national intelligence (Office of the President of the United States 2006, 4).

4. The 2006 *U.S. National Space Policy* has the correct guidance on U.S. freedom of action for space systems. Understanding that a space system extends to components on the ground, it is easier to understand how space systems are tied to terrestrial areas within the United States that overlap with areas that DHS secures and relies upon for DSCA. Creating a dichotomy between homeland defense and homeland security for aerospace is considered a fallacy in this thesis.

5. Procurement in the 2006 *U.S. National Space Policy* is appropriately addressed, but requires better prioritization. While the policy names space as important as sea and air power, it does not specifically prescribe as much guidance as it does for other areas within the policy. In budget authority and execution, space was not funded as though it were as important as air and sea power by DoD or two Presidents.

Strategy and Capability

6. The U.S. survived 60 years (from 1941 to 2001) without a major successful attack on U.S. soil. The evidence would suggest that we have the right capabilities. U.S. space capability civil, commercial, and military is relatively unparalleled. U.S. use of the information garnered from those capabilities is a function of strategy and leadership at all levels.

At the same time, the only reason the U.S. possesses successful capabilities is because of the policy and strategy that created them. Without informed strategy, there is

no updated descriptive document ensuring the continued production of capabilities to meet future needs. It is critical to evaluate policy, strategy, and resulting capability. The development of certain capabilities can also change conditions affecting policy. An example of this can be found in final operational status of the hydrogen bomb. U.S. Strategy, where available, is focused on the right things and the U.S. is building appropriate capability. Efficiency of this process is questionable since policy and strategy are not nested among all departments and organizations.

7. An interesting finding on strategy is that it is developing results abroad, but the language and results of U.S. strategy on space neglects some aspects of domestic protection and security. The specific area where this is evident is in the absence of the Secretary of Homeland Security in the *National Security Space Guidelines* of the 2006 *U.S. National Space Policy* and in other strategy documents. Strategy becomes very descriptive when describing specific systems and capabilities for homeland defense and defense abroad, but when it describes homeland security and other domestic topics, the language becomes too broad.

The 2007 *National Strategy for Homeland Security* is outdated. Revision of the *U.S. National Space Policy* to include DHS would require updating DHS's strategy. The President is the signatory on the current 2007 *National Strategy for Homeland Security*; therefore, it would require the President to revise his *National Strategy for Homeland Security*.

Evaluation

8. Policy is identifying the right things to do overall, and DoD is developing strategy; however, strategy is not being actively published by the military, since 2004.

DHS has strategy, but it is not executing well, according to its own evaluation. DHS Strategy is not mutually supporting and is inconsistent between the 2009 *APR* and 2010 *QHSR*. Because the 2006 *U.S. National Space Policy* does not direct DHS to worry about space, it does not worry about it. Therefore, DHS has no space strategy for its department because none is required.

9. DHS Strategy does not incorporate or integrate space directly. The 2007 *National Strategy for Homeland Security* mentions air, land, maritime, space, and cyberspace once in the entire document, but does not describe any particular strategy to achieve homeland security for space (Department of Homeland Security 2007c, 5). Based on FAA restrictions on UAS and interagency fusion, all the right things are not being done. There is not a strategy on how to integrate DoD's UAS assets into DSCA beyond counter-drug operations. The 2007 *National Strategy for Homeland Security* does not mention UAV or UAS anywhere in the document. Resources are not applied to stated 2006 *U.S. National Space Policy* priorities.

10. The 2006 *U.S. National Space Policy* resulted in guidance that continues to drive foreign policy, such as CTBT denial. If the current administration desires to sign a CTBT, it will need to amend the 2006 *U.S. National Space Policy* to exclude its rejection to signing any agreement that limits U.S. freedom of action in space. Findings related to policy practice from the current Administration, indicate the Administration has a different vision than the Administration responsible for the 2006 *U.S. National Space Policy*. If this is the case, policy should be revised to reflect this new direction.

11. Standardization of evaluations and evaluation criteria are not unified within the U.S. Government. There appears to be no real standardization of evaluation except

the Congressional Act on budget performance evaluations. Quadrennial Reviews are not uniformly required across the government, and the reviews that are required; lack any similar format between each other. Within DHS, the goals and objectives of the 2009 *APR* and 2010 *QHSR* have limited nexus. They are not mutually supporting or nested. The 2006 *U.S. National Space Policy* lacks a section that directs its own policy review, revision, or other evaluation. It does not set parameters on when it should be updated.

Recommendations

Recommendations of this thesis are in this section. They are organized by the area in which they were analyzed for Chapter 4. Recommendations on threats, law, treaty, and resources are located in their respective appendices (see appendices D and C).

Policy

The details about how to meet policy guidance come from developing a strategy. Strategy is more descriptive than policy. Without policy revision to match current conditions, policy becomes outdated. Without revised policy, strategy will be not stay currently informed.

1. The 2006 *U.S. National Space Policy* should be revised to incorporate the Secretary of DHS. The DHS Secretary should be named in the *U.S. National Space Policy* just as the Secretaries of Transportation and Commerce already are. Additional authority must be established for the DNI to meet the expectations of the 2006 *U.S. National Space Policy*.

2. The 2006 *U.S. National Space Policy* must adjust its priority with respect to the statement concerning space being as important as airpower and sea power. Budget

requests do not reflect this prioritization. Therefore, priority has to change in the policy or the requests must meet the policy.

3. The 2006 *U.S. National Space Policy* should be revised to incorporate a stated frequency for review, evaluation, and update. Based on current practices of the Administration, it should release a new *U.S. National Space Policy* to better guide the nation and the mandated *Space Posture Review*--in alignment with the Administration's objectives.

4. DSCA policy is not clear on how space should be used in DSCA. Legal restrictions concerning Intelligence Oversight complicate the use of any system primarily funded for Intelligence to be used for other than intelligence purposes. New DoD Doctrine addresses this issue, but legal authorities do not yet match Doctrine on how authority to employ intelligence systems for DSCA. Policy needs to address this issue on how to establish what "other than intelligence" functions should mean. An example is the language of the DODI O-5240.2, *Security Classification of Airborne Sensor Imagery*. Due to this DoD Issuance, it is difficult for intelligence platforms to share situational awareness in events like pinpointing wildfires using intelligence funded full motion video sensors and feeds.

If national fears stemming from events in the 1950s and 1960s that created Intelligence Oversight have diminished, it may be useful to establish policy to reform these laws in order to streamline intelligence system support to DSCA for other than intelligence purposes, like eyes and ears for local authorities in Incident Awareness and Assessment.

The 32 CFR 185 should be revised and the 1993 DoD Directive 3025.1 *Military Support to Civil Authorities*. The 1997 DoDD 3025.15, *Military Assistance to Civil Authorities*, should be updated or revised; as applicable, to incorporate DSCA language. The first evaluation criteria of this Directive is that military support will be evaluated by DoD for approval against certain criteria, the first being policy, paragraph 4.2.1, “Legality (Compliance with law)” (DODD 3025.15 1997, 3).

It is realistic to assume that in the absence of policy, current practice becomes a substitute when policy does not address the issue. It is also realistic to assume that in the face of great political risk, many government officials would prefer not to act, instead of act in the absence of clear policy. In light of these assumptions, it is recommended that the *U.S. National Space Policy* be revised to account for the policy issues identified above.

Strategy and Capability

5. A new *NSS* must be published. Following the issuance of a new *NSS*, a space strategy should be established. Once national strategy is established, then the *NDS* and *NMS* can be revised. Additionally the *National Strategy for Homeland Security* should be revised to reflect a new *NSS* and *U.S. National Space Policy*. The release of a new *NSS* would guide the DoD in its *Space Protection Strategy* and *Space Posture Review*, as well. The *NSS* needs to address integration of interagency intelligence and information sharing. Critical to the *NSS* would be a strategy for enforcement. The National Counterterrorism Center process is not optimal, and the *NSS* should address this.

Current strategy at all levels has developed good capability. The issue is that in some areas, there is too much redundant capability and in other areas such as WGS and AEHF, there is not yet enough government-controlled redundancy. Commercial systems need to be more jam resistant and shielded when the U.S. relies on these commercial services. The *Space Protection Strategy* (in a publicly releasable format) could address this for civil and commercial systems.

Evaluation

6. Policy recommendations were already made under law and policy. It is important to highlight the lack of uniform policy review, evaluation, or revision with current policy or practice. Revision of the 2006 *U.S. National Space Policy* needs to address how the policy will be revised; and at what frequency, or under what conditions it will be revised. The policy should include how it will evaluate itself. It should establish some guidance on how subordinate government should evaluate its own compliance.

7. There are some existing impediments to policy incorporating the findings or recommendations of professional research. In his article “Impact of Research on Policy and Practice,” for the London based Overseas Development Center, Dr. John Young makes some insightful points (Young 2010). He believes what works is when research on policy does the following:

1. Focus on current policy problems and have clear objectives.
2. Engage closely with policymakers throughout the process, from identifying the problem, undertaking the research itself and drawing out recommendations for policy and practice from the results.

3. Understand the political factors that may enhance or impede uptake and develop appropriate strategies to address them.

4. Invest heavily in communication and engagement activities as well as the research itself and build strong relationships with key stakeholders.

Dr. Young also cites a United Kingdom member of parliament, Vincent Cable. He states that research recommendations made from an evaluation may not be able to affect policy makers, because they are not scientists and are not inclined to rely on scientific motivations. He argues that policy makers do not respond to research-based evidence.

In a talk on evidence-based policymaking at the Overseas Development Institute (ODI) in 2003, Vincent Cable, a senior member of the United Kingdom (UK) parliament, said, “Politicians are practically incapable of using research-based evidence because, among other things, few are scientists, and they don’t understand the concept of testing a hypothesis.” (Young, 2010)

Policy on evaluation should be developed. Additionally, standardization should be addressed particularly in the area of evaluations and goals. There appears to be no real standardization of evaluation except the Congressional Act on budget performance evaluation.

8. Not all government departments are required to conduct a Quadrennial Review or other comprehensive evaluation. Many of the departments who do not have periodic reviews like the *QDR* are mentioned in the space policy. Examples are the Department of transportation, Department of Commerce, and Department of Energy. There must be one person on everyone’s report card. Why should anyone share with each other when there are so many competing priorities? Military, Department of State, Central Intelligence Agency, and other civil employees are not evaluated by the same criteria or priorities;

therefore, interagency cooperation is made more difficult when each individual's performance is evaluated by different criteria.

With respect to unity of effort and priority--a common goal or vision--is not lacking in space policy, but it is lacking when there is no *NSS* or space strategy. The lack of a new *NSS* or an overarching space strategy hinders the development of appropriate, subordinate strategy, at the national and below level.

Areas for Further Study

There are six main areas for further study. These areas are *Space Posture Review*, *Space Protection Strategy*, 32 CFR 185 revisions, DSCA and Immediate Response Authority; UAS and FAA restrictions impact on the Missile Defense Agency (MDA), FAA restrictions impact on DSCA, developing strategy in the absence of higher strategy, and Intelligence Oversight.

1. The *Space Posture Review* needs to be published in redacted form and studied for significant impacts on civil and commercial equities. For the military, it also represents one of the documents feeding all of the DoD's Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities (DOTMLPF) domains. It drives DoD force structure; the *QDR* and a *Space Posture Review* are important documents for building force structure when DoD represents a vital part of the nation's hardened space system architecture.

2. For similar reasons to the *Space Posture Review*, the *Space Protection Strategy* needs to be published in redacted form. It should be made available for strategic study and civil/commercial application study.

3. The 32 CFR §185.4, codifies DoD to provide military assistance to civil authorities. The 1997 DoDD 3025.15 authorizes MSCA. DoD has already done its revision recommendation for 32 CFR 185. Research on other revisions to this U.S. Code would be beneficial in shaping how civil authorities are supported. P.L. 103-337, The National Defense Authorization Act is another law directly related to DSCA/MSCA activities. This Act is oriented towards DoD roles in foreign disaster response and domestic response (related to Stafford Act).

Additionally, a clear definition of DSCA's Immediate Response Authority is needed. This authority is given by DoD to its Title 10 members and Title 32 members. The Stafford Act, under Title 42 U.S.C. and P.L. 93-288, The Robert T. Stafford Disaster Relief and Emergency Assistance Act, establishes authority for DoD to delegate authority to local commanders to exercise Immediate Response Authority; in order to "save lives, to safeguard public health or safety, or to prevent or mitigate great property or environmental damage" (DODD 3025.15, 1997).

An important issue with this authority is that the Stafford Act relates directly to a request from civil authorities for federal assistance. This is the specific area needing further study. Public law authority for where a DoD, Title 10 member can conduct immediate response to a direct request from local authorities is not clear. Language of the 1994 Stafford Act, is very similar to that of the 1997 DODD 3025.15; specifically, with respect to: "save lives, to safeguard public health or safety, or to prevent or mitigate great property or environmental damage." However, P.L. 93-288 (Stafford Act), subchapter IV, *Major Disaster Assistance Programs*, expressly states that the DoD only derives authority directed by the President for disaster assistance.

The Governor of the State in which such incident occurred may request the President to direct the Secretary of Defense to utilize the resources of the Department of Defense for the purpose of performing on public and private lands any emergency work which is made necessary by such incident and which is essential for the preservation of life and property. (Public Law 93-288, 1994)

4. The MDA is considering UAS for airborne missile defense. Further research on how this changes UAS operation in U.S. aerospace/airspace, due to FAA restrictions, would be beneficial to this area of study. This area of study should also address how FAA restrictions affect UAS operations within U.S. aerospace/airspace.

5. Deciding how to establish informed strategy at the service staff levels is a challenge when there is no updated *NMS*. Studying how informed and unified strategy can be formulated; especially in a policy or strategy vacuum, is a useful study area. In a conversation with a senior military staff officer, the officer identified that relationships with the Secretary of Defense made it easy to design strategy on force structure, without an updated *NMS*. The personality of the Secretary of Defense made it possible for this senior military staff officer to get the necessary guidance. Other civilian or military staff officers, not possessing a personal relationship (often known as “access” in Washington, DC) may not be afforded this insight into how to formulate their strategy. This was certainly the case for some Army staff under DoD Secretary Donald Rumsfeld.

6. Intelligence Oversight is a limitation to the full use of intelligence capabilities for DSCA. This affects all military services, and space. Executive Order 12333 is being revised, but the proposed revisions will not change the main issue that intelligence capabilities are to be used only for foreign intelligence and counterintelligence. The Executive Order needs language that allows intelligence systems and capability to be used for peaceful purposes in support of civil authority direction, during DSCA. This

would resolve a restriction to intelligence systems (UAS, ISR platforms, etc.) in exercising Immediate Response Authority under 32 CFR 185 and DODD 3025.15.

