Optimizing the Navy's investment in space professionals

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THESIS

OPTIMIZING THE NAVY'S INVESTMENT IN SPACE PROFESSIONALS

by

Clint W. Miller

September 2011

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The U.S. Navy relies heavily on the capabilities and advantages provided by space assets. Today's Navy would face severe operational challenges without space-based communications, navigation and surveillance capabilities. A small group of space professionals within the Navy diligently works with other organizations and services to ensure these capabilities are continuously available. The origins of the Navy's involvement with space and rocketry dates back to pre-World War II, when rockets for use on aircraft were developed and tested at the U.S Naval Academy. Since then, the Navy has had an undeniable need to ensure that space systems are available to support naval and joint operations. The Navy's collective knowledge of the space enterprise is therefore invaluable to current naval operations and must be preserved.

This study is a reassessment of the current Navy Space Cadre construct based on the implementation and effectiveness of the 2004 Naval Space Cadre Human Capital Strategy. Its purpose is to examine current and historical utilization rates of Navy space professionals, compare the Navy space personnel management construct to that of the other services, identify the current challenges and shortcomings of the Navy Space Cadre, and offer reasonable recommendations that could optimize the Navy's investment in space professionals.

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OPTIMIZING THE NAVY'S INVESTMENT IN SPACE PROFESSIONALS

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ABSTRACT

The U.S. Navy relies heavily on the capabilities and advantages provided by space assets. Today's Navy would face severe operational challenges without space-based communications, navigation and surveillance capabilities. A small group of space professionals within the Navy diligently works with other organizations and services to ensure these capabilities are continuously available. The origins of the Navy's involvement with space and rocketry dates back to pre-World War II, when rockets for use on aircraft were developed and tested at the U.S Naval Academy. Since then, the Navy has had an undeniable need to ensure that space systems are available to support naval and joint operations. The Navy's collective knowledge of the space enterprise is therefore invaluable to current naval operations, and must be preserved.

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LIST OF ACRONYMS AND ABBREVIATIONS

AEDO	Aerospace Engineering Duty Officer
AF	Air Force
AFB	Air Force Base
AFSC	Air Force Space Command
AFSCN	Air Force Satellite Control Network
AOC	Air Operations Center
AOR	Area of Responsibility
ARG	Amphibious Readiness Group
AQD	Additional Qualification Designator
ASPDO	Army Space Personnel Development Office
ASOpS	Advanced Space Operations School
BUPERS	Bureau of Naval Personnel
CCDR	Component Commander
CDR	Commander
CDRJSO	Commander, Joint Space Operations
CENTCOM	Central Command
CFACC	Combined Forces Air Component Commander
CF	Career Field
CG	Guided Missile Cruiser
CIA	Central Intelligence Agency
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CNO	Chief of Naval Operations
COA	Course of Action
COMM	Communications
CONOPS	Concept of Operations
CSG	Carrier Strike Group
CVN	Aircraft Carrier, Nuclear
CYBERFOR	Navy Cyber Forces
CY	Calendar Year
DARPA	Defense Advanced Research Projects Agency

DDG	Guided Missile Destroyer
DIA	Defense Intelligence Agency
DNRO	Director of the National Reconnaissance Office
DoD	Department of Defense
DODD	Department of Defense Directive
DoD SA	Department of Defense Space Architecture
DON	Department of the Navy
DSCS	Defense Satellite Communications System
DSP	Defense Support Program
EAS	Executive Agent for Space
EHF	Extremely High Frequency
ELINT	Electronic Intelligence
EMI	Electromagnetic Interference
ESG	Expeditionary Strike Group
FA	Functional Area
FAO	Foreign Area Officer
FCC/C10F	Fleet Cyber Command/Commander Tenth Fleet
FFC	Fleet Forces Command
FILL	Officer in a billet in which he/she does not have the proper SSC or AQD
FIT	Officer has proper SSC or AQD for the assigned billet
FLTSATCOM	Fleet Satellite Communications
FMOS	Free Military Occupational Specialty
FY	Fiscal Year
FYDP	Fiscal Year Defense Program
GAO	Government Accountability Office
GEO	Geostationary Orbit
GIG	Global Information Grid
GPS	Global Positioning System
GRAB	Galactic Radiation and Background
HCRS	Human Capital Resource Strategy
HCS	Human Capital Strategy

IC	Intelligence Community
IDC	Information Dominance Corps
IO	Information Operations
IP	Information Professional
ISO	In Support Of
IWO	Information Warfare Officer
JCS	Joint Chiefs of Staff
JP	Joint Publication
JROC	Joint Requirements Oversight Council
JSMB	Joint Space Management Board
JSpOC	Joint Space Operations Center
JSTO	Joint Space Tasking Order
JTAGS	Joint Tactical Ground Station
JTRS	Joint Tactical Radio System
LEASAT	Leased Satellite
LEO	Low Earth Orbit
MAGTF	Marine Air Ground Task Force
MCO	Marine Corps Order
MCSC	Marine Corps Space Cadre
MDA	Maritime Domain Awareness
MS	Master of Science
PMOS	Primary Military Occupational Specialty
MUOS	Mobile User Objective System
NASA	National Aeronautics and Space Administration
NAVASTROGRU	Navy Astronautics Group
NAVSOC	Naval Satellite Operations Center
NAVSPACECOM	Naval Space Command
NAVSPASUR	Naval Space Surveillance
NCST	Naval Center for Space Technology
NETWARCOM	Naval Network Warfare Command
NGA	National Geospatial-Intelligence Agency
NRL	Naval Research Laboratory

NRO	National Reconnaissance Office
NSA	National Security Agency
NSC	Navy Space Cadre
NSCO	Navy Space Cadre Office
NSCN	Naval Satellite Control Network
NSMS	National Strategy on Maritime Security
NSS	National Space Strategy
NSSI	National Security Space Institute
NSSAP	National Security Space Acquisition Policy
ODC	Officer Data Card
OPCON	Operational Control
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
OSD	Office of the Secretary of Defense
PEO	Program Executive Office
PMW-146	Communications Satellite Office
PNT	Position/Navigation/Timing
PPBE	Planning Programming Budget and Execution
R&D	Research and Development
RL	Restricted Line
SATCOM	Satellite Communications
SCA	Space Cadre Advisor
SCP	Specialty Career Path
S/C	Space Craft
SECNAVINST	Secretary of the Navy Instruction
SEP	Special Education Program
SSAG	Space Systems Academic Group
SSE	Space Systems Engineering
SSO	Space Systems Operations
SSR	Space Support Request
SOC	Space Operations Center
SPAWAR	Space and Naval Warfare Systems Command

SPDP	Space Professional Development Program
SPEC	Space Professional Experience Codes
SPMO	Space/Cyber Professional Management Office
SPOB	Space Professional Oversight Board
SSA	Space Situational Awareness
SSC	Sub-Specialty Code
SSFA	SPAWAR Space Field Activity
STO	Space Tasking Order
SW	Space Wing
SWO	Surface Warfare Officer
TACAIR	Tactical Air Forces
TACON	Tactical Control
TYCOM	Type Commander
UFO	Ultra High Frequency Follow-On
UHF	Ultra High Frequency
URL	Unrestricted Line
USA	United States Army
USAF	United States Air Force
USCYBERCOM	United States Cyber Command
USN	United States Navy
USSPACECOM	U.S. Space Command
USSTRATCOM	U.S. Strategic Command

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I. INTRODUCTION

Over the past 50 years, the United States' utilization and reliance on space-based capabilities have increased at an astounding rate. The Navy's reliance on space is best summed up by the testimony of Rear Admiral Titley and Dr. John Zangardi at the Military Space Program Hearing in May 2011:

> The Navy remains ***critically dependent*** on space to conduct not only its wartime mission, but also its core capabilities of forward presence, deterrence, sea control, power projection, maritime security, humanitarian assistance, and disaster response. Space capabilities are vital to our nation's maritime operations and are foundational to our ability to operate in a networked and dispersed manner. As the recently signed Navy Space Strategy states, space provides the ultimate crow's nest for maritime operations. (Titley & Zangardi, 2011)

Much of the United States' progress and investment in space has been in the name of defense and military applications. So much so, that the previous two National Space Policies (NSP) published each require that all major defense organizations must "develop, maintain and retain skilled space professionals to meet the future needs of our country" (Whitehouse, 2010). The United States Air Force (USAF) and United States Army (USA) both fulfill this requirement by having dedicated space career fields for their officers. This ensures availability of training and promotion opportunities and the ability to place the right person into the right job by having them remain in the field once they have gained the experience and training required to adequately perform their space assignment.

The Navy, however, has chosen a different approach to meeting this requirement. It has put together a Navy Space Cadre (NSC), which, over the last nine years, has mostly been a list of naval officers who have been assigned to a space related job in the Navy and/or have received formal education. It also identifies which officer billets in the Navy are space-related or are intended to be filled by a space professional with a defined level of training and experience. The NSC has not yet created a process to identify civilian or enlisted personnel or

billets. In the officer community, the NSC leadership has little to no control over the personnel identified as NSC members with respect to job assignments, professional development or retention/promotion. All members of the NSC belong to primary warfare communities and those communities have full control of these NSC personnel. As will be shown in this thesis, this has led to less than optimal manning and training within the Navy's space coded jobs. The current NSC construct, which was developed in July of 2002 and approved by then Chief of Naval Operations (CNO) Admiral Vern Clark, was intentionally designed to be a strictly subspecialty function leaving officers in their primary warfare designators rather than creating an officer community of space professionals.

A. REASON FOR STUDY

The Navy has a long history of space involvement and is more reliant now than ever before on the capabilities, reconnaissance and information flow that space systems provide. The modern U.S. Navy relies so heavily on space as a medium for communications, information and intelligence that the fleet and the Navy as a whole would be virtually dead-in-the-water without it. Admiral David Dorsett, in a prepared speech for the Senate Strategic Forces Subcommittee, stated "The Navy is one of the largest 'users' of space in DoD, yet we rely on our partnership with the Air Force and the Intelligence Community (IC) to develop and field the majority of our space systems" (Dorsett & Federici, 2010).

In 2001, the Commission to Assess National Security Space Management and Organization ("Space Commission") determined that space should be elevated to the status of a top national security priority. They also stated "The U.S. Government needs to play an active, deliberate role in expanding and deepening the pool of military and civilian talent in science, engineering and systems operations that the nation will need" (Department of Defense, 2001). Department of Defense Directive (DODD) 5101.2 requires that the heads of DoD Components will "Develop and maintain a sufficient cadre of space-qualified personnel to support their Component in space planning, programming,

acquisition, and operations." (Department of Defense, 2003) The Navy chose to meet this directive with the creation of a professional space cadre. The current cadre structure is established in the 2004 Navy Space Cadre Human Capital Strategy (NETWARCOM, 2004). The objective of this document was to answer national policy calls for a dedicated and skilled navy space force without creating another warfare community.

The idea of cross-community detailing outlined in the Navy Space Cadre Human Capital Strategy document has led to unintended consequences within the space cadre and has not provided the Navy with an acceptable level of utilization of its space cadre personnel. As of March 2011, there were 1033 active duty officers identified within the NSC and only 293 identified space billets or "jobs" within the Navy. Over the course of the last eight years, Office of the Navy Space Cadre Advisor data shows that personnel with adequate space experience to carry out the assignment have filled only 40% of these billets (Navy Space Cadre Office, 2011). In reality, this number is most likely even lower due to the current stipulation that when officers with no prior space education or experience have been in a space-coded assignment for 18 months, they are assumed qualified to do the job, earn the required subspecialty designation, and also earn investiture as NSC members. This proves highly inefficient and means that some billets are sub-optimally filled until a certain level of proficiency is obtained. The numbers presented are consistent with historical trends of utilization since data began to be collected in 2004. Another alarming indication of poor return on investment is the high percentage of officers who received graduate level space education who have not been required to pay back that education by performing a space-coded job identified as essential by the NSC. This issue will be thoroughly discussed in Chapter IV.

In 2010, the Chief of Naval Operations (CNO) directed the realignment of his staff to bring all Navy information-related capabilities and systems under a single resource sponsor—the Deputy Chief of Naval Operations for Information Dominance. This brought four individual officer communities: Information

Professional (IP), Intelligence Officer (IO), Information Warfare Officer (IWO), Meteorology and Oceanographic Officer (METOC) along with the NSC under one commander. This has led to the creation of an all-encompassing warfare community and qualification titled the Information Dominance Corps (IDC). As for the NSC aspect, the OPNAV N2/N6 Information Dominance Directorate established a single focal point to oversee Navy's space related policies, programs, requirements, investments, and resourcing. Fleet Cyber Command/U.S. Tenth Fleet (FCC/C10F), along with the task of being the Navy's operational lead for information and cyberspace, has been given the task of also executing the Navy's space operations (Titley & Zangardi, 2011). These changes, although relatively new, only realign the NSC under a new command structure but do not change the NSC construct. The last Department of the Navy Space Policy released on April 6, 2004, states:

> The United States Navy and Marine Corps must maintain their ability to tactically exploit the capabilities provided by space systems and participate in all appropriate aspects of the changed NSS environment in order to function as an integrated member of the Nation's joint war fighting team. Consequently, the DON must continually reassess its approach and investment to ensure that naval forces receive the maximum benefit of space-based capabilities. (Department of the Navy, 2004)

This study is a reassessment of the current Navy Space Cadre construct. Its purpose is to examine current utilization rates of space professionals, compare the Navy space construct to that of the other services, identify the current challenges and shortcomings of the Navy Space Cadre, and offer reasonable recommendations that optimize the Navy's investment in space professionals.

B. THESIS SCOPE AND ORGANIZATION

The purpose of this thesis is to research current training, education and utilization of the officer corps of space professionals within the Navy and propose solutions to better utilize their unique specialty within the Navy. This includes an

examination of the current NSC structure as outlined in the 2004 Human Capital strategy, the implementation of the concepts presented in that document and the intended and unintended results of that construct. This study also aims to analyze how the Navy trains and utilizes certain levels of expertise for the space assets and roles the Navy currently has. It also compares the Navy's Space Cadre to that of the other services in the interest of finding the most effective use of space personnel.

