NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

IMPACTS OF SPACE SYSTEM ACQUISITION ON NATIONAL SECURITY

by

Andrew W. Harris Jr.

December 2012

Thesis Advisor:	Robert Looney
Second Reader:	Clay Moltz

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.			
1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** December 2012	**3. REPORT TYPE AND DATES COVERED** Master's Thesis	
4. TITLE AND SUBTITLE IMPACTS OF SPACE SYSTEM ACQUISITION ON NATIONAL SECURITY			**5. FUNDING NUMBERS**
6. AUTHOR(S) Andrew W. Harris Jr.			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number _________N/A_________.			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			**12b. DISTRIBUTION CODE** A

13. ABSTRACT (maximum 200 words)

This thesis examines a series of problems that the United States has encountered in its space systems acquisition process, and how these problems have impacted national security. This thesis has also examines several space system projects, and analyzes the various elements contributing to increased project cost and major project delays. Based on this assessment, it is concluded that although the space acquisition process has gone through a number of significant changes over the past 50 years, it is questionable that lessons learned from past acquisition experiences coupled with implemented space acquisition process changes has led to significant progress. Several recommendations are made to improve the acquisition process.

14. SUBJECT TERMS Space Systems Acquisition, Space Systems Procurement Process, Satellites, Space Systems Programs, Space Procurement Process			**15. NUMBER OF PAGES** 73
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

IMPACTS OF SPACE SYSTEM ACQUISITION ON NATIONAL SECURITY

Andrew W. Harris Jr.
Civilian, Department of the Navy
B.S., California Polytechnic State University, 1993

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)

from the

NAVAL POSTGRADUATE SCHOOL
December 2012

Author: Andrew W. Harris Jr.

Approved by: Dr. Robert Looney
Thesis Advisor

Dr. Clay Moltz
Second Reader

Dr. Harold Trinkunas
Chair, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This thesis examines a series of problems that the United States has encountered in its space systems acquisition process, and how these problems have impacted national security. This thesis has also examines several space system projects, and analyzes the various elements contributing to increased project cost and major project delays. Based on this assessment, it is concluded that although the space acquisition process has gone through a number of significant changes over the past 50 years, it is questionable that lessons learned from past acquisition experiences coupled with implemented space acquisition process changes has led to significant progress. Several recommendations are made to improve the acquisition process.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF DIAGRAMS

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AEHF	Advanced Extremely High Frequency
AFLC	Air Force Logistical Command
AFSC	Air Force Systems Command
ARDC	Air Force Research and Development Command
ARPA	Advanced Research Projects Agency
ASD/NII	Assistant Secretary of Defense for Networks and Information Integration
DAE	Defense Acquisition Executives
DAPA	Defense Acquisition Performance Assessment
DCP	Development Concept Paper
DDR&E	Director of Defense Research and Engineering
DFARS	Defense Federal Acquisition Regulation
DoD	Department of Defense
FAR	Federal Acquisition Regulation
FIA	Future Imagery Architecture
GAO	General Accounting Office
HEO	Highly Elliptical Orbit
JCIDS	Joint Capabilities integration and Development System
KDP	Key Decision Points
MCS	Mission Control Station
MDA	Milestone Decision Authority
MDAPs	Major Defense Acquisition Programs
MRB	Mission Requirements Board
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NRO	National Reconnaissance Office
NSS	National Security Space
PEOs	Program Executives Officers
PMs	Program Managers
PPBE	Planning, Programming, Budgeting, and Execution Process
PPC	Package Procurement Concept
R&D	Research and Development

SAEs	Service Acquisition Executives
SBIRS	Space-Based Infrared System
STEM	Science, Technology, Engineering and Mathematics
TFX	Tactical Fighter Experimental
TRL	Technical Readiness Levels
TSAT	Transformation Satellite Network
U.S.	United States
USECAF	Under Secretary of the Air Force
WMD	Weapons of Mass Destruction

ACKNOWLEDGMENTS

It gives me great pleasure to express my deepest gratitude to my thesis advisor, Professor Robert Looney and my second reader Professor Clay Moltz who provided an endless supply of patience and countless hours of reviews of my thesis. Without their superior academic competence and guidance, this thesis might not have achieved its mastery of the subject. I thank most of all, my mother and father, Gladys and Andrew Sr., who has been my heart and spirit throughout this journey. My ultimate goal has always been to make you and Dad, as well as others that have supported me, very proud. Lastly, to our lovely daughters, Adalyn and Ariella, always strive to be extraordinary and do not be afraid to follow your dreams.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

A. RESEARCH QUESTION

This thesis examines problems that the United States (U.S.) has encountered regarding the space systems procurement process. The disastrous experience of the Future Imagery Architecture (FIA) satellites has led many to question whether the current space acquisition system is effective. Defense experts say the entire acquisition system for space-based imagery technologies is in danger of breaking down.[1]

Although the overall acquisition process may be faced with numerous challenges, the goal of this thesis is to explore the strengths and weaknesses of the U.S. Department of Defense (DoD) space acquisition system, in addition to the National Reconnaissance Office (NRO) procurement process, and to identify potential improvement and streamlining opportunities. Importantly, this thesis does not discuss the procurement process for classified projects, because these types of projects are time sensitive and are subject to process waivers. For example, the NRO has a waiver from full and open competition, but competes classified projects with contractors that have the appropriate security clearances.[2] However, for unclassified projects, full and open competition is a critical part of the procurement process.

B. IMPORTANCE

The United States relies on space for a number of purposes, such as information on Weapons of Mass Destruction (WMD), early warning of missile launches, as well as deterrence of other foreign military threats. As Philip Taubman argues, “Even though reconnaissance satellites are less useful in spying on terrorist groups than on more traditional threats like foreign military forces, they remain integral to intelligence and military operations, including monitoring nuclear and missile installations in Iran and

[1] Philip Taubman, “In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids,” *The New York Times*, November 11, 2007, http://www.nytimes.com/2007/11/11/washington/11satellite.html?_r=1#step1.

[2] Joe Mazur, Jr., “The Real Secret to Acquiring Space Systems,” *Air Force Journal of Logistics* (Winter 2003): 7.

North Korea. They are also critical to Pentagon mapmaking and the targeting of precision-guided weapons like cruise missiles."[3] Within the United States, space assets also provide critical information, such as warning of weather-related problems, and information necessary to prevent natural or economic disasters.

It is the goal of this thesis to analyze and explore the challenges of the space acquisition process, practices and how this process can potentially impact national security.

C. PROBLEMS AND HYPOTHESIS

The procurement process as a whole can be described as a broad and complicated system. It starts first with an acquisition plan that addresses all the technical, business, management, and other significant considerations that control the acquisition.[4]

During the early phase of the procurement process, several actions usually occur prior to the award of government contracts. These actions include project planning and verification that funds are available. A need also exists for market research to ensure that the government is not being charged too much for items purchased. The two commonly used methods are the bidding of potential contractors or a determination that a corporation has developed technology that other corporations have not yet developed.

Another key aspect of the procurement process is the award and monitoring phases of the contract. These two phases are critical for timely delivery of the end product. In the end, the procurement process must be smoothed out and perfected to avoid potential blind spots in space architecture that ultimately could affect U.S. national security.

[3] Taubman, "In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids."

[4] Ibid.

Several examples of the problems facing the procurement process occurred with FIA, which was under the directive of the NRO. The NRO is the single national organization tasked to meet the satellite needs for unique and innovative technology, large-scale systems engineering, development, acquisitions, and operations of space reconnaissance and operational systems.[5]

In 2001, the NRO was set to spend roughly $6 billion on the FIA satellite system through 2010, with billions more allocated for upgrades and replacements.[6] However, this project experienced extreme cost overruns, postponed delivery dates, and poor project oversight. Between the time the contract was awarded to Boeing in 1999 and 2005, the government spent over $10 billion on FIA, including roughly $5 billion in cost overruns.[7] The government canceled the multibillion-dollar effort after concluding that prime contractor, Boeing Integrated Defense Systems of St. Louis, which was well over budget and behind schedule on the system, would not be able turn things around. At the same time, the NRO tapped Denver-based Lockheed Martin Space Systems—the longtime incumbent unseated by Boeing in the FIA competition to bring together a solution based on legacy technology and hardware.[8]

While this thesis recognizes numerous problems and challenges affect the space procurement process, the entire process cannot be fixed overnight. Therefore, the goal of this thesis is to: 1) promote a better understanding of the procurement process, 2) integrate key suggestions by the end user and procurement experts into viable solutions, and 3) identify critical policies and regulations that will allow the customer, decision makers and project managers the flexibility to make sound judgments in a timely manner, which could possibly lead to reduced project overruns and delays.

---

[5] Mazur,"The Real Secret to Acquiring Space Systems," 3.

[6] Michael A. Dornheim, "FIA Outline Takes Shape," *GlobalSecurity.Org*, December 21, 2001, http://www.globalsecurity.org/org/news/2001/011221-fia.htm.

[7] "Future Imagery Architecture [FIA]-2005 Restructuring," *GlobalSecurity.Org*, (n.d.), http://www.globalsecurity.org/intell/systems/fia-2005.htm.

[8] Turner Brinton, "NRO Director Defends Plan for Electro-Optical Spy Satellites," *Space News*, October 9, 2009.

D. METHODS AND SOURCES

This thesis is based on unclassified primary and secondary sources, including government documents, federal regulations, scholarly articles, press releases, and practical experience. The goal of this thesis is to examine and identify problems areas in the acquisition process, particularly related to space systems. Secondly, this thesis uses comparative case studies of other similar acquisition projects to identify strengths and weaknesses and to develop policy recommendations for the future.

E. ORGANIZATION OF THESIS

This thesis is organized into six chapters. The first chapter describes the thesis topic and research questions, and the importance of this research. The second chapter gives an historical overview of the acquisition process. Chapter III defines the existing an overview of space procurement process, and governing regulations and policies. Chapter IV focuses on the impacts of the space acquisition process on national security. Chapter V includes several case studies of space projects as well as an objective analysis of project failures. Chapter VI provides a conclusion followed by recommendations.

II. HISTORICAL OVERVIEW OF THE SPACE PROCUREMENT PROCESS

During the World War II era, the DoD did not have a centralized office to handle military contracts or routine purchases. Historically, each branch of the armed services, which include the Navy, Marines, Army and Air Force, was responsible for handling its own contracts, which accounted for the purchasing of weapons and supplies.[9] The lack of a governing agency to oversee the procurement process for these separate armed branches led to a large duplication of efforts.

The established of many DoD procurement policies, management techniques and methods in place today are a direct outcome of the planning and efforts of the Kennedy administration. The historical acquisition reform and changes that have shaped the space procurement process, as known today, were impacted by the politics and issues of their time.

Chapter II discusses the evolution of the space and defense procurement process as established during the decades of the late 1950s and 1960s, up to the present time. Further, this chapter also discusses various military and civilian agencies established to oversee the overall procurement programs and contracts.