Legal authorities of the United States Army Corps of Engineers to respond, without DoD permission, are established in public law (PL 84-99); however, intelligence has no such provision to allow it to aid civil authority, when requested below the level of a Governor through the President. Additionally JP 3-28, *Civil Support*, states that only the Secretary of Defense can authorize intelligence capabilities to be used for “non-intelligence activities.”

When a DoD intelligence component asset or capability is needed for a non-intelligence activity, specific authorization from SecDef is required for both the mission and use of the DoD intelligence component capability or asset. The intelligence oversight rules do not apply to non-intelligence activities so the SecDef authorization must be sure to include any restrictions placed upon the assets or capabilities used in the domestic or domestic support operation. (Department of Defense 2007b, IV-13)

Information or imagery collected by intelligence or other DoD members is regulated by DoDD 5210.52, *Security Classification of Airborne Sensor Imagery and Imaging Systems*; Defense Intelligence Agency (DIA) Regulation 50-30, *Security Classification of Airborne Sensor Imagery*; and DoDD 5200.27, *Acquisition of Information Concerning Persons and Organizations not Affiliated with the Department of Defense*.

The joint publication on *Civil Support* (JP 3-38), further defines the complex relationship between intelligence and non-intelligence related activities, especially with regard to airborne and imagery sensors. Legal authority, or change to existing policy and regulation, must take place before DoD capabilities can be harnessed to their full potential for DSCA.

Summary

Research on how to improve policy on defense space support to civil authority requires the inclusion of multiple factors interacting with policy. It requires an understanding of existing conditions affecting policy formulation and the vision of an end state or goal for policy to inform strategy to achieve. This thesis studied six main areas spanning threats, law and treaty, policy, strategy and capability, resources, and performance evaluation. Study of these areas yielded findings, recommendations, and areas for further study. Many of the findings and recommendations were not exclusive to space policy. Given the interrelation between external factors to space specific policy, these findings and recommendations were included.

Threats to the nation include many forms that cover a spectrum involving many aspects from military to commerce. Space is one aspect of the nation's security and defense. Space policy affects all those whom it defends and secures across the same spectrum. The nation is anticipating the correct threats in policy and practice. The 2006 *U.S. National Space Policy* provides guidance for the appropriate threats and is complimented by the 2010 *QDR's* threat assessment, and the DNI's 2010 *Annual Threat Assessment of the US Intelligence Community*.

Law and treaty represent important factors in policy formulation. Policy may identify what portions of law or treaty it wishes to change, in order to affect the conditions for future policy. The 2006 *U.S. National Space Policy* accounts for existing law and major treaty affecting land, sea, and space. The 2006 *U.S. National Space Policy* has driven U.S. decisions on whether or not to sign treaties that may be contrary to its

position on freedom of action. As law changes and treaties are signed, policy must be revised to incorporate those changed conditions.

Policy represents a formal and “high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body” (Merriam-Webster 2010). Based on this definition, the 2006 *U.S. National Space Policy* represents the overall plan, goals, and acceptable procedures for U.S. space systems. All U.S. strategy should be informed by the plan set forth by this policy. The current *U.S. National Space Policy* was created by the previous administration and is still informing new strategy like the *Space Protection Strategy*.

The current Administration should revise the *U.S. National Space Policy* to reflect changes in current and anticipated future conditions. As the “overall plan,” it should serve to synchronize and prioritize a unified national effort; resulting in strategy, capability, resources, and a method to evaluate overall performance in accordance with the policy. Policy requires an enforcement mechanism for compliance. In the U.S. government, this requires an authority from congressional public law that allows influence over budgets. Congress wields budgetary power over the executive branch and this creates difficulty in garnering enough executive budgetary power to enforce executive policy. The solution to this issue is complicated and difficult without violating a necessary, and constitutional, balance of power.

Strategy is informed by policy. Strategy establishes what capabilities are need to meet policy goals. In turn, identified capabilities establish needed resources. Resources are allocated in accordance with priorities established by policy, and an evaluation of budget execution and performance. Currently, the *NSS* is dated. National space strategy

does not exist, but there is a *Space Protection Strategy* available to a limited audience. The 2008 *NDS* is the most recently updated and proactive strategy available to the public. The *NMS* has not been updated since 2004. The DHS has not published a new strategy since 2007. Analysis of these factors, demonstrates a breakdown in the alignment of U.S. policy and strategy. Due this misalignment, there is not a clear and unified strategy to reach policy goals.

Resources are primarily budgetary in this study. Congress controls the budget. Policy guides priorities, but so do the interests of constituents. If policy goals are not public, then they are not available to constituents who might find those policy goals within their self-interest. Strategy identifies the desired capabilities and provides a justification for resources are needed to build specific capability. A major recommendation of this thesis is for the *U.S. National Space Policy* to identify, clearly, the priority that space based and related systems represent. Current space policy priority for space does not match Presidential requests or congressionally approved budget authorities and appropriations.

Evaluation is a critical component of any process. There is no way to improve, refine, or make a process more efficient than to evaluate it. Any plan that sets priorities of work must have a way to reassess itself. The 2006 *U.S. National Space Policy* does not establish a method or frequency to reassess itself. The DoD and DHS have congressionally mandated ways of evaluating performance and reviewing their strategy. Policy needs the same thing. The President has made several verbal statements on policy. If the government took all its cues from verbal comments, there would be a swaying tide of just what people's interpretation of his policy goals were.

The current Administration must publish a new *U.S. National Space Policy* in order to inform the *NSS*, *NDS*, *NMS*, and space strategies. The overall plan for the nation should be published by the highest level of government, not the DoD. Policy is the overall plan and is required to synchronize the nation's efforts in reaching policy goals.

Conclusions

There is not a question of whether subordinates can function or act without written policy or strategy. The concern is whether one can expect unified action without unified guidance. Subordinates will always continue to act without new guidance, but this does not equal unified action. The U.S. has a strong DoD telling civil authorities the strategy. Those who disagree may want to study the DoD "pivot plan" leading the President to the Iraq war. If practice can be interpreted as policy, DoD may also be establishing U.S. policy.

Some have argued that the *NSS* would not be released until after the 2010 *QDR* was published. The reasoning for this seems backwards in precedence. Whether or not this is a reason, DoD has been the one leading the way on national strategy. DoD produced three lengthy and significant national documents (2008 *NDS*, 2008 *Space Protection Strategy*, and 2010 *QDR*). Meanwhile, President Barack Obama, in a similar timeframe, has produced no comparable document (unless one counts the limited 2009 *PPD-1*). DHS has been relatively productive as well, with the 2009 *APR* and 2010 *QHSR*.

The U.S. government is not good at integrating existing capabilities. Integration failure persists; despite, a robust Research, Development, Test, and Evaluation (RDT&E) base and cutting-edge technology for collection, analysis, and dissemination. The DHS,

DoD, and interagency still struggle with the ability to analyze, fuse, and disseminate information, despite the creation of a DNI. The most critical information comes from an organizational leader's mission or vision statement, amplified by authority to enforce it. Policy and strategy represent critical information that is not disseminated properly from the highest levels of Government.

It is not a surprise that information sharing is also an issue at other levels of government. This information must be codified in written policy and strategy, to give clear focus. When this occurred in the *HSPD-5* and other similar documents, it worked well to unify effort. Policy should direct integration by informing strategy. The 2006 *U.S. National Space Policy* states, "the conduct of U.S. space programs and activities shall be a top priority" (Office of the President of the United States 2006a, 1); however, space is resourced at two percent of the entire FY2010 DoD budget authority, as requested by the President (\$11.1 Billion out of \$534 Billion). Real change will not occur until guidance is clear, enforced, and public.

GLOSSARY

Aerospace. The atmosphere of earth and the surrounding space. Aerospace is not the same as airspace, which is a term, used to describe the physical air space directly above a location on the ground.

Airspace. The physical airspace directly above a location on the ground. This term is often used in reference to Air Defense, Air to Air combat within controlled airspace, or when controlling an airspace. It differs from aerospace in that it usually refers to the limits of manned or unmanned, fixed or rotary winged craft, or missiles.

Fishbone Diagram. Dr. Kaoru Ishikawa, a Japanese quality control statistician, invented the fishbone diagram. Therefore, it may be referred to as the Ishikawa diagram. The fishbone diagram is an analysis tool that provides a systematic way of looking at effects and the causes that create or contribute to those effects. Because of the function of the fishbone diagram, it may be referred to as a cause-and-effect diagram. The design of the diagram looks much like the skeleton of a fish. Therefore, it is often referred to as the fishbone diagram.

Homeland Defense. As defined by DoD, is the protection of U.S. sovereignty, territory, domestic population, and critical defense infrastructure against external threats and aggression, or other threats as directed by the president. The Department of Defense is responsible for homeland defense.

Homeland Security. As defined by DoD, is a concerted national effort to prevent terrorist attacks within the United States, reduce America's vulnerability to terrorism, and minimize the damage and recover from attacks that do occur. The Department of Homeland Security is the lead Federal agency for homeland security.

Homeland Security. As defined by DHS, is the National Strategy on Homeland Security is to secure the nation (U.S.) from the many threats the U.S. faces. This requires the dedication of more than 225,000 employees in jobs that range from aviation and border security to emergency response, from cyber security analyst to chemical facility inspector. The duties are wide-ranging, but the goal is clear--keeping America safe (U.S. Department of Homeland Security 2009). Homeland Security refers to five key tasks: guard against terrorism, secure U.S. borders; enforce emigration laws, readiness for response to and recovery from disasters, maturing and unifying the Homeland Security Department. These tasks are accomplished through strengthening and building partnerships; maximizing use of science, technology, and innovation; becoming more efficient in everything the Department of Homeland Security (DHS) does.

Policy. A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions. A

- high-level overall plan, embracing the general goals and acceptable procedures; especially of a governmental body.
- Space. According to NASA, space starts at or near 76 miles from Earth's surface, using the shuttles transition from thruster steering to air surface steering, upon re-entry. There is no absolute boundary between Earth's atmosphere and open space. The limit is open to interpretation. However, many organizations use at or near 62 miles from Earth's surface. Even at either of these two altitudes, there are still traces of atmosphere. The International Space Station (ISS), at 200 miles, needs a boost in its orbit periodically due to atmospheric friction slowing it down. The U.S. Space Shuttle, at 250 miles, still experiences enough atmospheric drag to limit orbital lifetime. Skylab, originally at 240 miles, crashed to Earth in 1979 because of atmospheric friction.
- Space Control Operations. The operations that provide freedom of maneuver to friendly assets and can deny enemy assets freedom of maneuver when directed. Space Control includes Offensive Space Control (OSC), Defensive Space Control (DSC), and Space Situational Awareness (SSA).
- Space Force Application. The DoD policy defines it as combat operations in, through, and from space, to influence the course and outcome of conflict (see also Department of Defense Directive (DODI) 3100.13, Space Force Application).
- Space Force Enhancement. The five areas: ISR, missile warning, environmental monitoring, SATCOM; and Positioning, Navigation, and Tracking (PNT).
- Space Operations. Defined using U.S. Joint Publication, 3-14, Space Operations, dated 6 January 2009. Space Operations encompass Space Force Enhancement, Space Support, Space Control Operations, and Space Force Application (see definitions for these terms below).
- Space Support. The three areas: Space lift Operations (launching and recovering satellites), Satellite Operations (maintaining, sustaining, controlling satellites), and Re-constitution of Space Forces (replenishing lost or damaged satellites).
- Space Systems. The U.S. systems used to support, operate, and execute Space Operations. Space systems include both terrestrial systems that communicate and control orbiting satellites or spacecraft, as well as the crafts themselves. The topic of this thesis applies to aspects of Space beyond Earth's Aerospace, but focuses on space systems within Earth's Aerospace.
- Strategy. The science and art of employing the political, economic, psychological, and military forces of a nation or group of nations to afford the maximum support to adopted policies in peace or war.

APPENDIX A

NEAR SPACE EXPLORATION CHRONOLOGY

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2006

March 30

- The first Brazilian astronaut, Marcos Pontes, goes to space in a Russian Soyuz spacecraft, Soyuz TMA-8, at 2:29:00 CET.

June 18

- The first Kazakh space satellite “KazSat” is launched.

July 3

- The asteroid labeled as 2004 XP14 flies within 432,308 km (268,624 miles) of Earth.

July 4

- Space Shuttle *Discovery* is launched to the International Space Station. It returns safely on July 17.

July 17

- Space Shuttle *Discovery* returns to Earth from the International Space Station, thirteen days after its launch.

September 9

- Space Shuttle *Atlantis* is launched on a mission to build up the International Space Station. It returns safe and successful on September 21.

November 8

- A transit of Mercury occurs.

December 10

- NASA space shuttle *Discovery* lifts off from the Kennedy Space Center on the first night launch since the 2003 loss of *Columbia*.
- Christer Fuglesang becomes the first Swede in space.

December 22

- The NASA space shuttle *Discovery* lands at the Kennedy Space Center, concluding a two-week mission to the International Space Station.

2007

June 8

- The Space Shuttle Atlantis is successfully launched on mission STS-117.

August 4

- At Cape Canaveral Air Force Station in Florida, NASA launches a Delta II rocket carrying the Mars Phoenix lander to explore the north of Mars.

August 8

- The Space Shuttle Endeavour is successfully launched on mission STS-118.

August 21

- STS-118 lands at the Kennedy Space Center, completing Space Shuttle *Endeavour's* 19th flight.

September 14

- The SELENE spacecraft launches. JAXA has called the mission “the largest lunar mission since the Apollo program.”

September 15

- A stony meteorite estimated with 1m-wide diameter travelling at 24,000 km/h plows into a dry riverbed near Lake Titicaca in Carancas in the Puno region of Peru.

October 23

- The Space Shuttle *Discovery* is successfully launched on mission STS-120.

October 24

- A Chinese rocket sends satellite *Change I* on China's first trip to the moon.

2008

January 23

- At the American Museum of Natural History in Manhattan, New York, Virgin Galactic unveils the design of its next generation of space vehicles, named *White Knight Two*, and *SpaceShipTwo*, intending to take paying passengers into space on a regular basis next year.

February 4

- Iran opens its first space center and launches a rocket into space.

February 7

- STS-122: Space Shuttle *Atlantis* launches to deliver the European-built *Columbus* science laboratory to the International Space Station.

February 12

- At the International Space Station, the Columbus laboratory module built by the Europe Space Agency is installed and opened for the first time.

February 18

- Space shuttle *Atlantis* departs from the International Space Station, after delivering a European laboratory.

February 20

- A U.S. Navy warship near Hawaii fires a missile at a defunct spy satellite 153 miles up in the atmosphere, to destroy the fuel tank of hydrazine fuel, to prevent it from being released as a toxic gas if it had fallen to Earth.

March 9

- At the Kourou spaceport in French Guiana, the Automated Transfer Vehicle is launched aboard an Ariane 5 rocket into space. The unmanned European Space Agency cargo freighter is on a mission to resupply the International Space Station.