The Navy is currently reorganizing the intelligence, information and cyber communities and that has and will continue to have an even greater effect on the NSC's role within the USN. However, at the time of this writing, there have been no changes to the detailing process or promotion process for NSC officers, which is the core topic within this thesis. This thesis does not intend to influence, or recommend changes to National Security Space (NSS) policy, or argue that the Navy should or should not take on a larger role in NSS. Its sole purpose is to examine ways in which the USN can better utilize the space education, training and experience its officers possess for the roles and missions it currently has. This body of work does not examine the enlisted or civilian aspect of the NSC. Specifically, it will cover a general introduction, then cover background information including a brief history of Navy space and the missions and roles Navy space currently plays. Then, the thesis will focus on examining DoD Space Cadre Management and the cadres/communities of the other services. Chapter IV covers specific issues within the NSC, and Chapters V and VI discuss options, conclusions and recommendations.

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II. BACKGROUND

A. NAVY SPACE INTRODUCTION

1. Origins of Navy Space

Much like the near concurrent formation of the Continental Army and the Continental Navy, the United States entry into the space age saw the near simultaneous entries of the U.S. Army and U.S. Navy into major space endeavors. The Navy's entry into the space age officially started with the successful launch of Vanguard I depicted in Figure 1. Launched on March 17, 1958, from Cape Canaveral Missile Annex, the Vanguard I payload was successfully inserted into a 2466 by 404 mile elliptical orbit. Vanguard was also the first satellite to utilize solar panels along with batteries for its power supply. The program was managed by the Naval Research Laboratory (NRL) and the spacecraft continues to remain in orbit as the oldest artificial satellite still in space (NRL, 2008).

Figure 1. Vanguard I (From National Space Science Data Center, 2011)

The NRL was also key in the development and testing of the Viking rocket, which became the launch vehicle for the Vanguard I. The NRL used technology from captured German V-2 rockets to develop the Viking and added a small second stage called the Aerobee. The Viking rocket tests provided both valuable knowledge of the upper atmosphere and proved the ability to launch rockets from

the decks of ships. These successful tests of the Viking also laid the foundation and vision for future sea-launched ballistic missiles.

The GRAB satellite shown in Figure 2 was launched on June 22, 1960. Also managed by the NRL, this highly successful project became an enduring program and earned the title of the world's first intelligence satellite and, more specifically, the first ELINT bird. The launch of GRAB1 initiated a space reconnaissance program, which was then followed by the POPPY program, which endured until the fall of 1977. The GRAB program was not declassified until 1998 (NRO, 2003).

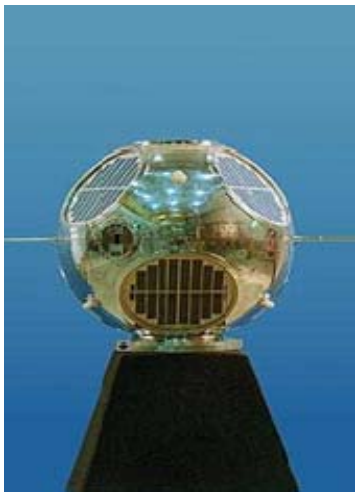

Figure 2. GRAB (From NRL, 2006)

The Naval Satellite Operations Center (NAVSOC), Point Mugu, CA, was established in 1962 as the Navy Astronautics Group (NAVASTROGRU) with the advent of the Navy Navigational Satellite System (also known as TRANSIT). The 1962 Mission Statement was:

> To maintain and operate astronautics systems assigned by the Chief of Naval Operations, including spacecraft, ground-based components, and subsystems, so as to fulfill naval and national requirements established by the Chief of Naval Operations and higher authority.

NAVSOC personnel were the first to test, and operate, the initial Department of Defense (DoD) satellite system. TRANSIT was sponsored in 1958 by the Navy, designed by NRL, and was the first space system designed to address a specific naval requirement. Between 1959 and 1977, 26 TRANSIT satellites were launched into orbit, allowing USN vessels to obtain a navigational position after a few passes of the satellites. TRANSIT demonstrated a significant capability from space and paved the way for the Global Positioning System (GPS). In 1990, NAVASTROGRU evolved into NAVSOC and started its new mission by assuming operational control of other Navy and DoD satellite systems and closing down the TRANSIT-only operations and associated sites.

Figure 3. Space Fence (From NAVSPASUR, 2001)

The “Space Fence,” depicted in Figure 3 was originally designed by NRL in 1958 as a multi-static RADAR space surveillance system. The original six site high-energy RADAR system was built along the 33rd parallel to give the Department of Defense full time situational awareness of space objects. The Navy’s first operational space command, Naval Space Surveillance (NAVSPASUR) took ownership of the “Space Fence” on February 1, 1961. By the mid-1960s, the fence reached the current configuration of six receive sites

and three transmit sites. Transferred to the United States Air Force (USAF) on October 1, 2004; the value of the space fence was soon appreciated by the USAF when initially turned off. As it turns out, the system produced over five million-satellite detection / observation reports each month (Wagner, 2004). Lockheed Martin and Raytheon Corp. are currently contracted by the U.S. Air Force to provide preliminary designs for a replacement Space Fence.

The Navy's initial endeavors into space were not without failures. After several successful launches of the Viking rocket, it was chosen to lift the Vanguard satellite into orbit. Three successful test launches occurred in late 1957. However, the first attempt to launch a Vanguard satellite resulted in the rocket exploding shortly after liftoff. This allowed the Army and their team headed by Werner Van Braun to achieve the first successful launch by the U.S. with the launch of the Explorer satellite on January 31, 1958. The second launch attempt of the Navy's Vanguard satellite also resulted in failure. Along with the successes the Navy achieved in early space endeavors, the failures are just as significant because the scientists, engineers and operators working on these projects obtained valuable knowledge and insight into the space field that few others in the world possessed.

In July 1958, over 200 of the Navy's best and brightest engineers and scientists were absorbed into the initial cadre of the National Aeronautics and Space Administration (NASA) (Naval Space Command, 2002).

2. Navy Space Needs

The Navy's mission to "maintain, train and equip combat-ready Naval forces capable of winning wars, deterring aggression and maintaining freedom of the seas" (United States Navy, n.d.) could not be accomplished without access to space and the products and communications that space allows. Vice Admiral David Dorsett stated during a Military Space Programs Hearing in 2010, that:

> Space capabilities have and will be critical to our Nation's success in the maritime domain. We now operate in a dynamic and

> challenging global environment that demands increased capability and capacity to operate in a networked but geographically dispersed fashion. Space capabilities are no longer nice to have; they are essential. (Dorsett & Federici, 2010)

The Navy's interests in space include communications, intelligence, surveillance, reconnaissance, positioning/navigation/timing (PNT), missile warning, meteorology, and oceanography capabilities. The NSC must meet these interests by providing trained and competent personnel that can meet missions and roles within the Navy to ensure space assets and products are continually available to meet fleet requirements.

a. Missions

The Defense Acquisition University has identified fifteen space mission areas that are essential to ensuring the Navy's interests in space are met. The title and description of these mission areas are listed in Table 1. For NSC personnel to be successful in any of these competencies, they require specific education and/or training and an in-depth level of space systems knowledge and experience. Once that level of education and experience has been achieved, it is critical that the Navy retains it for future mission success.

Table 1. Navy Space Cadre- Major Area Technical Competencies (After Defense Acquisition University, 2010)

	Title	Description
1	Space Systems Contract Management	Develop and administer contracts that achieve program strategic objectives.
2	Space Systems Project Management	Coordinate management of multiple inter-dependent activities to achieve a project's strategic objectives.
3	Space Systems Test and Evaluation	Provide scientific, engineering, and operational assessment of new or fielded space systems to ensure system meets mission requirements.

4	Space Systems Data Analysis	Review space systems data to develop trend reports and conduct threat analysis to support operational and intelligence requirements.
5	Space Systems Research and Development	Conduct research and development in space technology areas for potential new capabilities that support operational needs.
6	Space Systems Operations Management	Manage Space System operational functions and activities that ensure the delivery of mission requirements and strategic objectives.
7	Financial Management	Monitor and control finances to ensure the accountability of monetary resources that support programs and policies.
8	Space Systems Engineering and Design	Design space systems and ensure elements are supportable and meet operational needs.
9	Space and Space Related Systems Requirements Development	Develop specifications for Naval, DoD, National, and commercial space systems that fulfill naval missions.
10	Space Systems Consultation	Develop space systems scientific papers, briefings, and provide expertise to operational commanders to satisfy national and theater-level information needs.
11	Satellite and Space-Related System Employment and Maintenance Management	Provide technical management and support for space systems and associated equipment to maintain space systems and satellite operations that achieve Naval space goals.
12	Space-Related Education and Training Development and Administration	Develop and conduct education and training programs that ensure the education and skills needed to develop space power and to bring that power to bear on war fighting, intelligence collection and other national security needs.
13	Manpower Management	Define and prioritize manning requirements that optimize the match between work requirements and individual.
14	Space Strategy Development	Develop and influence overarching naval space strategy to enhance operational and tactical planning.
15	Space Cadre Workforce Enhancement	Coordinate the resources necessary to maintain a qualified workforce and maximize personnel effectiveness within the organization.

b. Roles

Over the past decades, consolidation of space-related roles and functions within DoD has moved most space related responsibilities to Air Force control in the “white space” world (communication, PNT, and missile warning) and to the National Reconnaissance Office (NRO) in the “black space” world (classified intelligence gathering and reconnaissance). While the Navy continues to serve as the program manager for DoD narrowband Ultra High Frequency (UHF) satellite communications systems, there are numerous other requirements for space-trained personnel within the Navy and on a national level.

UHF SATCOM communications are critical to military operations worldwide. The narrowband spectrum, in particular, is extremely useful in tactical military applications and communications on the move. The reason it is considered the “workhorse” of military communications is the band’s ability to penetrate jungle foliage, inclement weather and urban areas. More than 20,000 narrowband terminals are currently in military service and most of them are relatively small and can be hand carried or placed in small vehicles, vessels or aircraft due to the small antennas and minimal power required. UHF SATCOM is utilized by all services and a host of other government agencies and is the warfighter’s most reliable communications link (Office of Public Affairs and Corporate Communications, 2010). USN space professionals provide requirements, acquisition, and day-to-day operations management of the military’s narrowband UHF system, which includes but is not limited to satellites, terminals and ground stations. The narrowband UHF constellation currently in operation includes two very old Fleet Satellite Communications (FLTSATCOM) satellites, one Leased Satellite (LEASAT), and eight UHF Follow-On (UFO) satellites all flying in geostationary orbit (GEO). NAVSOC is the principle Navy command that operates, manages, and maintains the DoD’s narrowband UHF capability from five different ground stations.

The replacement satellite for the aging UFO system is the Mobile User Objective System (MUOS), seen in Figure 4. Navy space professionals

have also been vital in all aspects of the acquisition and production of this system and its associated ground terminals. The five satellite MUOS constellation will provide UHF secure voice, data, video, and network-centric communications in real-time to U.S. mobile warfighters through 2030 and will be fully interoperable with the Joint Tactical Radio System (JTRS) and other current radio systems. The system will also be fully compatible with the UFO satellite system and legacy terminals. Launch of the first MUOS satellite is scheduled for early 2012. NAVSOC is scheduled to be the principle operations center for the MUOS system.

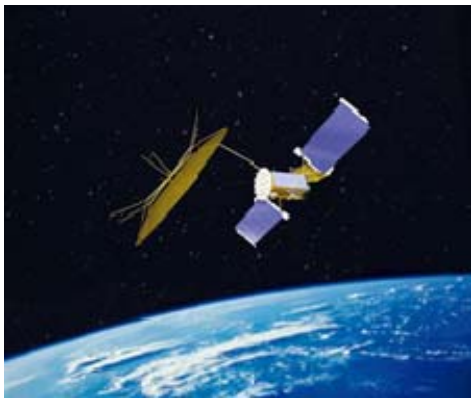

Figure 4. Artist's rendition of MUOS (From Lockheed Martin, 2011)

The Navy also plays a very large role in the requirements, acquisition, and operations management of national space systems. A large contingent of the NSC has historically worked at the NRO. The NRO's mission is detailed in the next section.

B. ORGANIZATIONS

Navy space professionals are essential to the operations and missions of numerous DoD, civilian, joint and Navy specific organizations. These organizations rely and depend on a constant flow of highly educated space officers and professionals from all services to meet the day-to-day and future

requirements for assured access to space. This section is intended to enhance the understanding of the numerous organizations and roles to which NSC officers contribute within NSS and the USN.

