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HARNESSING THE HIGH GROUND OF SPACE

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Abstract

Currently, US military space operations mainly serve to enhance and support air, land and sea forces. Indeed, space operations have emerged as a powerful enabler of surface and air warfare and are moderately robust, but the dependence on space systems and the uncertainty of potential adversarial capabilities necessitate looking beyond the current organizational structure. The 2001 Quadrennial Defence Review called for transformation of the US armed forces in order to maintain their military advantage and deny asymmetric advantages to adversaries. Arguably, a logical transformation for US military space operations would involve institutionalizing such operations as part of America's armed forces. The commission chartered to assess the US national security space management and organization (commonly referred to as the Space Commission) has identified technological, educational, doctrinal and organizational issues that must be addressed by DoD. Furthermore, the Space Commission endorsed the possibility of creating a 'Space Corps-like' force after DoD had implemented their recommendations. An assessment of the issues identified by the Space Commission will reveal that while the US has made critical advancements, now is the time to maintain space superiority and military advantage by institutionalizing US military space operations.

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I. Introduction

This was a fortuitous day, indeed. All four high level officials from the 'Phonetic Regime' were gathering for a covert meeting in an undisclosed location. Undisclosed except for one team – a special operations forces (SOF) teams on assignment. The following scenario ensued…

"Gemini, this is Jeremiah, standby for mission change." The Joint Force Air Component Commander (JFACC) un-keyed the secure satellite phone link to the E-3 Airborne Warning and Control System (AWACS) as he stood staring at the link display on the wall. One of the SOF teams that were inserted deep inside country had just called in a report via satellite that they had, "eyes on" the number one target in the current conflict. The Combined Air Operations Centre (CAOC) jumped to life when they heard this information, as everyone knew that the success of this strike, and possibly the war could hinge on how quickly this information could be turned around to an airborne shooter.

"Jeremiah, this is Gemini, standing by to copy." The secure satellite communications feed was clear, but the loudspeakers in the CAOC made most transmissions sound tinny. The JFACC held up the sheet of paper with the scribbled Global Positioning System (GPS) satellite coordinates on it, which had just been handed to him by the SOF liaison officer (LNO) in the CAOC.

"Gemini, Jeremiah, direct Hammer 25 and 26 to the following coordinates…," the JFACC read off the coordinates from the sheet of paper. "Tell Hammer 25 and 26 to buster to that location and check in with Thunder 37 for tasking on Yellow…," the JFACC looked back over to the SOF LNO for confirmation before passing the frequency to Gemini. "That's Yellow 7."

The AWACS crew read back the coordinates and the frequency before passing the information on to Hammer 25 and 26.

Two minutes after Jeremiah replaced his satellite phone handset to its cradle the link tracks for Hammer 25 and 26 separated from their ingressing strike package of 18 combat aircraft. The GPS coordinates supplied by the SOF team were input into the link display in the CAOC. These target coordinates generated a target symbol on the link display as Hammer 25 and 26's tracks began accelerating towards the newly generated symbol.

In the far left corner of the CAOC the Unmanned Aerial Vehicle (UAV) liaison team shouted out, "Sir, we have the target area in sight and should have the target vehicle in sight momentarily." The UAV display – again delivered via satellite data link, came to life with some initial interference then the picture cleared. The picture showed a dry mountainous expanse with a small dirt road centred in the display. A lone black vehicle could be seen speeding along the display right to left, a slowly rising dust cloud trailing behind it.

"Jeremiah, Gemini, Hammer 25 reports good comms with Thunder 37 and tally ho on the vehicle. TOT (Time on Target) one minute."

Jeremiah responded to Gemini's call with a, "Copy all," then sat the handset down on the desk in front of him. All eyes were on the UAV satellite feed as the seconds ticked away.

No audio accompanied the UAV display as it showed a massive explosion just aft of the speeding vehicle. The first 1000 pound GBU-31 Joint Direct Attack Munition (JDAM) GPS guided bomb landed just short of its target, too far away to destroy the Suburban, but close enough to damage it. The truck was almost upended from the blast, and careened off the road into a ditch. It came to an abrupt halt against the far side of the ditch in a flurry of dust and gravel. Within a few seconds the front doors flew open. The passengers lurched out of the Suburban, staggered to the rear of the vehicle and furiously ripped opened the passenger door.

For a moment, Jeremiah feared that their target might get away. He glanced back up at the link display to see if any other airborne assets were available for re-tasking to prevent their target's escape. No other aircraft were close enough to arrive on scene in a timely manner.

The UAV display now showed one of the front seat passengers furiously dragging the semi-conscious rear seat occupant away from the Suburban. The pair was only about 10 feet away from the truck, still well within lethal range of a GBU-31, but they were headed towards some boulders, which might offer them enough shelter to survive a second bomb. The JFACC grabbed his satellite phone to query the AWACS on the status of Hammer 26's attack. He glanced back to the UAV feed before keying the microphone as the second GBU-31 scored a direct hit on the Suburban. The bomb's shock wave and dust obscured everything in the target area except the Suburban's somersaulting frame.

Jeremiah tore his eyes away from the UAV feed to glance at the CAOC's digital clock. He let a small smile cross his lips as he muttered, "17 minutes…not bad, not bad at all."

This time sensitive targeting scenario, though fictitious, is representative of how space assets have evolved in their use on the battlefield to support surface operations. Arguably, space technology has become a critical force enabler as demonstrated recently in Operation Enduring Freedom and Operation Iraqi Freedom. This feat has been achieved by leveraging necessity, adaptation and creativity.

The Wright brothers launched people into the air medium via powered flight in 1903. Since then humans have endeavoured to travel further within the vertical domain. The Russians were the first to break into the space medium by successfully launching and orbiting *Sputnik I* in 1957. Since *Sputnik*, however, the US has emerged as the victor of the space race.

Today, military space operations mainly serve to either enhance or support air, land and sea forces. This role is reflected in the new Air Force Doctrine Document-1 (AFDD-1), *Air Force Basic Doctrine* that states, gaining and maintaining space superiority "is a major concern of the Joint Force Commander (JFC) today in order to preserve his ability to conduct ISR [Intelligence, Surveillance and Reconnaissance], to command and control his forces, and to communicate and navigate."[1] This statement shows a good but narrow focus on the depth of space superiority required by the US military. Indeed, space operations have emerged as a powerful enabler of surface and air warfare and are moderately robust. However, the increasing dependence on space systems and the uncertainty of potential future adversarial capabilities necessitate looking beyond the current organizational structure.

This paper will argue that the next logical step in transforming the US military would be the institutionalization of space operations by the Department of Defence as part of America's armed forces. This assertion will be validated by first exploring the call for military transformation and the effects of the existing

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[1] United States, Department of Defence, AFDD-1 *Air Force Basic Doctrine* (Washington D.C.: US Government Printing Office, November 17, 2003) 92.

theories on the Revolution in Military Affairs (RMA). Building on this baseline, current space capabilities will then be discussed. A case study will serve as a historic parallel of where the military space community finds itself today. Finally, arguments of space institutionalization will be examined and conclusions drawn.

There are some caveats to address prior to continuing. First, this paper is not intended to propose that the space medium should be weaponized.[2] Although this may become a logical conclusion through the ensuing discussion surrounding the institutionalization of space, that is not the focus of this paper. Second, this paper will not suggest an organizational structure or specific name for a "Space Corps" or "Space Force." It will only present reasons why military space operations should be organized and controlled differently than the current model. Third, while the Navy and Army both have space commands, the focus will primarily be on the United States Air Force (USAF) since doctrinally and financially, they have progressed further in military space operations.[3] However, JP 3-14, *Joint Doctrine for Space Operations* will provide insight into current joint space doctrine.

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[2] Weaponize in this context is defined as using space systems for force application. Whereas militarize is defined as utilizing space systems as a force enhancer. Therefore, one can conclude that space has already been militarized, but not weaponized.

[3] Eighty five percent of space related budget activity within the DoD resides in the USAF. United States, *Report of the Commission to Assess United States National Security Space Management and Organization,* (Washington D.C.: US Government Printing Office, 2001), 22. *Army Vision 2010* discusses how space can support the surface war. The Navy vision, *Forward…From the Sea* only mentions support provided by advancing technologies (i.e. space). Bruce H. McClintock, "The Transformation Trinity: A Model for Strategic Innovation and Its Application to Space Power," Thesis, The School of Advanced Airpower Studies, Maxwell Air Force Base, AL., 2002, 27.

"**Adherence to dogmas has destroyed more armies and cost more battles than anything in war."**

J. F. C. Fuller[4]

II. Transformation and the RMA

The September 30, 2001 Quadrennial Defence Review (QDR) asserted that the United States must transform from a threats-based defence posture to a capabilities-based model in order to maintain military advantage and deny asymmetric advantages to possible adversaries. The capabilities-based model shifted the analysis from who the adversary might be or where the conflict may occur to how the adversary will fight. The QDR 2001 also affirmed the adversary will likely "rely on surprise, deception, and asymmetric warfare to achieve their objectives."[5] While the existing capabilities must be maintained, they will have to be adapted to a new and changing security environment. Additionally, new military capabilities must be created and experimented with to achieve the capabilities-based defence approach. This will require the transformation of military forces, capabilities and institutions.