March 11

- At the Kennedy Space Center in Cape Canaveral, Florida, US space shuttle *Endeavour* lifts off headed for the International Space Station. Its cargo includes part of a Japanese space laboratory and a Canadian-built robotic system.

March 26

- US space shuttle *Endeavour* returns to Earth, landing at Kennedy Space Center in Florida. The mission delivered the first part of the Japanese Kibo research laboratory and a Canadian maintenance robot to the International Space Station. Space station flight engineer Leopold Eyharts returned with the shuttle, after spending seven weeks setting up the Columbus lab.

April 28

- India sets a world record by sending ten satellites into orbit in a single launch.

May 31

- NASA's *Discovery* space shuttle blasts off from the Kennedy Space Center in Florida on a 14-day mission to the International Space Station, delivering a cylinder for Japan's Kibo science lab, and also a new pump to repair the station's toilet.

June 11

- The Gamma-ray Large Area Space Telescope is launched.

June 14

- The space shuttle *Discovery* returns to Earth after a 14-day mission, landing at Cape Canaveral, Florida. Among the returning is Garrett Reisman, after 95 days in space.

June 20

- The Janus-2 satellite is launched from the Vandenberg Air Force Base in California, atop a Delta-2 rocket. The satellite will be used for measuring the shape of the world's oceans.

August 18

- Russian Proton Breeze M rocket launches one of the biggest commercial satellites ever built - the Inmarsat-4 (I4-F3). The telecommunications satellite is 7m long,

with a 9m wide antenna reflector. Inmarsat's network delivers high-speed mobile internet and phone services to users on land, at sea and in the air.

September 25

- From the Jiuquan spaceport in Gansu province, China launches the *Shenzhou VII* capsule atop a Long-March II-F rocket. This is China's third manned space mission, with astronauts Zhai Zhigang, Liu Boming, and Jing Haipeng.

September 28

- China's *Shenzhou VII* space capsule returns to Earth after a successful mission orbiting the planet. The astronauts conducted experiments, and one made China's first space walk.
- Space X launches the *Falcon 1* rocket into orbit, the first privately-developed liquid-fuel rocket into space, at a cost of under US\$10 million.

October 7

- The meteoroid 2008 TC3 impacts Earth, becoming the first such object to be discovered prior to impact.

October 12

- The *Soyuz TMA-13* spacecraft launches from Baikonur Cosmodrome, Kazakhstan. On board is US space tourist Richard Garriott, who paid about US\$15 million for the 10-day trip to the International Space Station. Richard's father, Owen Garriott, spent 60 days on a US space station in 1973.

October 22

- India launches its first unmanned moon mission; the rocket is called *Chandrayaan-1*, and is being sent on a two-year mission to orbit the Moon. The rocket carries payloads from India, the USA, Germany, Britain, Sweden, and Bulgaria.

November 8

- India's *Chandrayaan 1* spacecraft enters orbit of the Moon, the first Indian satellite to reach the Moon.

November 14

- From Florida, NASA launches the space shuttle *Endeavour*, to continue construction of the International Space Station.

November 20

- The 2008 Prairie meteoroid falls over Canada.

November 30

- The space shuttle *Endeavour* lands in California after a 16-day mission to renovate parts of the International Space Station.

December 6

- The University of Hawaii activates a new telescope designed specifically to look for dangerous asteroids under 1km diameter.

2009

January 23

- Japan launches an H-2A rocket carrying eight satellites into space; one satellite is to monitor greenhouse gases over the Earth's surface.

February 3

- Iran launches *Omid*, a domestically made research and telecom satellite into orbit for the first time.

February 10

- An American Iridium Satellite-operated communications satellite and the defunct Russian *Cosmos-2251* military satellite collide at about 485 miles above the Russian Arctic, leaving a debris field of millions of pieces. This is the first publicly known satellite collision.

March 1

- Chinese lunar probe *Chang'e 1* crashes into the moon in a controlled collision at the end of a 16-month moon-mapping mission.

March 15

- NASA launches space shuttle *Discovery* from Kennedy Space Center in Florida.

March 17

- Space shuttle *Discovery* docks with the International Space Station, delivering the last set of solar wing panels.

March 28

- NASA's space shuttle *Discovery* lands at Kennedy Space Center in Florida after a 13-day mission to the International Space Station.

March 31

- In Moscow, Russia, six volunteer “astronauts” are locked inside a mock spacecraft, to see if they can stand the simulated conditions of a manned flight to Mars, which would take over 100 days. Those who last more than 100 days experiencing the same isolation and claustrophobia as astronauts will earn a US\$20,000 reward.

May 11

- The NASA space shuttle *Atlantis* blasts off from Florida's Kennedy Space Center on a mission to fix the Hubble Space Telescope.

May 14

- An Ariane 5 rocket blasts off from Kourou in French Guiana, carrying Europe's Herschel and Planck telescopes into space. The satellites will gather new insights into the nature of the cosmos. The combined program cost US\$2.5 billion.
- Astronauts from space shuttle *Atlantis* outfit the Hubble Space Telescope with a new wide field camera that will allow astronomers to capture images of objects formed as early as 500 million years after the birth of the universe.

June 18

- America's NASA successfully launches two spacecraft to the Moon on missions to prepare for a return to the lunar surface by US astronauts. One mission will send a rocket crashing into the surface, so that the debris plume can be scanned for evidence of water. The other mission will help plan for future landing sites, and for construction of an outpost.

June 20

- Ground is broken in New Mexico, USA, on the construction site of Spaceport America, the world's first purpose-built commercial spaceport. It will cost the New Mexico government almost US\$200 million.

July 1

- An Ariane 5 rocket launches from French Guiana, carrying *TerreStar-1*, the world's biggest commercial telecommunications satellite. The TerreStar Networks' satellite will provide voice, messaging and data connections to the North American market.

July 15

- NASA space shuttle *Endeavour* lifts off from the Kennedy Space Center in Florida. The mission includes the last piece of Japan's Kibo laboratory, to be attached to the International Space Station during an 11-day stay.

July 22

- The longest total solar eclipse of the century sweeps across a narrow (250km wide) swathe from India through to China.

August 25

- South Korea launches its first space rocket, though a scientific satellite it was carrying failed to enter into its proper orbit.

August 29

- NASA launches the US shuttle *Discovery* from the Kennedy Space Center in Florida for a mission to the International Space Station (ISS), with seven astronauts on board.

September 11

- Japan successfully launches its new space freighter, 16.5-tonne unmanned H-II Transfer Vehicle, from the Tanegashima base in the south of the country, on a mission to re-supply the International Space Station.
- The space shuttle *Discovery* lands at Edwards Air Force Base in California at the end of a two-week mission to the International Space Station.

September 23

- India successfully launches an Oceansat-2 Indian remote-sensing satellite and six smaller foreign satellites in a single mission. [57]

October 9

- NASA intentionally crashes two unmanned spacecraft into the Moon in an attempt to detect water-ice.

October 28

- NASA launches a prototype Ares I-X rocket from Florida to test technology for the development of a future manned launch vehicle. The US\$450 million launcher is the first NASA has built in more than 30 years.

November 13

- NASA scientists announce that last month's experiment to find water on the Moon was a major success, revealing ice and water vapor in the debris field of smashing a rocket into a crater.

November 27

- Space shuttle *Atlantis* lands at its Florida homeport, after completing an 11-day mission to deliver cargo to the International Space Station.

December 14

- NASA launches the Wide-field Infrared Survey Explorer satellite on a Delta II rocket from Vandenberg Air Force Base in California. The satellite is designed to uncover hidden cosmic objects.

2010

February 1

- US President Barack Obama cancels the Constellation project designed to take humans to the Moon by 2020.

February 8

- The NASA space shuttle *Endeavour* blasts off from Florida, carrying six astronauts on a voyage to install the last two main pieces of the International Space Station.

February 11

- The US space agency NASA launches its Solar Dynamics Observatory from Cape Canaveral in Florida. The observatory is designed to acquire detailed images of the Sun to explain variation in its activity.

APPENDIX B

THREATS

Examining the need for defense and security in policy begins with an understanding of existing threat conditions and persistent conflict. In order to safeguard national interests from threats, it is critical to evaluate policy on space. Policy provides guidance, directives, and procedure. Policy informs strategy. It is also important to note that the conduct of space operations is bound by technological limitations and diplomatic restrictions. It is important to keep in mind that technology changes rapidly in the hands of intelligent adversaries, commercial or military; therefore, U.S. policy on technology development must develop as quickly as adversary capabilities. The study of threats relates to the need for national dominance in air, land, sea, cyber, and space domains. Threat analysis pre-supposes that conflict is persistent.

Persistent Conflict

Persistent conflict assumes an aspect of conservative realism. Conservative realism and civic republicanism demand professional military protection as a component. In reference to Samuel Huntington's book, *The Soldier and the State* (1981), Robert Kaplan summarized Huntington's view on the need for professional military protection. Kaplan stated, "In order to keep the peace, military leaders had to take for granted—and anticipate—the 'irrationality, weakness, and evil in human nature'" (Kaplan 2001).

The study of threats should include theorists like Clausewitz. The topics of Anticipation, irrationality, and evil in human nature from Huntington are reminiscent of Clausewitz and his paradoxical trinity. There are many translations of his trinity, but

Kaplan's description of the *Soldier and the State*, is most similar to reason, chance, and enmity. Another translation is policy, chance and probability, and passion.

This thesis recognizes that the element of chance and probability can never fully, be planned for. Military force has traditionally been the capability assigned to counter chance and probability through sheer numbers. This thesis focuses on two other opposing forces in Clausewitz' trinity, policy and the evil of human nature. Policy should counter a passionate, irresponsible, and determined threat, in an environment where conflict is always persistent. U.S. policy must anticipate the evil in human nature and appropriately maintain policy that combats it. It is significant to look at existing laws, treaties, and policies which seek to regulate space operations of the U.S. and other countries.

The study of threats to space systems and national security should not be limited to military topics. Many aspects of space systems are interrelated to commercial activities. Some may initially question the relationship of commercial threats to a study of DSCA or space policy. In a capitalist system, commercial enterprise is competitive and predatory. There are those who might argue that diplomatic methods alone can establish a lasting peace; and that peace may eliminate violence. Any notion that a world at peace will mean less violence is naive (Kaplan 2001). Policy on defense space and its support to civil authority must account for the possibility of violent threats.

It is important to consider commercial threats when studying threats to national security and its space system component. Space systems involve terrestrial components vulnerable to interference such as "spoofing" or jamming by individuals with commercial or private interests. However, their actions have strategic implications. "Spoofing" is when false information injected by malicious actors fools satellite control systems or their

associated communication of data. It can interfere with the control of the spacecraft itself or it can interfere with mobile user access to accurate data.

Commercial activities affect the economy and economy is inherently tied to any nation's security. Based on the understanding that threats can be economic, it would also be naive to assume that economic endeavors are all passive or peaceful. It is realistic to anticipate that policy must account for combating threats across the instruments of national power by integrating both space and ground, in order to maintain security and freedom of action. "Future adversaries will likely possess sophisticated capabilities designed to contest or deny command of the air, sea, space, and cyberspace domains" (Department of Defense 2010a, 9).

An assumption is that the current threat environment is one of persistent conflict, which has neither begun nor ended. It is a mistake to state that there is an "era of persistent conflict." This would presume that conflict would end by its own accord or the influence of any governing body. Conflict is as inherent in human nature as greed is to the seven deadly sins; or as self-actualization is to Maslow's hierarchy of needs. Threat nations and non-state actors can become intent on actualizing a potential capability. Therefore, policy must account for persistent conflict in space systems as it would in any other medium.

Threats to space systems are analyzed for the reason that space systems represent a critical civil, military, economic, and communication architecture that is both space and terrestrially based. Space systems are similar to other sovereign vessels such as civilian and military ships, or aircraft. For the purpose of this thesis, threats to all components of space systems are included in analysis, because of their importance to policy formulation

and context. If this thesis were focused on U.S. aircraft or U.S. ships, it would analyze threats to these vessels operating outside U.S. controlled territory, as threats to national security. Threats to national security are an extension of factors affecting homeland security or homeland defense.

Presidential Policy: *Homeland Security Guiding Principles*

President Barack Obama's administration maintains an internet site dedicated to providing official policy and information on important issues. On this White House site, the President lists his guidelines for homeland security issues.

The President's highest priority is to keep the American people safe. He is committed to ensuring the United States is true to our values and ideals while also protecting the American people. The President is committed to securing the homeland against 21st century threats by preventing terrorist attacks and other threats against our homeland, preparing and planning for emergencies, and investing in strong response and recovery capabilities. We will help ensure that the Federal Government works with states and local governments, and the private sector as close partners in a national approach to prevention, mitigation, and response. (Office of the President of the United States 2010)

The President's seven guidelines are: (1) defeat terrorism worldwide, (2) strengthen our biological and nuclear security, (3) improve intelligence and information sharing, (4) ensuring a Secure global digital information and communications infrastructure, (5) promote the resiliency of our physical and social infrastructure, (6) pursue comprehensive trans-border security, and (7) ensure effective incident management.

Analysis of the President's seven guidelines provides a method to evaluate how well the 2006 *U.S. National Space Policy* addresses the anticipated threats in the context of homeland security and DSCA. Understanding what threats policy is preparing the nation for will set the foundation for an eventual comparison and evaluation of how effective current space policy is. Now that a baseline is established for how the President

views national threats, it is necessary to analyze how subordinate departments have categorized threats and planned to prepare against them.

The National Preparedness Guideline

The U.S. Department of Homeland Security (DHS) established the 2007 *National Preparedness Guideline* in accordance with 2003 *Homeland Security Presidential Directive-8 (HSPD-8)*. Within this guideline, there are four critical elements. One of the four critical elements is the fifteen *National Planning Scenarios*.

The fifteen National Planning Scenarios collectively depict the broad range of natural and man-made threats facing our nation and guide overall homeland security planning efforts at all levels of government and with the private sector. They form the basis for national planning, training, investments and exercises needed to prepare for emergencies of all types. (Department of Homeland Security 2007a)

While the fifteen scenarios are not exhaustive, they do provide an insight into the type and range of threats the DHS uses to maintain national preparedness. The types of threats addressed by the *National Preparedness Guideline's* fifteen scenarios are chemical, biological, radiological, explosive, information/cyber threats, and natural (see table 8). These threats can be accidental or intentional. Regardless of the cause, they are threats that require the support of defense assets to predict, locate, deter, or neutralize them.