1. DoD/Civil Agencies

a. Office of the Secretary of Defense

The Office of the Secretary of Defense (OSD) is the principal staff element of the Secretary of Defense in the exercise of policy development, planning, resource and fiscal management, and program evaluation responsibilities. NSC personnel assist OSD with the development of space policy, provide professional expertise and experience to influence space programs and advise the OSD on Navy specific requirements, programs and resource management.

b. National Aeronautics and Space Administration

National Aeronautics and Space Administration (NASA) is the executive branch agency of the United States government responsible for the nation's civilian space program and aeronautics and aerospace research. Although NASA is a civilian run organization, a significant number of their astronauts are active duty officers from all branches of the military and remain on active duty within their service until they either resign or retire.

c. National Reconnaissance Office

> Headquartered in Chantilly, Virginia, the National Reconnaissance Office (NRO) develops and operates unique and innovative overhead reconnaissance systems and conducts intelligence-related activities for U.S. national security. The NRO also maintains ground stations at Buckley Air Force Base, Colorado, Fort Belvoir, Virginia, White Sands Missile Range, New Mexico, as well as a presence at the Joint Defense Facility Pine Gap, Australia, and the Royal Air Force Base Menwith Hill Station, United Kingdom. NRO spacecraft launch offices reside at Cape Canaveral AFB, Florida and Vandenberg AFB, California. The NRO, one of 16 Intelligence Community agencies, was officially established in September 1961

> as a classified agency in the Department of Defense (DoD). The existence of the NRO and its mission was declassified in September 1992. A hybrid organization consisting of some 3000 personnel, the NRO is jointly staffed by members of the armed services, the Central Intelligence Agency, and DoD civilian personnel. The NRO is managed by a Director, a Principal Deputy Director, and a Deputy Director.
>
> The NRO is funded through the National Intelligence Program (NIP) and the Military Intelligence Program (MIP) consistent with the priorities and processes established by the DNI and the Under Secretary of Defense for Intelligence (USD[I]). (NRO, 2011)

The NRO relies heavily upon Navy space expertise in virtually every space system mission area. Over a quarter of all identified NSC billets are assigned to the NRO (Navy Space Cadre Office, 2011). This ensures Navy requirements are incorporated into the space reconnaissance systems that are produced and operated by the NRO.

2. Joint Commands

a. United States Strategic Command

> United States Strategic Command (USSTRATCOM) combines the synergy of the U.S. legacy nuclear command and control mission with responsibility for space operations; global strike; Defense Department information operations; global missile defense; and global command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR), and combating weapons of mass destruction. This dynamic command gives National Leadership a unified resource for greater understanding of specific threats around the world and the means to respond to those threats rapidly. (U.S. Strategic Command, 2011)

USSTRATCOM is the combatant commander responsible for DoD space and conducts its space mission through its sub-unified commands. NSC members fill various space billets within USSTRATCOM including global operations, plans and policy, mission integration, assessment and analysis.

b. Joint Functional Component Command for Space

The Joint Functional Component Command for Space (JFCC SPACE) headquarters is located at Vandenberg Air Force Base. Established in July 2006, JFCC SPACE is the space sub-unified command of USSTRATCOM and is responsible for executing continuous, integrated space operations to deliver theater and global effects in support of national and combatant commander objectives. JFCC SPACE conducts space operational-level planning, integration and coordination to ensure unity of effort in support of military and national security operations, and support to civil authorities (U.S. Strategic Command, 2011). NSC personnel are assigned to integrate and coordinate Navy assets with global space operations and vice-versa. JFCC-SPACE's operational arm is the Joint Space Operations Center.

c. Joint Space Operations Center

> The Joint Space Operations Center (JSpOC) is a synergistic command and control weapon system focused on planning and executing USSTRATCOM's Joint Functional Component Command for Space (JFCC SPACE) mission. The purpose of the JSpOC is to provide a focal point for the operational employment of worldwide joint space forces, and enables the Commander, JFCC SPACE (CDR JFCC SPACE) to integrate space power into global military operations.
>
> The JSpOC includes the personnel, facilities and equipment necessary to provide CDR JFCC SPACE the ability to plan and execute worldwide space forces. It is composed of four core divisions: Strategy (SD), Combat Plans (CPD), Combat Operations (COD), and Intelligence, Surveillance and Reconnaissance (ISRD). (Vandenberg Air Force Base, 2011)

The JSpOC maintains a twenty-four hour watch floor and Space Situational Awareness (SSA) cell that provide reach-back capabilities to DoD entities. The JSpOC develops the Space Operations Directive (SOD), the Master Space Plan (MSP), and a weekly Joint Space Tasking Order (JSTO). These documents facilitate JFCC-SPACE requirements and provide operational

tasking for DoD space systems. NSC personnel assigned to the JSpOC stand watches, provide valuable naval-centric experience to space operations planning, and support fleet requests for space effects.

3. Navy

a. Office of the Chief of Naval Operations

The Chief of Naval Operations (CNO) is the senior military officer in the Navy. The CNO is a four-star admiral and is responsible to the Secretary of the Navy for the command, utilization of resources and operating efficiency of the operating forces of the Navy and of the Navy shore activities assigned by the Secretary. The Office of the Chief of Naval Operations (OPNAV) Staff command structure is shown in Figure 5.

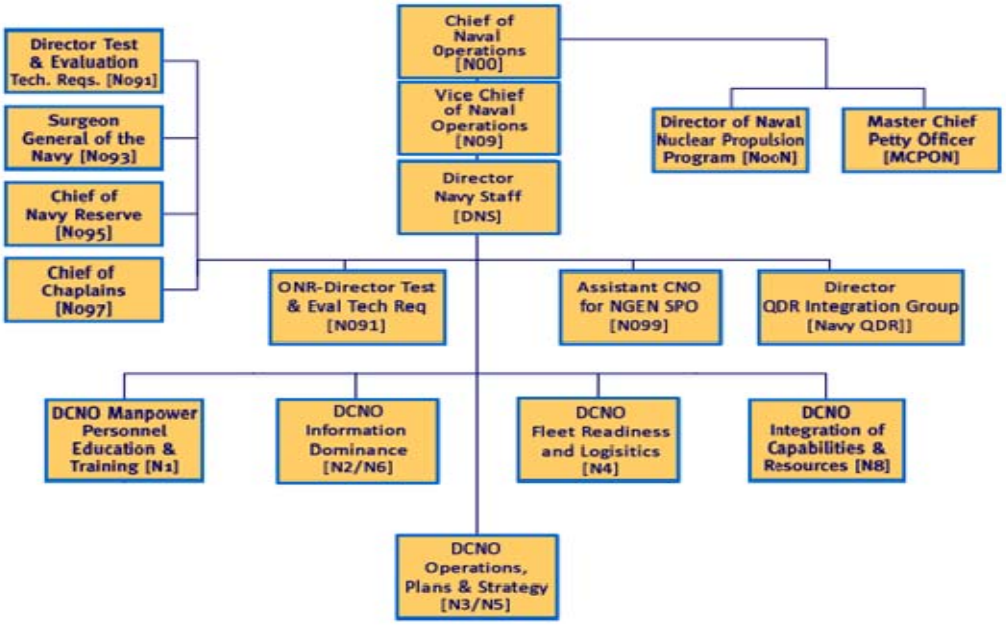

Figure 5. OPNAV Staff (From United States Navy, 2007)

A member of the Joint Chiefs of Staff, the CNO is the principal naval advisor to the President and to the Secretary of the Navy on the conduct of war, and is the principal advisor and naval executive to the Secretary on the conduct of naval activities of the

> Department of the Navy. Assistants are the Vice Chief of Naval Operations, the Deputy Chiefs of Naval Operations and a number of other ranking officers. These officers and their staffs are collectively known as the Office of the Chief of Naval Operations. (U.S. Navy, 2007)

The N2/N6 Deputy Chief of Naval operations for Information Dominance oversees the management of the NSC as part of the IDC.

b. Navy Cyber Forces

Navy Cyber Forces (CYBERFOR) is the Type Commander (TYCOM) or "administrative chain of command" for the Navy's global cyber workforce of more than 14,000 Sailors and civilians. The headquarters, located at Joint Expeditionary Base Little Creek-Fort Story, has a staff of nearly 600 personnel. CYBERFOR is tasked to man, train, and equip personnel in cryptology/signals intelligence, cyber, electronic warfare, information operations, intelligence, networks, and space (U.S. Navy, 2011).

c. Fleet Cyber Command/Commander Tenth Fleet

Fleet Cyber Command/Commander Tenth Fleet (FCC/C10F) was established January 29, 2010, as a dual role command. As Fleet Cyber Command, it is the naval component to U.S. Cyber Command (USCYBERCOM), the sub-unified cyber commander to USSTRATCOM. As U.S. Tenth Fleet, the command provides operational support to Navy commanders worldwide, supporting information, computer, and electronic warfare and space operations. In addition to joint and service reporting, the command also serves as the Navy's cryptologic commander, reporting to the Central Security Service (CSS). Tenth Fleet has operational control over Navy information, computer, cryptologic, and space forces. Figure 6 shows the FCC/C10F Chain of Command.

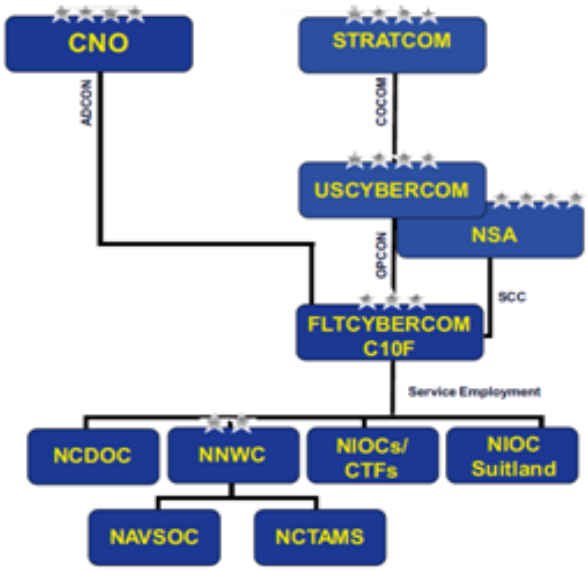

Figure 6. Cyber Forces Organization Chart (From McCullough,2010)

d. Naval Research Laboratory

NRL is the corporate research laboratory for the Navy and Marine Corps and conducts a broad program of scientific research, technology and advanced development. NRL has served the Navy and the nation for over 85 years and continues to meet the complex technological challenges of today's world. NRL is a campus-like complex of diverse scientific facilities, with a staff of more than 2,500 researchers, engineers, technicians and support personnel. Overall Laboratory management is under the direction of a Navy officer and civilian research director. The internal organization is organized into five directorates, four of which conduct scientific research, and the Naval Center for Space Technology. (Naval Research Laboratory, 2011)

e. Naval Network Warfare Command

Since its commissioning in 2002, Naval Network Warfare Command (NETWARCOM) has been the Navy's integration and compatibility catalyst for the information age. They deliver, integrate, and operate a secure and battle ready shipboard and global network. They are responsible for increasing the commander's warfighting capabilities through the use and integration of information operations, network centric operations, and space

capabilities throughout the fleet. With the recent restructuring of the Navy's information branch, NETWARCOM's operations and responsibilities are slowly migrating to the responsibilities of C10F/FCC.

f. NETWARCOM Maritime Operations Center

The NETWARCOM Maritime Operations Centers (MOC)s allow the Navy to maintain a state of readiness, providing commanders with all the necessary resources to constantly manage operations and be able to smoothly transition from peacetime operations to disaster relief operations and major combat operations, while still handling fleet management functions. The NETWARCOM MOC's space cell assists U.S. Navy assets in the development of Space Effects Packages and Space Support Requests (SSR) and provides reach back capability for naval units globally. They maintain a 24/7 watch floor.

g. Space and Naval Warfare Systems Command

Space and Naval Warfare Systems Command (SPAWAR) is one of three major acquisition commands for the USN. SPAWAR specifically specializes in information dominance. Working closely with C10F/FCC, SPAWAR personnel research, develop, test and evaluate, engineer, and acquire information management technology for the Navy. SPAWAR is currently divided into four major Program Executive Offices (PEO): Space Systems, Command, Control, Communications and Computers (C4I), Enterprise Information Systems (EIS), and Joint Tactical Radio Systems (JTRS). PEO JTRS is the Navy's portion of a larger Joint PEO. NSC personnel fill billets within the SPAWAR Space Field Activity (SSFA) co-located with the NRO (SPAWAR, 2011).

h. PEO Space Systems

The Navy's Program Executive Office for Space Systems is a Navy Echelon II acquisition organization chartered by the Secretary of the Navy as the sole executive agent for the development, procurement, engineering support and executive oversight of all DoD advanced UHF narrowband communication

satellites and associated ground systems. Naval acquisition officers provide program management and systems engineering expertise and act as liaisons between government contractors, policymakers, and SPAWAR for DoD narrowband UHF communications systems (SPAWAR, 2011).

i. Navy Communications Satellite Program Office (PMW-146)

> PMW-146 is responsible for managing the acquisition, integration, production, launch, test and providing operational support to DoD, various U.S. agencies, joint and coalition forces for narrowband communications satellites. This small engineering team of 25 personnel with numerous Space and Naval Warfare Systems Command employees and contractors is smartly leveraging the latest commercial advances in satellite communications to reduce technology and development risk. PMW 146 is collaborating closely with industry to build the Navy satellites as commercial-like as possible while meeting required military quality standards. PMW 146 reports to PEO Space Systems for the Mobile User Objective System, Ultra-High Frequency Follow-On, Leased Satellite, Skynet and Hosted Payload programs. (SPAWAR, 2011)

j. Naval Satellite Operations Center

Naval Satellite Operations Center (NAVSOC) is responsible for operating, managing and maintaining a number of assigned communications and science satellites. NAVSOC headquarters is located in Point Mugu, California. NAVSOC currently operates four additional remote satellite ground stations. They are preparing to provide command and control operations to the forthcoming MUOS constellation.

k. Carrier Strike Groups / Expeditionary Strike Groups

Carrier Strike Groups / Expeditionary Strike Groups (CSG/ESG)s are operational formations of the USN. They usually include either an aircraft carrier (CVN) or amphibious ship (LHA), two or three cruisers (CG) and destroyers (DDG), one or two attack submarines (SSN) and a supply ship (AOE). They also include a Navy or Marine air wing and the ESG may have a Marine Expeditionary Unit (MEU) assigned. A one- or two- star admiral leads the

CSG/ESG and his/her staff. The CSG/ESGs execute a variety of missions including humanitarian relief, maritime interdiction, freedom of navigation operations, and combat operations. The CSG/ESG staff provide the resources needed to accomplish any missions that the strike group may execute. The CSG/ESGs rely heavily on space systems for communications, PNT, intelligence and morale.