The challenges are vast, but considered achievable by the QDR. According to the 2001 QDR report, those challenges are protecting critical bases of operation, including the United States; projecting and sustaining US forces to remote locations and perhaps non-permissive environments. The challenges also

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[4] United States, Department of Defence, AFDD-1 *Air Force Basic Doctrine* (Washington D.C.: US Government Printing Office, November 17, 2003), 4.

[5] United States, Department of Defence, *Quadrennial Defence Review Report* (Washington D.C.: US Government Printing Office, September 30, 2001), 5.

include guaranteeing robust information systems and providing persistent surveillance and tracking of adversaries to enable rapid engagement of potential opponents. Finally, the challenges of transformation require improving the capabilities and survivability of US space systems, utilizing information technology and new warfighting concepts in order to spurn more effective joint operations.[6] Undoubtedly, transformation will require enduring commitment not only from US taxpayers, but also the political leadership. Although the QDR was almost completed subsequent to the September 11, 2001 attacks on the US homeland, these attacks served to confirm many of the assertions that resulted from the review. The DoD call for transformation demands an analysis into the past and current theories of the Revolutions in Military Affairs (RMA).

History has revealed many distinctive 'eras' that are demarcated by technological breakthroughs. These technological innovations often emerge from military research and development. More recently, these periods in history have been categorized as RMAs. Still, many theorists have often questioned the relevancy of the RMA and even its existence. There are on-going debates about whether or not we are currently experiencing an RMA and if so, the exact nature of the revolution.

What is a Revolution In Military Affairs? Perhaps the benefits gained by military space assets could be considered an RMA or at the very least, a natural transition for the US military. In order gain insight into these assertions, the history of the Revolution in Military Affairs and its various working definitions

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[6] *Ibid*, 29.

must be explored. Then, current transformational trends will be measured against the definition to explore if military space operations constitute an RMA.

Alvin and Heidi Toffler offer an extensive historical view of military transformation in their book, *War and Anti-War*. They note that revolution is often only associated with technological innovations, such as gunpowder, the airplane and the submarine. Even though these had significant impacts, the Tofflers contend they were actually sub-revolutions and simply made military

Toffler, *War and Anti-War*…, 42.

organizations have reorganized into smaller, more flexible companies.[12] The Tofflers use the Gulf War of 1991 to reflect their third-wave information age theory. They classify this conflict as a "dual war," one war was fought with second-wave weapons, while another was fought with third-wave precision weapons. Just like the economy, warfare was becoming more precise and selective. In addition, fewer troops with intelligent technology could accomplish more than many troops with the tools of the past.[13]

Andrew Krepinevich[14] has also theorized about military revolutions throughout history. He claims RMAs consists in four elements: technological change, systems development, operational innovation and organizational adaptation.[15] Krepinevich categorizes as many as ten military revolutions since the fourteenth century. His revolution classifications start with the infantry revolution of the Hundred Years War, where infantry displaced cavalry as the dominant combat unit on the battlefield. He considers the last revolution to be the nuclear revolution of the mid-twentieth century which centred on doctrine that called for avoiding war altogether.[16]

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[12] *Ibid*, 64.

[13] *Ibid*, 64.

[14] Andrew Krepinevich is the Executive Director of the Centre for Strategic and Budgetary Assessments, Washington DC.

[15] Elinor C. Sloan, *The Revolution in Military Affairs: Implications for Canada and NATO,* (Montreal: McGill-Queen's University Press, 2002), 21.

[16] Sloan, *The Revolution…, 21.*

A third RMA theorist is Williamson Murray.[17] Murray differentiates between Revolutions in Military Affairs and Military Revolutions, arguing that military revolutions "not only fundamentally change the character of warfare, but also recast the nature of society and the state."[18] Further, Murray claims RMAs occur after the larger phenomenon of military revolutions.

Murray believes four military revolutions have occurred in recent centuries. The first was the creation of the modern nation state, based on organized and disciplined military power in the seventeenth century. The second was the French Revolution, which established new norms for economic and

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approach to war." [19]

A final RMA example comes from Clifford Rogers.[20] Rogers views the RMA differently than the Tofflers, Krepinevich and Murray. Rogers claims RMAs *precede* military revolutions. Military revolutions take place when an RMA has a wide affect for social, economic and political structures, balances of power and other areas outside the dominion of military forces. Rogers postulates questions to predict whether an RMA is to become a true military revolution:

> "Does the current RMA involve military change in direction or is it the same only more? Does it change the balance between offence and defence? Does it change the balance between small and large populace states? Does it change the types of components that must be considered in order to assess a nation's military strength? To what extent will it require changes in social, cultural or economic structures, as opposed to just military ones? Does it mean a major difference in the answer to the question of who fights in society?"[21]

Rogers justifies the artillery revolution as an example of meeting his criteria. The artillery revolution reversed the tactical advantage from defence to offence due to the vulnerability of the castle walls, which no longer allowed weaker armies to resist stronger armies. This change, claims Rogers, eventually led to the emergence of the centrally governed nation-state with revenues and a standing army.

Therefore, there are several conclusions that can be made about the RMA. The first consideration is whether or not the RMA actually exists. Like other

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[19] *Ibid*, 23.

[20] Clifford Rogers is the Assistant Professor of History at the US Military Academy, West Point.

[21] Sloan, *The Revolution* …, 30.

theories, it seems reasonable that the RMA is just an alternate method of organizing existing trends into a logical "package" that can be manipulated when applied to similar situations. On the contrary, the theories of the Revolution of Military Affairs suggest insightful thought and consideration to the past, present and future of warfare, its technology and organizations. Certainly, not enough can be said or learned about the valuable lessons of history.

An RMA, then, must include an exploitation of technology to complement changes in doctrine and organizational structures. These technological, doctrinal and organizational pillars of the military are dynamic and interrelated. For example, exploiting new technologies will alter the face of the battlefield, but only in relatively short duration until the adversary learns how to successfully counter the change. To fully take advantage of the RMA and promote long-term effects on the battlefield environment, adaptation to any one of the pillars will drive necessary changes to the others. Seemingly, the Revolution of Military Affairs reflects the current notion of transformation as envisioned by the US Department of Defence.

> "Transformation results from the exploitation of new approaches to operational concepts and capabilities, the use of old and new technologies, and new forms of organization that more effectively anticipate new or still emerging strategic and operational challenges and opportunities and that render previous methods of conducting war obsolete or subordinate."[22]

Transformation also has intellectual and social dimensions. Fundamental changes in the conceptualization of warfare as well as in organizational culture

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[22] United States. *Quadrennial Defence Review*..., 29.

and behavior are critical for transformational change. Of course, transformation takes time to accomplish. The QDR reassures us that during the early phase of transformation, only a small portion of the force will typically be transformed.[23] However, "small transformed forces with a critical mass of spearhead capabilities can produce disproportionate strategic effects."[24] Because transformation must be planned and carefully managed, choices made today may constrain or enhance available options tomorrow.

Furthermore, the QDR asserts that transformation can accommodate the displacement of one form of war with another; such as fundamental changes in the way war is waged in the air, land and sea environments. Additionally, the QDR Report seems to indicate a somewhat slight preponderance of conflict in the fourth dimension of space…"It [transformation] can also involve the emergence of new kinds of war, such as armed conflict in new dimensions of the battlespace."[25] Although this paper will not argue for the weaponization of space, it is likely that the US is already anticipating its development. Additionally, the US cannot ignore the potential capabilities of the asymmetric adversary and thus, must maintain their edge in space. Arguably, if the American military let technology drive strategy in the past, the QDR seems to allude to the change of developing strategy in order to exploit technology. Using the above discussion as

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[23] *Ibid*, V.

[24] *Ibid*, 30.

[25] *Ibid*, 29.

a baseline, the remainder of the paper will examine military space capabilities within this context.

"The instruments of battle are valuable only if one knows how to use them."

Ardant du Picq[26]

III. Current Mission Areas/Capabilities

Given that a current RMA has been recognized, it is important to examine how it has affected current space missions. Current US doctrine identifies four distinct areas of military space activity through the missions of Space Support, Force Enhancement, Space Control and Force Application.[27]

Space Support

Space support involves providing lift capability and satellite control capabilities that enable other mission areas to operate more effectively. Support operations consist of spacelift, satellite operations and reconstitution of space forces, if required.

Spacelift delivers satellites to their required orbit to initially deploy, sustain or augment satellite constellations supporting military operations. Currently, the US operates two spacelift facilities. Satellite operations are conducted to manoeuvre, configure and sustain on-orbit assets – referred to as telemetry, tracking and commanding (TT&C). TT&C is executed through both dedicated antennas and common-user networks. The Air Force and Navy both operate satellite control networks. Finally, reconstitution refers to replenishing

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[26] United States, Department of Defence, JP 3-09.1 *Joint Tactics, Techniques, and Procedures for Laser Designation Operations* (Washington D.C.: US Government Printing Office, May 28, 1999), IV-1.