The space procurement process evolved out of the need for the United States to improve intelligence gathering during the Cold War era. The U.S.' primary goal was to improve reconnaissance techniques, promote technical advancement and develop the future space industry. The initial strategy to develop and deploy spacecraft was a product of President Eisenhower's New Look Policy.[10] Eisenhower realized from previous experiences that military success was contingent upon accurate intelligence.[11] Since the Soviet bloc was a closed society, and coupled with U.S. military demand to build

[9] AllGov, "Defense Contract Management Agency," (n.d.), http://www.allgov.com/Agency/Defense_Contract_Management_Agency.

[10] Eligar Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)* (Dordrecht, London: Kluwer Academic Publishers, 2002), 251.

[11] Ibid.

expensive new weapons to counter its guesses at what the Soviets might be building, Eisenhower was convinced of the necessity for hard photographic and signal intelligence upon which to base weapons acquisitions decisions.[12] During his presidency, he authorized flights over the Soviet Union and pushed for the development of new technologies for reconnaissance.[13]

With the growing fear that the Soviets were developing new atomic weapons and new space technology that would give them air space dominance, the United States continued to develop space technology. However, in 1957, the Soviets launched the satellite Sputnik, which forced the United States to rethink its approach to being a world leader in space and space policy. During this time, the Eisenhower administration had to expedite space research and development by considering: 1) a reorganization of military space efforts, 2) the establishment of civilian agencies, and 3) increased budgets for research.

In 1958, the Eisenhower administration imposed a reorganization that led to several major changes. The first was the signed legislation that placed the Secretary of Defense directly under the President in the military chain of command,[14] which was a major step in the centralization of procurement because all service chiefs were tasked with the operations of administration, procurement, recruitment and training. Secondly, a change occurred in the authority of the position of the Director of Defense Research and Engineering (DDR&E) with the Office of Secretary of Defense Reorganization Act of 1959.[15] This act gave the DDR&E control of all DoD Research & Development programs, including their funding.[16] Thirdly, the DoD created the Advanced Research Projects Agency (ARPA), whose primary purpose was to manage all military space programs and anti-missile defenses.[17] ARPA received a broad charter to encourage

---

[12] Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*, 251.

[13] Ibid.

[14] Wilbur D. Jones, Jr., *Arming The Eagle: A History of U.S. Weapons Acquisition Since 1775* (Defense Systems Management College Press, 1999), 327.

[15] Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*, 253.

[16] Ibid.

[17] Ibid.

innovation and long-term technologies. Fourthly, the National Aeronautics and Space Administration (NASA) was created on National Advisory Committee for Aeronautics (NACA)'s existing foundation to operate the civilian space program.

In 1960, John F. Kennedy was elected president of the United States, arguably on the basis that the previous administration wanted to use space technology primarily for reconnaissance. However, President Kennedy had the vision of sending a man into space. With this approach to space advancement, opportunities arose for civilian companies to be considered contractors for future space programs. This being the case, it became evident that the existing procurement process would need to be refined to increase project oversight on these larger projects, select the most experienced companies, and ensure that the government was getting exactly what it was paying for. To meet these demands, President Kennedy appointed former Ford Motor Company president Robert S. McNamara to serve as Secretary of Defense for the purpose of centralizing the procurement process and strengthening the early acquisition process. During his tenure as Secretary of Defense, McNamara created the Office of Systems Analysis to perform cost-effectiveness studies and encouraged the services to do likewise. Additionally, he developed a number of acquisition organizations including the Defense Contract Audit Agency, the Defense Contract Administration Service, and the Defense Supply Agency.[18]

McNamara's staff implemented the development concept paper (DCP), total package procurement, and concepts and techniques to increase competition, and it incentivized contracting and the network for planning and scheduling.[19] An example of the network's planning and scheduling is the implementation of the Programming, Planning and Budgeting System across the DoD to provide for long-term budget forecasts corresponding to technical and strategic assessments, and to unite the formerly separated budgeting and spending processes.[20]

---

[18] Lawrence R. Benson, "Acquisition Management in the United States Air Force and its Predecessors" (master's thesis, Air Force History and Museums Program, 1997), 29.

[19] Ibid.

[20] Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*, 256.

During the 1960s, it was challenging for civilian companies to compete for government space program contracts from the DoD or NASA. One of the reasons was that although the government encouraged open competition for contracts, it was difficult for new companies to be considered for contract awards. To counter this obstacle, companies began to focus their efforts in specific areas of expertise to place their companies in a greater competitive position. Nonetheless, it was soon discovered that just because a company was the best qualified and had the best technical experience, these qualities did not always guarantee a contract. For example, when NASA put out bids for the Apollo Command and Service Module in 1962, the Glen L. Martin Company won the competition based on its overall score.[21] However, NASA Administrator James Webb did not believe in Martin's ability to work with astronauts because Martin's engineers had not worked with aircraft or test pilots for over a decade.[22] By contrast, the second highest scoring bid, by North American Aviation, featured its concurrent expertise with NASA's test pilots on the X-15 program.[23] NASA ended up selecting North American over Martin.

Another aspect of obtaining space contracts was based on contacts within either NASA or the DoD. During this era, having a good inside connection with the contract awarding agencies also proved fruitful as evidenced by MIT Instrumentation Laboratory's win of the Apollo guidance computer contract because James Webb, a NASA administrator, personally knew and trusted Charles Stark Draper, MIT's guidance expert.[24]

The Air Force had a major influence on the space procurement process as well. In March 1961, Deputy Secretary of Defense, Roswell L. Gilpatric, gave Secretary of the Air Force Eugene M. Zuckert an opportunity to oversee the military space program and reform the existing procurement process in a way that would support the Air Force Systems Command (AFSC) that later became the Air Force Logistics Command

[21] Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*, 256.

[22] Ibid.

[23] Ibid.

[24] Ibid.

(AFLC).[25] Mr. Zuckert immediately implemented departmental changes to accomplish this objective. These changes included merging command functions of the Air Force Research and Development Command (ARDC), the AFSC, which gave it procurement authority, as well as the AFLC by transferring its three system centers and contract management offices to the AFSC. The ARDC was later transferred to the Office of Aerospace Research.[26]

Although these changes appeared confusing, the goal was to streamline project development for both weapon and space systems. The Air Force continued to reform procurement processes by returning to many of the contracting strategies introduced by McNamara, such as programming and budgeting systems featuring a five-year plan. The Air Force Ballistic Missile Division also developed the critical management process called "configuration management." Configuration management was a technique to tie the engineering changes to cost predictions and control the overall cost.[27] This management tool made it difficult for the project or system to be modified or changed arbitrarily.[28] Moreover, if project changes were to occur, these changes would need to be presented before a configuration control board. All changes required estimates of the cost and schedule impact of the technical modifications, which allowed the manager to trade off the costs of a change to a benefit.[29] This management tool proved to be effective in controlling overall cost and keeping projects within budget. This technique was so effective that it was implemented throughout the federal procurement process.

---

[25] Benson, "Acquisition Management in the United States Air Force and its Predecessors," 31.

[26] Ibid.

[27] Sadeh, *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*, 257.

[28] Ibid.

[29] Ibid.

Even though multiple project management models were implemented for both weapon and space systems, concerns still existed regarding system timeliness. A point of criticism was the total package procurement concept (PPC). This concept gave wide programmatic responsibilities to prime contractors to both develop and produce systems.[30]

In "Acquisition Management in the United States," the author argues, "the scope of the programs made cost predictions difficult and led to unrealistic bids. An example of this was the attempt to develop the Tactical Fighter Experimental (TFX), which became the F-111 as a multi-purpose aircraft for both the Air Force and the Navy. The total procurement process led to an unrealistically low bid, which made it difficult to correct the cost overrun.[31]" However, the PPC led to detailed proposals, studies, competitions, report audits, program reviews, and oversight tools.[32]

Issues, such as cost overruns and congressional concerns during the decades of the 1970s and 1980s, led to further implementation of reforms that impacted both defense and space procurement. For instance, in the Nixon administration, another round of procurement reform occurred in 1969. Deputy Secretary of Defense David Packard (co-founder of Hewlett-Packard) led these efforts of procurement policy reform.[33] These policy changes included detailed selected acquisition reports to Congress, more realistic cost estimates, more precisely defined operational requirements, technical risk analyses, less concurrency in favor of sequential schedules, and a return to the practice of building prototype aeronautics systems. They also led to strengthening the practices of the procurement process.

[30] Benson, "Acquisition Management in the United States Air Force and its Predecessors," 33.

[31] Ibid.

[32] Ibid.

[33] Ibid.

The Carter administration took a more conservative approach to stabilizing the acquisition process through defense cuts. The conventional wisdom of this administration was to reduce the size of an organization, which led to an overall reduction in both funding and spending.[34] This conservative approach extended into the space procurement process by reducing the space projects.

The Reagan administration reversed the trend of the previous administration and significantly increased defense spending. During his tenure, President Reagan not only effectuated military buildup, but also implemented various acquisition policy changes. In early 1981, Deputy Secretary of Defense, Frank C. Carlucci, launched a program of 32 acquisitions-related initiatives. During this program, he encouraged the tailoring of management practices to suit specific programs, as well as multi-procurement, budgeting flexibility, and pre-planned product improvement.[35] These streamlining and centralizing practices were called the Carlucci initiatives.

The Carlucci initiatives were criticized on several points, such as reliability, maintainability, and supportability of complex new systems addressed in the initiative. The primary problem was the split in responsibility in the Air Force with respect to acquisition and logistics.[36] In an effort to recentralize these duties, the Air Force created the Air Force Logistics Center.

As the Reagan defense buildup continued to reach its peak, the AFSC's projects encompassed many major programs, such as aircraft, satellites, and command and control equipment that relied increasingly on computer hardware and software for both performance and maintenance diagnostics, which was especially true for the electronic warfare, avionics, and command and control capabilities. During this time, numerous unanticipated issues and problems occurred during the subsystems integration period, which provided an opportunity for critics to identify weaknesses in the procurement process.

---

[34] Daniel R. Malin, "Back to the Future: Returning U.S. Space Acquisition to Glory," *Air Command and Staff College*, April 2006, 18.

[35] Benson, "Acquisition Management in the United States Air Force and its Predecessors," 40.

[36] Ibid.

With respect to the procurement processes in place, the 1980s brought bureaucratic pressures supported by the General Accounting Office (GAO), and military leaders, as well as public scrutiny. On September 5, 1982, President Reagan signed into law the Department of Defense (DoD) Act 1983 (P.L.97-252), known as the Nunn-McCurdy Act.[37] The Nunn-McCurdy Act required the DoD to report to Congress whenever a major defense acquisition program experiences cost overruns.[38] The purpose of this act was to help control the cost of major defense systems by holding Pentagon and defense officials publically accountable and responsible for managing cost.[39]

By the late 1980s, evidence of waste and corruption was brought to light by "Operation Ill-Wind," which was a far-ranging federal investigation into fraud in the defense contracting industry.[40] Those implicated included contractors, consultants, and DoD personnel. This case further deteriorated the credibility of the procurement process.