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III. DOD SPACE CADRE MANAGEMENT

The 2001 Report of the Commission to Assess United States National Security Space Management and Organization, also known as the 2001 Rumsfeld Space Commission, stated that one of the U.S. Objectives for Space must be:

> Create and Sustain a Cadre of Space Professionals: Since its inception, a hallmark of the U.S. space program has been world-class scientists, engineers and operators from academic institutions, industry, government agencies and the military Services. Sustained excellence in the scientific and engineering disciplines is essential to the future of the nation's national security space program. It cannot be taken for granted. Military space professionals will have to master highly complex technology; develop new doctrine and concepts of operations for space launch, offensive and defensive space operations, power projection in, from and through space and other military uses of space; and operate some of the most complex systems ever built and deployed. To ensure the needed talent and experience, the Department of Defense, the Intelligence Community and the nation as a whole must place a high priority on intensifying investments in career development, education and training to develop and sustain a cadre of highly competent and motivated military and civilian space professionals. (Department of Defense, 2001)

Because of this Space Commission's recommendations, the USAF was designated as the Executive Agent for Space (EAS) for the second time by Department of Defense Directive (DoDD) 5101.2 (the first was in 1961 by DoDD 5160.32, which was cancelled in 1970). This directive also mandated the creation of individual service space cadres. These cadres are tasked with supporting their respective service in space related issues including planning, programming, acquisition, and operations. They are additionally tasked with supporting the EAS by providing competent, well-trained personnel to represent their component in DoD-wide space activities, such as acquisition, planning, programming, and operations.

In order to ensure DoD and its respective services are training, maintaining and retaining qualified space professionals, the Space Professional Oversight Board (SPOB), which is co-chaired by the DoD EAS and the Director of the NRO, was created to oversee the development of the Space Professionals within the Department of Defense (DoD). By strategically managing multiservice and multi-agency space professional development and by guiding investments in space professional development, the board ensures that space professionals possess the depth and breadth of training, education and experience required to advance space power and to maximize its use in military and intelligence operations (Teets, 2011).

The Space Professional Oversight Board will:

- Approve NSS professional development policy
- Validate NSS-level space professional requirements
- Approve DoD-level space professional development plans
- Guide the synchronization and integration of the department's space cadre efforts
- Promote the development of a cadre of space professionals within each of the military services
- Provide guidance on professional development efforts, plans and activities
- Oversee DoD EA for Space managerial processes and identify best practices pertaining to space professionals

In addition, the SPOB has a role in overseeing space-related graduate education programs at the Air Force Institute of Technology (AFIT) and the Naval Postgraduate School (NPS).

The SPOB in support of the AFIT/NPS Educational Alliance will:

- Ensure officers in space programs receive high-quality, relevant and responsive graduate education aligned to defense needs
- Prevent unnecessary duplication within AFIT and NPS space programs, while sustaining excellence
- Make periodic reports to the NPS Board of Advisors and AFIT Board of Visitors

- Establish and Oversee an Admissions Review board to make future recommendations for candidates to attend either AFIT or NPS

As of the end of 2009, the entire DoD Space Cadre had approximately 15,800 personnel. These included DoD civilians and USAF and USA enlisted personnel (they are the only services that track enlisted space expertise). Figure 7 shows the total number of DoD identified space personnel broken down by service.

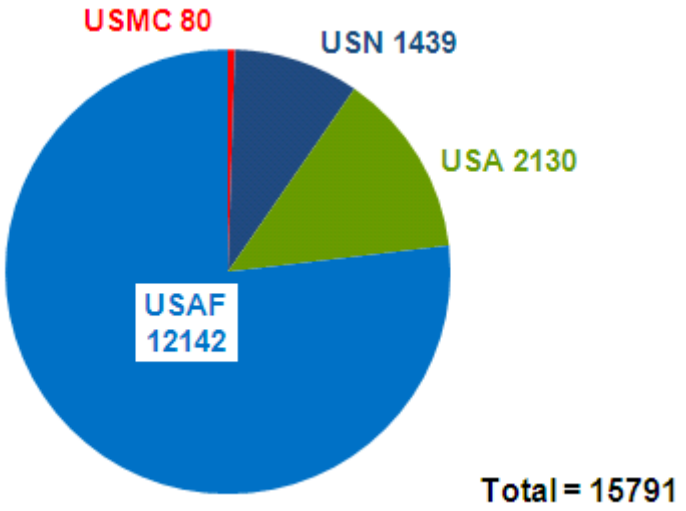


Figure 7. DoD Space Cadre Composition (From Executive Agent for Space, 2010)

The following section provides a breakdown of the four services' space cadres and examines how they are structured, implemented, and utilized.

A. ARMY

The USA's space cadre is made up of two distinct groups of personnel; when combined they meet the needs and billet requirements for the Army's interests and responsibilities towards space. The USA's cadre is made up of Space Professionals (FA-40)s and Space Enabler personnel.

1. Functional Area 40 (FA40)

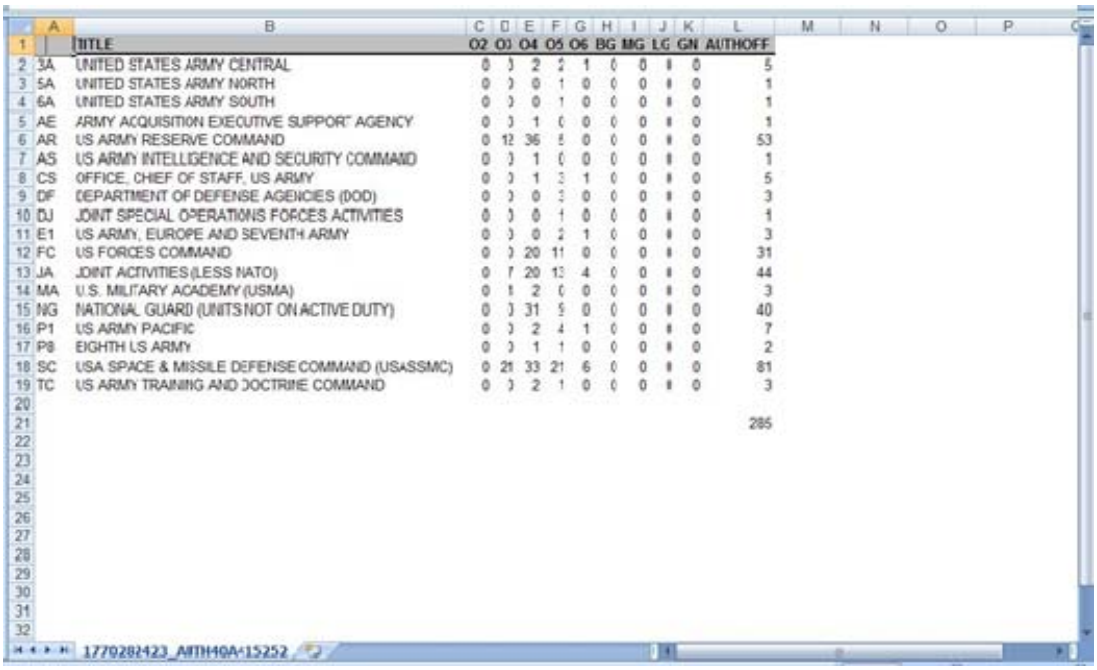
The Army's Functional Area 40 is the group of Army officers responsible for Army space operations. The FA40 community was started in 1998 as part of the Information Operations (IO) Career Field (CF). Table 2 shows how FA-40 integrates into the Army's specialized CF's. This practice allowed army officers to remain "due course" within their respective branches (what the Navy calls designators) and specialize in a particular field of expertise. FA40 officers serve in operational, DoD, Joint, Interagency, Intergovernmental, and multinational assignments that focus on integrating space capabilities to support the warfighter in ground force operations. Space Operations Officers provide commanders with expertise and advice on integrating and utilizing military, civil, and commercial space capabilities to enable military operations across the full spectrum of conflict.

Table 2. Army Career Field and Functional Areas (From Scherer, 2005. p. 68)

Information Operations CF	**Institutional Support CF**	**Operations Support CF**	**Operations CF**
FA24 Information Systems Engineering	FA43 Human Resources Management	FA48 Foreign Area Officer	Basic Branches
FA30 Information Operations	FA45 Comptroller	FA51 Army Acquisition Corps	FA39 Psychological Operations (PSYOP) and Civil Affairs
FA34 Strategic Intelligence	FA47 USMA Permanent Instructor		FA90 Multifunctional Logistician
FA40 Space Operations	FA49 Operations Research/Systems Analysis		
FA46 Public Affairs	FA50 Force Management		
FA53 Information Systems Management	FA52 Nuclear Research and Operations		
FA57 Simulation Operations	FA59 Strategic Plans and Policies		

As of the end of 2009, the FA40 community has approximately 240 officers within their functional area. These officers are designated as “Space Professionals” and will only be billeted to space jobs once designated and trained. The Army Space Personnel Development Office (ASPDO) in Colorado Springs, CO manages both the FA-40 career field and the Army Space Cadre as a whole. The ASPDO’s mission is to develop policies, procedures, and metrics for the Army Space Cadre and execute the life cycle management functions of FA40 Space Operations Officers, ensuring the Army has trained personnel to meet national security space needs (Executive Agent for Space, 2010).

Similar to the Navy’s Aerospace Engineering Duty Officer (AEDO) community, the Army’s FA40 community is composed of officers, which have earned their warfare qualifications prior to transferring into space operations. As outlined in the Army’s Field Manual 3–14, Space in Support of Army Operations and the U.S. Army Force Management Support Agency, no 2nd or 1st Lieutenants are part of the force structure. Starting at the Captain level, and predominantly at the Major level, is when career army officers start to migrate into the FA40 community. The ASPDO currently has 285 Army billets designated for FA40 personnel. These billets are delineated in Figure 8.



	A	B	C	D	E	F	G	H	I	J	K	L
1		TITLE	O2	O3	O4	O5	O6	BG	MG	LG	GN	AUTHOFF
2	3A	UNITED STATES ARMY CENTRAL	0	0	2	2	1	0	0	0	0	5
3	5A	UNITED STATES ARMY NORTH	0	0	0	1	0	0	0	0	0	1
4	6A	UNITED STATES ARMY SOUTH	0	0	0	1	0	0	0	0	0	1
5	AE	ARMY ACQUISITION EXECUTIVE SUPPORT AGENCY	0	0	1	0	0	0	0	0	0	1
6	AR	US ARMY RESERVE COMMAND	0	12	36	5	0	0	0	0	0	53
7	AS	US ARMY INTELLIGENCE AND SECURITY COMMAND	0	0	1	0	0	0	0	0	0	1
8	CS	OFFICE, CHIEF OF STAFF, US ARMY	0	0	1	3	1	0	0	0	0	5
9	DF	DEPARTMENT OF DEFENSE AGENCIES (DOD)	0	0	0	3	0	0	0	0	0	3
10	DJ	JOINT SPECIAL OPERATIONS FORCES ACTIVITIES	0	0	0	1	0	0	0	0	0	1
11	E1	US ARMY, EUROPE AND SEVENTH ARMY	0	0	0	2	1	0	0	0	0	3
12	FC	US FORCES COMMAND	0	0	20	11	0	0	0	0	0	31
13	JA	JOINT ACTIVITIES (LESS NATO)	0	7	20	13	4	0	0	0	0	44
14	MA	U.S. MILITARY ACADEMY (USMA)	0	1	2	0	0	0	0	0	0	3
15	NG	NATIONAL GUARD (UNITS NOT ON ACTIVE DUTY)	0	0	31	5	0	0	0	0	0	40
16	P1	US ARMY PACIFIC	0	0	2	4	1	0	0	0	0	7
17	P8	EIGHTH US ARMY	0	0	1	1	0	0	0	0	0	2
18	SC	USA SPACE & MISSILE DEFENSE COMMAND (USASSMC)	0	21	33	21	6	0	0	0	0	81
19	TC	US ARMY TRAINING AND DOCTRINE COMMAND	0	0	2	1	0	0	0	0	0	3
20												
21												285

Figure 8. Snapshot of Army's Force Management Personnel Database

a. Training

Once Army officers transition to the FA40 career field, they may be detailed to the eleven-week FA40 Space Operations Officer Qualification Course (SOOQC) and then take an initial space assignment. After that, they attend graduate education usually at the Naval Postgraduate School (NPS) or the Air Force Institute of Technology (AFIT).

Once an army officer has finished the FA40 basic course, billets can include joint commands, intelligence agencies, Corps/Division/Brigade/Battalion assignments, Army Headquarters, Space and Missile Defense Command (SMDC), space brigade, or space battalion assignments (Scherer, 2005).

2. Space Enablers

The Space Enabler category consists of approximately 1800 (including reserves) soldiers and civilians from a wide variety of branches, career fields, disciplines, and functional areas. The Army defines Space Enablers as military

and civilian personnel assigned to positions whose primary career field is not space, but who perform unique tasks or functions or may require skills to apply space capabilities. Space Enablers do not occupy a space career track and may or may not move in and out of Space Enabler positions throughout their careers. These personnel may have performed a space related job or received a certain level of space education that could be utilized in future billeting.

As of 2010, there were 2,008 Space Enabler billets identified by the ASPDO. Space Enabler tracking and reporting has been difficult in the past and these personnel could be better classified and documented by their respective proponent and career management offices to maximize the use of their multifunctional space-related training and experience in future assignments. Career and life-cycle management of Space Enablers remains the responsibility of the Soldier's respective assignment and proponent offices (Executive Agent for Space, 2010).