[27] Space mission areas are outlined differently in the current AFDD 2-2 *Space Operations* versus the Joint Publication 3-14 *Joint Doctrine for Space Operations*. The mission areas introduced here are from JP 3-14.

space forces in the event of satellite failure. This could entail repositioning or reconfiguring remaining assets, augmentation by civil capabilities or replacement of lost assets.[28]

Force Enhancement

Force enhancement multiplies joint force effectiveness by improving battlespace awareness and providing warfighter support. The force enhancement mission area includes Intelligence, Surveillance and Reconnaissance (ISR), Integrated Tactical Warning and Attack Assessment (ITW/AA), environmental monitoring, communications and position, velocity, time and navigation.

ISR helps reveal the location, disposition, and intention of the adversary. Information received from ISR assets provides warning of attack, operational combat assessment and tactical battle damage assessment (BDA). ITW/AA utilizes satellite- and ground-based systems that provide timely detection and warning of an adversary's use of ballistic missiles or nuclear detonations (NUDETs) to US strategic forces, tactically deployed forces, and US allies. Tactical warning notifies operational command centers and deployed forces that a specific threat event is occurring (e.g. surface-to-air missile or theatre ballistic missile). Environmental monitoring provides data on meteorological, oceanographic, and space environmental factors that might affect operations. Imagery capabilities can also provide joint force planners with current information on surface conditions such as surface trafficability, beach conditions,

[28] United States, Department of Defence, JP 3-14 *Joint Doctrine for Space Operations* (Washington D.C.: US Government Printing Office, August 9, 2002), IV-10.

vegetation, and land use. Environmental monitoring also supports intelligence preparation of the battlefield by providing the commander with information needed to identify and assess potential adversary courses of action. Space-based communications help shape the battlefield by enabling reach-back operations, sustaining two-way data flow, disseminating plans, orders, and force status over long distances, increasing C2 effectiveness, especially in areas with limited or no communications infrastructure.[29] Satellite communications also provide critical connectivity for maneuver forces whose rapid movement and non-linear deployments take them beyond inherent line of sight communication networks. Finally, position, velocity, time and navigation deliver precise, reliable position and timing information that permits joint forces to more effectively plan, train, coordinate, and execute operations. Space-based blue force tracking will improve C2 of assets and provide enhanced situational awareness while decreasing the chances of fratricide. These assets also enable the use of precision-guided munitions.[30]

Space Control

Space control operations provide freedom of action in space for friendly forces while, when directed, denying it to an adversary. Space control missions include protection, surveillance of space, prevention, and negation functions.

Providing freedom of action in space includes protection and surveillance.

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[29] Reachback operations draw from support databases in the continental United States.

[30] JP 3-14 *Joint Doctrine for Space Operations…, IV-8, 9.*

Space assets are protected through active and passive defence measures to ensure friendly space systems operate properly. Space control requires robust space surveillance for continual awareness of orbiting objects, threat detection, identification, and location and predictive analysis of adversarial space capability. Denying freedom of action in space to the enemy includes prevention and negation. Prevention utilizes measures to preclude an adversary's hostile use of US space systems and services. Prevention can be accomplished through military, diplomatic, political, and economic means as appropriate. Negation consists of measures taken to deceive, disrupt, deny, degrade or destroy an adversary's space capabilities.[31]

Force Application

Force application would consist of attacks against terrestrial-based targets carried out by military weapons systems operating in or through space. The force application mission area includes ballistic missile defense and force projection. Currently, there are no force application assets operating in space.[32]

While there are currently no space-based force application assets on orbit, a commission chartered to assess the US national security space management and organization (commonly referred to as the Space Commission) cautioned DoD to not ignore this possibility. The commissioners acknowledged the sensitivity that surrounds the notion of weapons in space for offensive or defensive purposes.

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[31] *Ibid*, IV-9.

[32] However, Air Force Space Command (AFSPC) does maintain and operate the land-based Intercontinental Ballistic Missile (ICBM) force.

But, they also argued, "that to ignore the issue would be a disservice to the nation."[33] The commissioners expressed that the U.S. Government should vigorously pursue the capabilities called for in the National Space Policy to ensure that the President will have the option to deploy weapons in space to deter threats and, if necessary, defend against attacks on U.S. interests.[34]

With the current space mission areas outlined, a historical case study will help guide the focus for institutionalizing space operations.

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[33] United States, *Report of the Commission to Assess United States National Security Space Management and Organization,* (Washington D.C.: US Government Printing Office, 2001), Ch 2, 17.

[34] *Ibid*, Ch 2, 17.

"Both the army and navy may well possess aerial means to aid their respective military and naval operations; but that does not preclude the possibility, the practicability, even the necessity, of having an air force capable of accomplishing war missions solely with its own means."

Giulio Douhet, 1921[35]

IV. Case Study – The U.S. Air Force Struggle For Independence

Case studies can help draw historic parallels upon which one can make logical conclusions for application to the present and future. The US's struggle to create an independent air arm in the US military has many parallels to the current situation of military space operations.

Giulio Douhet, an Italian air strategist, suggested that the solution to the next war was not to conduct it like the last, but to use advanced technology in the form of airpower to win before the opponent could respond: "Victory smiles upon those who anticipate the changes in the character of war, not upon those who wait to adapt themselves after the changes occur."[36] He wanted an air force that could win not just air battles, but achieve and maintain total command of the air. This command of the air would have a debilitating effect on the capability of land and sea forces, which would be relegated to a secondary role in future conflicts.[37] Although some of Douhet's theories were disregarded and proven somewhat

[35] United States, Department of Defence, AFDD-1 *Air Force Basic Doctrine* (Washington D.C.: US Government Printing Office, September 1997), 40.

[36] *Ibid*, 105.

[37] Giulio Douhet, *The Command of the Air,* trans. Dino Ferrari (New York: Coward-McCann, Inc., 1942), 191.

faulty during the Second World War, he did indeed correctly promulgate the idea that airpower, in its own right, could be decisive.

1907 – 1914: Aeronautical Division of the Signal Corps

The very first origins of the present US Air Force can be traced back to 1 August 1907, when the Aeronautical Division was created within the US Army's Signal Corps.[38] The Aeronautical Division of the Signal Corps experienced two major problems – insufficient funding and an inadequate number of personnel. A trivial, yet revealing fact is the first airplane for the Aeronautical Division was purchased in 1909 not through a Congressional appropriation, but through a diversion of funds by the Army. The first appropriation for military aviation did not occur until March 1911 when Congress allowed "$125,000 to purchase, maintain, operate and repair airplanes and other aerial machines" in fiscal year 1912.[39]

The personnel factor was also a crucial issue for the Aeronautical Division. In 1910, there were only two officers and nine enlisted personnel assigned to aviation. On March 1913, after five disapproved measures, legislation was finally approved that allowed the aviation service a minimum of 30 officers and increased their pay by 35 percent.[40]

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[38] Earl R. McClendon, *Autonomy of the Air Arm,* (Washington D.C.: U.S. Government Printing Office, 1996), 7.

[39] *Ibid*, 2.

[40] *Ibid*, 2.

1914 – 1918: Aviation Section of the Signal Corps

On 18 July 1914, Congress created an Aviation Section within the Army Signal Corps.[41] The Aviation Section represented the recognition of the first statutory air arm of the military. This legislation authorized sixty officers and students and 260 enlisted men. By May 1917, Congress passed noticeably larger appropriation bills for military aeronautics: $10 million in May, $43 million in June and $640 million in July. This funding increase was largely due to the increased demand of aircraft from European allies and increased public interest.[42] It is also worth noting that during the First World War, aviation technology developed rapidly. But the army's reluctance to use the new technology began to make aviators think that as long as the army controlled aviation, development would be stunted and a potentially valuable force neglected.[43]

1918 – 1926: U.S Army Air Service

The Overman Act, an executive order from the War Department issued on 21 May 1918, authorized President Wilson to redistribute functions among executive agencies for the duration of the First World War to enable successful prosecution of the war. With this authority, the Commander-in-Chief removed aviation from the Signal Corps and authorized the Division of Military Aeronautics to procure and train the necessary flying forces. Wilson also created

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[41] *Ibid*, 2.

[42] *Ibid*, 6.

[43] U.S. Centennial of Flight Commission, "United States Air Force," available from http://www.centennialofflight.gov/essay/Air_Power/Air_Force/AP33.htm; Internet; accessed 14 March 04.

the Bureau of Aircraft Production to provide planes, engines and equipment.[44] This move marked the beginning of the U.S. Army Air Service.