Due to several critical issues related to the acquisition process, the Packard Commission released its final report in June 1986. Amidst numerous recommendations, it called for the DoD to "establish unambiguous authority for overall acquisition policy, clear accountability for acquisition execution, and plain lines of command for those with program management responsibilities, as well as additional project and program oversight."[41] The commission further called for a more streamlined structure consisting of a Defense Acquisition Executive (DAE) who would act like the chief executive officer of a major corporation, Service Acquisition Executives (SAEs) to perform CEO principle duties, Program Executives Officers (PEOs) to manage related major programs, and Program Managers (PMs) who would report directly to their program executive officer. Upon completing their review, the Packard commission of reported that Congress made

---

[37] Moshe Schwartz, "The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress," *Federation of American Scientists*, June 21, 2010, http://www.fas.org/sgp/crs/misc/R41293.pdf.

[38] Ibid.

[39] Ibid.

[40] Jeffrey L. Levy, "An Ill Wind blows: Restricting the Public's Right of Access to Search Warrant Affidavits," *LexisNexis*, February 1990, https://litigation-essentials.lexisnexis.com.

[41] Benson, "Acquisition Management in the United States Air Force and its Predecessors," 41.

on-going changes to well over 1,800 separate defense programs in the budget, and directed the initiation of 458 studies ranging from the feasibility of simplified acquisition to complex systems acquisition.[42]

During the 1990s, President Clinton reversed the defense spending trends of his predecessor and took a more conservative approach to defense spending, a view similar to that of President Jimmy Carter, which entailed defense spending, research and development, and project management being held in accordance with approved initiatives and bureaucratic processes. An example is the Spaced-based Infrared System (SBIRS) contract awarded in 1998 for $2 billion. This program was celebrated as a revolutionary concept applied to all defense concepts.[43] This process suffered major cost overruns and time delays causing this project to be eight years off schedule and roughly $8 billion over budget.[44]

President George W. Bush authorized the U.S. National Space Policy on August 31, 2006. This policy established several principles, goals and guidelines for peaceful exploration, growth in the commercial space sector, as well as guidelines for space acquisition. The 2006 U.S. National Space Policy stated, "The United States is committed to the exploration and use of outer space by all nations for peaceful purposes, and for the benefit of all humanity."[45]

The National Space Policy principle encouraged development in the commercial space sector and states, "The United States is committed to encouraging and facilitating a growing and entrepreneurial U.S. commercial space sector. Toward that end, the United States Government will use U.S. commercial space capabilities to the maximum practical extent, consistent with national security."[46]

---

[42] Malin, "Back to the Future: Returning U.S. Space Acquisition to Glory," 18–19.

[43] Ibid.

[44] Ibid.

[45] Federation of American Scientists, "U.S. National Space Policy," August 31, 2006, http://www.fas.org/irp/offdocs/nspd/space.pdf.

[46] Ibid.

The Space Policy further established two goals that supported and encouraged growth in the commercial sector: 1) enable a dynamic, globally competitive domestic commercial space sector to promote innovation, strengthen U.S. leadership, and protect national, homeland and economic security, and 2) enable a robust science and technology base supporting national security, homeland security, and civil space activities.[47] These goals built a foundation for the implementation of the General Guidelines.

The General Guidelines that were developed to meet the subject goals and improve the space acquisition process included developing space professionals, improving space development and procurement, and increasing and strengthening interagency partnerships.[48]

President Barack Obama authorized a new U.S. National Space Policy on June 28, 2010. This policy establishes Intersector Guidelines for peaceful exploration, growth in the commercial space sector, as well as guidelines for space acquisition.

The President has established several key points vital to the acquisition process. These points are developing and retaining space professionals, as well as improving space development and procurement processes.

The Space Policy states, “The primary goals of space professional development and retention are: achieving mission success in space operations and acquisition; stimulating innovation to improve commercial, civil, and national security space capabilities; and advancing science, exploration, and discovery. Toward these ends, departments and agencies, in cooperation with industry and academia, shall establish standards, seek to create opportunities for the current space workforce, and implement measures to develop, maintain, and retain skilled space professionals, including engineering and scientific personnel and experienced space system developers and operators, in government and commercial workforces. Departments and agencies also

[47] Federation of American Scientists, “U.S. National Space Policy.”

[48] Ibid.

shall promote and expand public-private partnerships to foster educational achievement in Science, Technology, Engineering, and Mathematics (STEM) programs, supported by targeted investments in such initiatives."[49]

The second key point of the Space Policy is improving the space system development and procurement processes. The Space Policy states, "Departments and agencies shall: Improve timely acquisition and deployment of space systems through enhancements in estimating costs, technological risk and maturity, and industrial base capabilities; Reduce programmatic risk through improved management of requirements and by taking advantage of cost-effective opportunities to test high-risk components, payloads, and technologies in space or relevant environments; Embrace innovation to cultivate and sustain an entrepreneurial U.S. research and development environment; and Engage with industrial partners to improve processes and effectively manage the supply chains."[50]

Over the past 50 years, various attempts have been made to improve the overall space procurement process through streamlining and acquisition reform; however, it is difficult to identify the cause for the breakdowns in U.S. processes that lead to delays and cost overruns, not to mention the best approach to mitigate these issues. The question is, "where is the bottleneck?" Is the problem the space procurement process itself, or is it the fault of the political and bureaucratic pressures that drive these changes? Some have argued that the cause of procurement issues are ambiguous procurement directives; others have argued that enormous and ever-changing political and bureaucratic pressures occur that make it difficult for the procurement process to work smoothly. Nonetheless, it is the goal of this thesis to examine the defense procurement process in comparison to the space procurement process.

---

[49] The White House, "National Space Policy of the United States of America," June 28, 2010, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

[50] Ibid.

THIS PAGE INTENTIONALLY LEFT BLANK

III. SPACE PROCUREMENT PROCESS

In the United States, the federal government has a complicated and fragmented organizational structure. In other words, the federal procurement operates within a democratic framework under the constitutional check and balances powers of the three branches of government: legislative, judiciary, and executive.[51]

While the courts are not directly involved in setting procurement policies and rules, they try all legal cases that involve the federal government, including contract disputes, in which their decisions become a source of federal procurement regulations.[52] The Congress primarily influences the federal procurement system through laws, budget appropriations, and its oversight powers. It passes laws establishing procurement policies and procedures, and appropriates funds for procurement purposes, within the time and amount of funds specified.[53] In addition, the Senate and Congress oversee federal procurement through their various standing committees. For example, the Senate has the armed services, government affairs and small business committees, while the House of Representatives has national securities, government reform and oversight, and small business committees.[54]

In principle, the President is responsible for implementing procurement statues and procurement authorization and appropriations.[55] His role is to establish government-wide acquisition policies and procedures through executive orders, make political and management decisions relative to procurement programs, and appoint agency heads and other officials who have direct or indirect management control over procurement

---

[51] David Drabkin and Khi V. Thai, "U.S. Federal Government Procurement: Structure, Process and Current Issues," (paper presented at the International Purchasing and Supply Education and Research Association's Comparative Public Procurement Cases Workshop, Budapest, Hungary, April 10–12, 2003), 2–3.

[52] Ibid.

[53] Ibid.

[54] Ibid.

[55] Ibid., 3.

programs and procurement organization.[56] As the federal government spends a large budget on procurement, roughly $200 billion annually, and procures a great variety of goods, services and capital assets, its procurement administration has a centralized structure to maintain a uniform standard of control, as well as a decentralized structure allowing flexibility to meet the unique requirements of over 60 federal agencies.[57]

Overall, the basic procurement process involves an agency that identifies the goods and services it needs. That agency can also provide market research that evaluates the best price available. However, this process can prove to be different when reviewing space programs because these acquisitions are high priced, involve a number of people in the completion of the project, and could extend over a period of five to 10 years.

The Federal Acquisition Regulation (FAR) guides the basic procurement process. The FAR is the primary regulation used by all federal executive agencies in their acquisition.[58] The FAR became effective in April 1, 1984, and was intended to minimize redundant agency acquisition regulations, as well as limit agency acquisition regulations to those necessary to implement FAR policies and procedures within an agency. It also provides for coordination, simplicity and uniformity the federal acquisition process.[59] The Defense Federal Acquisition Regulation Supplement (DFARS) is a supplemental document that contains expansive policies and procedures for those grey areas not covered in the FAR.[60] Although the FAR and the DFARS are the overall documents that govern the procurement process for large and small acquisitions, the DoD National Security Space Acquisition Policy (NSS) Directive 03-01 governs the space acquisition process.

[56] Drabkin and Thai, "U.S. Federal Government Procurement: Structure, Process and Current Issues," 3.

[57] Ibid.

[58] General Services, Administration Department of Defense National Aeronautics, and Space Administration, "Federal Acquisition Regulation (FAR)," March 2005.

[59] Ibid.

[60] ACQ Web, "Defense Federal Acquisition Regulations Supplement, Part 201, 201.301," (n.d.), http://www.acq.osd.mil/dpap/dars/dfars/pdf/r20111220/201_3.pdf.

The NSS 03-01 provides an ideal roadmap designed to facilitate the development, production, and deployment of space systems.[61] This process begins with an understanding of the end user's requirements and is characterized by five phases.

- Pre KDP A: Concept Studies
- Phase A: Concept development
- Phase B: Preliminary design
- Phase C: Complete design
- Phase D: Build and Operations

It is important to note that the space systems fall into two categories, either a Small Quantity Model, which is typically bought in quantities of 10 or less, in comparison with the Large Quantity Models, which are bought in quantities of 50 or more.

Second, NSS 03-01 uses a structured review like Key Decision Points (KDPs) to assess whether a program is ready to process into the next phase using very well-defined and distinctive criteria, which are customized by each phase.[62] KDPs also ensure senior senior-level involvement early in the acquisition process, and serve as timely and focused independent assessments before proceeding into the next acquisition phase.[63] See Diagram 1.

---

[61] Steve G. Green, Kurt A. Heppard, and Robert L. Tremaine, *Space and Defense Policy*, *The Acquisition Process: Acquiring Technology for Space and Defense* (London, New York: Routledge, 2009), 237–238.

[62] Ibid.

[63] Ibid.

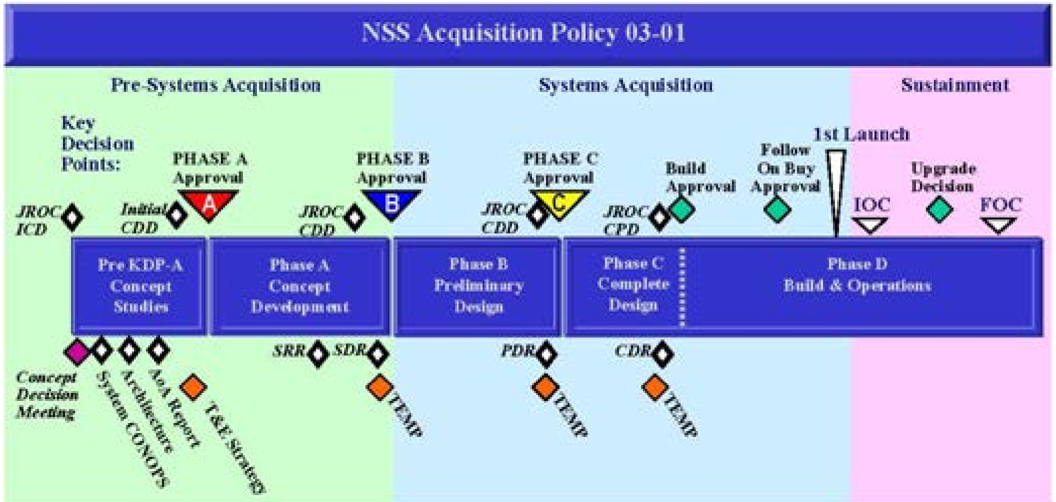


Diagram 1. NSS: 03-01 Acquisition Phases[64]

The Under Secretary of the Air force (USecAF) is the DoD Space Milestone Decision Authority (MDA) for all DoD Space Major Defense Acquisition Programs (MDAPs).[65] The MDA expects proof and verification that the project is ready to proceed to the next phase, and it cautious about authorizing a program to move ahead.[66] The MDA bases his decision of whether a project is mature to move to the next phase based on several principles that include mission success, accountability, streamlined/agile, flexibility, and whether the project budget is stable.[67] See the List of Process Principles, Evaluation Criteria and Findings for the principle definitions in the Appendix.