B. AIR FORCE

As the DoD's Executive Agent for Space, the USAF has the largest space community of all the services. Air Force space professionals have a direct role in fielding, launching, and executing space power. The 12,000+ member AF space community is comprised of officer and enlisted operators, scientists, engineers, and program managers and communications, weather, and intelligence personnel. The AF cadre also includes Air Force Reserve and Air National Guard members and civilians. The AF space cadre is managed by the Space/Cyber Professional Management Office (SPMO), assigned to Headquarters, Air Force Space Command (AFSC), Colorado Springs. The Air Force Space Professional Development Program (SPDP) ensures deliberate development of the space workforce to guarantee a sufficient inventory of space-knowledgeable officer and enlisted personnel to meet mission requirements. The SPMO tracks cadre members and billets via the Space Professional Development Database (SPDD), tracking experience via Space Professional

Experience Codes (SPEC) in ten space mission categories. The SPDD is also a source of personnel and manpower information for assignments, leadership boards, metrics, and statistics relating to the space cadre. Detailed studies and analyses have been performed specifically for the development and utilization of Air Force space (Executive Agent for Space, 2010).

The Air Force Specialty Code 13SX is the officer designator that has been reserved for space and missile operators. The separate space and missile career fields were merged partly because after the cold war ended, the Intercontinental Ballistic Missile (ICBM) forces were drastically reduced. In addition, during the mid-1990s the number of Precision/Navigation/Timing (PNT) satellites increased with the Global Positioning System (GPS) coming on-line. An increase in warning and surveillance satellites also added to the need for USAF space trained operators. As one would expect, space operators can be assisted/augmented by contract civilian personnel while nuclear-armed missile operations need to be operated and controlled by military personnel.

1. Experience

Space operators typically credit most of their career experience in missile operations, followed by satellite Command and Control (C2), and the least amount of time assigned to other space mission areas as depicted in Table 3. Personnel designated with the 13SX AFSC are further divided into five sub-specialties or mission areas: missile operations, satellite command and control, space lift operations, space surveillance, and space warning (Vernez, 2006).

Table 3. Authorized 13S billets (From Vernez, 2006)

Authorized 13S Duty Positions, by Shred and by Grade (number)

Shred[a]	Grade					Total
	O-1/2	O-3	O-4	O-5	O-6	
C—Missiles	303	582	51	48	1	985
A—Satellite C^2	58	265	76	31	1	431
B—Spacelift	21	112	27	16	1	177
D—Surveillance	35	113	36	11	—	195
E—Warning	16	145	35	22	2	220
None[b]	1	158	432	209	57	857
Total	434	1,376	657	337	62	2,865

SOURCE: AFSPC authorization file (2001).
NOTE: All data as of fourth quarter FY 2001.
[a]A *shred* is an area of specialization within the 13S AFSC. These are indicated by letter suffixes to the code, as noted here.
[b]No shred indicates no preference for specialization. Most positions above O-3 carry no shred.

2. Career Path

As seen in the above table, 70% of the authorized positions allocated in 2001 for pay grades O-1 (second lieutenant) or O-2 (first lieutenant) are missile crew positions. At the captain level, space positions start to play a major role. The AF's overall cadre counts all personnel with space education or experience, whether reserve/active/civilian. This includes personnel whose primary field is not within the 13SX AFSC, therefore they most likely will spend a majority of their career in a billet that does not pertain to space. Figure 8 shows a typical career path for 13SX officers and space education levels preferred at the different ranks.

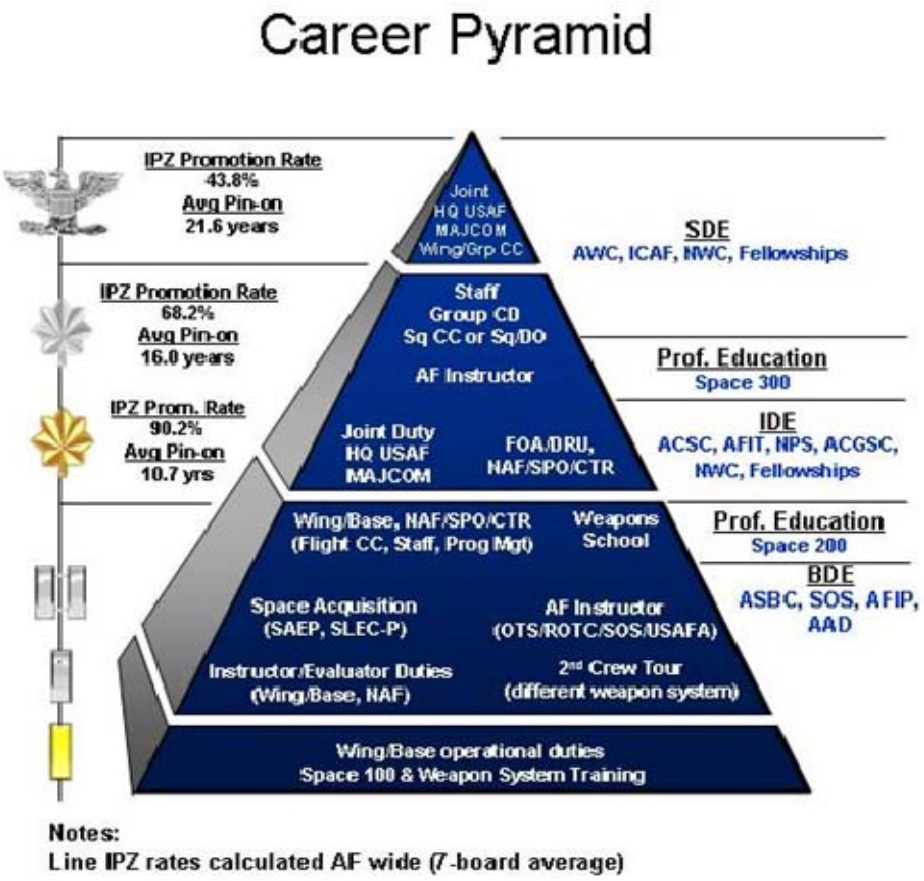


Figure 9. AF Space Officer Career Pyramid (From Cancellier, 2008)

Most officers that are commissioned as 13SX attend the Air and Space Basic Course, then, depending on assignment, they attend a specific space course such as Space 200 or they report directly to their assignment for on the job training. As Space and missile officers progress through their careers, they are designated as a 13S1,13S2, 13S3, or 13S4. These codes correspond to Entry level, Intermediate level, Qualified level, or Staff level, respectively.

3. Education

In addition to the extensive opportunities for space education the Air Force provides its space personnel, the majority of these courses are open to all DoD personnel. Other than the space-related master's degree programs taught at

AFIT, AFSC and Air University's National Security Space Institute (NSSI) both offer a myriad of space short-courses that can be taken in-residence or via distance learning.

C. MARINES

The Marine Corps Space Cadre (MCSC) is the smallest of all the services' space cadres and consists only of officers designated with a Free Military Occupational Specialty (FMOS) Space Operations Officer (8866) or Space Operations Staff Officer (0540). Like the Army, only officers already warfare qualified in a Primary Military Occupational Specialty (PMOS) may earn the FMOS. As of the end of 2009, the MCSC consisted of 80 personnel (79 Active and Reserve Officers and one civilian). Of these, 26 are categorized with FMOS 8866 and 54 have the FMOS 0540. The MCSC is tasked to directly support the Marine Air Ground Task Force (MAGTF) by filling billets that integrate NSS, DoD, Joint, Interagency, and Marine Corps organizations with space planning, programming, operations and acquisition. The Marine Corps has exactly 58 space billets of which 13 are designated for Space Operations Officers with advanced space degrees and the rest are for Space Operations Staff Officers, which only require a space short-course and 6 months in a designated billet (Executive Agent for Space, 2010).

1. Education

The FMOS 8866 requires entry into the Special Education Program (SEP). The program is outlined in MCO 1520.9G and has strict payback requirements. Once selected, the officer must earn a space related Masters of Science (MS) degree at either the Naval Postgraduate School (NPS), Air Force Institute of Technology (AFIT), or a comparable civilian institution. MCO 1520.9G then places the following requirements for payback:

- One tour in a validated SEP billet as soon as practicable after completion of SEP School, but no later than the second tour. A SEP payback tour is defined as 36 months. As a general rule, officers can expect assignment to a SEP billet immediately upon graduation.
- As many subsequent tours in a validated SEP billet as Marine Corps requirements and proper career development will permit. The SEP utilization tours will be separated by a minimum of 3 years whenever possible.

FMOS 0540 personnel attend the National Security Space Institute's (NSSI) Space 200 course or the AFSC Advanced Space Operations School's (ASOpS) space fundamentals course. These courses usually last only a few weeks compared to the multi-year graduate education requirement for FMOS 8866.

D. NAVY

1. The Navy Space Cadre

The current NSC has been implemented based on the December 2004 Navy Space Cadre Human Capital Strategy produced by NETWARCOM. This was largely in response to an August, 2004 Government Accountability Office (GAO) report that criticized the Navy's poor management of their space professionals. It stated:

> The Navy does not have an organizational focal point for space cadre issues because space is seen as a function that is integrated across Navy activities. However, without strategies and organizational focal points, the Army and the Navy may not be able to determine their requirements for space personnel and develop a cadre of sufficient numbers of space professionals with the required training, education, and experience to meet service and joint requirements. (GAO, 2004)

a. Space Cadre Advisor (SCA) and Assistant SCA

The NSC now has an organizational focal point, in the form of a Space Cadre Advisor (SCA), typically the rank of Commander or Captain, Who is assigned to the OPNAV staff. In addition, the SCA has an assistant, positioned at

the Bureau of Naval Personnel (BUPERS). The SCA responsibilities, as stated in the Human Capital Strategy are listed below:

- Use force shaping models to properly size the workforce
- Identify critical billets
- Develop and maintain a succession plan for critical Space Cadre billets that ensures personnel continuity and compliance with subspecialty requirements
- Ensure that opportunities for promotion exist and that members are given the opportunity to serve in Space Cadre billets as the timing in their career paths allow
- Ensure that the promotion board members understand the need to retain highly qualified Space Cadre members and that they are able to identify Space Cadre members before statutory and non-statutory boards convene
- Identify and code appropriate Fleet, Joint, and NSS billets
- Identify Space Cadre career patterns for all designators and civilians
- Oversee Space Cadre policy and management implementation
- Coordinate with NSS organizations on Space Cadre matters
- Coordinate with Space Cadre, community managers and commands/organizations having space-coded billets
- Develop guidelines for the management of Space Cadre career paths
- Analyze statistics concerning the utilization of Space Cadre members in space-coded billets and promotion trends
- Analyze requirements versus inventory for all designators of space-coded officers as a basis for educational programs and selection board requirements
- Provide input into the PPBE to ensure that the FYDP accurately tracks the resource requirements to recruit, promote, train and retain Space Cadre members

b. Personnel

The current NSC is made up of over 1000 active duty officers (O-6 and below), 170 reserve officers and 307 Navy Civilian Service employees.

These numbers have grown from 547 active and reserve officers in 2004. NSC members are Unrestricted Line (URL) and Restricted Line (RL) officers including Aviators, Surface Warfare Officers (SWO), Submariners, Aerospace Engineering Duty Officers (AEDO), Engineering Duty Officers (EDO), IPs, IOs, IWOs and METOC officers who have been identified as having a certain level of space knowledge ascertained either through jobs they have performed, education or both. The NSC's makeup by rank is shown in figure 10. It is made very clear in the HCS that "The Space Cadre is NOT a new designator or a new career path. Members flow in and out of their primary career path and space oriented billets, as appropriate, in order to ensure they remain competitive for promotion in their primary career field" (Naval Network Warfare Command, 2004, p.3). This means that personnel with space training or experience are managed by their respective community managers or "detailers" and not by the SCA or other manager whose primary concern is space. NSC members have no pre-determined career paths other than those set by their primary community, which must be met to ensure promotion. The issues with the cross community detailing process will be discussed in Chapter IV.

Members	
ADM	**24**
CAPT	**180**
CDR	**326**
LCDR	**289**
LT	**185**
LTJG	**24**
ENS	**2**
CWO	**3**
Total	**1033**

Figure 10. NSC Officer Makeup by Rank (From Navy Space Cadre Office, 2011)

NSC members are tracked two different ways, by Subspecialty Codes (SSC) and by an Additional Qualification Designator (AQD). The Navy SSC is defined as:

> A five-character code indicating an officer's field or discipline of advanced education, functional training, or significant experience. This code, when applied to billets, denotes the requirement for an officer with the advanced education, functional training, or significant experience needed to properly perform the duties of the billet. (NAVPERS 15839I, 2010. p.18)

The two codes awarded for space are 6206 for Space Systems Operations (SSO) and 5500 for Space Systems Engineering (SSE). Letter identifiers at the end of these codes describe the level of education or experience obtained within the subject area of the code. A "T" code means that an officer is currently enrolled in a space curriculum. A "P" code means that graduate education has been completed but the member has not served 18 months in a space-designated billet. An "R" means the subspecialty was awarded based on experience alone and the individual does not possess the educational requirements usually associated with the code (usually two separate tours equal to 36 months or greater), and "Q" designates an officer as having both completed the education and gained proven experience of at least 18 months in a space-coded billet. This is the method primarily used by BUPERS to identify officers with sub-specialties as detailed on their Officer Data Card (ODC).

Additionally, Space Cadre members are tracked via an additional qualification designator (AQD). These AQDs determine the level of training and experience a cadre member possesses to assist detailers with matching qualified personnel with billets. The definitions of these AQDs are as follows (Naval Network Warfare Command, 2004):

- VS1 (Recruit) = Officer who has received a Space Certificate from the Naval Postgraduate School or an equivalent institution.
- VS2 (Apprentice) = Officer who has a space-related bachelor's degree from an accredited institution or has 18 or more months of experience in a space-related billet.
- VS3 (Journeyman) = Officer who has a space-related master's degree from an accredited institution, has proven experience (more than one tour of 18 or more months of experience) in a space related billet; or a space-related

bachelor's degree from an accredited institute plus 18 or more months of experience in a space-related billet.

- VS4 (Expert) = Officer who has a space-related masters or doctorate degree from an accredited institution and has proven experience of at least 18 months in a space-related billet.