Soon after the creation of the Division of Military Aeronautics and the Bureau of Aircraft Production, a liaison problem emerged. The issue stemmed from the Bureau of Production being responsible for producing the aircraft, but the Division of Aeronautics was held accountable for their operation and efficiency. Therefore, no one individual could be held responsible for overall production. Eventually, on 28 August 1918, the Secretary of War dual-hatted the Second Assistant Secretary of War as the Director of Air Service. The Director of Air Service was given full control over both branches of the Air Service, with full power to coordinate operations and develop programs.[45] Finally, after the First World War, the US Army Air Service was permanently established through the Army Reorganization Act of 1920.

It is important to note that during this time period, the Air Service realized it needed to establish a formal process for writing and refining airpower doctrine and then educating its personnel so they understood that doctrine. Often, those actually using a given weapon in the field devise the best tactics and procedures for employing it. However, such broad thinking on strategy or on warfare in a general sense usually is best left to those who are able to think, write and argue and have the time set aside to do so. Air Service leaders realized this, and as a

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[44] *Ibid*, 8.

[45] Ibid, 7-9.

consequence, convinced the Army to establish an Air Service Tactical School (later the Air Corps Tactical School) at Langley Field, Virginia in August 1920. The mission of the school was to formulate airpower doctrine and then teach that doctrine to a select group of officers each year. Eventually, the ideas taught at the school would permeate the entire Air Service officer corps. Virtually every senior American air commander of the Second World War had attended the school.[46]

1926 – 1941: U.S. Army Air Corps

Subsequent to the Army Reorganization Act of 1920, the U.S. Army Air Corps was established through the Air Corps Act of 1926. During this interval, there still remained the question of greater autonomy for aviation. General "Billy" Mitchell was one of the most outspoken advocates of an independent air force. When Mitchell suggested that U.S. airpower could defend the nation's coasts from attacks by enemy warships better than U.S. sea power, controversy developed as to whether an airplane could sink a battleship. It was decided to conduct tests off the Virginia coast in June and July 1921. Mitchell's bombers sank three captured German naval vessels and in September 1921, the obsolete U.S.S. Alabama. Two years later, additional tests were conducted off Cape Hatteras and two more obsolete U.S. battleships were sent to the bottom.[47]

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[46] Philip S. Meilinger, "Significant Milestones in Air Force History," available from http://www.au.af.mil/au/awc/awcgate/af/sigmilestones.pdf; Internet; accessed 14 March 2004, 5.

[47] C.V. Glines, "Billy Mitchell: Air Power Visionary," *Aviation History Magazine,* September 1997.

The successful bombing trials encouraged the supporters of a separate air arm to press even harder for their objectives, but the Army General Staff remained firm in its belief that airpower, acting independently, could not win a war. Mitchell, however, became increasingly critical of his superiors until his public statements could no longer be condoned. In December 1925 he was found guilty before a court-martial of violating the all-inclusive 96th Article of War and was suspended from duty for five years. In 1926, Mitchell resigned from the service.[48]

The origin of the Air Corps Act of 1926 stems from primarily the findings of two boards established to consider the possibility of an independent air arm. In 1925, the Lambert Committee in Congress recommended the establishment of a Department of National Defense with separate Army Navy and aviation departments. At about the same time, the Morrow Board came to a different conclusion. It rejected the Defense Department idea and instead backed an air arm remaining under the War Department, although with increased power in the Department hierarchy, including representation on the General Staff.[49]

The result of all these studies was the 1926 Air Corps Act, which followed most closely the recommendations of the Morrow Board: The Act turned the Air Service into the Army Air Corps. This increased the numerical strength of the air arm and further increased its prestige as an offensive force, as opposed to an

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[48] *Ibid*.

[49] McClendon, *Autonomy of the Air Arm…*, 52-57.

auxiliary service of the Army. It left the air arm under the War Department's General Staff and thus, the Air Corps had to compete with the rest of the Department for its share of the limited funds appropriated by Congress. The key position taken by the War Department was that any emancipation by Air Services would violate the fundamental principle of unity of command.[50] In 1928, Billy Mitchell in his writing as a private citizen was quick to note that by this time, "in all leading countries, air, land and water are under independent ministries and organized under either a department of national defence or a committee."[51] He went on to explain that this made it possible for each branch of service to formulate its own plans and programs and called the defence arrangement of the US "an indescribable mess that no one knew who was in charge of anything."[52]

Along with the establishment of the US Army Air Corps came a five-year expansion plan. The War Department however, was not able to maintain funding for the plan and appropriations were scaled down. At the end of the five-year plan, the Air Corps was short of the original goal by 129 aircraft, 396 officers and 1,600 enlisted personnel.[53]

Another wave of commissions in the early 1930s, by both the War Department and the newly established Federal Aviation Commission, studied the need for an independent aviation service. Once again they supported the status

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[50] *Ibid*, 57.

[51] *Ibid*, 60.

[52] *Ibid*, 60.

[53] *Ibid*, 63.

quo, but also recommended setting up a General Headquarters Air Force (GHQ Air Force), composed of all air combat units, trained as a unified force and able to perform both close support and independent action.[54]

The War Department moved on these recommendations in 1935 when it created the General Headquarters (GHQ) Air Force. The GHQ Air Force was a coordinate component with the Air Corps, with its own commanding general who reported directly to the Chief of Staff in peacetime, and to the theater commander in wartime. It was a step in the right direction, but military aviation was split between the two organizations, with employment under the GHQ Air Force and supply and individual training under the Air Corps.[55]

1941 – 1947: U.S. Army Air Force

It took an emergency situation to further strengthen the air arm and to give it more autonomy. Reacting to the worsening situation in Europe at the end of the 1930s, President Franklin Roosevelt called for U.S. production of 10,000 planes a year for the protection of the Western Hemisphere. After the German invasion of France in 1940, he called for an Air Force of 50,000 to meet the mounting threat. Due to this growth, the Army Air Forces were created by order of the Secretary of War on 20 June 1941. The Deputy Chief of Staff for Air was also the chief of the new organization, and he commanded both the Chief of the Air Corps and the

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[54] *Ibid*, 66-74.

[55] *Ibid*, 73.

Commanding General of the Air Force Combat Command (formerly the GHQ Air Force).[56]

This is the organization with which the United States went into the Second World War. On 9 March 1942, the War Department recognized the Army Air Forces as one of the three major Army commands, and the Office of the Chief of the Air Corps and the Air Force Combat Command were abolished.[57]

Further moves toward autonomy surfaced during the course of the war. During the fighting in North Africa, the tactical air forces were at first under control of ground commanders. The British, who had had a separate air force since the end of the First World War, brought the idea of coequal ground commanders and air commanders reporting to the overall theater commander. The effectiveness of this arrangement became evident, when Allied planes took control of the air from the Germans.[58]

Before the war, the Army's air arm was a fledgling organization; by the end of the war the Army Air Forces had become a major military organization comprised of many air forces, commands, divisions, wings, groups, and squadrons, plus an assortment of other organizations. The eventual victory in Africa led to the 1943 Army Air Forces field manual 100-20 *Command and*

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[56] *Ibid*, 93.

[57] *Ibid*, 95.

[58] *Ibid*, 98.

Employment of Air Power, which stated "Land power and air power are coequal and interdependent forces; neither is an auxiliary to the other."[59]

18 September 1947: U.S. Air Force

President Harry S. Truman, in an address to Congress on 19 December 1945, advocated an independent air force organized in parity with ground and naval forces. After months of inter-service and congressional negotiations and compromise, President Truman signed the National Security Act of 1947 on 26 July 1947.[60] The measure established an independent Air Force for "offensive and defensive air operations" and placed the Army, Navy, and Air Force on an equal level under a civilian Secretary of Defense. The Department of the Air Force began operating as a separate entity on 18 September 1947.

The struggle for US Air Force independence was long and arduous. It took nearly four decades to convince the Army and Navy that airpower could bring significant contributions to the battle. Some of the same issues the pioneers such as General Billy Mitchell or General Henry “Hap” Arnold faced are similar to issues currently being faced in military space operations. The concerns that surrounded early air theorists - technology, budget, organization, doctrine and personnel are all visible concerns of space theorists today. Even though the

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[59] *Ibid*, 99.

[60] The act also created the Joint Chiefs of Staff, consisting of the highest-ranking officers of all the branches of the United States armed forces, as a military advisory group to the President. It additionally transformed the wartime Office of Strategic Services into the Central Intelligence Agency (CIA) and fashioned the National Security Council (NSC) as an ancillary to the executive branch.

USAF gained its independence, one must keep in mind that the US Army and US Navy both have their own supporting aviation arms. This has made command and control of air space even more complex in an area of operations and has led to the development of a single Joint Force Air Component Commander (JFACC) to manage air operations in a joint environment. DoD can certainly learn from this and strive to realign global space assets under one commander. This would allow the uniform employment of space forces regardless of whether the US is at peace or at war. And, just as airmen should control air power, space professionals should control space power. In the following section on the debate for space operations solidarity, certain themes from this historical analysis will resonate the past. The Department of Defence should listen and learn from history.