Although the USecAF is the DoD MDA, the acquisition of DoD space systems is subject to the interaction of three complementary processes: 1) the Joint Capabilities Integration and Development System under the authority of the Chairman of the Joints Chiefs of Staff, 2) planning, programming, budgeting, and 3) execution process under the authority of the DoD Comptroller, and the NSS acquisitions process under the authority

[64] National Security Space Acquisition Policy, NO03-01, December 27, 2004.

[65] Ibid.

[66] Green, Heppard, and Tremaine, *Space and Defense Policy, The Acquisition Process: Acquiring Technology for Space and Defense*, 237–238.

[67] Ibid., 3.

of the Space MDA.[68] To work effectively, the space acquisition process requires constant coordination among processes and their authorities.[69] Each process is listed below. These processes are further defined in the List of Process Principles, Evaluation Criteria and Values for principle definitions in the Appendix.

5.1 Joint Capabilities integration and Development System (JCIDS)

The JCIDS process identifies, develops, and validates all defense-related capability needs.

5.2 Planning, Programming, Budgeting, and Execution Process (PPBE)

The PPBE process translates military capability needs into budgetary requirements, which are presented to Congress for funding consideration.

5.3 National Security Space (NSS) Acquisition Process

The NSS model emphasizes the decision needs for "high-tech" small quantity NSS programs. The funding profile for a typical NSS program is usually front-loaded when compared to a production-focused system.

Although these processes are in place to provide space systems oversight, they also ensure that these systems follow the systems acquisition, systems acquisition and sustainment phases as shown in Diagram 1.

Nonetheless, based on the several space programs that have encountered project delays and increased cost, it is arguable that the phases identified in the NSS: 03-01 are being followed or monitored. Space programs that do not have adequate funding, suffer from technical issues or immature technology should be flagged before they are able to move to the next development phases. However, it is not clear how these space programs are being allowed to move through the critical project phases. Additionally, based on the checks and balances built into the space acquisition process, projects cannot move into development phases without approval from senior level management. Chapter V further addresses several examples of projects that have encountered some of the issues previously mentioned.

[68] National Security Space Acquisition Policy, NO03-01.

[69] Ibid.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. THE IMPACTS OF SPACE ACQUISITION ON NATIONAL SECURITY

The space acquisition process has experienced a number of reforms over the past 50 years to improve process effectiveness and efficiency. Although these reforms were to improve the space acquisition process, several instances of gaps in U.S. satellite defense and imaging systems occurred because the acquisition process has struggled with providing the products and services in a timely and cost-effective manner. Much of the criticism of the procurement process revolves around the issue that the acquisition process is long and cumbersome with respect to research and development of weapons and space systems. Other problems include increasing project cost, unrealistic budgets, lack of mature technology, unstable staff, and poor government/customer planning strategies.[70]

Although the goal of this thesis is to address the pertinent issues within the space acquisition process as they relate to national security, it is also important to understand and identify several broader issues and dynamics that not only impact the overall acquisition process, which includes space acquisition, but ultimately, national security. One of the major concerns with the space acquisition process as it relates to weapons and space systems is whether certain disconnects are embedded within the acquisition process itself, or instead, management oversight of the process. In a report prepared by the Staff of the Deputy Secretary of Defense, the 2005 Executive Summary, Defense Acquisition Performance Assessment (DAPA), the committee focused of several root problems that impact the procurement process. The report stated, "The Senate Armed Services Committee was concerned that problems with organization structure, shortfalls is acquisition workforce capabilities, personnel structure, and personnel instability continue to undermine the performance of major weapons systems programs."[71]

---

[70] James D. Rendlemand and J. Walter Faulconer, "Escaping the Space Acquisition Death Spiral, Part 2, *Air Force Space Command*, (n.d.), http://www.afspc.af.mil/shared/media/document/AFD-110825-030.pdf.

[71] U.S. Department of Defense, "Defense Acquisition Performance Assessment Report," 9, December 2005, http://www.defense.gov/pubs/pdfs/DAPA%2012-22%20WEB%20Exec%20Summary.pdf.

In the DAPA report, Acting Secretary of Defense Gordon England authorized an integrated assessment to consider aspects of the acquisition process.[72] This extensive research focused on research, observations, and interviews with subject matter experts that resulted in an integrated acquisition performance assessment. The key points taken from the DAPA report included findings, integrated assessments, and recommendations. Several key findings address both internal external impacts of the procurement process. These findings are listed below.

- The acquisition system must deal with external instability, a changing security environment and challenging national issues[73]
- A DoD management model based on lack of trust-oversight is preferred to accountability[74]
- Oversight is complex, it was program-focused-not process focused.[75]
- Complex acquisition programs do not promote success; they increase cost and schedule[76]
- The DoD elects short-term savings and flexibility at the expanse of long-term cost increases[77]

The DAPA Panel defined the acquisition process as one of the elements that falls within a larger acquisition system. The panel further defined the acquisition system to be a simple construct reflecting efficient integration of three interdependent processes, termed Big "A."[78] The little "a" as the acquisition process states "how to buy' but does not include requirements and budget, which creates competing values and objectives The processes are budget, requirements, and acquisition, a shows in Diagram 2 (Acquisition System).[79]

[72] U.S. Department of Defense, "Defense Acquisition Performance Assessment Report," 9.

[73] Ibid.

[74] Ibid.

[75] Ibid.

[76] Ibid.

[77] Ibid.

[78] Ibid.

[79] Ibid.

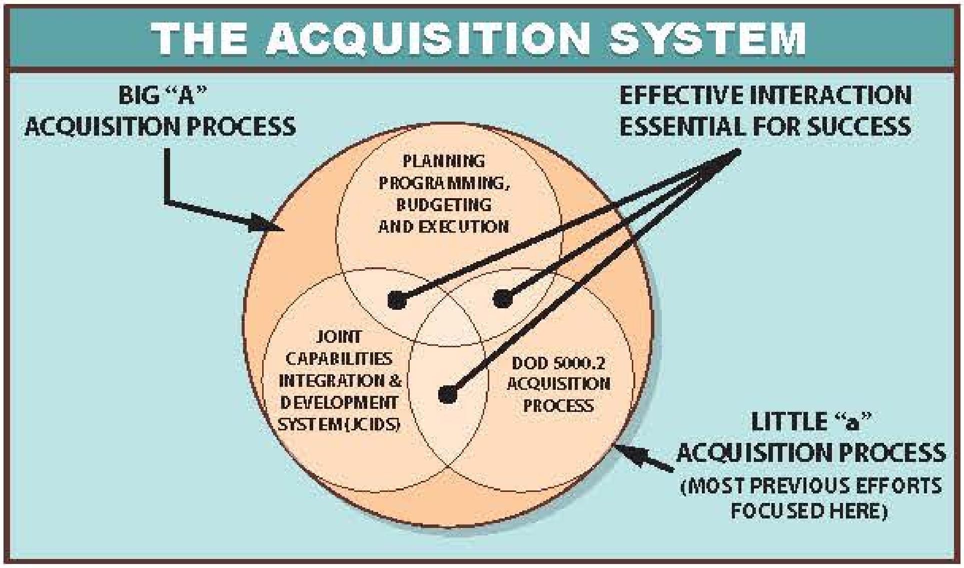


Diagram 2. Acquisition System[80]

The DAPA evaluated the acquisition process not as a process but as a system. This system is composed of three parts: budget, requirements and acquisition. The forces that hold these parts together include workforce, organization, and industry, which is described as a stable system. See Diagram 3 (Cohesive and Stable System).[81] An effective acquisition system requires stability and continuity that can only be achieved through the integration of the major elements upon which it depends as shown in the diagram.[82]

---

[80] Acquisition Community Connection, "Defense Acquisition Performance Assessment Report," January 2006, https://acc.dau.mil/adl/en-US/17721/file/577/DAPA-Report-web.pdf.

[81] Ibid.

[82] U.S. Department of Defense, "Defense Acquisition Performance Assessment Report," 10.

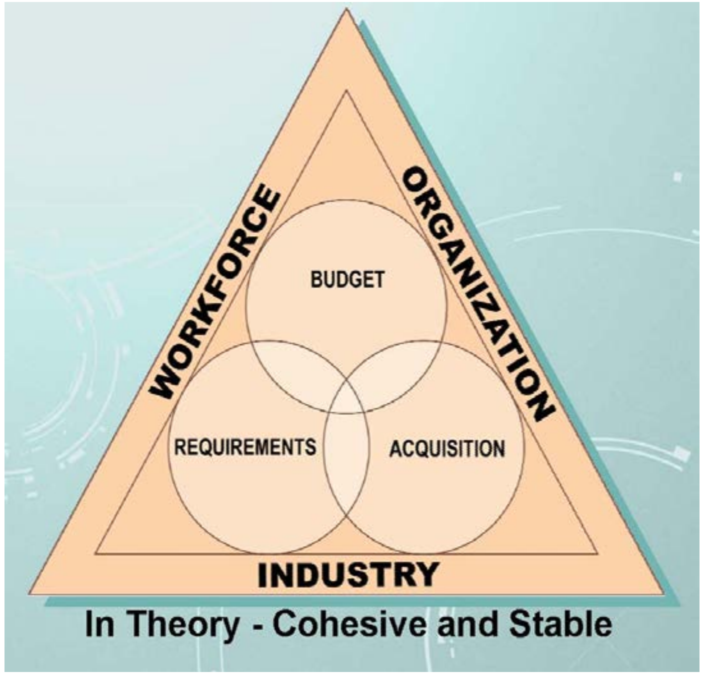


Diagram 3. Cohesive and Stable System[83]

However, research and observation have indicated that differences in the theory and practice of acquisition, conflicts in values among the acquisition community, and changes in the security community, have driven the budget requirements and acquisition processes further apart. These external factors have created significant instability in the acquisition process. These competing values are shown within the triangle and include oversight, control over the budgets, requirements and acquisition.

The "DAPA Report January 2006," states, "In theory, new weapon systems are delivered as the result of the integrated actions of the three interdependent processes whose operations are held together by the efforts of the organization, workforce, and the industrial partnerships that manage them.[84] However, in practice, these processes and practitioners often operate independent of each other. Actions in each of the processes

[83] U.S. Department of Defense, "Executive Summary: Defense Acquisition Performance Assessment Report (DEPA)," December 2005, http://www.defense.gov/pubs/pdfs/DAPA%2012-22%20WEB%20Exec%20Summary.pdf.