Figure 11 shows the NSC breakdown by AQD for calendar year (CY) 2009. These two methods of identifying NSC experience levels and coding billets overlap quite extensively and a better system could Identify more specific space specialties or elaborate with more detail members who have critical levels of education and experience and must be both promoted and placed into critical space billets.

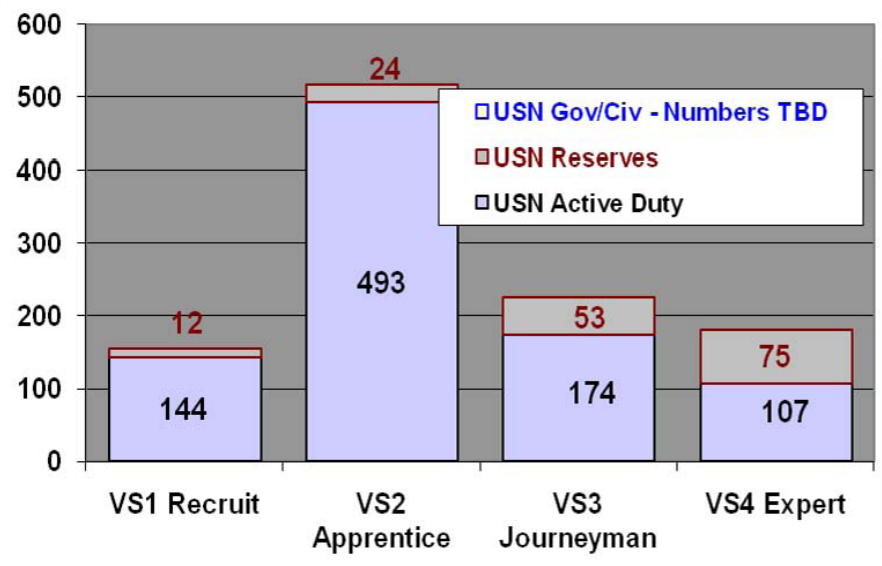


Figure 11. CY 09 NSC AQD Experience Level (From Executive Agent for Space, 2010)

c. Billets

The current number of active duty Navy billets coded for a primary or secondary space subspecialty or a space AQD has also grown from 237 in October of 2004 to 293 currently. Determining the proper number of space-coded billets is an ongoing process for the NSC leadership mostly because space-coded billets are historically created or requested from various Navy

commands who have determined they have a need for Space Professionals. The majority of these billets are for the subspecialty code 6206, which is the SSO code, versus the 5500 SSE code. Flag Officer billets are not space coded. All communities throughout the Navy have SSC and AQD coded billets, which they are to fill with personnel within their community who are qualified by having the proper AQD or SSC.

The number of billets each community possesses determines the number of quotas the community is assigned to send officers to advanced schools to receive training or education in those specialties. Navy space is no different; each community has space coded billets and is expected to send officers to advanced schools such as NPS, AFIT, and NSSI to obtain the required AQDs and SSCs. Completing a graduate degree program and earning a "P" code incurs additional obligated service and an understanding that the officer is required to fill a SSC coded billet at some point in their career. Figures 12 and 13 represent how the 300 Navy space billets were distributed in CY 09 by SSC and rank, respectively.

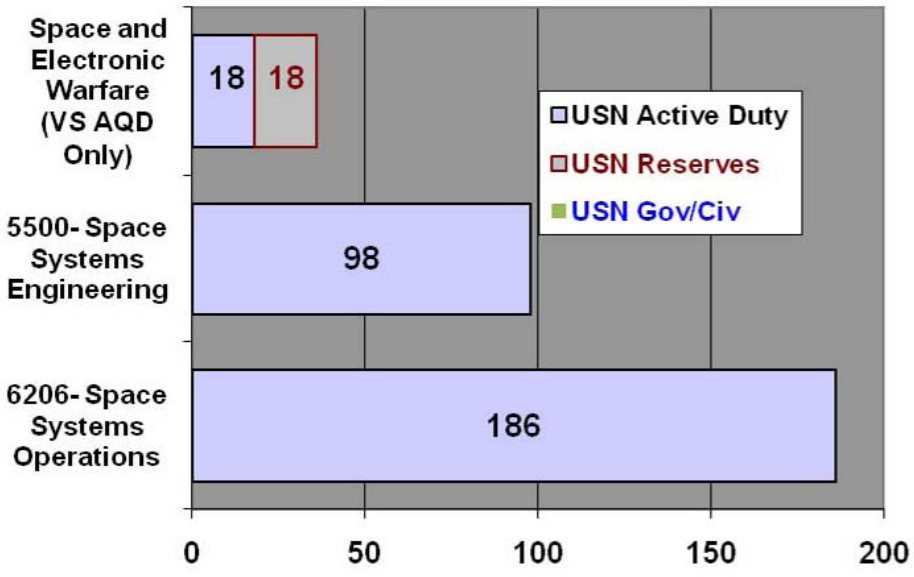


Figure 12. CY 09 Billet Requirements by SSC (From Executive Agent for Space, 2010)

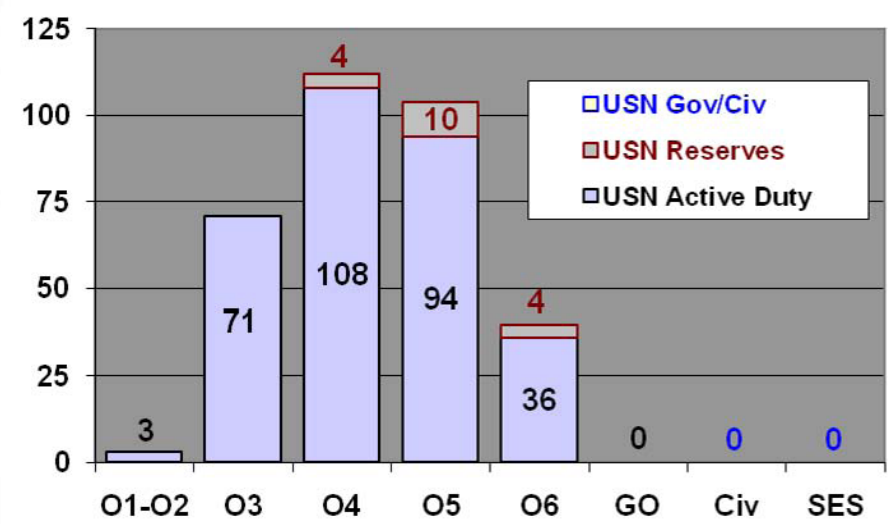


Figure 13. CY 09 Billet Requirements by Rank (From Executive Agent for Space, 2010)

d. Education

The Naval Postgraduate School provides military officers and government and corporate civilians with an exceptional education in many fields that are directly related to military operations. Space is no different. NPS's Space Systems Academic Group (SSAG) offers five different space educational curricula:

- Space Systems Engineering (591)
- Space Systems Operations (366)
- Space Systems Operations International (364)
- Space Systems Certificate (273)
- Space Systems Operations Distance Learning (316)

The Space Systems Engineering (SSE) and Space Systems Operations (SSO) curricula offer full MS degrees providing in-depth instruction in all aspects of space, including space policy, orbital mechanics, spacecraft design, space architectures, operations, acquisition, communications, PNT and national systems. The certificate course contains four fundamental quarter-long courses, taken through distance learning, that introduce students to orbits, the

space environment and communications and sensor systems. The programs at NPS aim to tie education into mission requirements as shown in Figure 14.

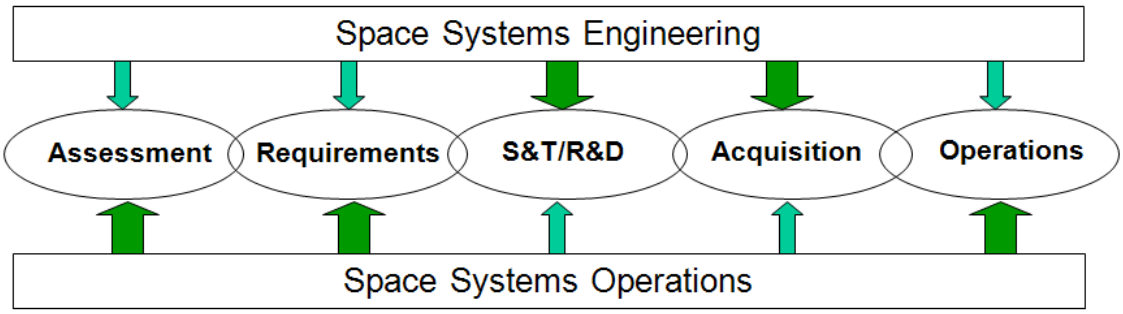


Figure 14. Tying Resources to Mission (From Space Systems Academic Group, 2011)

The SSE curricula puts the majority of its emphasis, as shown by the large arrows, on the acquisitions, science/technology, and research/development aspects of space mission requirements. The SSO curriculum is designed to focus on space system assessments, requirements and operations.

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IV. ISSUES

The NSC is the only specialized group of individuals within the U.S. Navy that does not have its own designator, community or Specialty Career Path (SCP). Space professionals within the USN find themselves in a similar position to that of Navy Foreign Area Officers (FAOs) 5–10 years ago. The Navy FAO program, at the time, was trying to accomplish that mission with a dual-track, cross-community detailing process much like the NSC is currently doing. They found that the program was severely behind the other services with respect to filling billets with qualified personnel and meeting DoD directives, and was not using their officer's sub-specialties to the maximum extent possible. In April of 2006, Major Ried Langdon, a scholar in Foreign Affairs at the Air Command and Staff College, stated that:

> The Navy FAO only serves in billets that take advantage of their special skills when normal career progression permits. As an example, a Surface Warfare Officer may only have the opportunity to serve as a FAO during shore duty. Additionally, FAO billets are outside the mainstream of normal career progression and are seen as detrimental to one's career. (Langdon, 2006, p. 9)

By the end of 2006, with increasing pressure from the U.S. Department of State and a mandate from DODD 1315.17, the Navy formally created a FAO community as described in OPNAVINST 1301.10B. Similarly, Title 10, United States Code, section 490, requires the Secretary of Defense and each Secretary of a Military Department to develop metrics to: "identify, track, and manage space cadre personnel within the Department of Defense to ensure the Department has sufficient numbers of personnel with the expertise, training, and experience to meet current and future national security space needs" (Executive Agent for Space, 2010).

The current NSC construct is facing many of the same challenges the FAO community was facing a number of years ago. This chapter outlines those issues in detail.

A. UTILIZATION AND DETAILING

1. FIT/FILL Rates

The primary statistic used by NSC leadership to gauge the utilization of the cadre is the Fit/Fill rate. An Officer is considered a "FIT" if they are detailed to a space billet and have the required SSC or AQD needed for that specific assignment. A "FILL" is defined as a billet that has an officer actually in that assignment, whether qualified or not. Since tracking began in late 2003, Navy space billets have had around a 78% FILL rate and have averaged approximately a 40% FIT rate (Navy Space Cadre Office, 2011). Figure 15 shows the historical averages.

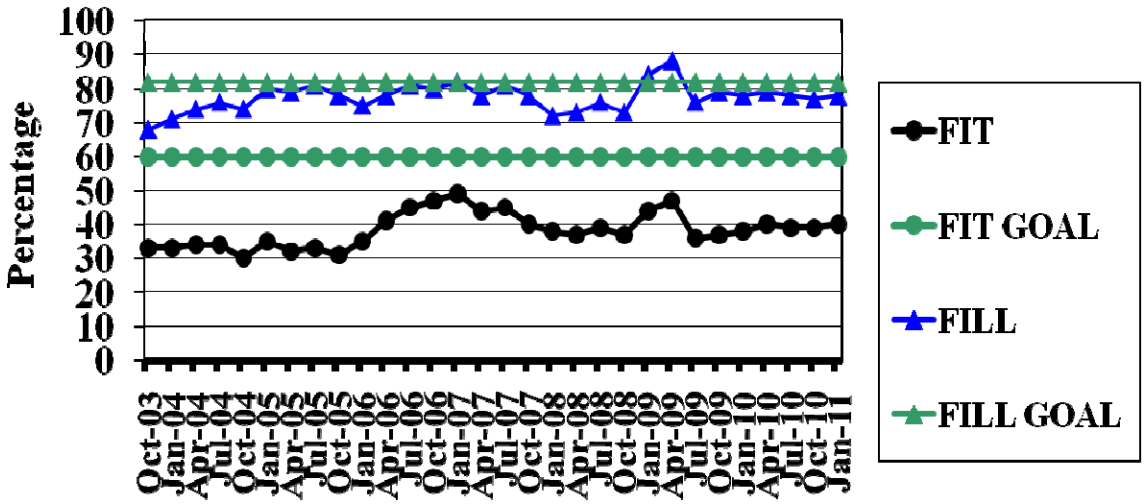

Figure 15. Historical FIT/FILL Rates (From Navy Space Cadre Office, 2011)

A memorandum for the Deputy Chief of Naval Operations, Information Dominance, dated July 30, 2010 states in the supporting facts that "A more accurate FIT rate is 20%" (Department of the Navy, 2010). This is because the current system considers anyone that has been in a space assignment for more than 18 months an automatic FIT and they earn a SSC of 6206 or 5500 depending on the type of billet they are filling and the "S" code that goes with it.

Plus, since some billets only have a space SSC/AQD as a secondary subspecialty, meaning the space aspect may be a collateral duty, an officer lacking space experience could be disregarding that aspect of the assignment, become a space professional with a VS2 AQD after 18 months, but still not know the difference between Low-Earth Orbit (LEO) and Geostationary Orbit (GEO).

If the actual FIT rate is 20%, that means only 56 out of 293 billets have a truly educated and/or experienced space professional performing the job. There are 73 identified “critical” space billets. Therefore, if all 56 of those true space professionals were manning only the critical billets, the Navy would still not have the required expertise needed even in critical billets.