"***To develop anything, the underlying thought and reason must govern, and then the organization must be built up to meet it."***

Brigadier General William "Billy" Mitchell[61]

V. Debate for Military Space Operations Institutionalization

In future conflicts, the enemy will not be easily identifiable as in the past. They will seek sanctuary in austere locations and they will have a discrete, yet viable communication and control system. They may also surprise their enemy with their ingenuity and ruthlessness. This begs the question of how to militarily deal with these adversaries. The US must strive to maintain its position of unparalleled military strength. As the US becomes more dependent on space-based systems, it is therefore critical that space operations are organized in a manner that will be most effective and efficient. Transformation is the right direction and now is the time to prepare for future opponents – space superiority is not an option, but a requirement.

Much like the USAF prior to 1947, transformation and the full utilization of spacepower will not be realized until the US Department of Defence institutionalizes military space operations. Transformation, as defined earlier, emphasizes that technological innovation must be accompanied by intellectual innovation leading to changes in doctrine and organization.[62] Therefore, the

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[61] United States, Department of Defence, Air Force Doctrine Document 2 *Organization and Employment of Aerospace Power* (Washington D.C.: US Government Printing Office, November 17, 2000) ix.

[62] United States, Department of Defence, *Joint Vision 2020*. (Washington D.C.: US Government Printing Office, 2000), 3.

debate on institutionalizing military space operations will revolve around these precepts.

Technological Innovations

Technological innovations can be considered as transformation enablers, but are limited by perceived necessity, budget allocations and feasibility. Certainly, feasibility studies are crucial when collaborating on new technologies, but outside the scope of discussion for this particular topic. Therefore, discourse on technological innovation will revolve around perceived necessity and budgeting.

In 1957, perceived necessity marked the beginning of the space age for the United States. Although the plans for a satellite had been on the table, the US arguably did not focus on development and launch of their own satellite until the Soviet Union displayed an edge in capability with the unexpected launch of *Sputnik I.* This spurned a need to "spy" on the Soviet Union and thus, the rapid development of technology reaching for higher ground in the vertical dimension emerged. There is an inherent need to learn from the past, ensure that the United States maintains its edge in technology and retains effective approaches to emerging adversarial capabilities.[63]

Obviously, the USAF perceives technical innovation as a necessity. AFDD-1 *Air Force Basic Doctrine* states the USAF needs to make an institutional

[63] Reinforced by the National Security Strategy of the United States of America. United States, Executive Office of the President of the United States, *The National Security Strategy of the United States of America* (Washington D.C.: US Government Printing Office, September 2002).

commitment "to learn from experience and to exploit relevant ideas and new technologies so we may be the masters of our future."[64] Often, technological innovations that become operational deliver unexpected benefits that can be exploited. An example of this is the Defence Support Program (DSP) satellite performance during Desert Storm. DSP was designed to detect incoming Intercontinental Ballistic Missiles (ICBMs) during the Cold War using infrared sensors. During Operation Desert Storm, DSP detected and reported several Iraqi SCUD missile launches to aid in locating and eventually destroying them. Even though DSP had not been designed to detect a low intensity theatre ballistic missile, the potential to accomplish this more efficiently became a reality after the Gulf War ended. The unexpected benefit gained through the conflict was exploited by designing the Attack and Launch Early Reporting to Theatre (ALERT) system, which has now led into the follow-on program for DSP, Space Based Infrared System (SBIRS). As an added bonus, some of the DSP satellites on orbit have outlasted their design life by ten years. There is no doubt that the world security situation has changed significantly since the Cold War. The once enjoyed bipolar stability is now dynamic and uncertain. New innovations (not necessarily new technologies) will be necessary to root out and neutralize the enemy. However, the budgetary commitment record of the US government for space innovations has been sketchy.

The Space Commission criticized the government for limiting its investment in breakthrough technologies to enable revolutionary capabilities.

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[64] AFDD-1,…106.

This report reinforces the need to encourage and support technology demonstration projects vice cancelling them as Congress did for the Discoverer II demonstration in 2000.[65] This will enable the US to develop effective and affordable systems dedicated to military missions in space. The report goes on to summarize that the "US will not remain the world's leading space-faring nation by relying on yesterday's technology to meet today's requirements at tomorrow's prices."[66]

According to the Director of the Defense Advanced Research Projects Agency (DARPA), the Space Commission report's emphasis on increased investment in space-based technology was the impetus for significant increases in space research and development funding over the next 5 years—from $235 million in fiscal year 2003 to $385 million by fiscal year 2007 as shown in the fiscal year 2004 President's budget request.[67] Between fiscal years 2003 and 2007, DoD also plans on increasing its budget for space science and technology by almost 25 percent, from approximately $975 million in 2003 to over $1.2 billion in 2007.[68] Under current plans, DARPA will receive most of these funds.

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[65] The Discoverer II demonstration would have provided two satellites with synthetic aperture radar (SAR), moving target indicator (MTI) and digital terrain-elevation data and served as a precursor to Space Based Radar currently being developed.

[66] United States, *Report of the Commission to Assess United States National Security Space Management and Organization* (Washington D.C.: US Government Printing Office, 2001), 18.

[67] United States. General Accounting Office, GAO-03-379 *Defence Space Activities: Organizational Changes Initiated, but Further Management Action Needed* (Washington D.C.: US Government Printing Office, April, 2003), 13.

[68] *Ibid*, 13.

The Director claimed that over the years, the agency's concentration on space-based technologies varied and noted that just prior to the Space Commission report, ongoing space efforts were at a low point.[69] Furthermore, DARPA stated that investments in space are consistent with the agency's charter to solve national-level technology problems, foster high-risk/high-payoff military technologies to enable operational dominance, and avoid technological surprise.[70] Innovative space technology studies currently underway include the "Responsive Access, Small Cargo, Affordable Launch" and "Orbital Express" efforts and are a direct result of the Space Commission report.[71] The Air Force is the next largest recipient of increased funding for space research and engineering with an expected budget increase of more than $89 million between 2003 and 2007.[72] The Government Accounting Office (GAO) reports that DoD recently completed a department-wide assessment of space science and technology and intends to use the assessment to direct the priorities of future research. However, the GAO remains skeptical of whether planned funding increases will become available in view of other departmental priorities.[73]

Technical innovations obviously require expensive and enduring

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[69] *Ibid*, 13.

[70] *Ibid*, 13.

[71] Responsive Access, Small Cargo, Affordable Launch is an effort to provide quick and economic launch capabilities for micro-size satellites. Orbital Express is an effort to demonstrate the feasibility of refueling, upgrading, and extending the life of on-orbit spacecraft. Ibid, 13.

[72] *Ibid*, 14.

[73] Ibid, 14.

investment. The contribution value to the defence of the US justifies this investment and is under tight scrutiny by Congress. For example, since 1981, the US DoD appropriated $40 billion for the B-2 bomber program through Fiscal Year 1994 (FY 04). The cost per plane was roughly $2.2 billion.[74] In the same vein, space systems are also very expensive. The unit cost of one Defence Satellite Communication System (DSCS) satellite is $200 million. The USAF currently operates 10 DSCS satellites.[75] Arguably, the investment is worth the critical contribution to US national security from both of these platforms.

Budgeting processes for space systems are also an identified dilemma for the Department of Defence.[76] The Space Commission highlighted the fact that there was no single DoD appropriation that identified and collectively represented funding for military space programs therefore; there were no quick insights into space funding. Space funding is spread across DoD and Intelligence Community budgets under many appropriations.[77] Most of the military space funding resides in the Air Force and National Reconnaissance Office (NRO) budgets.

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[74] United States, General Accounting Office, GAO/NSIAD-95-164 *B-2 Bomber: Status of Cost, Development, and Production*, (Washington D.C.: US Government Printing Office August 1995).

[75] United States, *Defence Satellite Communication System Fact Sheet* (Colorado Springs: AFSPC, 2003).

[76] *Space Commission Report*…, xxviii.

[77] The Intelligence Community is led by the Director of Central Intelligence (DCI) and includes the National Reconnaissance Office, National Imagery and Mapping Agency, National Security Agency and the Central Intelligence Agency.

Interestingly, the US Army and Navy primarily fund service-unique space programs that support their own requirements.[78]

Multiple lines of appropriations lead to several issues. The first issue manifests in joint program disconnects that often lead to duplication. This occurs when satellite programs and user terminals are funded in different budgets. The second problem is incongruent agreements on user requirements. If the funding organization does not agree with requested user requirements, certain critical capabilities may not be included in the satellite design. The last issue identified by the Space Commission is the lack of relevance given to space operations by the US Army and Navy as reflected in their limited budget activities for space research and development. This seems precarious since the Army and Navy represent DoD's largest users of space products. The Commission stated that military space budgeting lacks the "visibility and accountability essential to developing a coherent program".[79] The Space Commission suggests creating a Major Force Program (MFP)-12 budget category for space appropriation that would be managed in a decentralized manner to solve the awareness problem. A major force program is an aggregation of related budget items that can be used to track resources that support a macro-level combat or support mission. However, this suggestion by the Commission would not establish an Assistant Secretary of Defence for Space who would be responsible for the MFP and funding across

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[78] The Army funds common user and Army-unique ground terminals, and the Navy funds the UHF Follow-On program, the Multi-User Objective System and Navy terminals. *Space Commission Report*…, 75.