Scenario	Description
1	Nuclear Detonation - 10 Kiloton IED
2	Biological Attack - Aerosol Anthrax
3	Biological Disease - Outbreak Influenza
4	Biological Attack - Plague
5	Chemical Attack - Blister
6	Chemical Attack - Toxic Industrial
7	Chemical Attack - Nerve Agent
8	Chemical Attack - Chlorine Tank Explosion
9	Natural Disaster Major Earth Quake
10	Natural Disaster - Major Hurricane
11	Radiological Attack
12	Explosives Attack - IED
13	Biological Attack - Food contamination
14	Biological Attack - Foreign Animal Disease
15	Cyber Attack

Source: Created by author from data contained in the Department of Homeland Security, *National Preparedness Guideline: National Planning Scenarios* (Washington, DC: Government Printing Office, 2007).

The National Security Threat List

The *National Security Threat List (NSTL)* is comprised of two elements: the issues threats, which are national security threat issues regardless of the country of origin; and a classified list of foreign powers that pose a strategic intelligence threat to U.S. security interests (Federal Bureau of Investigation 2010). The issue threat portion of the *NSTL* was developed with the U.S. Intelligence Community and elements of the U.S. Government (Federal Bureau of Investigation 2010). From this collaboration, the FBI identified eight categories of foreign intelligence activity that are significant threats to U.S. National Security interests.

The FBI will investigate the activities of any country that relate to any of these eight issues. These categories are: (1) Terrorism, (2) Espionage, (3) Proliferation, (4) Economic Espionage, (5) Targeting national information infrastructure, (6) Targeting

the U.S. Government, (7) Perception management, and (8) Foreign Intelligence Activities. Table 9 clearly defines how these issue threats are categorized. Evaluation of the FBI's counterintelligence based issue threats can make one focus on individual threat actors or established organizations. Threats can come in many forms and the FBI model does well to characterize threats across the instruments of national power: diplomatic, informational, military, and economic.

Table 9. National Security Threat List

Issue Threats	Threat Description
Terrorism	<p>This issue concerns foreign power-sponsored or foreign power-coordinated activities that:</p> <ol style="list-style-type: none"> 1. involve violent acts, dangerous to human life, that are a violation of the criminal laws of the United States or of any State, or that would be a criminal violation if committed within the jurisdiction of the United States or any state; 2. appear to be intended : to intimidate or coerce a civilian population; to influence the policy of a government by intimidation or coercion; or to affect the conduct of a government by assassination or kidnapping; and 3. occur totally outside the United States or transcend national boundaries in terms of the means by which they are accomplished, the persons they appear intended to coerce or intimidate, or the locale in which their perpetrators operate or seek asylum.
Espionage	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments, or persons, which involves the identification, targeting and collection of U.S. national defense information.</p>
Proliferation	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments or persons, which involves:</p> <ol style="list-style-type: none"> 1. the proliferation of weapons of mass destruction to include chemical, biological, or nuclear weapons, and delivery systems of those weapons of mass destruction; or 2. the proliferation of advanced conventional weapons.
Economic Espionage	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments, or persons, which involves:</p> <ol style="list-style-type: none"> 1. the unlawful or clandestine targeting or acquisition of sensitive financial, trade or economic policy information, proprietary economic information, or critical technologies; or 2. the unlawful or clandestine targeting or influencing of sensitive economic policy decisions.
Targeting National Information Infrastructure	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments, or persons, which involves the targeting of facilities, personnel, information, or computer, cable, satellite, or telecommunications systems which are associated with the National Information Infrastructure. Proscribed intelligence activities include:</p> <ol style="list-style-type: none"> 1. denial or disruption of computer, cable, satellite or telecommunications services; 2. unauthorized monitoring of computer, cable, satellite or telecommunications systems; 3. unauthorized disclosure of proprietary or classified information stored within or communicated through computer, cable, satellite or telecommunications systems; 4. unauthorized modification or destruction of computer programming codes, computer network databases, stored information or computer capabilities; or 5. manipulation of computer, cable, satellite or telecommunications services resulting in fraud, financial loss or other federal criminal violations.
Targeting the U.S. Government	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments, or persons, which involves the targeting of government programs, information, or facilities or the targeting or personnel of the:</p> <ol style="list-style-type: none"> 1. U.S. intelligence community; 2. U.S. foreign affairs, or economic affairs community; or 3. U.S. defense establishment and related activities of national preparedness.
Perception Management	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity directed at the U.S. Government or U.S. corporations, establishments, or persons, which involves manipulating information, communicating false information, or propagating deceptive information and communications designed to distort the perception of the public (domestically or internationally) or of U.S. Government officials regarding U.S. policies, ranging from foreign policy to economic strategies.</p>
Foreign Intelligence Activities	<p>This issue concerns foreign power-sponsored or foreign power-coordinated intelligence activity conducted in the U.S. or directed against the United States Government, or U.S. corporations, establishments, or persons, that is not described by or included in the other issue threats.</p>

Source: Created by author from the Federal Bureau of Investigation, *National Security Threat List: Issue Threats* (Washington, DC: Government Printing Office, 2010).

State Actor Threats

In addition to the types of threats established by the *National Planning Scenarios* and the FBI, it is important to consider the spectrum of other general threats supported by recent historical events. The political spectrum ranges from traditional state on state threats to non-state threats.

A look at international incidents can illustrate this concept. An international incident usually arises during a time of relative peace between nation-states. Conflicts that grow out of a series of escalating issues between nation-states generally are not considered international incidents; however, terrorist actions can and often do become international incidents. However, historical views of past international incidents often reveal the incident was the flashpoint of a simmering conflict between nation-states, or organizations opposing nation-states. It is useful to take a sample of events that occurred between 2006 and 2010 to help transform the analysis of threats from mere theory to concrete example. Table 10 is a sample of international historical events. This small sampling of events demonstrates the wide variety of events that pose threats to a nation in a wide spectrum from conventional to natural disaster. It is the job of both the civil authorities as well as the DoD to plan for and aid in resolving incidents or other threats.

Table 10. Sample of Historical Incidents 2006-2010

Date	Event
APR 2006	President of Iran Mahmoud Ahmadinejad confirms that Iran has successfully produced a few grams of low-grade enriched uranium.
JUL 2006	North Korea test fires missiles, timed with the liftoff of Discovery, preceding the fireworks celebrations that night in America. The long range Taepodong-2 fails shortly after takeoff.
OCT 2006	North Korea claims to have conducted its first ever nuclear test.
NOV 2006	Alexander Litvinenko, a former Russian KGB agent, is killed by Polonium-210 in a London sushi bar.
NOV 2006	Iran successfully test-fires 3 new models of sea missiles in a show of force to assert its military capacities in the Gulf.
2007	
JAN 2007	China successfully tests a ground-based ballistic missile capable of destroying satellites in orbit, drawing criticisms from other countries.
FEB 2007	The deadly H5N1 strain of bird flu is found at a Bernard Matthews turkey farm in Suffolk.
APR 2007	The Solomon Islands is shaken by a magnitude 8.1 earthquake, and hit by a subsequent tsunami.
AUG 2007	The I-35W Mississippi River Bridge on I-35W over the Mississippi River in Minneapolis, Minnesota between University Avenue and Washington Avenue collapses at 6:05 pm CST during the later part of rush hour, killing 13 people.
SEP 2007	The SELENE spacecraft launches. Japan's JAXA has called the mission, "the largest lunar mission since the Apollo program."
2008	
FEB 2008	A major tornado outbreak across the Southern United States leaves at least 58 dead, the most since the May 31, 1985 outbreak that killed 88.
APR 2008	The raid on the FLDS owned ranch called the YFZ Ranch in Texas, 401 children were taken into custody. 133 women were taken into state custody also; the total number of woman and children is 534.
MAY 2008	Wenchuan earthquake (measuring around 8.0 magnitude) occurs in Sichuan, China, killing over 69,000 people.
AUG 2008	Georgian invasion into South Ossetia. Begin of five-day war between Georgia and Russia.
SEP 2008	China launches the spacecraft Shenzhou 7.
NOV 2008	Terrorist attacks in Mumbai, India: Ten coordinated attacks by Pakistan-based terrorists kill 164 and injure more than 250 people in Mumbai, India.
DEC 2008	Bernard Madoff arrested and charged with securities fraud in \$50 billion Ponzi scheme.
2009	
FEB 2009	U.S. Iridium and Russian Satellite Crash.
APR 2009	North Korea launches its controversial Kwangmyŏngsŏng-2 rocket. The satellite passed over mainland Japan, which prompted an immediate reaction from the United Nations Security Council, as well as participating states of Six-party talks.
JUN 2009	2009 Washington Metro subway crash: Two Metro trains collide in Washington, D.C., USA, killing 9 and injuring over 80.
JUL 2009	Jakarta double bombings at the JW Marriott and Ritz-Carlton Hotels killed 9 people including 4 foreigners.
OCT 2009	Iran agrees to send its enriched uranium to Russia and open up the newly discovered nuclear plant to international inspection.
DEC 2009	Attempted Suicide Bombing on U.S.-Bound Flight.
2010	
JAN 2010	Facing Threats, U.S., U.K. Embassies Close in Yemen.
FEB 2010	Obama Unveils \$3.8 Trillion Budget, Included in the budget are cuts to domestic programs and spending; some programs, including NASA's return trips to the moon, will be eliminated all together.

Source: Created by author using data from Pearson Education, *History and Government: Year by Year 1900-2010*, <http://www.infoplease.com/yearbyyear.html> (accessed 26 February 2010).

Non-State Threats

A significant threat today is the non-state actor. Our system of diplomacy is based on being able to negotiate with a state and when negotiations fail, military actions are used. It is difficult to negotiate or establish treaty with a non-state actor. The capability of a state's military can be tracked and one can develop strategy to defend against that capability. What happens when states fail and non-state actors take control of a failed

state's threat capabilities? What could Al Qaeda do if it could seize Pakistani nuclear capability? The current and projected threat environment is such that the science and technology of an established state easily be exported and harnessed by non-state actors. On 23 June 2002, television signals illegally broadcast by the Falun Gong cult cut into transmissions using the Sino Satellite from 23 to 30 June 2002, blocking the World Cup finals for viewers in some rural and remote areas in China. China did not know the exact location of where the attack came from, but it represented a real threat to China's National Security especially in the area of strategic communications.

Some may be familiar with a similar type of incident that happened in the U.S. On 27 April 1986, at 12:32 am, a satellite uplink operator aimed at the location of Galaxy 1, the satellite that carried Home Box Office (HBO). As a protest against the introduction of high fees and scrambling equipment, he transmitted a signal onto the satellite that overrode HBO's airing of a movie for four and a half minutes. The text message that appeared on the sets of HBO subscribers across the Eastern time zone read:

GOOD EVENING HBO FROM CAPTAIN MIDNIGHT \$12.95/MONTH? NO WAY! [SHOWTIME/MOVIE CHANNEL BEWARE!]. (MacDougall, 1986)

If the knowledge or access demonstrated by these two incidents were employed for purposes other than free speech, what might the implication be? Could non-state actors jam or manipulate U.S. tactical, operational, or strategic communications. What about weather, or navigational and positional data coming from satellites? How would this affect U.S. civil authorities? 18 U.S.C. § 1367 (enacted 21 October 1986), prohibits intentional or malicious interference with satellite transmissions and was enacted to counter the Captain Midnight incident. It was enacted five months after the incident.

MacDougall was charged; his plea bargain was a \$5,000 fine with a one-year probation.

Specific Space Threats

The President has an agency designed to inform policymakers, provide intelligence for decision support, and generally provide threat analysis. There are other members of the IC who perform supporting roles across multiple disciplines. The President's agency is the Central Intelligence Agency. This organization is primarily concerned with threats related to counterintelligence and human intelligence threats. Intelligence from this agency is more focused on socio-economic interests related to policy and not space specific threats. The Central Intelligence Agency has come under much criticism for its divergence from intelligence support to the President in its emphasis on clandestine operations. This criticism began with Presidents Truman and Kennedy. The criticisms continue today.

If the very agency tasked to do intelligence decision support to policymakers is not even focused on that task (McGovern 2009, 1), it raises a question about who is focused on the space aspect of threat analysis. Is this organization a civilian or military organization? If it is mainly a defense or military organization, then it may be established as an enduring defense support to civil authorities. This would be especially true if civil agencies and other civil authorities lacked the capabilities to monitor and affect space threats. The answers to these questions necessitate the study of several areas, because space does not have one single agency that studies it. Space crosscuts multiple agencies and departments. In order to decide which organizations space affects, it is necessary to describe and define space based and related threats.

Defining Space Systems

A review and analysis of existing international and national threats was necessary before approaching a more specific component of a nation's infrastructure. Space encompasses a vast area; however, for the purpose of threat analysis, this thesis will focus on earth's satellites (to include the moon) and will not discuss anything outside of Earth's direct influence. The moon, how would this have anything to do with DSCA? Here is an example: if a civilian NASA operation were to encounter an issue, there is a rescue procedure. One must ask if using defense resources to rescue a civil asset is a DSCA activity. The answer to this question is not completely clear because DSCA itself is traditionally thought of as relating to disasters in populated areas on U.S. soil. The major threat scenarios will be reviewed later in this section. DSCA does not necessarily mean a human being will be involved "on the ground" DSCA encompasses defense resources and in the area of space capabilities, the DoD has much to offer civil authorities--from images to assessments.

Before narrowing analysis down to DSCA alone, it is necessary to look at the situation as a whole when looking at the influence space has on National Security. A space related threat can come in many forms. A space system encompasses U.S. systems used to support, operate, and execute space operations. Space systems include both terrestrial systems that communicate and control orbiting satellites or spacecraft, as well as the crafts themselves. The DoD's Joint Publication 3-14, *Joint Doctrine for Space Operations*, defines space systems further:

Space Systems. All of the devices and organizations forming the space network. These consist of: spacecraft; mission packages(s); ground stations; data links among spacecraft, mission or user terminals, which may include initial reception, processing, and exploitation; launch systems; and directly related supporting

infrastructure, including space surveillance and battle management and/or command and control. (Department of Defense 2009, GL-10)

With this definition, it is now possible to examine the environment in which space systems operate. Joint Publication 3-14 further defines the environment:

Space has several unique characteristics that differentiate it from the air, land, and sea. Accepted international conventions do not extend a nation's geographical boundaries into Earth orbit. Therefore, nations enjoy unimpeded satellite over flight of other nations through space. Spacecraft movement is not significantly impeded by any of the Earth's surface features (such as terrain), but instead is primarily governed by orbital mechanics, thereby allowing satellites to remain in orbit for extended periods (i.e., years). The space environment affects the performance of both terrestrial and space systems. (Department of Defense 2009, ix)

Once there is an established baseline for what a space system is and where it operates, a list of possible threats to space specific systems can be established.

Threats to Space Systems

Threats to space systems are typified by at least fifteen different types of threats. There are five major threat categories: (1) space to space, (2) space to ground, (3) air to space/air to air (includes air to ground), (4) ground to space, and (5) ground to ground. These four categories are not exhaustive, but cover the significant range of threats. While United Nations, *Treaty on Principles Governing Activities of States in the Exploration and Use of Outer Space Including the Moon and Other Celestial Bodies* (the "Outer Space Treaty" 1967) prohibits the mass weaponization of space; however the language refers to nuclear weapons and WMD.