[84] Ibid., 4.

cause unintended negative consequences that magnify the effects in any one area. Incompatible actions are often caused by differences in organizational values among process owners and participants."[85]

Organization have disconnects in the workforce, industry and organization, many of these disconnects are based on competing organizational needs and values. The "DAPA Executive Report December 2005," defines these values as driving factors that influence the acquisition process both directly and indirectly. See the Appendix for definitions of process principles, evaluation criteria and values.

For instance, in an industry model, the critical issue is survival followed by predictability in the defense market segment and achieving stockholder confidence.[86] Additionally, the "DAPA Executive Report December 2005" states: "While each of these sets of values is legitimate, pursuing them without consideration for their impact in other processes adds instability to the overall acquisition process."[87] These factors are exacerbated by changes in the international security environment. Although the operational environment faced by the U.S. armed forces has changed significantly since the Cold War, the system used to design, develop and deliver the systems they need has not.[88] Further, efforts to improve the performance of this system have focused almost entirely on only one part of the process, namely "little a" acquisition.[89] This report indicates that although the procurement method is problematic, many of the issues driving the procurement are embedded within the acquisition system itself, and induced by the government itself.[90]

---

[85] U.S. Department of Defense, "Executive Summary: Defense Acquisition Performance Assessment Report (DEPA)," 4.

[86] Acquisition Community Connection, "Defense Acquisition Performance Assessment Report," 4.

[87] Ibid.

[88] Ibid.

[89] Ibid.

[90] Ibid.

Although the findings of the DAPA Panel demonstrates that many of the issues that plague the acquisition system are government induced, this same model can also be applied to the space acquisition process. For example, these same forces are also present in the space acquisition process, and are the same basic elements present, which consist of a budget, requirement and acquisition that are held together by the workforce, industry and organization. The external competing forces and lack communication between the workforce, industry and organization has led to space projects becoming being poorly evaluated prior to project approval, further leading to other issues, such as over budgeted, failed delivery dates, and poorly managed projects.

Another challenge that the space acquisition process faces is the inability to determine or predict problems that will occur late in the development process because the space project is going through approval phases prior to project completion. It is difficult to determine space project performance until the project has been launched; unlike weapons systems that can be tested and evaluated to determine performance flaws.

In “Escaping the Space Acquisition Death Spiral,” the authors offer a different opinion of what the causes of the problems are with the space acquisition process. The authors argue that the problem with space procurement process is not acquisition system itself, but rather overinflated Technical Readiness Levels (TRL).[91] The authors state, “Space Acquisition failures begin with overly optimistic technical readiness and resource estimates and resources estimates. Programmatic architectures and the technology readiness levels (TRL) needed to secure important objectives are left incomplete and inadequate. Without proper TRLs, or sufficient or-or off-ramps to add or delete technologies inserted into a program, the program’s baseline can easily become unexcitable. Such improperly base-lined and resourced acquisitions cannot achieve success.”[92]

[91] James D. Rendleman and J. Walter Faulconer, “Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series,” *High Frontier* 7, no. 4 (August 2011): 41–57.

[92] Ibid.

The authors further state, “By allowing over inflated TRL levels and low-ball program bids discourages industry from becoming more efficient.[93] This difficulty is compounded by a failure of most of the senior U.S. space leadership to recognize the true scope of the immense challenges confronting them.”[94]

Additionally, the authors argue that a project’s downward spiral effect of a space project begins at the initiation phase. The key points that lead to project failure include unrealistic baselines, such as inadequate project budgets, inadequate project schedules, and lack of mature technology. As the project continues to move through the different phases, other issues began to emerge, such as cost growth, inadequate staffing, and scheduling delays. See Diagram 4, Acquisition Death Spiral.

Diagram 4. Acquistion Death Spiral[95]

---

[93] Rendleman and Faulconer, “Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series,” 41–57.

[94] Ibid.

[95] Ibid.

The Acquisition Death Spiral is interesting because it appears that once a project starts to face these different factors, it becomes difficult to change the outcome or move the project back on track, which leads to outcomes, such as project cancellation, program failure, increased project cost, and possibly failed project delivery dates.

Additionally, it is can be argued that the creation of the Nunn-McCurdy Act was established to identify space and weapon projects before they even reach the downward spiral point, simply due to increased project threshold cost breaches. The Nunn-McCurdy breaches fall into two categories, significant breaches and critical breaches.[96] A significant breach occurs when the Program Acquisition Unit Cost (the total cost of development, procurement, and construction cost divided by the number of units to be procured) increases 15% or more over the current baseline estimate or 30% or more over the original baseline estimate.[97] A critical breach occurs when the program acquisition or procurement unit cost increases 25% or more over the current baseline estimate or 50% or more over the original baseline estimate.[98] Thus, it would appear that Congress would have an additional tool to monitor projects based on performance in the event these projects request additional funds. At this time, Congress would take a close look at the value of each space project prior to approval of additional funds for projects grossly over budget.

Although the authors has presented different views on potential acquisition breakdowns, the question still remains, Is the U.S. space procurement process effective enough to provide space projects to be completed and delivered in a manner to provide national security? The following chapter reviews space projects and discuses various problem areas.

---

[96] Schwartz, “The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress.”

[97] Ibid.

[98] Ibid.

V. SPACE SYSTEM CASE STUDY ANALYSIS

The case study analysis focuses on the strengths and weaknesses of three troubled space system programs. Although these weaknesses were considered project failures in some cases, these programs are excellent learning tools with tremendous opportunities for progress and improvement. These models consist of the Space Based Infrared System (SBIRS), the Future Imagery Architecture (FIA), and the Advanced Extremely High Frequency (AEHF) Satellite System. Although this thesis cannot conclusively identify all project-related and collateral problems, due to the uniqueness of each space system program, it does demonstrate several similarities that appear to be consistent with space system projects.

A. SPACE BASED INFRARED SYSTEM (SBIRS)

The U.S. Air Force created the SBIRS-High concept in 1996 with the goal of replacing the existing Defense Support System (DSP) for missile launch detection and warning capabilities.[99] The SBIRS satellites provided sensors that have three times the sensitivity of the DSP, and two times the revisit rate, while providing better persistent coverage.[100]

This satellite constellation was designed to perform four missions including missile defense, technical intelligence, and observing and reporting on military activities on the battlefield.[101] The plan was for the system to consist of four operational GEO satellites (plus a ground spare), sensors on two classified DoD satellites in highly elliptical orbit (HEO), a ground-based Mission Control Station (MCS), and ground-based relay stations.[102]

---

[99] Rendleman and Faulconer, "Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series," 41–57.

[100] Before It's News, "Despite Problems, SBIRS-High Moves Ahead," September 11, 2012, http://beforeitsnews.com/military/2012/09/despite-problems-sbirs-high-moves-ahead-2444882.html.

[101] U.S. Library of Congress, Congressional Research Service, *Military Space Programs: Issues Concerning DOD's SBIRS and STSS Programs*, by Marcia S. Smith, Congressional Rep. RS21148 (Washington: The Service, January 30, 2006), 3.

[102] Ibid.

The Lockheed Martin-Northrop Grumman team won the $2.16 billion contract to build the SBIRS in 1996.[103] In September 2002, the DoD increased the contract to $4.18 billion, which did not include three of the five satellites.[104] Due to the institutional pressures to keep this program as opposed to scrapping it, roughly $10 billion was allocated to extending its life.[105] Many of the problems that hindered the development of the SBIRS included massive hardware systems and software engineering shortfalls that generated budget and schedule failures. Additionally, SBIRS suffered setbacks when its flight software failed testing and its ground support equipment experienced problems.[106] The GAO identified other issues, such as a weak acquisition approach that led to oversight by the project contractors, immature technologies, unclear requirements, unstable funding, underestimated software complexity, poor oversight, and other problems that has resulted in billions of dollars in cost overruns and years in schedule delays.[107]

The SBIRS-GEO is the newer version of the SBIRS High satellite. The SBIRS-High HEO (High Elliptical Orbit) are payloads hosted on spacecraft. The first SBIRS High payload was declared operational in November 2008; however, it was pushed back many times from the original launch date of 2002 for many of the reasons stated above.[108] The SBIRS GEO-1 was not delivered to Cape Canaveral until March 2011, and the launch occurred in May 2011.[109] As of March 2012, SBIRS HEO -1 and HEO-2 are in use, and SBIRS GEO-1 is on orbit and performing well.[110] The Air Force is set to

---

[103] U.S. Library of Congress, Congressional Research Service, *Military Space Programs: Issues Concerning DOD's SBIRS and STSS Programs*, 3.

[104] Ibid.

[105] Rendleman and Faulconer, "Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series," 41–57.

[106] U.S. Government Accountability Office, *Space Acquisitions: DoD's Goals for Resolving Space Based Infrared System Software problems Are Ambitious* (GAO-08-1073), 2008, http://www.gao.gov/products/GAO-08-1073.

[107] Ibid.

[108] Before It's News, "Despite Problems, SBIRS-High Moves Ahead."

[109] Ibid.

[110] Ibid.

launch the SBIRS GEO-2 in March 2013.[111] The Geo-3 and Geo-4 have run into some technical problems and will not be operational until 2018.[112]

B. FUTURE IMAGERY ARCHITECTURE (FIA)

The FIA project was one of several programs to break down leaving the United States with outdated imaging technology.[113] The National Reconnaissance Office (NRO) formally proposed the FIA program to Congress on March 6, 1997. This program was initially designed to capitalize on available small satellite technology to address the needs of tomorrow's customers.[114] The program had roughly a $5 billion dollar budget at the onset.

This satellite system promised to deliver collected data at a much-reduced interval between images, thus complicating the lives of terrorists, drug lords, and weapons proliferators who posed national security challenges and risks.[115] The FIA program was classified and did not receive the project scrutiny that unclassified space projects would normally receive, which is evident by the project contract bidding and selection process, as well as the limited project oversight. Also, questions arose at the beginning regarding the maturity of the project technology, and whether the technical goals were attainable given the budget and project schedule at the onset,[116] not to mention if enough funding and resources were available to complete this program.[117]

The selection of the contractor was another critical problem with this project. In most cases, contractors are selected based on past performance, project expertise and performance cost. However, in this case, Lockheed Martin, the longtime reconnaissance

---

[111] Pat Host, "Air Force Sets Launch Date for SBIRS GEO-2 Satellite," *Defense Daily*, June 7, 2012, http://www.defensedaily.com/sectors/space/Air-Force-Sets-Launch-Date-For-SBIRS-GEO-2-Satellite_18000.html.

[112] Before It's News, "Despite Problems, SBIRS-High Moves Ahead."

[113] Taubman, "In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids."

[114] GlobalSecurity.Org, "Future Imagery Architecture [FIA] To Broad Area Surveillance Intelligence Capacity [BASIC]," (n.d.), http://www.globalsecurity.org/intell/systems/fia.htm.

[115] Ibid.

[116] Taubman, "In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids."