[79] *Space Commission Report*…, 76.

Service lines. In contrast, MFP-11 funds the development and acquisition of special operations equipment, supplies and services through US Special Operations Command (USSOCOM) and is centrally managed by the Assistant Secretary of Defence for Special Operations and Low-Intensity Conflict.[80]

Since the Space Commission report, the Government Accounting Office (GAO) confirms DoD has established a "virtual" MFP, which identifies and aggregates space-related budget elements for space activities across DoD and the Intelligence Community within DoD's 11 existing MFPs. This provides better visibility of DoD's and the Intelligence Community's level and distribution of fiscal and personnel resources. According to DoD officials, having a crosscutting major force program for space activities is logical because space activities span multiple program areas, such as strategic forces and research and development. The space major force program covers spending on development, operation, and sustainment of space, launch, ground, user systems and associated organizations and infrastructure whose primary or secondary missions are space-related.[81] DoD included the space major force program in its Future Years Defence Program (FYDP) for fiscal years 2003 to 2007 and identified $144 billion in space spending planned for this period.[82] The GAO claims it is too early to assess the

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[80] Benjamin S. Lambeth, *Mastering the Ultimate High Ground: Next Steps in the Military Uses of Space* (Santa Monica, CA: RAND, 2003), 77.

[81] GAO-03-379 *Defence Space Activities…,*11.

[82] DoD's Future Years Defense Program is the official document that summarizes the force levels and funding associated with specific programs. It presents estimated appropriation needs for the budget year for which funds are being requested from Congress and at least 4 years in the future. *Ibid*, 12.

effects of the virtual MFP.

Indeed, the virtual MFP has increased visibility and will perhaps minimize acquisition disconnects that could lead to duplication. But potential challenges could entail negotiating memoranda of agreement with all involved Services and the Intelligence Community to determine which space systems would fall under the space MFP provision. Additionally, disagreements on user requirements are likely to continue and, while clearly increasing visibility of space funding, there is no incentive for the Army or Navy to increase investment in anything other than their own Service-related space activities. But, by institutionalizing space, the budget could be more focused and give equal consideration to all user requirement needs. Consequently, removing the current biases and sourcing the space funding from the overall defence budget rather than from the more limited and competitive Air Force budget would foster joint development and acquisition. Arguably, this would be a dramatic improvement compared to the contentious budgets and decentralized spending occurring today.

Intellectual Innovations

Intellectual innovations manifest through knowledge gained via individual training and professional development. This, in turn, stimulates sound ideas and theories for doctrine. Therefore, the diligence of training and professional development is directly proportional to the robustness of doctrine. Due to the outstanding thoroughness and discipline of the current operator training at the unit level, the following discussion will focus on professional development for both the space cadre and non-space related personnel in the military.

Professional space-related education is crucial when developing space cadre. The Space Commission noted that from its inception, the defense space program has benefited from world-class scientists, engineers, and operators, but now many experienced personnel are retiring and the recruiting and retention of qualified space personnel is a problem.[83] Further, the commission concluded that DoD does not have a strong military space culture - including focused career development and education and training, similar to pilots.[84] The creation and maintenance of highly trained and experienced space professionals who can master complex technology as well as develop new concepts of operation for offensive and defensive space operations is critical. A workforce that is not balanced by age and experience puts the orderly transfer of knowledge at risk. The GAO reports that DoD does not have a strategic approach in order to better guide the development of the services' space professional.[85] In October 2001, in response to the Space Commission report, the Secretary of Defense directed the Services to draft "specific guidance and plans for developing, maintaining, and managing a cadre of space professionals to provide expertise within their services and joint organizations."[86] However, these plans have not been completed to date and the GAO has not been not afforded access to the draft plans to assess their completeness and viability. Nor was the GAO given firm estimates of when they

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[83] *Space Commission*…, 42.

[84] *Ibid*, 42.

[85] GAO-03-379 *Defence Space Activities…, 16.*

[86] *Ibid*, 17.

might be completed and implemented. The GAO is also quick to point out that the Secretary did not direct the development of a department-wide space human capital strategy to ensure that military space human capital goals, roles, responsibilities, and priorities are clearly articulated so that the service implementation plans are coordinated to meet overall stated requirements.[87]

Conversely, Air Force Space Command (AFSPC) has created high-level space education to Air Force space professionals through the 28 June 2001 establishment of the Space Operations School (SPOSC) within the Space Warfare Centre based in Colorado Springs, Colorado. Their mission is to "lead the development and instruction of space Tactics, Techniques and Procedures (TTP), concepts, and systems knowledge required to prepare war fighters for military operations."[88] AFSPC considers the school to be the "Air Corps Tactical School of Space".[89] SOPSC offers nine different courses ranging from an introductory level to an advanced course for which students are hand-selected by the school to attend. They have also developed a course in direct response to the Space Commission's recommendation to develop a cadre of space professionals. Space 200 "is a 4-week course with an emphasis on warfighter integration of space power with significant technical, nuclear and acquisition content. The target

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[87] *Ibid*, 16.

[88] Space Operations School (SOPSC); available from http://www.sopsc.us/index.asp; Internet; accessed 13 March 2004.

[89] *Ibid*.

audience is DoD civilians and military at the mid-career 8-10 year point."[90] Since their activation by AFSPC, they have taught over 75 courses and instructed over 3500 students ranging from enlisted airmen to Combatant Commanders. This is exactly what space professionals need, but the SOPC still needs to increase visibility into their educational opportunities to the space community.[91] Furthermore, since a space human capital strategy has yet to be articulated, it is hard to determine whether this school will meet all the prioritized requirements in the forthcoming Service plans. While each Service has separately begun planning to build and maintain service space professionals, the Services have not yet

capabilities and be able to employ them throughout the spectrum of operations."[94] The plan calls for transforming the Air Force culture by developing air and space leaders through officer development programs.

Unfortunately, there is little professional development available to space operators and likewise, space operations have been minimally introduced into the Services' professional military education programs through Intermediate Developmental Education (IDE), formerly known as Intermediate Service School. IDE includes the USAF's Air Command and Staff College (ACSC), the USA's Command and General Staff College, the USN's Command and Staff College and the Marine Corps Command and Staff College. Officers are either selected to attend these courses in residence or can complete them through correspondence. The most recent curriculum for ACSC in correspondence does not include a space operations course, but instead space is covered in one lesson under the "Air Operations" course.[95] The in-residence ACSC and the USN Command and Staff College curricula, however, show more progress in integrating space through a specialized studies program respectively titled "Space Operations" and "Seminar on Space Technology and Policy".[96] While these additions indicate growth, more

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[94] United States. Department of Defence. *The USAF Transformational Flight Plan FY03-FY07* (Washington D.C.: US Government Printing Office, November 2003), 10.

[95] *Air Command and Staff College Distance Learning Program Student Guide*, Version 3.2; available from http://wwwacsc.au.af.mil/Downloads/downloads.htm; Internet; accessed 9 March 2004, 10.

[96] The ACSC students are assigned a specific program based on their background while USN course remains an elective. *ACSC In-residence Curriculum Academic Year 2004*; available from http://wwwacsc.au.af.mil/Inresidence/inresidence.htm; accessed 9 March 2004. *USN Command and Staff College Elective Program Academic Year 2003-2004*; available from http://www.nwc.navy.mil/electives/; Internet; accessed 9 March 2004.

must be accomplished to educate military officers in space operations and doctrine. Similarly, the GAO reported the Services outlined some initiatives to increase space education for all military personnel, but these have not been fully implemented.[97]

The conclusions that can be drawn from the intellectual innovations movement currently within the USAF are bittersweet. Space operators and those personnel who will work in a Combined Air Operations Centre (CAOC) have the opportunity to receive excellent space education, which could foster better doctrine. However, the space operator career development and training should be more focused to rebuild experienced personnel pool. Overall, space education level for the general military population is insignificant and the USAF, in particular, is still very much focused on air theory, air history and air power. Furthermore, without a strategic plan in place or dispersed efforts among the Services to guide education development, it seems this may result in a futile endeavour. There is more work to be done and true space warriors will only be produced when they can jointly focus on what space bring to the fight now and will bring in the future.

Doctrine

Doctrine is a natural extension of effective intellectual prowess and is crucial to the full transformation of military space operations. AFDD-1 *Air Force Basic Doctrine* defines doctrine as "a statement of officially sanctioned beliefs, warfighting principles, and terminology that describes and guides the proper use

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[97] GAO-03-379 *Defence Space Activities…, 17.*

of air and space forces in military operations."[98] Further, doctrine shapes the manner in which the military organizes, trains, equips, and sustains its forces; doctrine should prepare forces for future uncertainties and provide a common understanding for military personnel. Space doctrine is currently plagued by two factors. The first is that the basic doctrine is being used to solidify the Air Force's grip on the bulk of America's space forces. The second is that extensive space doctrine does not exist.