It does not specify other forms of weapons such as lasers and other malicious or unconventional weapons, nor does it prevent a non-signatory or a non-state from establishing this capability, regardless. Table 11 depicts the author's categorization of

possible related threats related to space systems. The space threat table does not prioritize the threats, however, space debris and space weather are among the most common accidental or natural threats to space systems.

	Category	Type
1	Space to Space	Space Debris
2		Space Weather
3		Satellite to Satellite Collision
4		Satellite to Satellite Hostile Rendezvous
5		Space to Space Lasers
6		Space to Space Jamming
7	Space to Ground	Space to Ground Jamming
8		Space to Ground Collection
9		Space to Ground Weapon
10	Air to Space/Space to Air	Space to Air
11		Air to Space/Ground
12	Ground to Space	Ground to Space Missiles
13		Ground to Space Lasers
14		Ground to Space Jamming
15	Ground to Ground	Ground to Space Ground Station

Source: Created by author from analysis of multiple qualitative sources contained within the reference list of this thesis.

Space weather refers to solar flare activity, ionospheric variability, energetic particle events, and geophysical events (Department of Defense 2009, GL-10). In plain language, there are particles and energy waves that can jam or interfere with the transmission of satellite signals, much the way a car radio can experience interference. This interference affects both ground and space assets within a space system. Space

debris consists of broken meteors, broken satellites, and other debris orbiting or de-orbiting the earth.

Age of Collision

Second, to space weather and debris, the next most frequent threats are satellite collisions; and ground to space missile events. China shot down one of its aging satellites in January 2007 (Kaufman and Linzer 2007). The U.S. and the Soviet Union experimented with anti-satellite missiles in the 1980s, but discontinued the practice due largely to the creation of space debris. The U.S. shot down its last satellite under this program in 1985; however, it recently shot down one of its own satellites over the Pacific Ocean, in February 2008, for safety reasons to neutralize an out of control satellite from falling to Earth and contaminating it with hydrazine fuel (Kaufman and Pincus 2008). China who had received a considerable amount of public ridicule for its renewed anti-missile test in 2007, and who was in-line for the satellite fallout from the missile in the Pacific, was very concerned. Ironically, in February of 2009, a U.S. and Russian satellite accidentally collided in the same area two years later. “The collision happened not far from the orbit of a defunct weather satellite blown to pieces by a ground-based missile in a Chinese weapons test in 2007. European and U.S. officials argue the resulting debris made it harder to identify crash risks” (Faulconbridge 2009).

Crashing satellites or rockets into the moon is a new trend. In March 2009, while attempting further its space exploration capability, China reported that it intentionally crashed a satellite into the moon (Jones 2009). On June 10 2009, Japan intentionally crashed one of its lunar orbiting satellites into the moon (Rincon 2009a). Several months later, in October 2009, the U.S. sent a rocket into a moon crater to explore for evidence of

water on the moon (Rincon 2009b). It is beyond the scope of this thesis to analyze the reasons or timing of these events, despite some clear geo-political benefit for the countries involved to demonstrate comparable capabilities in a world of deterrence combined with scientific exploration.

Remaining Threats to Space Systems

There are twelve remaining threats to discuss. Satellite to satellite hostile rendezvous can occur when a satellite maneuvers to attack or rendezvous with another satellite. Some satellites are designed to conduct rendezvous or proximity operations in the normal course of maintenance or other upgrades or repair. Space to space lasers can be employed, particularly because they are not specifically banned by treaty or international law. Some draft treaties, which specify weapons to be banned, are not signed by the U.S. and others because they restrict freedom of action.

The draft Treaty on Prevention of the Placement of Weapons in outer space and of the Threat or use of force against outer space objects (PPWT) (CD 2008), It was—and continues to be—the most promising proposal to fill the normative void in the current space security treaty regime. However, almost two years after its introduction, the international community has failed to embrace this unique opportunity to lay down the foundation for a robust, unambiguous, and universal space security treaty that unequivocally prohibits the weaponization of space.” (Jaramillo 2009, 1)

While the PPWT itself, may not be the answer, the critical highlight here is that there is not a comprehensive ban on space weapons beyond nuclear and WMD. One of the biggest opponents to this treaty is the United States. In congruence with official policy (Office of the President 2006), a permanent representative made comment on the U.S. position. On the U.S. Mission to Geneva, in 2007, the US Permanent Representative to

the CD, Christina Rocca, said, “We continue to believe that there is no arms race in space, and therefore no problem for arms control to solve” (Jaramillo 2009, 3).

Space to space jamming can occur if a hostile satellite actively jams or interferes with another satellite in order to disrupt the Command and Control, Computers, Communications, or ISR operations of that satellite. Space to ground jamming could occur if a malicious satellite attacks the command and control or ISR of a space system’s ground assets or other terrestrial infrastructure. Space to ground collection represents a passive threat that can occur without obvious signs and includes most ISR operations. Space to ground weapons is a relatively undeveloped category, a laser can be considered a possible weapon; however, lasers are already being employed for peaceful and scientific measurement purposes. Other forms of space weapons are not yet widely in employment.

This is significant because international law does specifically prohibit all forms of weapons and some existing peaceful capabilities in space systems could be directed for offensive use. Examples are the chemical threat of the hydrazine fuel in satellites; another is that nuclear power is not prohibited as a space power source (only nuclear weaponization of space is prohibited).

Space to air threats represents the possibility for a satellite to attack an aircraft or other craft like a space shuttle. Air to space or air to ground threats represents the ability of a nation’s aircraft to conduct missile or other attack on a space system in its orbit or against its terrestrial components. Ground to space threats represents ground assets attack on a satellite or space station with a missile. In April 2009, when the North Koreans conducted a launch, the first two stages succeeded; the third stage failed. Analysts around

the world were careful calculating the ability of North Korea to affect satellites and even the International Space Station. Political reaction was mixed at the U.N. level. “President Barack Obama and other world leaders called [April 2009’s] launch a provocation that cannot go unanswered, but the U.N. Security Council was so divided it didn’t even issue a preliminary statement of condemnation” (Kim 2009).

Ground to space lasers have been researched and tested. In September 2006, China was accused of using ground-based lasers to blind imaging and radar satellites (Harris 2006). The use of lasers has been listed separately from jamming and weapons for the sole purpose that it has been employed but operates in a unique dual and ambiguous role. Ground to space jamming represents the same kind of threat to command and control as previously discussed in Space to ground or space to space jamming. Ground to ground threats for space systems represents the terrestrial component of a space system. Any conventional threat that exists for other critical infrastructure, can threaten a ground station’s capability.

Threat Findings

In general, the U.S. is anticipating the right threats. This finding is based on analysis of historical threats and a comparison of existing documents used by the U.S. to anticipate threats. Both the 2010 *QDR* and 2009 *APR*, from DoD and DHS, respectively identify a common weakness which was then further highlighted by President Obama’s verbal reprimand in January 2010.

The weakness is information sharing on the detected or anticipated threats. The 2010 *QDR* says that DoD and its interagency partners can improve to “comprehensively monitor the air, land, maritime, space, and cyber domains” (Department of Defense

2010a, 19) for potential direct threats to the United States. DHS identified that it performs at or near 60 percent for its Objective 5.2 in “Reducing the risk of emerging terrorist threats through intelligence and information sharing” (Department of Homeland Security 2009a; 11, 99). It identifies corrective action:

Information Sharing and Access Agreements (ISAA) are now primarily developed with other Federal agencies or with Foreign, State, local, tribal or private sector partners. With the issuance of the February 1, 2007 Secretary’s Memo, DHS Policy for Internal Information Exchange and Sharing, (the “One DHS” memo), subsequent component-to-component information sharing relationships are only required to be documented with ISAA’s if required by the negotiated terms of external ISAA’s. Consequently, no additional component-to-component ISAA’s were developed in FY2008. (Department of Homeland Security 2009a, 100)

It is not clear that DHS’s corrective action is helpful to the larger national issue. The Christmas day bombing seems to invalidate the notion that any progress was made in this area. The DHS corrective action, itself, implies that paperwork is to blame, in the form of ISAA’s. It is not clear that a policy memo for DHS is enough to affect external, interagency information sharing. Integration is still a national issue. Policy does not appear to address this issue unless one ascribes any verbal or written remark by the president to constitute official policy. That assumption is dangerous and confusing; however, even the author would assume that the President’s 5 January 2010 remarks do constitute a strong policy on national information sharing.

Threat Recommendations

Threat assessments made by all U.S. Government elements are appropriate and useful. Integrated analysis, fusion, and dissemination of information must be enforced. Legal and monetary mechanisms are the only effective methods for enforcement. There is

no lack of policy guidance, directive, or other document on information sharing. What is lacking is an enforcement strategy to force compliance.

The Directors of National Intelligence have not done any better than the former Directors of Central Intelligence in intelligence and information fusion. The common issue is authority to enforce compliance through budget control. If legislation could address authority of the DNI, then a meaningful change could be made to analysis, fusion, sharing, and dissemination of information (note: Intelligence is analyzed information). Enforcement must be acknowledged in a policy. Policy and treaty are both defeated without enforcement mechanisms.

It is recommended that U.S. Policy and the *NSS* specifically address analysis, fusion, and dissemination of information as a priority, to be funded according with its priority. Historically, IC directors have not interpreted directives or policy memorandums the same way. This happened to the former director of the Central Intelligence Agency, George Tenet when he issued a memorandum that was largely ignored for various reasons. It is recommended that the direction come from a higher executive authority. This should be done in the form of an unclassified *PPD* directing the integrated analysis, fusion, and dissemination of threat activity against the U.S. If it is acceptable to reprimand, in public, the analysis situation; then, it is perfectly acceptable to publicly direct a solution or compliance. The legislative branch must backstop the executive authority through law and the judicial branch must advise on issues of legal authority conflicts.

APPENDIX C

LAW AND TREATY

As the second and third factors in the existing conditions (threat, law, treaty) affecting policy; law, and treaty, should compensate for a lack of moral or ethical integrity. While law or treaty enforcement is a difficult thing; nonetheless, compensation for immorality is a goal of establishing laws to codify norms.

With large resources and without regulation, a country could develop imposing capabilities. Military dictatorships are an excellent example of a situation where this could occur. The subject of avoiding accidental nuclear war and agreements on limited test bans are also good references. There is a proposal for a CTBT. The Office of the President of the United States and the U.S. State Department websites address the CTBT and U.S. policy on the signing of this treaty. Arguments against the U.S. signing a CTBT are the probability of it limiting U.S. freedom of action to deny anticipated threats.

Law

Law is slave to interpretation, not morality, as Martin Luther King Jr. warned, “Never forget that everything Hitler did in Germany was legal” (King Circa. 1960s). Plato said, “Good people do not need laws to tell them to act responsibly, while bad people will find a way around the laws” (Plato circa. 300 B.C.). In many cases, especially concerning international circumstances, treaty is often used interchangeably with law, agreement, or convention. Law must be defined. “Law: a binding custom or practice of a community: a rule of conduct or action prescribed or formally recognized as binding or enforced by a controlling authority” (Merriam-Webster 2010).

How then, does treaty differ from law? If law is merely a binding custom of a community, then how can it be enforced with those who do not believe that very same community represents them? If law enforcement is conducted by a controlling authority, then who authorizes or recognizes that authority? Some have said that whoever can bring to bear the most force is the one who commands authority. This philosophy, one related to persistent conflict, does not fare well for those seeking peace. This is especially significant if Mao Tse-Tung (Mao Zedong) is correct in saying, “peace grows from the barrel of a gun” (Griffith 2000). If authority comes from a peaceful democratic process with consensus, then there are fewer reasons for concern in developing policy from international law.

A cautionary note must be made when relying upon law to establish policy. Analyzing law from the perspective of Martin Luther King Jr., morality comes into play here. Just because something is legal, it does mean it is right. The consequences for acting upon strictly legal grounds can be tactical victory at the cost of strategic moral failure. Analyzing law from the perspective of Plato, one can expect an adversary to find a loophole in every law.

The irresponsible adversary will subvert any established law. Irresponsible adversaries represent a portion of the threat condition. The lesson here may be to plan one’s policy to account for safeguarding national freedom for self-defense against lawless adversaries or threats. The 2006 *U.S. National Space Policy* does this by directing the DoD to “develop, capabilities, plans, and options to ensure freedom of action in space, and if directed deny such freedom of action to adversaries” (Office of the President of the United States 2006, 4). The DoD responds to this guidance with DoD Space Control

Policy (DoDI S-3100.15) *Tactical Denial*, which authorizations flexible deterrent options or a final reservation to conduct what could be termed as a hard kill.

Space Law

The relationship of space law can now be analyzed. What laws govern space? There are international and domestic laws that govern space, as well as treaties. Table 12 establishes the relationship of treaty, law, and policy to space.

Table 12. Treaty, Law, and Policy Relation to Space

	Treaty/Law/Policy	Category	Description
1	Treaty/Agreement/ Convention (Can be suspended during conflict)	Treaty/ Convention	1967 Outer Space Treaty
2			1968 Rescue and Return Agreement
3			1972 Liability Convention
4			1975 Registration Convention
5			1991 Strategic Arms Reduction Treaty (START I) Expired 1 December 2009
6			2002 Strategic Offensive Reduction Treaty “Moscow Treaty” Expires 31 December 2012
7		Agreement	1979 Moon Agreement (US is a non- signatory)
8			1963 Limited Test Ban Treaty
9			U.S./Russia Agreement to Prevent Accidental Nuclear war
10	International Law	International Law	The UN Charter
11			Law of Treaties
12			Law of Armed Conflict
13			Law of Neutrality
14			Law of the Sea
15			Air Law
16			Environmental Law
17	U.S. Domestic Law	United States Code (U.S.C.)	Title 10 U.S.C., Data Sharing
18			Title 15 U.S.C., Remote Sensing
19			Title 18 U.S.C., Malicious Interference with Satellite Transmissions
20			Title 22 U.S.C., Export Control
21			Title 42 U.S.C., NASA Act, “Peaceful Purposes”
22			Title 47 U.S.C., Violation of Radio Frequency Rules
23			Title 15 U.S.C., DoD Support to Commercial Space Activities
24			Title 50 U.S.C., Intelligence Oversight, Restrictions on collection against U.S. Persons
25		Commercial/ Military	1992 Land Remote Sensing Act
26			Posse Comitatus Act, 18 U.S.C. § 1385 (18 U.S.C. § 1385).
27			1807 Insurrection Act
28		Environmental	1978 Foreign Intelligence Surveillance Act
29	Environmental	See Policy	
30	U.S. Policy Directives /Instructions	National	2006 U.S. National Space Policy/National Security Space Guidelines
31		Defense	DoD Space Control Policy (DoDI S-3100.15) Tactical Denial and Hard Kill
32		Commercial/ Military	2003 U.S. Commercial Remote Sensing Policy
33		Environmental	DoDI 3100.12 Space Support, space craft end-of-life actions
34			Department of Transportation (DoT) and Department of Energy (DoE)
35			Strategic Command Instruction 550-4, Satellite Disposal Procedures

Source: Created by author from author’s analysis of multiple sources contained in the reference list of this thesis.