[117] Ibid., 51.

satellite incumbent was not selected.[118] Additionally, it was known that Boeing had never built the kind of spy satellites that the U.S. Government was looking to acquire.

Other questionable issues included project oversight, and whether a clear pathway of open communication about project progress even existed. Boeing was given project oversight for monitoring its own work under the new government policy of shifting control of big military projects to contractors. Boeing was providing reassuring reports to the White House that the project could meet the proposed time schedules.

FIA was discontinued in September 2005 a year after the first satellite was to be launched because of technical difficulties, with cost overruns estimated at roughly $18 million.[119]

C. ADVANCED EXTREMELY HIGH FREQUENCY (AEHF) SATELLITE

The AEHF program began in April 1999, and development started in September 2001.[120] The original launch date was scheduled for June 2004. This satellite is designed to support twice as many tactical networks as the current Milstar II satellites, while providing 10–12 times the bandwidth capacity and six times the data rate of speed.[121] Milstar is the tactical and strategic multiservice satellite system designed to provide survivable communications for the U.S. Air Force Space Missile Center.[122] The original AEHF was originally designed and developed as a joint service satellite communications to provide global, secure, protected, and jam-resistant communications for high-priority

[118] National Reconnaissance Office, "10 Who Made a Difference in Space: Bruce Carlson, NRO Director," 2011, www.nro.gov/news/articles/2011/2011-01.pdf.

[119] Taubman, "In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids."

[120] Defense Industry Daily, "Next-Stage C4ISR Bandwidth: The AEHF Satellite Program," September 18, 2012, http://www.defenseindustrydaily.com/nextstage-c4isr-bandwidth-the-us-militarys-aehf-program-updated-02165/.

[121] Ibid.

[122] Boeing Satellites, Defense, Space & Security, "Milstar II," (n.d.), http://www.boeing.com/defense-space/space/bss/factsheets/government/milstar_ii/milstar_ii.html.

military ground, sea and air assets.[123] The original cost for this project was roughly $6.15 billion for five satellites, and the first launch was scheduled for late 2007.[124]

Due to resource and technical problems, optional satellites four and five were deleted from the project, with the intention of making AEHF "only an interim bridge to the larger Transformation Satellite Network (TSAT) program."[125] However, the TSAT had its own technical and resources problems. In addition, its leadership was unable to circumvent them. Secretary of Defense Robert M. Gates canceled the TSAT.[126] Upon further review of the reduction of the AEHF satellites as the military's main future guarantors of secure, hardened bandwidth, efforts to look at the overall gap created by TSAT's removal led to the restoration of AEHF-5, and the addition of a sixth satellite.[127]

As of 2009, the program total was $10.3 billion for four satellites, a per-unit cost increase of 109.3%. R&D costs had jumped 51.7%, from $4.75 billion to $7.2 billion, but procurement costs skyrocketed even faster. From an initial estimate of $1.4 billion for five satellites (mean average of $281 million per), procurement costs rose to $3.1 billion for four (mean avg. of $775 million per). In the April 2010 Selection Acquisition Report (SAR), the program had settled in at total research and development and production estimates of $12.45 billion for six satellites. On a per-satellite basis, it is still a 67.2% jump from the 2001 baseline.[128] See Diagram 5.

The AEHF Space Vehicle-1 (SV-1) launched in August 2010, almost three years after its original scheduled launch date. The AEHF (SV-2 and SV-3) both ran into technical failures and project delays, but the SV-2 eventually was launched in May 2012, roughly a year later than its previous scheduled launch date. The SV-3 missed its January 2012 launch date; however, it is scheduled to launch January 2013.

---

[123] Rendleman and Faulconer, "Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series," 53–54.

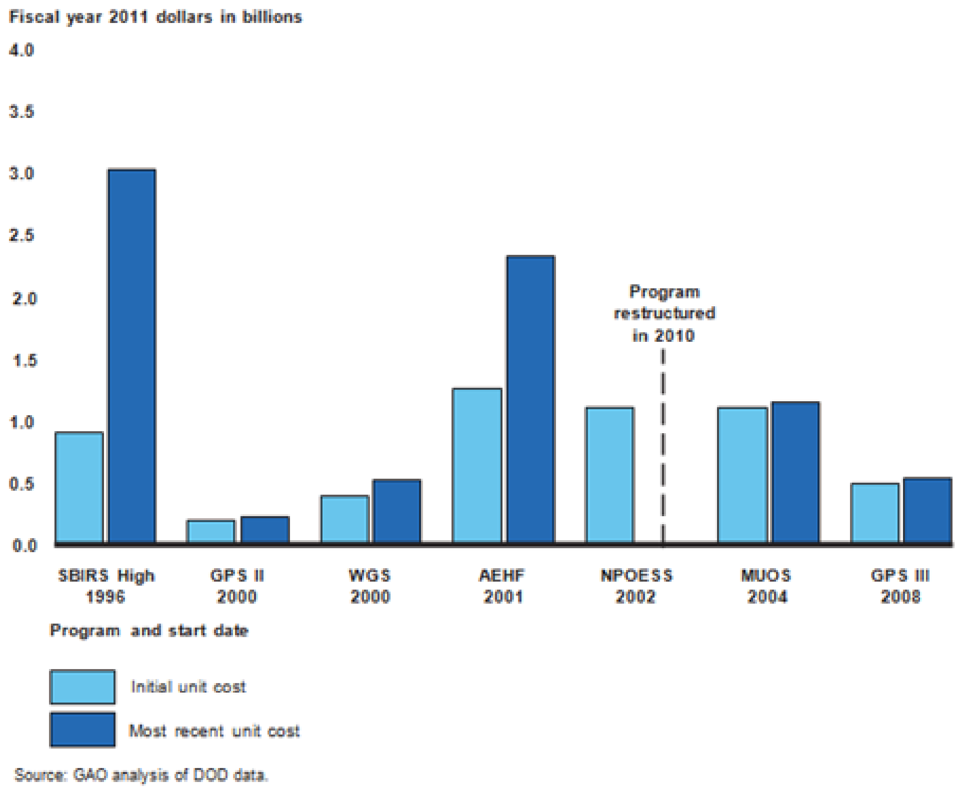
[124] Ibid.

[125] Ibid.

[126] Ibid.

[127] Defense Industry Daily, "Next-Stage C4ISR Bandwidth: The AEHF Satellite Program."

[128] Ibid.



Legend: SBIRS = Space Based Infrared System High; GPS = Global Positioning System; WGS = Wideband Global SATCOM; AEHF = Advanced Extremely High Frequency; NPOESS = National Polar-orbiting Operational Environmental Satellite System; MUOS = Mobile User Objective System.

Diagram 5. Differences in Unit Costs from Program Start and Most Recent Estimates[129]

Diagram 5 also illustrates initial and recent cost growths for both the SBIRS High and AEHF space programs, as well as other space programs. This diagram also illustrates the cost growth based on program changes, such as adding an additional satellite to the program leading to space program delays.

The DoD has identified a number of causes of cost growth and related problems prevalent in the aforementioned models, which include creating a competition for funding that encourages overly low cost estimating, optimistic scheduling, overpromising, suppressing bad news, and starting projects with immature technology. Additionally, the

[129] U.S. Government Accountability Office, *Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management* (GAO-11-590T), 2011, http://www.gao.gov/assets/130/126174.pdf.

DoD has too many continuous on-going programs, and is required to shift funds from program to programs, particularly as programs experience technical and resource problems.[130] See Diagram 6.[131]

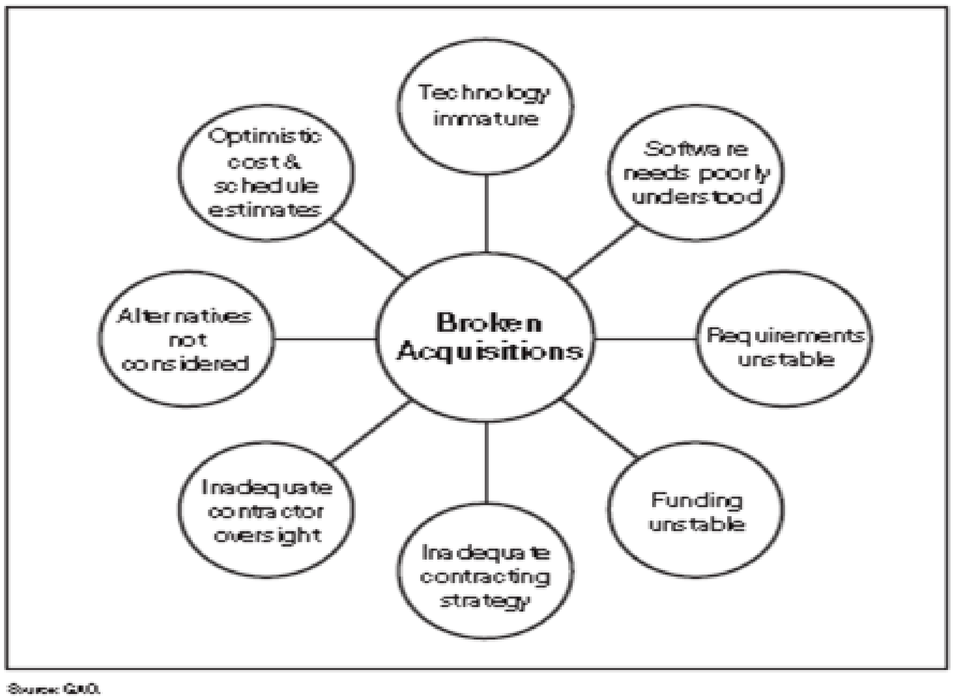


Diagram 6. Key Underlying Problems That Can Break Acquisitions

Although, Diagram 6 demonstrates multiple causes that can lead to broken acquisition, it begins with immature technology. One of the noticeable key problems during the research of this thesis was that many of these space programs started with immature technology. In other words, the technology needed for the project to complete its various stages was not fully tested, or developed. It can normally be presumed that before a project can be completed, a reasonable amount of the technology for finishing the project would have to be completed at a basic level just to deliver it in a timely

130 U.S. Government Accountability Office, *Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management*.

131 Ibid.

manner. However, this was not the case, and projects were awarded to contractors before the research and development was completed. It appears that immature technology alone in these space programs could lead to technical delays and program changes, because it is not always clear what the technical problems will be until the space system program has started.

John D. Christie, argues three causes for program cost growth: 1) overly ambitious requirements, 2) immature technologies, and 3) unrealistically low projections of costs in all function areas.[132] He suggests three parallel actions for the DoD, as well as Congress, could lead to project success. These actions include, firstly, prior to awarding any space program contracts, ensure that every requirement has a reasonable probability of being achieved within the desired time and that it will add value, which is consistent with program cost. Secondly, acquisition managers should use applied research programs and advanced technology demonstrations before inserting them in formal acquisition programs. Lastly, resource allocation managers need to avoid large disruptive changes in all functional areas that might require project modifications and changes.[133] Although this approach, as suggested by the author, may appear to be very simplistic and practical, they appear to be critical missing components in weapons and space acquisition programs.