The NSC boasts over one thousand members who have a space SSC/AQD and 247 of them have an MS in SSO or SSE. Therefore, the Navy has educated and experienced personnel, but they are just not serving in assignments in which they have training or experience. Another discrepancy with the FIT rate is that billets are hard coded, which means that the FIT rates only assume an exact fit if the SSC/AQD of the individual is exactly the same as that of the billet. For example, a certain billet may require a 5500Q code but if an officer with a 6206Q code is placed in the billet, it is unfair to say that an officer without space experience is filling the billet. The overall FIT rate and billet coding system does not consider this anomaly.

With a rather consistent FIT rate of 40% over the course of 8 years, it is clear that by using the cross community detailing process, the Navy has been unable to put the right Space Cadre members into billets that require a proven space professional. This is particularly apparent in the joint billets, which are arguably the most important space jobs for Navy personnel as they are working next to specialized space personnel of the Air Force, Army and Marine Corps. There are currently 54 space coded joint billets in the Navy and only 45 of them are being filled for an 83% FILL rate. The current Joint FIT rate is only 38%. However, none of the billets requiring an AQD level VS3 or VS4 are being filled by qualified officers (Navy Space Cadre Office, 2011).

The FIT/FILL goal itself also exposes the issue of the priority Navy leadership places on space billets. The overall FIT/FILL goal has been set to 60% and 80%, respectively. This means that only 80%, or 234 of the 293 identified space jobs in the Navy have someone actually assigned to the job. If the space FIT goal, set at 60%, was actually met, still only 176 out of 293 billets would have qualified personnel in them.

2. Payback Tours

The only way for anyone in the NSC to become a Space Cadre Expert (VS4) and gain the "Q" after their SSC is to obtain a space related masters or higher degree and have at least 18 months of experience in a space billet. The Naval Postgraduate School (NPS) offers Naval Officers and government civilians masters' degrees in a host of sub-specialty fields including SSO and SSE. Naval Officers who take advantage of this education while on active duty are obligated to a period three times the length of education through the first year and a month-for-month basis thereafter. This service can be served concurrently with other service commitments. The 1991 Graduate Education Instruction OPNAVINST 1520.23B (p.2) also states the following rules for utilization:

> f. Utilization
>
> (1) Officers who have received Navy funded graduate education will serve one tour in a validated subspecialty position as soon as possible but not later than the second tour following graduation. Exceptions must be approved by Chief of Naval Personnel (CHNAVPERS), (Pers-4). This policy will not be waived for personal preference.
>
> (2) These officers will serve in as many positions in related subspecialty billets as Navy requirements and career development permit.

As of January 1, 2011, only 91 out of 232 (39%) current active duty Navy NPS space graduates have done or are currently doing a payback tour. Additionally, 85 of the 232 graduates are Unrestricted Line Officers (URL), and only 14 of them have completed a payback tour for a 16% payback rate. Payback

data is shown in Table 4 and are based on payback over the full career to date, not just within the two tour requirement. Most primary career paths do not allow for detailers to uphold the payback requirement, resulting in poor utilization of specially educated officers. This is extremely apparent within the URL community since space trained officers must meet certain career milestones and a URL Specialty Career Path does not exist for space.

Table 4. NSC Payback Stats as of January 2011 (Navy Space Cadre Office, 2011)

1-Jan-11	NPS Grads			Completed Payback Tour			Summary		
Designator	**P**	**N**		**C**	**Q**	**M**	**Total Grads**	**Pay-back**	**% Payback**
1110	33	0		0	7	0	40	7	**17.50%**
1120	14	2		0	1	0	17	1	**5.88%**
1130	1	0		0	1	0	2	1	**50.00%**
12xx	2	0		2	0	0	4	2	**50.00%**
13xx	20	1		0	5	0	26	5	**19.23%**
14xx	17	2		0	17	1	37	18	**48.65%**
15xx	17	3		0	15	2	37	17	**45.95%**
17xx	1	0		0	0	0	1	0	**0.00%**
1800	0	0		0	0	0	0	0	**0.00%**
1810	5	0		0	13	0	18	13	**72.22%**
1820	18	1		0	27	0	46	27	**58.70%**
1830	4	0		0	0	0	4	0	**0.00%**
Total	**132**	**9**		**2**	**86**	**3**	**232**	**91**	**39.22%**

3. Detailing

As previously stated, the NSC is not a community and therefore does not have community managers or detailers with direct authority to place NSC personnel in appropriate billets and ensure payback tours are being completed. In a sense, the NSC does not "own" any of its personnel or billets. The NSC Human Capital Strategy set up the NSC to have the SCA and assistant SCA work with community detailers to place NSC members into appropriate space billets, when possible. The current Navy Space Strategy directs the NSC office to act in a "virtual community management" capacity (CNO, 2008). The idea

behind this method of “cross-community” detailing is to bring fleet experience into space billets and take space knowledge back out to the fleet after obtaining it. Since NSC members are horizontally integrated across many designators, this approach seems logical. However, with no defined career path and milestones for NSC members, they are at the mercy of their community detailer placing them in assignments that will further their career, and rightfully so.

Some communities have done a better job at managing personnel and filling space coded billets than others. Table 5 shows how the individual communities with space billets are faring with their FIT/FILL rates as of February 2011.

Table 5. FIT/FILL Rates by Designator (After Navy Space Cadre Office, 2011)

Designator	FIT	FILL
1000	53%	89%
1050	33%	72%
13XX	39%	56%
11XX	44%	100%
1440	53%	94%
15XX	30%	85%
1800	92%	92%
1810	18%	27%
1820	38%	72%
1830	59%	94%
Joint	36%	83%
Total	40%	78%

The historically low utilization resulting from the “cross-designator community” detailing philosophy should come as no surprise to anyone. The Challenges and Barriers section of the NSC HCS foresaw this method of detailing as a potential problem. It stated “Parent community career path requirements, such as the need for all officers to serve as a Joint Service Officer

(JSO) in order to promote to flag, can affect an officer's ability/desire to fill a Space Cadre Billet" (Naval Network Warfare Command, 2004, p. 16).

B. BILLETS

The current number of billets with a space SSC or space AQD is currently at 293. The total number of billets changes from year-to-year usually due to disestablishment or restructuring of commands or a commander identifying a need. These billets span many Navy and Joint commands and government agencies throughout the world. They include both sea going and shore based assignments, although the majority is shore based. The NSC staff have also defined billets as operational or non-operational, and determined whether the billet is critical or not. The coding process for these billets is complicated and inconsistent, to say the least. Most billets receive a SSC/AQD during a zero-based review, the last of which occurred approximately five years ago. This is a fleet-wide call for commanders to review all current billets and determine if/what subspecialties are needed as either primary or secondary skills to complete their mission and what level of knowledge is needed within those subspecialties. A few problems exist with this method of determining need:

- Most commanders likely want the most experienced professionals possible so billets could become "over-coded" for a mission set
- Status quo may be maintained and commanders may not have insight to emerging capabilities and technologies that certain sub-specialties can provide.
- Joint Commanders request a high level AQD for Joint Space billets assuming that's what they will get, however because these billets are owned by a community other than space, and Joint billets are essential to promotion, a selective "FILL" can become more important than the FIT. This results in an officer with little to no space education/experience assuming a high visibility space position at Joint commands.

1. Carrier/Expeditionary Strike Group/Fleet Staff

CSG/ESGs are the backbone of the operational Navy and would be virtually dead-in-the-water without the support of capabilities derived from space.

This was reflected in the Navy Space Campaign Plan 2005 to 2007, which established CSG-8 the Fleet Executive Agent for Space. Commander Zigmond Leszcynski, who acted as Space Operations Officer, successfully incorporated space effects into daily operations during their 2006–2007 deployment (Bandini & Dittmer, 2007). Although the space campaign was effective, the lack of any follow-on top down mandate to Fleet and Strike Group Commanders to employ a space officer in a primary billet has led to inconsistencies in requirements for space AQD/SSCs and lack of a focused attempt to better leverage space effects. Most operational coded space billets are assigned to ships' company versus the Fleet/CSG/ESG staffs where they could prove more useful to commanders by incorporating space capabilities into operational planning and identifying commander's needs that can be turned into future space system requirements. Figure 16 depicts the current layout of space-coded billets throughout the fleet.

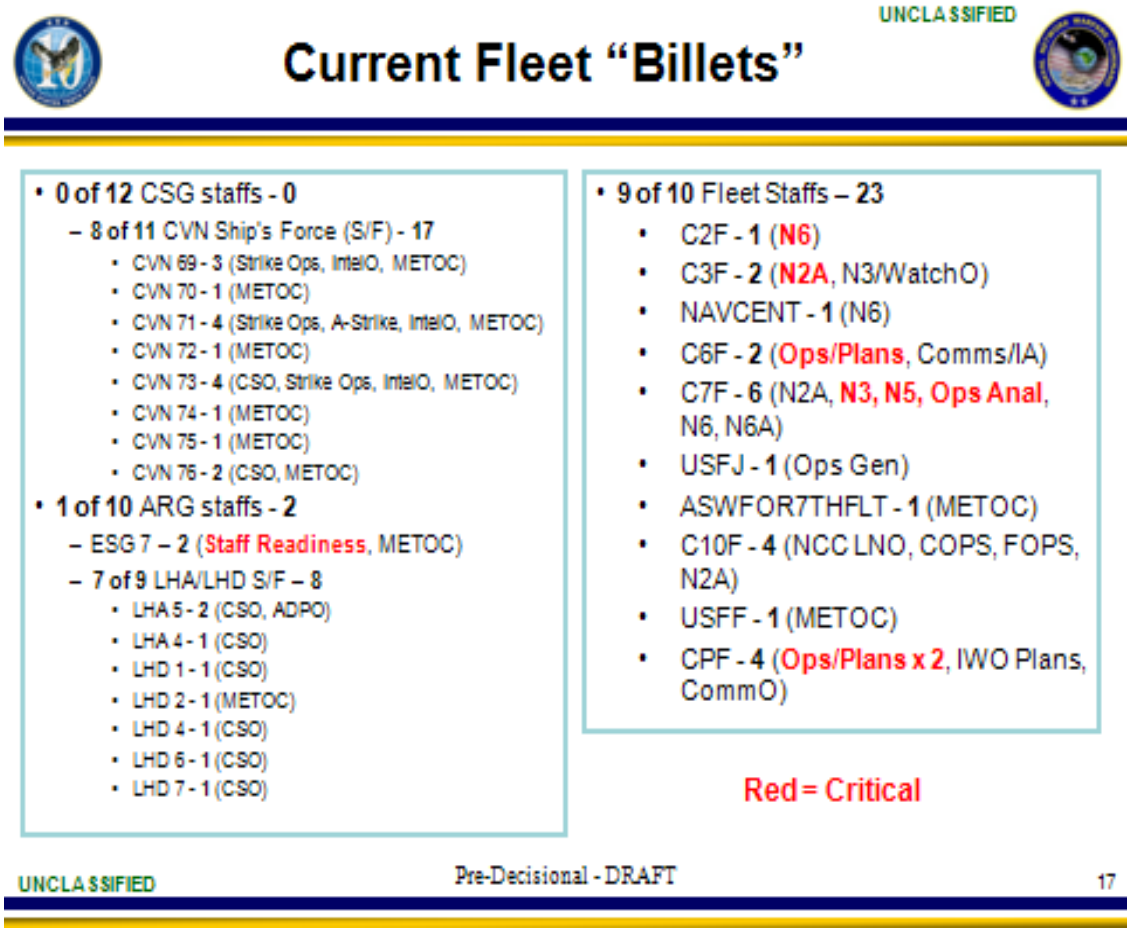

Figure 16. Current Fleet Billet Layout (From Bates, 2010)

It is very clear that huge inconsistencies exist in distribution of space billets throughout the fleet. Usually, if officers check into one of these commands and they have a space-related "P" code, meaning graduate education; they are automatically tagged as the Space Officer even if the primary billet they are filling is not coded for space. Otherwise, the space job responsibilities are distributed between the METOC, Strike Operations, Information Warfare or Intelligence Officers, or any other officer the command can find with any knowledge or interest in space. Another daunting issue with this method of billet identification is that not all staffs/units are taking advantage of the full range of capabilities that

space effects provide. It will only become more important to have knowledgeable space professionals integrated into these staffs and commands as other countries become space savvy.

2. Entry Level Billets vs. Higher Level Billets

Because the NSC lacks an organizational structure, it is very difficult to identify at what level space billets should be coded. There is a very large difference between a recruit or apprentice, and a journeyman or expert when it pertains to space systems knowledge. Every community within the Navy has billet milestones that require different levels of expertise as the officer grows professionally. For example, a Surface Warfare Officer (SWO) initially fills a junior officer billet, where he or she earns the surface warfare qualification, then takes an educational billet, such as NPS or other advanced education. Then that officer does a Department Head tour, followed by an Executive/Commanding Officer tour, etc. This billet structure does not exist for NSC professionals. It is very difficult for the "virtual community managers" to investigate every job that warrants space expertise and define what level of experience is required, then convince a community detailer to ensure that billet is filled with a qualified individual, even though that assignment will most likely hinder the officer's further advancement.

3. Acquisition Billets

Both SSO and SSE officers from all communities fill a myriad of billets that contribute to the requirements/procurement process. A large portion of these billets augment the SSFA and the NRO to ensure they have naval/space expertise in all aspects of space systems procurement. Within the SSFA, the AEDO and EDO communities provide the majority of Navy space acquisition personnel. The AEDO community has 27 SSE billets and 7 SSO billets while the EDO community has 17 SSE billets and 0 SSO billets. The majority of these billets are identified as "P" code or higher and thus require graduate-level education.

C. SPACE EDUCATION AND TRAINING

The NSC has no specific training track to ensure continuous professional development of space cadre personnel. This allows for a very large discrepancy in baseline space knowledge and can range from no space education or training at all to having a doctorate in space and having worked in many aspects of space systems. In early 2011, a Space Personnel Qualification Standard (PQS) was developed to try to establish a baseline of knowledge for Navy space professionals. However, since there is no Navy space community and almost all officers within the NSC are already qualified in some other community, very little incentive remains to obtain this qualification. This will be covered more in-depth in section D of this chapter.