The distinction between international and domestic laws is important. Domestic laws are easier to enforce than international laws. International laws can be likened to a treaty because only the member of the governing body, who ratified a particular law--actually

recognize that law. This is not to say there are not ways to punish a violating state with sanctions, but it is important to note that not all international entities, such as states or non-state actors, recognize all or any international treaties or laws. There are also instances where members of an international governing body do not interpret the laws, agreements, or treaties the same way. Examples of this can be found within the United Nations (UN) with the U.S., China, and France. Each of these countries has at one time or the other conducted a launch or nuclear test that was controversial. This is not to say that any of these events were in specific violation, but merely controversial to other members of the same governing body.

Treaty

The third condition to be analyzed is treaty. Policy is established with the consideration of threats, treaty, and law. Treaty will be analyzed in general and then by specific space treaty. Conceptually, treaties are agreements that can then be ratified by a lawmaking body. A treaty is typically made between nation states. Non-state actors do not recognize treaties nor are they themselves, bound by treaties.

General Treaty

Treaty will be looked at conceptually and generally in order to next analyze space specific treaty. In order to differentiate treaty from law, a definition of law must be established. “Treaty: an agreement or arrangement made by negotiation: a contract in writing between two or more political authorities (as states or sovereigns) formally signed by representatives duly authorized and usually ratified by the lawmaking authority of the state” (Merriam-Webster 2010).

Treaty requires ratification from a domestic and international ratifying body. Treaty can be suspended in a time of conflict or war. The significance of this is who decides when to suspend the treaty and under what circumstances. Charles de Gaulle, the French General and Statesman says, “Treaties are like roses and young girls--they last while they last.” From Charles de Gaulle’s perspective, treaties are impermanent. In his support, many of the ratified treaties governing space, have, or will expire.

The 1991 Strategic Arms Reduction Treaty (START I), expired on 1 December 2009 (note: On 8 April 2010, the U.S. and Russia signed the new START). The 2002 Strategic Offensive Reduction Treaty (SORT), also known as the “Moscow Treaty,” expires on 31 December 2012. Benjamin Franklin, the American philosopher and statesman, argues about treaty along the lines that Plato argues about Law; he says, “mad kings and mad bulls are not to be held by treaties and packthread” (Franklin circa. 1700s).

The significance here is the importance of balancing existing conditions in developing policy by weighing the factors of treaty, law, and anticipated threat. This relationship can be described as understanding what the threat (manmade or natural) is capable of, regardless of restrictions or confinements; and understanding what the policy maker can do, given the existing limitations of laws or treaties. Once an understanding is established, a policy is made to guide decisions, while operating within the conditions.

International Space Treaties

A brief overview of the international treaties will be made. The major treaties governing space are the 1963 Limited Test Ban Treaty, 1967 Outer Space Treaty, 1968 Rescue and Return Agreement, 1972 Liability Convention, 1972-1994 U.S./Russia

Agreements to Prevent Accidental Nuclear War, 1975 Registration Convention, 1979 Moon Agreement, and the 2002 Strategic Offensive Reduction Treaty (SORT). See table 12 for a comparison of space laws, treaties, and policy.

The 1963 Limited Test Ban Treaty (LTBT)

The 1963 Limited Test Ban Treaty (LTBT) is a trilateral agreement negotiated by the U.S., former United Soviet Socialist Republic (USSR), and the United Kingdom prohibiting tests of nuclear devices in the atmosphere, in outer space, and underwater. It allows nuclear testing to continue underground, so long as radioactive debris is not allowed “outside the territorial limits” of the testing state.

As of 2006, there are 116 signatory countries, including new and future nuclear states: Argentina, Brazil, India, Israel, Pakistan, and South Africa. Though two major nuclear powers, France and the People's Republic of China, have not signed, they are now abiding by its provisions. At a 1991 conference on the LTBT, the United States, strongly opposed using the LTBT as a vehicle for negotiating a CTBT. The U.S. made it clear to all participants that it would block any attempt to amend the LTBT by consensus (Atomic Archive 2010). In 1992, China exploded a bomb beyond the LTBT limits (Atomic Archive 2010).

In September of 2009, on the subject of the CTBT, the President of the United States made remarks to the United Nations general assembly. He stated, within the week, the U.S. “Secretary of State will become the first senior American representative to the annual Members Conference of the Comprehensive Test Ban Treaty” (Department of State 2009, 1). In order to understand how relevant test ban treaties are to the threat environment, it is useful to know how frequent nuclear tests are. “According to the

Natural Resources Defense Council, the United States conducted 1,030 nuclear tests, the Soviet Union 715, the United Kingdom 45, France 210, and China 45. The last U.S. test was held in 1992; the last U.K. test, in 1991. Russia claims it has not conducted nuclear tests since 1991” (Medalia 2006, 3). This 2006 summary does not include sub-critical testing conducted in Nevada by the U.S. and United Kingdom in 2002. The summary does not include subterranean testing like that of North Korea.

The 1967 Outer Space Treaty

The 1967 Outer Space Treaty is the first of five major space treaties. It establishes exploration of outer space, moon, and other celestial bodies for all countries, establishes liability, and generally bans nuclear weapons and WMD in space. The treaty prohibits the testing of any weapon on a celestial body. It calls for States to, “refrain from placing in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction or from installing such weapons on celestial bodies” (1967 *Treaty on Principles Governing the Activities of States in the Exploration and use of Outer Space, Including the Moon and Other Celestial Bodies*).

Significant to this treaty is that the language does not preclude weapons that are less destructive than WMD to be employed in space. It does prohibit any weapons of any kind on the moon. This is no small distinction, for it allows states to possess weapons in space. Many assume that the Outer Space treaty bans all weapons, and it does not.

The 1968 Rescue and Return Agreement

The 1968 Rescue and Return Agreement is the second of five major space treaties. It establishes procedures for the rescue of astronauts and a status of forces

agreement to return astronauts and equipment back to the launching country. The 1972 Liability Convention is the third of five major space treaties. It expands liability established in the Outer Space Treaty. It establishes procedure for resolving damage claims and clearly defines liability for damages caused on earth or in space because of a launching country's actions.

The U.S./Russia Agreements to Prevent Accidental Nuclear War

The 1972-1994 U.S./Russia agreements to prevent accidental nuclear were a continued process to prevent situations in 1972 and 1973 that brought both countries close to nuclear war, specifically at sea. Accidental nuclear war relates to four major scenarios of concern: (1) the unauthorized use of nuclear weapons, (2) the mechanical failure of a nuclear system leading to detonation, (3) the false warning of an imminent attack, and (4) a misperception of an international incident that escalates to nuclear exchange. The Cuban Missile Crisis (1962-1963), Yom Kippur War (1973), and various naval maneuvers by the U.S. and USSR lead to agreements like the 1972 Agreement on the Prevention of Incidents at Sea and the U.S./Russian agreements to prevent accidental nuclear war. Some space capabilities are designed to monitor, detect, and analyze aspects of launch capabilities and events in order to prevent an accidental nuclear war. By being able to characterize different launches, preparations, or other incidents, a nation can better determine intent; or it can neutralize a launch without a nuclear disaster.

The 1975 Registration Convention

The 1975 Registration Convention is the fourth of five major space treaties. It establishes procedure for launching countries to report objects launched or no longer in

orbit and establishes a subjective timeliness to report launches. It requires countries to maintain national registries. The purpose for this treaty is to prevent collisions and track debris.

The 1979 Moon Agreement

The 1979 Moon Agreement is the fifth of four major treaties governing space. The United States is not a signatory. This agreement establishes the moon in a similar way as the Antarctic Treaty. It looks to establish practices for natural resource exploitation. It establishes the moon and celestial bodies' natural resources as a common heritage not to become property of a single state.

The 2002 Strategic Offensive Reduction Treaty (SORT)

The 2002 Strategic Offensive Reduction Treaty (SORT). The Moscow Treaty is different from the Strategic Arms reduction Treaty (START) in that it limits actual warheads, whereas START I, limits warheads only through declared attribution to their means of delivery (ICBMs, SLBMs, and Heavy Bombers). Russian and U.S. delegations meet twice a year to discuss the implementation of the Moscow Treaty at the Bilateral Implementation Commission (BIC). Criticisms of this treaty are:

1. There are no verification provisions to give confidence, to either the signatories or other parties, that the stated reductions have in fact taken place.
2. The arsenal reductions are not required to be permanent; warheads are not required to be destroyed and may therefore be placed in storage and later redeployed.
3. The arsenal reductions are required to be completed by December 31, 2012, which is also the day on which the treaty loses all force, unless extended by both parties.

4. There exists a clause in the treaty, which provides that withdrawal can occur upon the giving of three month's notice and since no benchmarks are required in the treaty, either side could feasibly perform no actions in furtherance of the treaty, and then simply withdraw in September of 2012.

Nation State Compliance

Current treaties allow what can only be termed as acceptable risk. There are several countries, which are operating within the treaties they have signed or within established UN sanctions. The actions of these countries represent the political freedom still available for nation states to operate in a grey area. North Korea conducted a missile test in July 2006, in close proximity to the timing of a U.S. space shuttle launch, but the rocket failed shortly after take-off. In May and October 2006, North Korea conducted nuclear tests underground.

In January 2007, China violated accepted practice, not treaty, with its anti-satellite missile testing (reminiscent of the 1992 nuclear testing issue violating the Limited Test Ban). In April 2009, North Korea attempted to launch a satellite. "North Korea has signed the appropriate international protocols governing satellites and given the proper notification. The UN resolution sanctioning North Korea after its 2006 nuclear test does not explicitly forbid satellite launches" (Feffer 2006).

North Korea's actions in April 2009, to launch a satellite by rocket, alarmed political analysts. While North Korea's actions may have been alarming, they were not operating against treaty. Based on Feffer's analysis, North Korea is also free to continue satellite launches. North Korea's satellite launches are conducted using the same long-range missile vehicle, the Taepodong rocket. North Korea's success rate in missile

launches is zero out of three attempts. What prohibits a non-state actor from testing nuclear devices if nation states cannot be controlled?

Law and Treaty Findings

The following findings relate to law and treaty. While it is not the goal of this thesis to affect law or treaty, applicable findings are listed where the importance to the space policy is concerned. There were sufficient law, regulation, and treaty issues related to this topic to include these findings in this section for the purpose of improving space policy and DSCA.

Law

It is not the goal of this thesis to improve the law, as law is a pre-existing condition to policy. However, in the course of analysis, if a particular law or regulation was significant in affecting space and DSCA, it is included. The FAA restricts UAS in U.S. airspace. Normally, this is not be an issue. Two issues make FAA restrictions on UAS in U.S. airspace applicable to this thesis. First, the limit of airspace and space is not clearly defined, so future UAS may operate in an area overlapping space and airspace. Second, UAS are an important component of DSCA and Incident Assessment and Awareness. Only through formal request can UAS operate in U.S. airspace. The reason for this is flight safety (particularly between UAS and rotary wing aircraft). Manned aircraft are already a hazard, as referenced by the Marine and Coast Guard collision near California, in October 2009.

The issue here is that FEMA, DHS, FAA, and DoD must be more proactive in jointly planning UAS operations related DSCA. Especially, since DoD owns the majority

of all UAS. Existing FEMA Emergency Support Functions and memorandums establish aviation support packages for disaster support. UAS packages should be developed and the FAA should establish contingency plans that compliment their use. An attitude appears to exist that creating UAS airspace is a DoD problem, since they own the majority of these systems. It is irresponsible to operate this way.

The FAA must better pre-plan a system to clear airspace or create restricted operating zones, within airspace, for UAS to perform DSCA missions under commanders' immediate response authority. The existing FAA regulation, limits defense assets from executing immediate response without the FAA first, grounding other aircraft, or implementing other airspace control measures. Appendix G contains further discussion related to UAS, UAV, and legal implications on their use for DSCA.

A second finding related to law is that the DoD has yet to completely comply with providing an unclassified *Space Protection Strategy* or *2008 Space Posture Review*. Both are mandated by congressional public law. The current *Space Posture Review* and *2008 Space Protection Strategy* have classified annexes but do not accomplish the specific, unclassified, requirement or spirit of the law. In light of the established problems with information sharing, the significance of publishing a publicly disseminated product cannot be neglected. Failing to publish a public document on the *Space Posture Review* and *Space Protection Strategy* also neglects the importance of these documents on domestic and foreign policy. Commercial applications are affected by these two documents when approximately 85 percent of DoD's SATCOM relies in some way on commercial architecture. Potential commercial providers could posture to provide better platforms if more public guidance was available.

There are resource and technology development implications if desired capabilities are not publicized. The published direction for space technology development affects the economy and many businesses dress off national policy and strategy. Therefore, it is useful to publish something that would define current national space policy, strategy, or an evaluated status in a posture review. A strength of the 2006 *U.S. National Space Policy* is its public declaration and dissemination. It specifically addresses civil, military, and commercial domains. A *Space Posture Review* and *Space Protection Strategy* are valuable in their availability to civil and commercial consumers.

Treaty

Similar to the area of law, it is not the goal of this thesis to improve treaty. However, in the course of analysis, a significant issue arose, which highlights the importance of policy to treaty. Treaty is an existing condition to policy. There are times when an existing policy will affect treaty. This is not optimal. President Bush's 2006 *U.S. National Space Policy* affected U.S. foreign policy on signing any treaty that would limit U.S. freedom of action in space. A specific example of such a treaty that would limit U.S. freedom of action in space is the CTBT. The U.S. has not signed this treaty because of its perceived limitations to U.S. freedom of action. Some believe that current treaties ban all weapons in space; however, this is not the case. The U.S. is no longer a current signatory to any treaty that bans all weapons or defensive/offensive countermeasures in space.

Recently, under President Obama, it appears that the Administration would like to go in a different direction than the previous administration and its policies on freedom of action in space. A press release identified that the U.S. would participate more in the committee formulating the CTBT. This appears to be a different posture than that

established by the 2006 *U.S. National Space Policy*. Despite the obvious intent, there is a deficit of public documents to guide the nation in a new direction. New space policy supporting the signing of a treaty that would limit U.S. freedom of action in space is not publicly available. There are few successful or functional organizations, which operate without a published mission or vision statement.