Over the past several years, the DoD has made efforts to reform how weapons and space systems are acquired, through its own initiatives, as well as those required by statute. The goal of these efforts has been to increase both effectiveness and efficiency. For space, efforts have been made to ensure that the requirements are clearly defined early in the process and that the design remains stable.[134] The DoD is also providing more program and contractor oversight and implementing military standards and specifications to improve the efficiency of the acquisition process.

---

[132] John D. Christie, "DoD on a Glide Path to Bankruptcy," *U.S. Naval Institute Proceedings* 134, no. 6 (June 2008): 24–25.

[133] Ibid.

[134] Ibid.

Additionally the DoD and the Air Force are working to streamline both management and oversight of the national security space enterprise by centralizing project leadership. An example is that Air Force space system acquisition responsibility has been aligned to the office responsible for all other Air Force acquisitions efforts, and the Defense Space Council, which was created last year, is reviewing options for streamlining the many committees, boards, and councils involved in space issues.

Table 1 defines these space acquisitions outcomes, actions taken or being taken that could benefit space system acquisition outcomes.[135]

Table 1, continues on following pages

Acquisition Outcomes	
Category	**Actions**
National Policy	In June 2010, the President of the United States issued the new National Space Policy that establishes overarching national policy for the conduct of U.S. space activities. The policy states that the Secretary of Defense and the Director of National Intelligence are responsible for developing, acquiring, and operating space systems and supporting information systems and networks to support U.S. national security and enable defense and intelligence operations. The policy helps to clarify the Secretary of Defense's roles and responsibilities for coordinating space system acquisitions that span DoD and federal agencies, such as those for space situational awareness. In January 2011, the Secretary of Defense and the Director of National Intelligence issued the National Security Space Strategy to build on the National Space Policy and help inform planning, programming, acquisition, operations, and analysis.

[135] U.S. Government Accountability Office, *Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management*.

Acquisition Outcomes	
Category	**Actions**
Acquisition Policy	The Secretary of Defense expressed concern over DoD's tailored national security space acquisition policy—initially issued in 2003—primarily because it did not alter DoD's practice of committing to major investments before knowing what resources will be required to deliver promised capability. Instead, the policy encouraged development of leading-edge technology within product development, that is, at the same time the program manager is designing the system and undertaking other product development activities. In 2009, DoD eliminated the existing space acquisition policy and moved the acquisition of space systems under DoD's updated acquisition guidance for defense acquisition programs (DoD Instruction 5000.02). In October 2010, the Under Secretary of Defense for Acquisition, Technology and Logistics issued a new space acquisition policy to be incorporated into DoD Instruction 5000.02 that introduces specific management and oversight processes for acquiring major space systems, including retaining the requirement for independent program assessments to be conducted prior to major acquisition milestones.

Acquisition Outcomes	
Category	**Actions**
Management and Oversight	In August 2010, the Secretary of Defense announced the elimination of the Office of the Assistant Secretary of Defense for Networks and Information Integration (ASD/NII) as part of a broader effort to eliminate organizations that perform duplicative functions or that have outlived their purpose. The elimination of this organization may help to reduce the problems associated with the wide range of stakeholders within DoD responsible for overseeing the development of space- based capabilities. In May 2009, Air Force leadership signed the Acquisition Improvement Plan that lists five initiatives for improving how the Air Force obtains new capabilities. One of these initiatives relates to establishing clear lines of authority and accountability within acquisition organizations. In August 2010, the Secretary of the Air Force transferred space system acquisition responsibility from the Under Secretary of the Air Force to the Assistant Secretary of the Air Force for Acquisition, thereby placing all Air Force acquisition responsibility under one office. As part of this realignment, the Program Executive Officer for Space now reports to the Assistant Secretary of the Air Force for Acquisition (previously, the Program Executive Officer for Space reported to the Under Secretary of the Air Force).

Table 1. Actions Taken or Being Taken That Could Benefit Space System Acquisition Outcomes[136]

[136] U.S. Government Accountability Office, *Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management*, 20.

THIS PAGE INTENTIONALLY LEFT BLANK

VI. CONCLUSION

Various problems have impacted space procurement. The outcome of many of these issues has led to failed space programs, project redesigns, significant program cost increases, as well as project delays. This thesis has uncovered several weaknesses with the procurement process, as well the difficulties involved with correcting these problems. Although the space and defense procurement processes are systems that face their own complexities, and difficulties, many of the factors affecting acquisition included effectiveness of the acquisition process itself as it relates to a variety of space programs, the selection process of the contractors, program management and oversight, program funding, and encouraging mature technology at project onset.

Nonetheless, the space acquisitions process has made significant progress in terms of improving effectiveness and efficiency. Many of the changes imposed on space acquisition have happened within the past three years. Most of the changes implemented by DoD include utilizing a higher degree of patience and discretion when considering space projects. Two examples are verifying the needs of requirement and ensuring the technology is sound before contracts are awarded. Also, the DoD is placing more emphasis on realistic project cost and timelines.[137]

Additional acquisition reform was introduced by Secretary of Defense Robert Gates (no longer in office) and Under Secretary of Defense for Acquisition, Technology and Logistics Ashton B. Carter in a 23-point plan. The intent of this reform was to improve U.S. spending practices and identify issues that lead to programs not being delivered on time. Mr. Gates and Dr. Carter stated, "We have set out to save you at least 100 billion over five years in our purchasing of goods and services, which accounts for $400 billion of the $700 billion in annual defense spending."[138] Dr. Carter's, 23-Point

[137] U.S. Government Accountability Office, Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management.

[138] Ashton B. Carter, "The Pentagon Is Serious About Saving Money," *Wall Street Journal*, September 21, 2010, http://online.wsj.com/article/SB10001424052748703904304575497754176193396.html.

plan covers five major areas. Its objectives include: 1) target affordability and control growth, 2) incentivize productivity and innovation in industry, 3) promote real competition, 4) improve tradecraft in services acquisitions, and 5) reduce non-productive processes and bureaucracy.[139]

Dr. Carter defined target affordability and control growth as requiring that acquisitions professionals and suppliers not only plan for what programs should cost, but also not rely on historical estimates of what projects will cost.[140] Currently, this approach has been applied to weapons programs and found to be successful.[141]

Secondly, Carter sets a goal of incentivizing productivity and innovation in the industry. A strong emphasis has been placed on strengthening the connection between profit and performance in business practices by rewarding contractors for controlling their production costs, delivering products ahead of schedule deadlines, as well as demonstrating exemplary performance.[142]

Thirdly, Carter emphasizes that, "We must remove the barriers that prevent effective competition by encouraging more contractors to participate in program bidding, and selecting vendors that provide the best product at the best price."[143] Dr. Carter stated, "We need to stop deluding ourselves with the idea that directed buys from two designated suppliers represent real competition."[144] He further stated real competition is the single most important tool available to the department to drive productivity.[145]

Fourthly, this plan addressed more aggressive management oversight over contract support services.[146] Carter stated, "In 2009, the Department spent more than

---

[139] Ashton B. Carter, "Memorandum for Acquisition Professionals," *ACQWeb*, 11, September 14, 2010, http://www.acq.osd.mil/docs/USD_ATL_Guidance_Memo_September_14_2010_FINAL.PDF.

[140] Carter, "The Pentagon Is Serious About Saving Money."

[141] Ibid.

[142] Ibid.

[143] Ibid.

[144] Carter, "The Pentagon Is Serious About Saving Money."

[145] Carter, "Memorandum for Acquisition Professionals," 11.

[146] Ibid.

$212 billion in contracting services, using more than 100,000 contract vehicles held by 32,200 contractors, with more than 50 percent awarded to roughly 100 contractors."[147] Carter further states, "Our practices for buying such services are even less effective than buying weapons systems."[148]

Lastly, Carter's plan seeks to reduce non-productive processes and bureaucracy. Dr. Carter stated, "Unnecessary and low- value added processes and document requirements are a significant drag on the acquisition productivity and must be aggressively identified and eliminated.[149] He further states, "We cannot achieve cost goals, and award incentives to contractors with the processes we have in place."[150] One of the key strategies to eliminating non-productive strategies and bureaucracy is abolishing low value-added stator processes by being cautious of the McCurdy reprocess. This process, as stated previously, provides Congress with budget approval oversight when programs are experiencing cost growth. Carter stated, "The acquisition process can be streamlined in a way that we can make sound decisions about the future of program and provide Congress with the information and certifications they need without overly burdening programs."[151]

Upon examining the problems that impacted the acquisition process, the author agrees with the recommendations presented by the U.S. Government Accountability Office, and Under Secretary of Defense for Acquisition Technology and Logistics Ashton B. Carter. Additionally, the 23-point plan introduced by Carter is very broad and can be applied to both the defense weapon systems and space program acquisition process. Nonetheless, the author believes that implementing and providing oversight, as well as measuring the success of the 23-point plan has not been clearly explained or defined. He

[147] Carter, "Memorandum for Acquisition Professionals," 11.

[148] Carter, "The Pentagon Is Serious About Saving Money."

[149] Carter, "Memorandum for Acquisition Professionals," 13.

[150] Ibid.

[151] Ibid.

believes that more research can be provided in this area. Additionally, this thesis offers several recommendations that can further provide assistance to the existing challenges defined in space acquisition.

A. RECOMMENDATIONS

1. Require mature technology prior to awarding contracts on space programs with incentives to contractors that present the results of their research and development.
2. Encourage a stronger transition from old space systems to advanced systems.
3. Select the best and most qualified personnel both civilian and military to manage and oversee space programs.
4. Ensure that adequate funds are set aside for the entire life cycle of a space project prior to space system approval, where feasible to avoid security gaps.
5. Cancel space systems projects that show early signs of technical difficulties or project delays to ensure funds are not wasted.
6. Encourage research and development primarily for space systems programs to ensure mature space program technology.

B. SUMMARY

In conclusion, this thesis identified several space acquisition problems that potentially could have been disastrous for the United States. As stated previously, the acquisition process is extremely broad. However, it was the intent of this research to focus on the concerns presented by the government, which ultimately falls on the shoulders of the taxpayers. The concerns explored included project re-designs, significant program cost increases, project delays and failed space programs. Space programs are critical to the United States because they provide early missile detection and imaging technology that can be used for predict natural disasters, such as super storm sandy, or to provide images to prevent potential terrorist attacks. Furthermore, the goal of this research was to identify problems with the space acquisition process, so the United States can transition from old technology to new technology in a more effective manner without leaving the country technically, or economically vulnerable.

APPENDIX. LIST OF PROCESS PRINCIPLES, EVALUATION CRITERIA AND VALUES[152]

A. MDA-PRINCIPLES–PAGE 27

a.) Mission Success: The overarching principle behind all National Security Space programs is mission success. When acquiring space systems, mission success must be the first consideration when assessing the risks and trades among cost, schedule, and performance. Risk management, test planning, system engineering, and funding profiles must be driven by this objective.

b.) Accountability: The acquisition execution chain is ultimately accountable for a program's success or failure. The SPD/PM, as the leader of the Government-Contractor team for a program, must be accountable and have the authority to accomplish the program's objectives and meet the user's needs. The PEO or CAE and the DoD Space MDA have the responsibility to provide the SPD/PM with the resources and guidance necessary to accomplish these goals.

c.) Streamlined/Agile: The NSS acquisition team should work to reduce the acquisition decision cycle time and have short, clear lines of authority with decision making and program execution at the lowest levels possible. Staff elements, at all levels, exist to advise the acquisition decision making principals (i.e., DoD Space MDA, CAE, PEO, SPD/PM). No more than two layers can be between the SPD/PM and the MDA. (Ref: 5000.1)

d.) Inclusive: Advice and information should be actively sought from all parties with an interest in NSS programs. A collegial/team relationship among all government, academia, and industry partners is the goal.