Recently, the USAF term aerospace has spawned the movement of integrating air and space and has infiltrated into doctrine. However, the Space Commission, commenting on the USAF's use of the term declares, "Space is not simply a place from which information is acquired and transmitted or through which objects pass. It is a medium much the same as air, land or sea."[99] The report predicts, "In the coming period, the U.S. will conduct operations to, from, in and through space in support of its national interests both on earth and in space."[100] The commission's observations appear to have had impact on the latest version of AFDD-1. This document uses a compare and contrast model to illustrate exploration of good doctrine. The first principle addressed is that

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[98] United States, Department of Defence, AFDD-1 *Air Force Basic Doctrine* (Washington D.C.: US Government Printing Office, November 17, 2003), 3.

[99] *Space Commission Report*…, Chap 2, 13.

[100] *Ibid*, Chap 2, 13.

"doctrine is about *warfighting*...not physics."[101] This principle specifically addresses the perceived differences between operations in the air and in space. The principle is further defended by declaring, "air and space are separate domains requiring exploitation of different sets of physical laws to operate in, but are linked by the effects they can produce together."[102] AFDD-1 stresses the inherent differences in the two media and the associated technical and policy related realities, but hold onto the notion that "to achieve a common purpose and focus on the best means to achieve warfighting effects, "air" and "space" need to be integrated."[103] One cannot help, but to agree with those statements, however, the same case could be made for not only the air arms of the other three Services, but also the forces on the ground and at sea. There is no doubt that joint forces produce more efficient effects in conflict than working separately. Since space systems are inherently global it's only logical to create space doctrine and a corresponding force that complements all terrestrial activities.[104] The current wording in the basic doctrine tends to reflect the 1943 Army Air Forces Field Manual 100-20, but stops short of saying it should be treated separately and could possibly produce its own effects in the near future.

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[101] AFDD-1 *Air Force Basic Doctrine…*, 5.

[102] *Ibid*, 5.

[103] *Ibid*, 5.

[104] Some space systems can promulgate through and cover several theatres simultaneously thus providing support to more than just one combatant commander or conflict.

There is also a lack of extensive space doctrine.[105] A quick glance at the Air Force Doctrine Document (AFDD) e-publishing web site reveals that space missions are all generally lumped into AFDD 2-2 *Space Operations*, while the unique capabilities of airpower each have their own, quite expansive guidance in the AFDD 2-1 and 2-6 series.[106] As the quote at the beginning of this section by General Billy Mitchell plainly states, doctrine must serve as the cornerstone with which everything else will revolve.

Therefore, better doctrine will have to be written in response to this transformation. Dedicated joint space professionals, in concert with the Navy, Army and Air Force will be called upon to deliver sound, functional space doctrine and the US government has a responsibility to ensure they're ready.

Organizational Changes

Military organizational structure should facilitate efficient command and control and provide a functional framework for force generation and employment. Space systems are inherently global; therefore the organizational structure should be relatively global as well. Many organizational changes have occurred over the past three years primarily as a result of the Space Commission report and were captured in a memorandum issued by the Secretary of Defence in October 2001. Those changes, their resulting effects and the changes that remain will be explored further.

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[105] While joint space doctrine exists, space operations missions are lumped together in one document while other operational missions have been expanded in detail.

[106] United States, Air Force e-Publishing, available from http://www.e-publishing.af.mil/, Internet; accessed 15 March 2004.

The Space Commission report suggested that the "Secretary of Air Force assign responsibility for the command of Air Force Space Command (AFSPC) to a four-star officer other than the commander, U.S. Space Command and North American Aerospace Defence Command."[107] This change, the commissionaires claimed, would free the Commander, US Space Command from the role as Commander, Air Force Space Command and the associated responsibilities devoted to the needs of a single Service. Therefore, Commander, US Space Command would be better positioned to play a significant role in developing long-term requirements for space systems for the Department of Defence as a whole, which are increasingly "joint."[108] On 19 April 2002, the Secretary of Defence did indeed appoint a four-star officer to fulfill this role. However, US Space Command merged with US Strategic Command on 1 October 2002. The appointment of a separate AFSPC commander was a positive change as it created a concentrated focal point for military space activities, as depicted in the next modification made by DoD.

The next change suggested by the Space Commission was to assign Air Force Space Command responsibility for providing resources to execute space research, development, acquisition, and operations.[109] To enforce this realignment, the commission recommended that the Space and Missile Systems Center (SMC) that was under Air Force Materiel Command, be reassigned to Air

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[107] *Space Commission Report*…, 88.

[108] *Ibid*, 88.

[109] *Space Commission Report*…, 89.

Force Space Command. The Commander, AFSPC would have the authority to program funds and direct space related research and development within the Air Force Research Laboratory. The commission claimed this arrangement would increase the role of the uniformed military in research, development and acquisition of space systems to better meet operational requirements. SMC was realigned under AFSPC and according to Air Force officials in a GAO report; this new arrangement "will enable space system program managers who have been responsible for acquiring space systems - such as the Global Positioning System - to help generate new concepts of operations." Conversely, the arrangement "will also enable space system operators to develop a better understanding of the acquisitions processes and acquire new skills in this area."[110]

The Space Commission also recommended that the Secretary of Defence designate the Air Force as DoD's executive agent for space.[111] The commissioners claimed consolidating space functions into a single organization would create a strong centre for space advocacy.[112] On 3 June 2003, DoD issued a directive appointing the Air Force as the DoD Executive Agent for Space and designated the Under Secretary of the Air Force as the Air Force Acquisition

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[110] GAO-03-379 *Defence Space Activities…,* 90.

[111] The executive agent is a term used to indicate a delegation of authority by the Secretary of Defense to a subordinate to act on the Secretary's behalf. The exact nature and scope of the authority delegated may vary. It may be limited to providing administration and support or coordinating certain functions or extend to direction and control over specified resources for specified purposes. GAO-03-379 *Defence Space Activities…,*27.

[112] *Space Commission Report*…, 90.

Executive for Space.[113] As the DoD Executive Agent for Space, it gave the Air Force authority to develop, coordinate, and integrate plans and programs for "space systems and the acquisition of DoD space Major Defence Acquisition Programs to provide operational space force capabilities to ensure the United States has the space power to achieve its national security objectives."[114] This gives the USAF department-wide responsibility to integrate the needs and requirements of the DoD Components into space plans and major space program requirements documents. Primary responsibility to perform these tasks was given to the Under Secretary of the Air Force (who also serves as Director, NRO).

As alluded to in the preceding paragraph, the commissioners did recommend assigning the Under Secretary of the Air Force as the Director of the National Reconnaissance Office. The Commission noted that this change would better align Service and NRO space acquisition organizations and would provide an opportunity to align space acquisition policies with the "best practices" of each. It would also help the Under Secretary in his current role in the Air Force resource process to ensure balance between air and space programs within the Air Force.[115] The Secretary of Defence has implemented this change and the creation of this position has provided a focal point for DoD space activities. In explaining the rationale for this change, senior DoD officials told the GAO that the barriers

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[113] The acquisition executive is the individual charged with overall acquisition management in his or her organization. GAO-03-379 *Defence Space Activities…*,27.

[114] United States, Department of Defence Directive, *Executive Agent for Space* (Washington D.C.: US Government Printing Office, 3 June 2003), 2.

[115] *Space Commission Report*…, 91.

between military and intelligence space activities are diminishing because of the current need to support the warfighter with useful information from all sources.[116] Additionally, in an effort to improve DoD space acquisitions and operations, joint Air Force and NRO teams have been working to identify the best practices of each organization that might be shared. These teams have recommended what they believe to be 37 best practices to the Under Secretary of the Air Force in the areas of acquisition, operations, launch, science and technology, security, planning, and programming. Air Force and NRO officials also report that efforts to identify best practices are continuing in the areas of requirements, concepts of operation, personnel management, financial management, and test and evaluation.[117] The Under Secretary of the Air Force has established an Office of National Security Space Integration (NSSI) in order to implement the executive agent duties across DoD, coordinate the integration of Service and intelligence processes and programs, develop streamlined national security space acquisition processes and lead the development of a management framework for space activities. Although this office is located within the Air Force and NRO, it consists of members from all the Services and some defense agencies.[118] Attachment 1 shows the new organization for supporting national security space activities.

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[116] GAO-03-379 *Defence Space Activities…,* 8.

[117] *Ibid*, 8

[118] *Ibid*, 9.