Ultimately, any organization exists to achieve results. In order to achieve results, a leader must harness an organization's components. In *Leadership: Enhancing Lessons of Experience* (Hughes, Ginnett, and Curphy 2005), the Rocket Model of team effectiveness is introduced. The first stage in the rocket model (its fuel) is mission. Here, a leader establishes the vision for the organization; and upon that foundation, the other stages build.

The 8 April 2010 signing of the new START treaty between the U.S. and Russia, establishes a significant stance on continued arms reduction. If the current Presidential Administration desires to change its policy on arms control, it should consider formally changing its space policy to reflect that changed condition. Otherwise, one begins following policy that does not reflect existing conditions.

Law and Treaty Recommendations

For similar reasons that the law and treaty findings were included, law and treaty recommendations were included. The following recommendations refer to law and treaty, respectively. Implementations of these recommendations would aid in national security, space systems, and homeland security.

Law

Recommendations to law encompass legislation to address DNI authority on enforcement of information sharing within the Intelligence Community. Mandates for policy evaluation, and revision are recommended. Changes to FAA procedure or regulation are recommended along with revisions to 32 CFR 185.

The DNI must be given legal authority over Intelligence Community budgets if he is to be able to control the community. There is no incentive to cooperate within the IC, because there is no unified individual on everyone's report card within the IC. DoD is a strong opposing player in this dynamic, and the most likely to resist relinquishing any budgetary control.

The National Intelligence Priority Framework (NIPF) is one of the biggest improvements from the DNI in synchronizing and prioritizing intelligence, but there are inherent flaws in dissemination of intelligence that does not meet the current priority. In other words, a flaw in the current system is that important intelligence can fall on deaf ears if it does not meet top priorities. There is not a good way to brief emerging threats outside established priorities. The current NIPF has the propensity to cause certain information to effectively hit the cutting room floor--only to rise to the public consciousness when priorities change. This usually occurs after an incident, when it is too late.

Legislation directing policy review and evaluation is necessary. Congress saw the utility in directing a *Quadrennial Defense Review*, so much so, that it now makes DHS do the same thing through a *QHSR*. Congress may do well to mandate this for all departments.

Additionally, documents like the *NSS* are mandated by public law under the 1986 Goldwater-Nichols Act; requiring the publication of a *NSS* by 15 June of a new administration. No Administration has ever accomplished this; however, each has requested extensions. In a time when the Intelligence Community is under fire for failure to analyze and disseminate information, policymakers are slow to disseminate their most valuable information, their own policy and strategy. There is as an old adage that a good plan now is better than a perfect one tomorrow. It is recommended that a frequency be mandated and an enforcement function be assigned for policy review, evaluation, and update for policymakers. The area of enforcement is the most significant.

Due to constraints on UAS operation within U.S. controlled airspace, FAA regulations should be revised to allow procured DoD UAS to operate in a DSCA role. There must be a preplanned method to conduct emergency clearance of UAS for operations under DSCA and Immediate Response Authority of local Title 10 UAS. The National Response Framework does well in establishing Emergency Support Functions; however, there is more work to be done in improving Executive Order 12333, *Intelligence Oversight* and FAA procedures for UAS operation in DSCA. This is an area recommended for further study since issues established with UAS and other collection platforms in the 2005 Hurricane Katrina disaster and other incidents on immediate response dating back to the 1995 Oklahoma City bombing.

The 32 CFR §185.4 should be revised to include the new language concerning DSCA instead of military assistance or military support to civil authorities. Additionally DoD has already formulated recommendations on other changes to the 32 CFR 185, which should be incorporated. A section dedicated to authorizing intelligence systems to

be used for other than intelligence purposes during DSCA would be extremely useful in the conduct of DSCA; and should ultimately, be reflected in Title 18 and Title 50 U.S.C., followed by policy revisions.

Treaty

Based on the intent of the 2006 *U.S. National Space Policy* on freedom of action, and the nature of anticipated threats, it is the recommendation of this thesis that the U.S. not sign the CTBT or other treaties limiting its freedom of action. In part this would create a condition that would force the U.S. to change its policy on freedom of action. Threat analysis does not support limiting U.S. freedom of action in space or elsewhere. It is a recommendation that U.S. continue to seek arms reduction of nuclear missiles, but not to eliminate all options for freedom of action through the ban of all nuclear weapons. The signing of the 8 April 2010, START will not completely deny U.S. capability for freedom of action.

APPENDIX D

PRESIDENTIAL POLICY DIRECTIVES

Table 13. Presidential Directives			
Acronym	Description	Time Period	Administration
NCSCID	National Security Council Intelligence Directives	1947-1977	Truman - Ford
NSAM	National Security Action Memorandums	1961-1969	Kennedy and Johnson
NSSM	National Security Study Memorandums	1969-1977	Nixon and Ford
NSDM	National Security Decision Memorandums	1969-1977	Nixon and Ford
PRM	Presidential Review Memorandums	1977-1981	Carter
PD	Presidential Directives	1977-1981	Carter
NSSD	National Security Study Directives	1981-1989	Reagan
NSDD	National Security Decision Directives	1981-1989	Reagan
NSR	National Security Reviews	1989-1993	G. H. W. Bush
NSD	National Security Directives	1989-1993	G. H. W. Bush
PRD	Presidential Review Directive	1993-2001	Clinton
PDD	Presidential Decision Directives	1993-2001	Clinton
NSPD	National Security Presidential Directives	2001-2009	G. W. Bush
HSPD	Homeland Security Presidential Directives	2001-	G. W. Bush and Obama
PSD	Presidential Study Directives	2009-	Obama
PPD	Presidential Policy Directives	2009-	Obama

Source: Created by author from data in the Federation of American Scientists, Intelligence Resource Program, “Presidential Directives and Executive Orders.” <http://www.fas.org/irp/offdocs/direct.htm> (accessed 13 February 2010).

APPENDIX E
STRATEGY AND CAPABILITY

Once policy is reviewed, it is possible to consider the strategy developed from policy. Strategy guides capability development. The 2006 *NSS* has not been updated since President George W. Bush's Administration. The 2008 *NDS* was issued soon after Secretary Gates took office.

The 2008 *Space Protection Strategy*, mandated by Congress, was not published in the full spirit of the mandate established by the 110th Congress. The congressional mandate required an unclassified document, with classified annexes. The unclassified portion consists primarily of a congressional cover letter to the classified document. It is reasonable to expect the entire details of a space protection strategy to be classified for national security; however, the purpose of an unclassified document is to inform citizens and the interested U.S. economic parties.

Another purpose of a public strategy is to shape how adversaries see U.S. strategy. The 2004 *NMS* has not been updated by any Chairmen, Joint Chiefs of Staff, since General Richard B. Myers' tenure. Strategy determines the desired capabilities needed to combat these threats. Admiral Mike Mullen gave a lecture in which he commented on the relationship between policy and strategy.

Policy and strategy should constantly struggle with one another. Some in the military no doubt would prefer political leadership that lays out a specific strategy and then gets out of the way, leaving the balance of the implementation to commanders in the field. But, the experience of the last nine years tells us two things: A clear strategy for military operations is essential; and that strategy will have to change as those operations evolve. (Mullen 2010)

One must understand the existing capabilities the nation possesses to combat expected threats. The next step is to understand what capabilities are specific to space applications and how these applications are relevant to DSCA. This is a large area of study; however, this thesis will attempt to address the area by beginning with a broad background overview and then narrowing it down to the specific components relevant to space and its support to civil authority.

Understanding what capabilities exist develops the background necessary to evaluate whether the U.S. has the necessary systems to combat the established or expected threats. If the U.S. does not have the necessary systems, it is important to study why. If there are security gaps, then the limitations of law or treaty, policy, strategy or capability, or resources must be reviewed.

The 2010 QDR and 2010 QHSR provide an idea of what capabilities the respective departments are building. The DHS Target Capabilities List and the Military Critical Technologies List also provide information on desired capabilities for the military and DHS, respectively.

APPENDIX F

RESOURCES

The public must understand how the nation applies its budget to space, defense, and homeland security. The public must know how well policy is applying resources to their security, and whether it is appropriate. The public should know how spending on U.S. space based and related systems, compares to other nation's expenditures on space activity.

Study of resources for space, defense, and homeland security cover a spectrum of official U.S. Department budgets and baseline proposals to professional institute evaluations of budget proposals. There are *Congressional Research Studies (CRS)* and there are Department produced performance reports. The DoD 2006-2010 *QDR* report and the DHS FY2008-2010 *Annual Performance Report* provide a relationship of budget to performance. The DoD FY2010, *Green Book*, and other budgetary documents such as the National Aeronautics and Space Administration (NASA) Budget documents, and the Office of Management and Budget (OMB) for all Departments are studied.

The reason the public must know defense program expenditures is due to the role the public plays in government accountability. In a democracy, each branch of the government is accountable to another and the government is ultimately accountable to the public. Understanding the budget is important in understanding what funding is available to support the development and maintenance of space systems. This allows politicians to appropriate and fund programs that keep U.S. interests secure.

DoD Budget for Space

Analysis of DoD “space based and related systems” is contained below. Analysis of how the President applies resources to achieve policy objectives may aid in evaluating priorities and whether or not policy should be revised to reflect any new priorities.

Analysis of budget requests for FY2010 were used as the main reference for comparison.

Transformational Satellite Communications Satellite (TSAT) and Advanced Extremely High Frequency Satellite (AEHF)

Significant to the FY2010 budget, is the redirection of \$1.784 billion from TSAT to the AEHF. The President canceled the TSAT program and redirected the funding for FY2010 into AEHF. The HASC’s 2009 report identified a gap between the jam resistant capabilities of the TSAT and the non-jam resistant capabilities of existing alternatives, such as the Wide-band Global Satellite Communications (SATCOM) system (WGS). AEHF, “will only be capable of delivering a fraction of the protected communications bandwidth that was anticipated in the TSAT” (HASC 2009, 205).

The significance is that in a network centric defense strategy, reliant upon strategic communications and other enhancement capabilities--space systems should not be susceptible to jamming. The current and future threat conditions clearly identify jamming as a real threat capability.

Mobile User Objective System (MUOS)

MUOS is a communications constellation and land interface. It is designed as the next generation to provide secure, communications on the move. In FY2009, Congress appropriated only \$858.2 million. The President requested a 5.3 percent increase of \$45.4

million with a \$903.6 million in his FY2010 request. MUOS is expected to launch by August 2010.

Global Positioning Systems and Positioning, Navigation, and Timing (GPS & PNT)

The current GPS constellation of 24 satellites is not fully resistant to jamming. GPS III satellites are the next generation of GPS, resistant to jamming and interference. President Obama requested a small increase (one third of a percent) of \$3.4 million over the FY2009 request, totaling \$927.8 million for FY2010 (Department of Defense 2009b, 3-54).

The increase dedicates funding almost exclusively for RDT&E. Funding for RDT&E does not immediately put any new satellites into orbit; in fact, the initial GPS III satellite launch is not planned until 2014. The danger of unshielded technology from a nuclear blast created Electro-Magnetic Pulse (EMP) has not disappeared from the lexicon of threat capability either; and yet, current hardware such as GPS receivers and other sensitive equipment are often unshielded.

Space Based Infrared System-High (SBIRS-High)

SBIRS-High is a detection satellite system for detecting missile launch experienced no real growth in the FY2010 budget. Slightly more than \$1 billion was requested, representing a decrease of \$1.3 billion from FY2009 appropriations (Department of Defense 2009b, 3-55). The real significance of this is the reduction of satellites by half, only one will be launched instead of two. This returns SBIRS-High to FY2008 standards. The SASC recommended the addition of \$15 million for High Earth Orbit or highly elliptical orbit (HEO) satellites and ground control stations (SASC 2009,

81-82). The SASC also noted Geosynchronous Earth Orbit (GEO) satellites experience delay and cost overrun, so it recommended that the Air Force look to buy these satellites at fixed prices. SBIRS-High appears to have stronger support from the Congress and Senate than the President does.

National Polar-Orbiting Operational Environmental Satellite System (NPOESS)

NPOESS is a global environment monitoring collection and dissemination process. It will replace the military's current Defense Meteorological Space Program and the National Oceanographic and Atmospheric Organization (NOAA) Polar-Orbiting Operational Environmental Satellites (POES). President Barack Obama wants to increase the NPOESS budget from \$287.5 million to \$400.5 million for FY2010. This represents a 39 percent increase from FY2009 to FY2010.

Despite the national priority of NPOESS, the HASC is not confident that the tri-agency committee currently administering the program can solve the program's consistent issues. The SASC increased the NPOESS budget by \$80 million due to its national importance, but directed the Air Force to withhold half of the appropriation until the tri-agency committee complies with the HASC directive for the tri-agency committee to submit its restructuring evaluation to Congress. The SASC cited the NPOESS as "a disjointed, barely functioning program," in need of Presidential intervention (SASC 2009, 163).

Operationally Responsive Space (ORS)

ORS is defined by DoD as assured space power for Joint Force Commanders' needs. Under United States Northern Command, the Joint Force commander or a JTF

North commander, or JTF National Capitol Region commander operates either in a National Defense role, or more commonly in a Defense Support to Civil Authority role. The President's FY2010 request reduces the ORS budget by 42.5 percent. The FY2010 ORS budget request is \$112.9 million, a decrease of \$83.7 million from FY2009. The HASC added \$23.4 million (HASC 2009, 204). The SASC recommended an additional \$40 million to ORS (SASC 2009, 79). The SASC also recommended an additional \$227.9 million for prototypes of moderate-imagery satellites with 36 months of contract awards (SASC 2009, 80).

Space Tracking and Surveillance System (STSS)

STSS is the space part of an overall integrated missile defense system. STSS is part of the MDA. The President decreased the STSS budget by 13.8 percent, or \$28.9 million. The FY2010 request was \$180 million, down from \$209.6 in FY2009. This continues a trend since FY2008, when the FY2009 request decreased the STSS budget by 9.4 percent, or \$21.9 million.

Defense Advanced Research Projects Agency (DARPA)

DARPA space programs and technology strives to maintain a U.S. military technical superiority and surprise edge against adversaries. The President decreases the FY2010 DARPA budget by 11.4 percent, or \$25.8 million. The FY2010 request was for \$200.6 million. DARPA reduction is more a function of re-pricing than real loss. Congress, criticizes DARPA for adjustment to funding without any justification, and has directed it to provide increased detail (P.L. 2009, 411).

Under DARPA, the Satellite Program for Instant Depletion of Energetic Radiation (SPIDER) is a system designed to neutralize the radiation affects of High Altitude Nuclear Detonations (HAND) on Low Earth Orbit (LEO) satellites. The President doubles the FY2010 from \$17 million in FY2009 to \$31 million.

The System F6 program budget also doubles from \$44.7 million in FY2009 to \$92.7 million in FY2010. The FY2009 budget represented a doubling of the FY2008 budget of \$21 million. This totals a quadrupling of the System F6 program since FY2008.