DoD Space acquisition plans and documents should be coordinated with the appropriate lead user/operating command.

e.) Flexible: The "model" acquisition processes outlined in this document should be tailored to properly fit the circumstances of each NSS program. Only those activities, reports, plans, coordination's, or reviews required by statute or directed by the NSS acquisition execution chain are required.

f.) Stable: Within a given acquisition increment, stable budgets, stable requirements, stable direction, and low personnel turnover are necessary for successful program acquisition. Decisions made by the acquisition execution chain must be durable.

[152] National Security Space Acquisition Policy, NO03-01.

g.) Disciplined: All parties to this space acquisition policy must exercise the discipline necessary to achieve its goals without allowing its procedures to become unnecessarily burdensome and/or time consuming.

h.) Credible: The NSS team must deliver what it promises on schedule and within budget. The NSS process is meant to incentivize and foster quality decision making for programs that exhibit the necessary maturity to proceed into the next acquisition phase.

i.) Cost Realism: The goal is to develop and grow a world-class national security space cost estimating capability. Cost estimates must be independent and accomplished in a timely, realistic, and complete manner. Cost will be controlled by estimating accurately and focusing on quality to reduce rework and achieve mission success. All members of the NSS acquisition execution chain must insist on, and protect, a realistic management reserve.

B. MDA-PROJECT5 EVALUATION PROCESS—PAGE 29

5.1 Joint Capabilities integration and Development System needs. (For the IC, the Mission Requirements Board (MRB) defines and prioritizes future

The JCIDS process identifies, develops, and validates all defense-related capability national foreign intelligence needs within substantive mission areas and drives those needs into intelligence planning, resource, and large system acquisition decisions.) CJCSI 3170.01D describes the JCIDS process and serves as the governing capability needs process document for this NSS policy. A disciplined capability needs process is key to achieving effective and timely acquisitions within expected budgets. Users and operators are responsible for comprehensive, clear, and timely identification of capability needs through the JCIDS process. Space system SPDs/PMs are responsible for supporting the JCIDS process by providing users and operators with timely, credible programmatic implications (cost, schedule, and risk) of meeting operational capability needs. SPDs/PMs should work closely with the users and operators to support the development of the Key Performance Parameters. This will allow the users and operators to make informed decisions. Within the DoD, the capability needs validation authority and acquisition authority are separate.

5.2 Planning, Programming, Budgeting, and Execution Process (PPBE)

The PPBE process translates military capability needs into budgetary requirements, which are presented to Congress for funding consideration. Each of the functions of the PPBE operates on a near-continuous basis throughout the fiscal year. Within the DoD, the budget authority and the acquisition decision authority are separate.

5.3 National Security Space (NSS) Acquisition Process

The NSS model emphasizes the decision needs for "high-tech" small quantity NSS programs. The funding profile for a typical NSS program is usually front-loaded when compared to a production-focused system. Defense Acquisition Performance Assessment (DAPA) Executive Report December 2005, Defines Organization Values:

- Organizations providing oversight and coordination of "little a" acquisition activities value compliance, consistency of approach and control of program activities
- The workforce is incentivized by job satisfaction, the opportunity for continuous training and stability in the process.
- The budget process values how much and when to buy and focuses on control and oversight to balance the instability that advocacy creates.
- The requirements process values the "why" and "what to buy" issues, focusing on obtaining the ability to achieve mission success at lowest cost in lives.
- The "little a" acquisition process values "how to buy." It strives to balance cost, schedule and performance.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

ACQ Web. “Defense Federal Acquisition Regulations Supplement, Part 201, 201.301.” (n.d.). http://www.acq.osd.mil/dpap/dars/dfars/pdf/r20111220/201_3.pdf.

Acquisition Community Connection. “Defense Acquisition Performance Assessment Report.” January 2006. https://acc.dau.mil/adl/en-US/17721/file/577/DAPA-Report-web.pdf.

AllGov. “Defense Contract Management Agency.” (n.d.). http://www.allgov.com/Agency/Defense_Contract_Management_Agency.

Before It’s News. “Despite Problems, SBIRS-High Moves Ahead.” September 11, 2012. http://beforeitsnews.com/military/2012/09/despite-problems-sbirs-high-moves-ahead-2444882.html.

Benson, Lawrence R. “Acquisition Management in the United States Air Force and its Predecessors.” Master’s thesis, Air Force History and Museums Program, 1997.

Boeing Satellites. Defense, Space & Security. “Milstar II.” (n.d.). http://www.boeing.com/defense-space/space/bss/factsheets/government/milstar_ii/milstar_ii.html.

Brinton, Turner. “NRO Director Defends Plan for Eloctro-Optical Spy Satellites.” *Space* News, October 9, 2009.

Carter, Ashton B. “Memorandum for Acquisition Professionals.” *ACQWeb*. September 14, 2010. http://www.acq.osd.mil/docs/USD_ATL_Guidance_Memo_September_14_2010_FINAL.PDF.

———. “The Pentagon Is Serious About Saving Money.” *Wall Street Journal*, September 21, 2010. http://online.wsj.com/article/SB10001424052748703904304575497754176193396.html.

Christie, John D. “DoD on a Glide Path to Bankruptcy.” *U.S. Naval Institute Proceedings* 134, no. 6 (June 2008): 24–25.

Defense Industry Daily. “Next-Stage C4ISR Bandwidth: The AEHF Satellite Program.” September 18, 2012. http://www.defenseindustrydaily.com/nextstage-c4isr-bandwidth-the-us-militarys-aehf-program-updated-02165/.

Dornheim, Michael A. “FIA Outline Takes Shape.” *GlobalSecurity.Org*. December 21, 2001. http://www.globalsecurity.org/org/news/2001/011221-fia.htm.

Drabkin, David, and Khi V. Thai. "U.S. Federal Government Procurement: Structure, Process and Current Issues." Paper presented at the International Purchasing and Supply Education and Research Association's Comparative Public Procurement Cases Workshop, Budapest, Hungary, April 10–12, 2003.

Federation of American Scientists. "U.S. National Space Policy." August 31, 2006. http://www.fas.org/irp/offdocs/nspd/space.pdf.

"Future Imagery Architecture [FIA]-2005 Restructuring." *GlobalSecurity.Org*. (n.d.). http://www.globalsecurity.org/intell/systems/fia-2005.htm.

General Services. Administration Department of Defense National Aeronautics, and Space Administration. "Federal Acquisition Regulation (FAR)." March 2005.

GlobalSecurity.Org. "Future Imagery Architecture [FIA] To Broad Area Surveillance Intelligence Capacity [BASIC]." (n.d.). http://www.globalsecurity.org/intell/systems/fia.htm.

Graham, William. "Atlas V Launches with SBIRS GEO-1 at Second Attempt." *NASA Spaceflight.com*, May 7, 2011. http://www.nasaspaceflight.com/2011/05/live-atlas-v-launch-with-sbirs-geo1/.

Green, Steve G., Kurt A. Heppard, and Robert L. Tremaine. *Space and Defense Policy, The Acquisition Process: Acquiring Technology for Space and Defense.* London, New York: Routledge, 2009.

Host, Pat. "Air Force Sets Launch Date for SBIRS GEO-2 Satellite." *Defense Daily*, June 7, 2012. http://www.defensedaily.com/sectors/space/Air-Force-Sets-Launch-Date-For-SBIRS-GEO-2-Satellite_18000.html.

Jones, Wilbur D. Jr. *Arming The Eagle: A History of U.S. Weapons Acquisition Since 1775*. Defense Systems Management College Press, 1999.

Levy, Jeffrey L. "An Ill Wind blows: Restricting the Public's Right of Access to Search Warrant Affidavits." *LexisNexis*. February 1990. https://litigation-essentials.lexisnexis.com.

Malin, Daniel R. "Back To The Future: Returning U.S. Space Acquisition To Glory." *Air Command and Staff College*, April 2006.

Mazur, Joe Jr. "The Real Secret to Acquiring Space Systems." *Air Force Journal of Logistics* (Winter 2003): 7.

National Reconnaissance Office. "10 Who Made a Difference in Space: Bruce Carlson, NRO Director." 2011. www.nro.gov/news/articles/2011/2011-01.pdf.

National Security Space Acquisition Policy. NO03-01, December 27, 2004.

Rendleman, James D., and J. Walter Faulconer. “Escaping the Space Acquisition Death Spiral, Part One of a Three Part Series.” *High Frontier* 7, no. 4 (August 2011): 41–57.

Rendlemand, James D., and J. Walter Faulconer. “Escaping the Space Acquisition Death Spiral, Part 2, *Air Force Space Command*. (n.d.). http://www.afspc.af.mil/shared/media/document/AFD-110825-030.pdf.

Sadeh, Eligar. *Space Politics and Policy: An Evolutionary Perspective (Space Regulations Library)*. Dordrecht, London: Kluwer Academic Publishers, 2002.

Schwartz, Moshe. “The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress.” *Federation of American Scientists*. June 21, 2010. http://www.fas.org/sgp/crs/misc/R41293.pdf.

Taubman, Philip. “In Death of Spy Satellite Program, Lofty Plans and Unrealistic Bids.” *The New York Times*, November 11, 2007. http://www.nytimes.com/2007/11/11/washington/11satellite.html?_r=1#step1.

U.S. Department of Defense. “Defense Acquisition Performance Assessment Report.” December 2005. http://www.defense.gov/pubs/pdfs/DAPA%2012-22%20WEB%20Exec%20Summary.pdf.

———. “Executive Summary: Defense Acquisition Performance Assessment Report (DEPA).” December 2005. http://www.defense.gov/pubs/pdfs/DAPA%2012-22%20WEB%20Exec%20Summary.pdf.

U.S. Government Accountability Office. *Space Acquisitions: DoD’s Goals for Resolving Space Based Infrared System Software problems Are Ambitious* (GAO-08-1073). 2008. http://www.gao.gov/products/GAO-08-1073.

———. *Testimony Before the Subcommittee on Strategic Forces, Committee on Armed Services, U.S. Senate Space Acquisitions: DoD Delivering New Generations of Satellites, but Space System Acquisitions Challenges Remain, Statement of Cristina T. Chaplain, Director Acquisition and Sourcing Management* (GAO-11-590T). 2011. http://www.gao.gov/assets/130/126174.pdf.

U.S. Library of Congress. Congressional Research Service. *Military Space Programs: Issues Concerning DOD’s SBIRS and STSS Programs*, by Marcia S. Smith. Congressional Rep. RS21148. Washington: The Service, January 30, 2006.

The White House. “National Space Policy of the United States of America.” June 28, 2010. http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf.

THIS PAGE INTENTIONALLY LEFT BLANK

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California