1. NPS/AFIT

The length of education at NPS and AFIT, especially for officers pursuing a technical degree, does not fit into some URL and RL community's career paths and is considered detrimental to their career progression of officers in those communities. This is primarily because active duty officers attending school receive non-observed fitness reports and are essentially out of their primary community during this period. For most officers, their first chance to receive this education comes at the O-3 level. This is when they are most valuable to their community and most of their peers are remaining in competitive jobs where they can "break-out." Promotion and milestone boards tend to pick those officers that remain competitive, and rightfully so.

2. Lack of Initial Training

As previously stated, community detailers often place officers who do not possess any understanding of space in space billets. There is no requirement for initial training for space-coded billets. There are short courses available such as Space 200 and 300 conducted at NSSI. And, although the Navy has sufficient quotas for these courses, the training opportunity is not being utilized on a mandatory basis en-route to a coded billet that requires some level of space

training. Noting that these courses are geared towards general knowledge and are primarily taught by Air Force personnel, a Navy-centric version could be taught by NPS. The Space Systems Certificate is a “short course” in a sense, but would still take three months to complete on a full-time basis if all courses were taught in the same quarter.

D. INFORMATION DOMINANCE CORPS AND THE SPACE CADRE

The IDC was formed to bring together RL information communities to better integrate and exploit their individual contributions to support core navy warfighting capability and to functionally integrate intelligence, information warfare, information/network management, oceanography, and geospatial information. Four actual communities (IW, INTEL, IP and METOC) and the NSC make up the IDC. About half of the NSC already belonged to one of these formal communities and the other half belongs to either the URL, AEDO or EDO communities (Navy Space Cadre Office, 2011).

1. IDC Designation

The IDC has developed a warfare qualification that is available to all members within the community. In order to obtain this warfare designation, an officer must first complete the initial qualification in their respective community. Then they must complete a general IDC PQS, and pass a verbal board conducted by senior IDC officers. This ensures all members have a baseline level of knowledge of all the communities within the IDC. A Naval Space PQS was created in the spring of 2011 to allow NSC members to fulfill the individual community requirement and obtain the IDC warfare designation. However, because of the cross-community nature of the NSC, almost all officers are already warfare qualified and there is very little need/requirement for officers to complete the Space PQS and earn the IDC qualification as a NSC member.

E. CAREER PROGRESSION/PROMOTION

Career progression remains a concern for members of the NSC. Officers that volunteer to attend graduate education in a space field usually have a sincere interest in space. The lack of a defined career path for space professionals within the Navy contributes greatly to the poor utilization rates of these members and an eventual loss of valuable space expertise within the Navy enterprise. Since the NSC crosses multiple designators and there is no Officer Program Authorization (OPA), promotion flow points are not managed by N1 through promotion flow point guidelines. Because of this problem, the 2004 HCS states that:

> Steps have been taken to ensure that the expertise of today's Space Cadre members can be recaptured in future job assignments. The need to retain a healthy and robust Navy Space Cadre required space specific language and information be provided to statutory boards because Space Cadre members may take jobs that are different from their community's traditional career paths. (Naval Network Warfare Command, 2004)

This "specific" language was even a larger concern within the URL communities. URL officers are commonly referred to as the "warfighters" of the Navy. Therefore, it is important for space professionals to possess "front line" experiences to have the ability to merge operations and space effects to assure the most advanced fighting force possible. However, when URL officers receive education or take space billets that may not provide the most competitive opportunities, there is a risk of being passed over for promotion.

The space cadre "specific language" on promotion boards has changed quite drastically from 2005 to 2011. The following excerpt was the precept language for the FY07 Line promotion boards. It specifically addresses the importance of the NSC and why promotion of space cadre members is essential:

> PRECEPT LANGUAGE FROM FY07 AD 04/05/06 LINE BOARDS
>
> Success of naval operations is dependent on the capabilities of national, DoD and commercial space support. It is imperative that the Navy develops a significant cadre, comprised of the URL and

> RL communities, that is competent in relating the areas of operations, requirements, development and acquisition to space. Members of this cadre may have atypical career paths because of specialized education, training and assignments outside of the Navy. This cadre will continue to represent the Navy in mid-level and senior joint billets, as well as be assigned to Navy billets in direct support of space requirements and acquisition. When selecting the best and fully qualified officers to meet the needs of the Navy, you must view the quality of performance of offices in the Space Cadre as having weight equal to that ordinarily given to the quality of performance of other members of their respective communities who have followed more traditional career paths. (Niedermaier, 2007)

The FY 2012 URL promotion board language has change drastically with respect to the NSC. It generically lists competency/skill areas that some officers possess and ranks them in order of importance. The NSC ranks 13th out of 14 skill sets, with the fourteenth not even being a skill, but rather an application to become an astronaut. The FY12 O-5 URL promotion board selection guidance reads (Secretary of the Navy, 2011):

> (1) Skill Requirements. The Navy must focus on the skill sets mandated by current needs and on developing the professional competencies required in our future leadership. The Navy and joint force leadership needs to be comprised of a diverse blend of officers that have excelled in both traditional and specialized career paths. Give due consideration to demonstrated performance and expertise in the competency/skill areas listed in order of significance below. For amplifying information, see reference (b) competency/skills information, included in reference (a).
>
> Competitive Category: Unrestricted Line (11XX-13XX)
>
> 1. Financial Management (FM)
> 2. Joint Experience
> 3. Operational Analysis (OA)
> 4. Expeditionary Warfare and Irregular Challenges
> 5. Acquisition Corps
> 6. Cyber Operations and Planning
> 7. Language, Regional Expertise, and Culture (LREC) Experience
> 8. Navy Operational Planner
> 9. Naval Special Warfare (NSW) Experience

10. Learning and Development
11. Integrated Joint Air Defense
12. Shore Installation Management (SIM)
13. Space Cadre
14. Astronaut Consideration

This promotion board guidance demonstrates that Navy leadership, especially in the URL communities, clearly does not value the contributions that space professionals provide to ensure continued access and utilization of space effects.

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V. OPTIONS

There are many changes Navy leadership could implement to better utilize their space professionals. Incorporating the correct courses of action would create a NSC that assures access to space and can exploit all of the tremendous advantages space provides. This chapter proposes a multitude of initiatives that may be implemented to improve the Navy's utilization of space professionals. They are listed in order as having the most impact on utilization down to the least, accompanied by discussion of some of the advantages and disadvantages of each.

A. CREATE A SPACE WARFARE OFFICER COMMUNITY

1. Space Warfare Officer

The NSC of today faces many of the same issues confronted by the FAO community a few years ago. A small community of officers, who have received graduate education and understand the larger space picture, would likely solve most of the critical issues facing the NSC. This pool of officers, much like the Army's FA-40 personnel, could provide Navy leadership with consolidated Naval space requirements, while deploying throughout Joint and Navy fleets and staffs to help understand and assist commanders with the strategic and operational utilization of space assets and space effects. The key to making this organization a success is billet identification. The Navy would need to identify, adjust and/or create a consistent, core group of billets that require space literate professionals with the necessary education, experience and seniority. This would most likely mirror the current "critical" billets, which have already been identified, and add positions to ensure every Fleet staff and CSG/ESG staff has a Space Operations Officer as a primary billet to provide standardization. Besides ensuring robust exploitation of space capabilities, this billet could also act as the primary space educator for the rest of the staff and commands within the organization. This position can also act as the focal point for bringing

requirements/ideas from the fleet into the NSS arena. This will enable the fleet as a whole to become smarter with regard to space and how the utilization of everyday services such as SATCOM and GPS may be degraded, erroneous or compromised.

Accessions into the field would be through the Lateral Transfer Board process and the community would consist of officers who have achieved a previous warfare qualification. This would allow the community to own core billets and ensure they have the correct manpower to fill them. This community would also meet National Space Policy requirements to "develop, maintain, and retain skilled space professionals" (Whitehouse, 2010, p. 6) and round out the IDC to five actual communities. As officers become more senior within the community, they will be able to integrate with Joint staffs to insert specific, collective Navy space needs into future Joint Requirements and current operations. The largest argument against a space community is that it gives the impression of expanding or "growing" the force in a budget-constrained environment. Further research is necessary to confirm this, however, at initial glance it seems it would merely be a reallocation of billets and personnel. The NSC already has personnel allocated to try to manage the cadre; they just do not own billets or personnel to do their job effectively. This option provides that ability.

2. Space Enablers

Although the core community would be made up of graduate educated space personnel, Space Enablers would fill auxiliary billets required by the fleet to fulfill mission requirements with respect to space. These officers would essentially continue the current idea of cross-community detailing to billets owned by their respective community, which are not considered primary space billets. A space short-course should be given to these personnel enroute and they should then be tracked for further utilization at some point in their careers.

B. SPECIALTY CAREER PATH

The URL community has opened up the SCP program to all of their communities. Most of these SCPs are for sub-specialties obtained at the NPS. A space SCP would provide URL officers with significant space experience an opportunity to fill critical space billets possessed by the URL community while offering some opportunity at promotion, even though they may have missed a key promotion milestone. Since the URL community has the poorest FIT and payback rates, they would benefit the most from this option. Although this option could greatly increase utilization within the URL, it does not correct the cross-community detailing problem and does not improve/enhance the IDC's position, especially since they are currently tasked with oversight of the NSC and are the Navy's executive agent for space.

C. ATTACHING BILLETS TO NPS/AFIT ORDERS

In order to capitalize on the space education received and immediately reinforce education with real-world experience, attaching follow-on orders to NPS/AFIT education could prove very beneficial to the Navy. The Marines do this effectively to ensure they receive an immediate return on their investment. Again, the key to this option requires a billet review to identify critical billets that require graduate level education. Most likely, the largest concern for this option modeled after the Marine Corps' SEP program would be the extended length of time away from a primary designator. In order for this option to work, the space curriculums at NPS/AFIT would need a reduction from approximately 24–27 months currently to 15–18 months, and then the member would go directly to a 24–30 month space billet. The need to complete significant foundational coursework prior to starting a thesis, and the technical nature of most theses, requires the extended time. The reduction in curriculum length could be accomplished through elimination of the thesis and requiring only a group capstone project similar to the Systems Engineering Analysis Curriculum at NPS.

D. REMOVE THE AUTO "FIT" AND DEVELOP/UTILIZE SPACE SHORT COURSES

The auto "FIT" currently awarded to officers with no previous space education or experience falsely inflates NSC FIT/FILL rates and space cadre membership numbers. Officers detailed to a space VS1 or VS2 coded billet should be required to attend a space short course en-route to that billet. This will ensure they are contributing to the mission from the beginning of the tour rather than spending the first part of the tour learning general aspects of space. This could be accomplished by utilizing the existing NSSI courses or a Navy specific space short course produced and taught by NPS.

E. STANDARDIZE SPACE OFFICER BILLETS THROUGHOUT THE FLEET

A primary space officer designated on each Fleet/CSG/ESG staff would ensure that space effects are being utilized to the maximum extent possible to support naval operations. As stated, a space officer would assist commanders with the integration and synchronization of all available space capabilities into combat plans and execution by generating Space Support Requests (SSR) and maintaining reach-back with key space organizations. They also would keep the commander apprised of situations involving space such as status of systems, space weather effects, SATCOM and GPS electromagnetic interference (EMI) and other vulnerabilities to maximize mission effectiveness. One additional benefit a primary space officer could provide is much needed education to the Fleet. Ideally, this billet should be "P" coded to ensure personnel with the greatest level of education and expertise are assigned.

This option alone could possibly improve both FIT rates and payback tours, especially for the URL communities. URL community detailers would most likely be more willing to send graduates of space education programs to sea going space billets immediately after completing their degrees. With this option however, promotion of these officers would still be uncertain.

VI. CONCLUSIONS AND RECOMMENDATION

There is no shortage of Navy leaders stating how important space is to the Navy; however, the poor utilization and organization of the Navy Space Cadre tells a different story. Navy space has been a sub-specialty for many years; and, for many years, the Navy's space force has been in disarray due to the lack of a defined career path or professional development pipeline, especially when compared to the other services. This has led to consistently poor utilization of the Navy's space professionals and less than optimal exploitation of space capabilities to support naval operations. If the Navy intends to fully capitalize on the advantages space effects provide and ensure those capabilities are always available, the Navy must overhaul management of the cadre of personnel who provide them. All of the issues surrounding the NSC, such as FIT/FILL rates, payback percentages, billet identification, detailing, promotion and education/training can be traced back to one reason. Cross-community detailing does not work. No organization can succeed if it does not have control over its people, positions or promotions. The Navy realized this with the FAO program in 2007, and must realize it for the NSC. Otherwise, it will be virtually impossible to convince officers to pursue space related education if they cannot obtain real world opportunities to apply that education or maintain viable careers after they graduate.

The only clear way to fix the challenges and issues that face the NSC is to create a small community of space professionals that controls its people, positions, and promotions. Finding the correct Human Capital Strategy to meet requirements is a continuous challenge. The 2004 NSC HCS was a milestone in this process that has proved to be insufficient for the Navy. The next step is to supersede this construct with one that involves a core group of graduate space educated and/or equivalently experienced personnel. They can continually serve in space assignments which will guarantee continuous access to space for the fleet, obtain milestones and career progression, and ensure that the Navy is well

represented and respected in the Joint and National Security Space arena. This space community will grow leaders that can adjust manpower and billets throughout DoD, establish future requirements, and meet the changing needs of the Navy. A Space Warfare Officer community, as outlined in Chapter V, would provide much needed naval space expertise to the Fleet, NSS agencies, Joint operations and procurement organizations.

The Navy has already invested in the education of space professionals. It is time to optimize that investment because assured access to space is much too valuable for Navy Leadership to ignore any longer.

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