National Security Space Office (NSSO)

NSSO conducts long-range strategic planning and assesses defense and intelligence space programs for conformity to policies. The President's \$10.6 million request increases the NSSO budget by 39 percent, or \$3 million in FY2010. In FY2008, there was significantly less confidence in the NSSO.

Maui Space Surveillance System (MSSS)

MSSS is the largest telescope in the DoD and is the only one of its kind in the world. The President's FY2010 request decreases the budget by 86 percent, or \$30.6 million. Congress restored \$31 million in FY2009 when the President made a similar reduction.

Nuclear Space Detection System--Space Component (NUDET-Space)

The NUDET System consists of space and land or user segments. The space component uses GPS satellites to house its sensors. This is a combined DoD and Department of Energy effort. The President's FY2010 request doubles the budget with a

\$99.4 million price tag. In FY2008, Congress appropriated \$54.1 million to NUDET, and \$69.8 million in FY2009. It is significant to highlight that this increase is in RDT&E, while procurement apportionment declines.

Evolved Expendable Launch Vehicle (EELV)

The EELV is a government and commercial launch service. It replaces the Delta, Atlas, and Titan missile launch platforms. The President's FY2010 request decreases the EELV budget by 4.5 percent, with a \$1.32 billion in comparison to FY2009 appropriations of \$1.39 billion. The HASC reduced this request by \$88.1 million. However, the SASC recommended adding \$12 million for GPS launch tracking to reduce the cost of radar tracking (SASC 2009, 82-83).

Space Lift Range System (SLRS)

SLRS is a ground based space system component of surveillance, navigation, flight operations, analysis, communications, and weather assets. The President's FY2010 request reduces the SLRS budget by three percent, or \$3.3 million. FY2009 appropriations were \$113.6 million and the FY2010 request was \$110.3 million. Significant to the apportionment of this request is that 90 percent of the funds are focused on RDT&E, not acquisition or employment (Department of Defense 2009c, F-20; 2009d, F-12).

Space Situational Awareness (SSA)

SSA encompasses programs that assure a safe operating environment for space assets. The President's FY2010 request increases the SSA budget by 37.9 percent, or \$137.8 million. FY2009 appropriations were \$224.9 million compared to \$362.7 million

requested for FY2010. In 2008, the Air Force planned to spend \$824 million on its Space Based Surveillance System (SBSS), needed to fill a critical void in monitoring satellites and avoiding collisions. Previously, this function could only be performed from the ground when the sun reflects on satellites.

The SASC highlighted a gap in the President’s budget request regarding missile defense integration. The request allocates no funding to integration of X-band radar into the space surveillance network. The SASC recommends an additional \$5 million for a prototype capability that performs this necessary integration (SASC 2009). Table 14 contains a summary of DoD space programs of interest.

Table 14. DoD Space Security Programs of Interest			
DoD Space Security Programs of Interest (Budget FY2008-2010)			
	Fiscal Year		
	In Millions of Dollars		
Project Category	FY08	FY09	FY10
High Energy Laser Use	69.675	74.438	107.428
Space Control Technology	165.328	209.859	281.892
Operationally Responsive Space (ORS)	86.985	196.561	112.861
Microsatellite and Rendezvous Technology	39.070	62.375	103.021
Space Situational Awareness	292.297	274.304	373.121
Joint Space Operations Center (JSPoC)	0.000	0.000	131.271
Missile Defense	204.707	189.567	301.500
Miscellaneous	44.100	40.800	44.000
DoD Space Programs of Interest Totals	902.162	1047.904	1455.094

Source: Created by author from data contained in The Stimson Center, *Space Security Programs of Interest in the Fiscal Year 2010 Department of Defense Budget Proposal* (Washington, DC: The Henry L. Stimson Center, 2009).

Figure 9 is an illustration of how DoD funding for space, on procurement, compares to RDT&E.

National Space Security Budget FY2008-2010 (in millions of dollars)

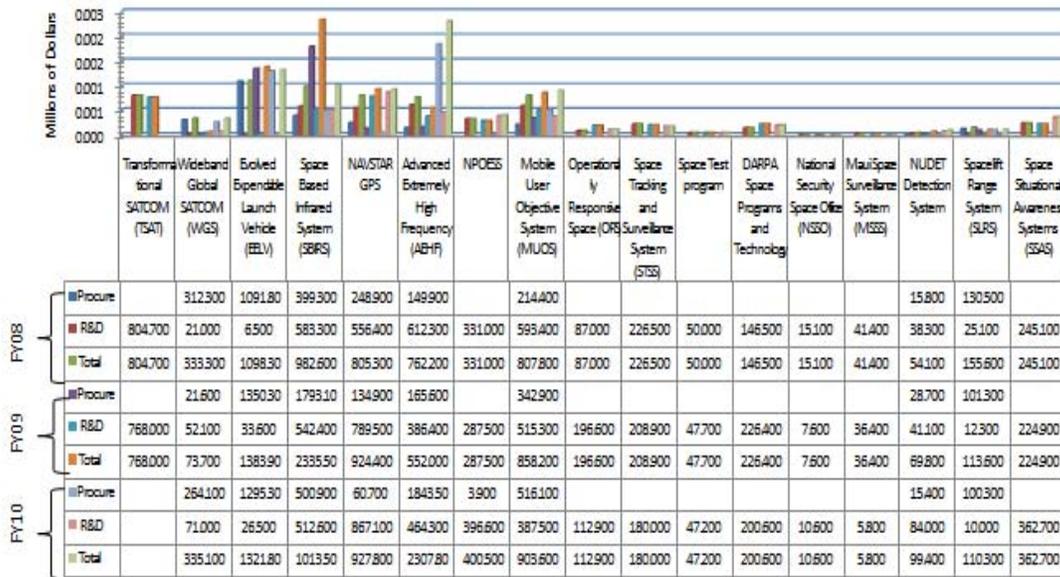


Figure 9. DoD National Security Space Budget FY2008-2010

Source: Created by author from The Marshall Institute Policy Outlook, *Considering the Fiscal Year 2010 National Security Space Budget* (Washington, DC: The George C. Marshall Institute, 2009).

By budget alone, DoD is one of the largest space enterprises in the U.S.; however, it is not the largest. Compared to NASA’s FY2010 space budget of approximately \$18.7 billion, DoD’s FY2010 space related budget is only \$11.1 billion. One of the difficulties in measuring how much of DoD’s budget is allocated towards space is inherent in national security matters. Some professionals assess the DoD space budget to be larger than NASA (Smith 2010). The Stimson Center attempted to look beyond the primary space related categories in the DoD budget, to analyze space security programs of interest. Figure 10 depicts the relevant fiscal year comparison from the Stimson Center’s research. The Center categorizes DoD space security programs beyond its common

categories of space force enhancement, space support, and space control. The Stimson Center created the following categories: high-energy lasers, space control, operationally responsive space, microsatellite technology, space situational awareness, joint space operation center, missile defense, and miscellaneous.

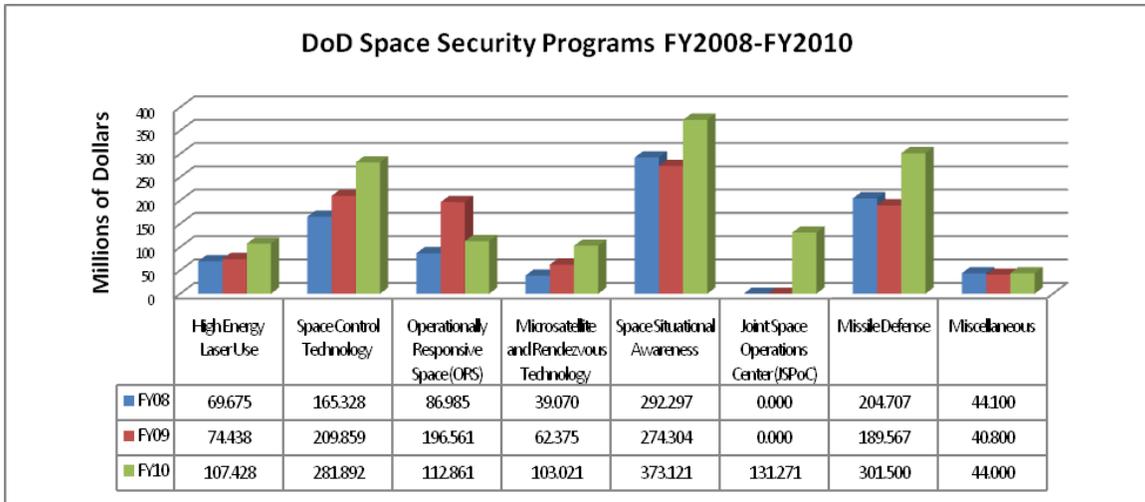


Figure 10. DoD Space Security Budget FY2008-FY2010

Source: Created by autor from data contained in The Stimson Center. 2009. *Space Security Programs of Interest in Fiscal Year 2010 Department of Defense Budget Proposals* (Washington, DC: The Henry L. Stimson Center, 2009).

Resource Findings

Analysis of fiscal year budget authorities and requests presented by the President for DoD, do not support the 2006 *U.S. National Space Policy* guidance on space as being equal in importance to air and sea power. Budget cuts on space based and related systems, as well as civil space exploration exist. Shielding systems from jamming, electro-magnetic pulse, or other related environmental hazards have reduced in funding and priority while their threat persists.

In several instances, the HASC and SASC appropriated space based and related systems budgets, when the President did not request funding for systems that the committees believed to be important. This demonstrates a positive process in which there are some checks and balances to what systems and capabilities receive funding; while, programs like NPOESS are cited for poor management and execution.

Documents like the 2006 *U.S. National Space Policy*, 2008 *Space Protection Strategy*, and *Space Posture Review* are designed to provide a unified vision that the President, Congress, constituents, and subordinate government departments can use to synchronize priorities for procurement and RDT&E. Analysis found that in fiscal years 2008-2010, spending on RDT&E of space based and related systems, outweighed procurement (Mazol 2009, 10). That would indicate that more money is spent on developing technology for new systems than is spent on producing the systems. That is a simplified finding. There are mitigating factors for this, RDT&E is applied to future systems and is not entirely wasted when a system never reaches procurement.

Another mitigating factor in RDT&E and procurement is that the complexity of space systems requires a higher expenditure on RDT&E before funds are committed to procuring or launching systems. Regardless of the mitigating factors, the U.S. often spends more money than a system is worth before it is even procured, or before the program is terminated. TSAT is a good example of a system that spent more than 10 years in RDT&E before it was terminated, without a single satellite launched. NPOESS is the most glaring example of a mismanaged system. AEHF is another program that has missed its projected mark. It missed its anticipated 2009, first launch.

Resource Recommendations

The 2006 *U.S. National Space Policy* is incongruent with DoD budget requests since its release. There are two options, either the policy should drive the President and DoD to request resources proportionate to the existing policy, or it must change to accurately reflect space system priority the newly desired ratio. DoD space procurement and RDT&E should act to adjust the ratio between the two. Historical spending on RDT&E has been larger than procurement.

Theoretically, the cumulative RDT&E should now amount to a knowledge base allowing rapid procurement of needed systems and the delivery of these capabilities into the space architecture. The opposite is the case. The RDT&E cycle is too slow to outpace threat capability. Therefore, time and money are wasted. The waste is in developing the perfect solution for an outdated threat. This occurs just in time for the existing and aging systems to require immediate replacement. Examples are the Defense Satellite Communications System, MILSAT, TSAT, and GPS III. These are ultimately strategy issues of how the U.S. accomplishes its objectives.

It is recommended that a strategy be developed for a rapid fielding initiative to deploy needed capability using minor upgrades to existing technology. The Hubble telescope is a great example of how a failure was salvaged through an upgrade delivered in space. RDT&E focused on recycling of existing capability would provide cost effectiveness and would provide more safety by relying on proven platforms. This would reduce risks and losses like that of the Delta II rocket or the loss of necessary redundancy existent in total reliance in the EELV.

APPENDIX G

EVALUATION

Analysis of department performance evaluation between DoD and DHS revealed some areas demanding further study. The result of further analysis was conducted to determine relevance to the topic of DSCA. UAS are an unresolved problem area.

Unmanned Aerial Systems and DHS

Do UAS have anything to do with space or DSCA? There is some debate as to how to classify UAS. Some UAS are operating in near-space or are communicating with other near-space assets. Near-space is defined as the area between airspace and outer space, or about 12.5 miles to 61.6 miles above sea level. Regardless of how one classifies UAS, most experts agree that UAS are important to conducting ISR and providing a safe way to monitor an area at a lower cost and risk to manned systems.

There is no mention of UAS or UAVs in the entire 2010 *QHSR*, not even in response to acquisitions for future border security. The only inference that can be made from this is that DoD must be the anticipated and enduring provider for UAS support to civil authority. However, as already established, DoD acquisitions are focused on overseas requirements and employment, while domestic regulations do not reflect planning for UAS expansion within U.S. airspace. Analysis reflects little evidence of “integration” between agencies and departments from law to procurement for UAS and border security. More importantly, planning for UAV support in the event of an emergency within a congested civilian airspace does not look integrated at all.

Unmanned Aerial Systems and DoD

UAS have been a topic of space discussion and homeland security discussion. The Federal Aviation Administration (FAA) governs domestic airspace. FAA regulation specifically prohibits UAS use, “No person may operate a UAS in the national airspace system without specific authority” (FAA 2007, 6689-6690).

Several military and government agencies are authorized to operate UAS in the U.S.; however, their operating areas are confined to areas already free of commercial air traffic. “The FAA has indicated that, at present, it is only issuing experimental airworthiness certificates for unmanned aircraft. By being designated as experimental, these vehicles are restricted to sparsely populated areas and away from routes used by manned aircraft” (Elias 2009, 38). The 2010 *QDR* response to the overall UAS issue is to produce more systems now for overseas contingency operations, despite restrictions for their use within the U.S. for civil support, “In FY2010, the Department made a commitment to grow to a capacity of 50 sustained orbits of Predator/Reaper by FY2011” (Department of Defense 2010a, 22).

Procurement of UAS for overseas employment, in the absence of a domestic area to operate, is not necessarily a shortsighted plan. The Secretary of Defense is widely known as a very insightful leader. DoD procurement of UAS is one portion of developing a useable DSCA capability. It is the responsibility of the U.S. Government to allow the full use of UAS within appropriate safety control measures. Changes to regulation or exceptions to policy can resolve the UAS restriction problem faster than the acquisition process to build, train, and field UAS. In the meantime, UAS can continue to deploy in

support of forces in contact overseas and in DSCA counter-drug operations, until airspace control issues are resolved for domestic use.

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1 Reynolds Avenue
Fort Leavenworth, KS 66027-1352

MAJ Nicholas Martin
Joint Space Operations, Department of Joint, Interagency and Military Operations
USACGSC
100 Stimson Avenue
Fort Leavenworth, KS 66027-2301