On 1 October 2002, the Secretary of Defence implemented an organizational change that was not suggested by the Space Commission and has been somewhat puzzling. As part of the ongoing initiative to transform the U.S. military into a 21st century fighting force, U.S Space Command was disestablished and merged with U.S. Strategic Command (USSTRATCOM). The new USSTRATCOM was tasked with space operations, information operations, computer network operations, strategic defence and attack missions.[119] Admiral James O. Ellis Jr., U.S. Strategic Command commander, declared, "United States Strategic Command provides a single warfighting combatant command with a global perspective, focused on exploiting the strong and growing synergy between the domains of space and strategic capabilities"[120] A DoD news release stated, "The intended merger of U.S. Space Command and U.S. Strategic Command will improve combat effectiveness and speed up information collection and assessment needed for strategic decision-making.[121] AFSPC provides the one link between the US nuclear force and space forces, as they are responsible for organizing, training and equipping both Intercontinental Ballistic Missiles (ICBMs) and USAF military space systems under separate Numbered Air Forces. Another possible link could be the strategic/global nature of assets assigned to

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[119] Reason for the change was documented in this news release. American Forces Information Service News Article, *Strategic, Space Commands Merge,* available from http://www.defenselink.mil/news/Oct2002/ n10022002_ 200210021.html; Internet; accessed 13 March 2004.

[120] *Ibid*.

[121] United States, Department of Defence, *News Release No 331-02 DoD Announces Merger of U.S. Space and Strategic Commands,* available from http://www.defenselink.mil/releases/2002/b06262002_bt331-02.html; Internet; accessed 13 March 2004.

USSTRATCOM. But, a closer look at the latest Air Force doctrine reveals that the platform no longer determines the strategic level of conflict, but rather the effect of disabling, destroying or denying the target. This could be accomplished through either an F-16 or B-2. The other perplexing issue is that these forces are employed with totally different methods – space assets are controlled through the Space Tasking Order process and nuclear capable weapons through the Single Integrated Operational Plan. One cannot help but question why the US military space assets are in the hands of the last generation's warfighters, while its mission is to plan and fight the next generation's wars.

Even though these changes have been made, unresolved organizational issues still remain. The GAO reports that DoD still lacks a results-oriented management framework. Further, it claims DoD has not completed a comprehensive strategy or an implementation plan to guide the space program and monitor its results.[122] This management framework would be outlined in documents such as a national security space strategy or an annual national security space plan. The GAO has not been provided drafts of these documents, so cannot assess specifically how DOD will provide department-level oversight of the Air Force's activities as executive agent for space. According to National Security Space Integration officials, they have not yet determined performance goals and measures to assess program implementation progress and ascertain

[122] GAO-03-379 *Defence Space Activities…,*17.

whether program initiatives are achieving their desired results.[123] The GAO reported that lacking an overarching plan, the Services developed their fiscal year 2004-09 program budget plans without clearly defined objectives and milestones for space activities. In addition, the National Security Space Architect relied on multiple policies, studies, architectures, and guidance to identify overall effectiveness goals when planning defence and intelligence budgets for fiscal years 2004-2009. According to the GAO, DoD cannot fully gauge its progress toward increasing the effectiveness of national security space activities.[124]

There are two other issues that will need resolution in the near future. The first issue is reconciliation of the Joint Force Commander's need in theatre with the global coverage of military space assets while retaining unity of command of space forces. There are two schools of thought on how to resolve this issue. The first solution is to centralize military space tasking at the unified level so that the Commander, USSTRATCOM, would receive taskings. In effect, this would create a Joint Force Space Component Commander (JFSSC) in addition to the Joint Force Air Component Commander (JFACC). The second school of thought is to designate the existing JFACC as the unified commander within a specific theatre so essentially he becomes a Joint Force Air and Space Component Commander (JFASCC).[125] Regardless of the solution, this is one area that will

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[123] *Ibid*, 19.

[124] *Ibid*, 20.

[125] Benjamin S. Lambeth, *Mastering the Ultimate High Ground: Next Steps in the Military Uses of Space* (Santa Monica, CA: RAND, 2003), 158..

need addressed and could possibly be best resolved by making space a separate entity.

The second issue involves the relationship between the Air Force and the NRO. The Secretary of Defence made positive progress when he "dual-hatted" the Under Secretary of the Air Force as both the executive agent for military space and the Director of the NRO. However, even though the Air Force largely staffs the NRO and provides the launch and support services to various NRO assets on orbit, the Air Force is "only an agent in the service of the intelligence community when it comes to control and exploitation of those assets."[126] In other words, NRO assets are acquired and launched by the Air Force, yet are controlled by the Director of Central Intelligence. Indeed the Undersecretary of the Air Force Peter B. Teets outlined five priorities for the national space effort to the House Armed Services Committee subcommittee on strategic forces on 25 February 2004. One of those priorities was integrating space capabilities for national intelligence and warfighting.[127] This is a very delicate topic and however it is approached, one goal should be kept in mind. That goal is to get all of the nation's security-related space assets seamlessly working together to provide timely and accurate support to Joint Force Commanders. The Chief of Staff of the Air Force reiterated this point when he testified before the defence subcommittee of the House Appropriations Committee about horizontally

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[126] *Ibid*, 159.

[127] United States, *Air Force Policy Letter Digest* (March 2004) [policy letter on-line]; available from http://www.af.mil/policy/letters/pl2004_03.html; Internet; accessed 9 Mar 04.

integrating the battlefield. General Jumper argued that if horizontal integration could occur, the US wouldn't have to go through "stovepipes and tribal representatives" to get the information from one tribe to another.[128] Seemingly, the line between military space operations and the intelligence community has become increasingly blurred. Action must be taken to integrate operations from both communities to better serve the warfighters, after all both organizations are DoD entities.

There are many conclusions that can be drawn from analyzing the current transformation of the US space forces. First and foremost, many of the changes that have been discussed in the previous pages were a direct result of the Space Commission. This fact reveals that for at least a decade after the first acclaimed "space war" of Operation Desert Storm, space was largely ignored by the Department of Defence except in its support of the warfighter, primarily GPS and its contribution to precision guided munitions and the development of communications satellites. In the meantime, the USAF, specifically USSPACECOM and AFSPC and the Intelligence Community, specifically the NRO continued their quest for developing and acquiring impressive space systems. The recognition of what space currently brings to the battlefield and the possibilities lurking in the future will be perhaps the reward for pressing forward when others were still searching the past.

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[128] George C. Wilson, " Air Force's Jumper Catches a Tailwind," *National Journal*, 34, no. 11 (March 16, 2002): 802.

The discussion of transformation was balanced around technical innovations, intellectual innovation, doctrine and organization. Technical innovations are largely driven by perceived necessity and budget. Due to the essential fact that the US military is under civilian control and its primary duty is to protect American citizens, which must be balanced against other social issues, these two concepts are intertwined and complex. Obviously, the commission reminded DoD that it was time to re-assess current space operations and make some crucial adaptations. It seems that the Secretary of Defence has made a commitment to technical innovation backed by budget increases for research and development. However, there are still potential challenges to be resolved that surely will require compromise due to the still divisive source of space funding.

Review of the current levels of space education revolved around producing a better-informed space cadre and infiltrating space studies into professional military education. This is inextricably linked to the development of doctrine. Unfortunately, this appears to be the least important issue to be resolved by DoD. Although AFSPC has made some improvements with the establishment of the Space Operations School, the GAO was harsh in its critique of the lack of a department-wide human capital strategy. Educational curricula are in dire need of renewed emphasis. It is a logical conclusion that this renewed emphasis in both education and doctrine would materialize under a new Space Department.

Finally, most of the organizational changes enacted by DoD have been positive and appear to have, at least for the moment, cemented the USAF with the lead for military space. However, there are still unresolved issues to be solved.

Interestingly, the Space Commission did not totally rule out the possibility for a Space Department. The commissioners admit, "The use of space in the defence of U.S. interests may require the creation of a military department for space at some future date."[129] They claim a Space Department would provide strong advocacy for space and a single organization with the primary mission of providing forces for conducting both military and intelligence space operations. They outlined a number of reasons why they thought this was not yet prudent. Those reasons included the lack of a critical mass of qualified personnel, budget, requirements or missions sufficient to establish a new department. Meanwhile, they agreed that near- and mid-term organizational adjustments should be fashioned so as to not preclude eventual evolution toward a Space Department if that proves desirable.[130] Moreover, the Commission believes that once their suggested realignment in the Air Force is complete, a logical step toward a Space Department could be to transition from the new Air Force Space Command to a Space Corps within the Air Force.[131] DoD decided to implement 10 of the 13 Space Commission recommendations and with the assignment of the Air Force as the DoD Executive Agent for Space, have completed all 10. Therefore, one could reasonably conclude that the need for this shift is rapidly approaching.

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[129] *Space Commission Report*…, 80.

[130] *Ibid,* 80.

[131] *Ibid*, 93.

VI. Conclusion

In analyzing the necessity to emancipate space operations, the call for transformation was explored, then existing space capabilities and mission areas were reviewed, next, a case study offered a historical parallel to the proposed thesis and finally, the arguments of how space is currently being transformed and how it could be accomplished more efficiently were reviewed.

The call for transformation as outlined in QDR 2001 sets the stage for drastic change in the way combat operations are conducted. The current Revolution of Military Affairs theories gives insight into the notion that society may very well be at the crossroads of another revolution and that, indeed the past has demonstrated that the change will be dramatic. Change in the face of the enemy and the resulting security environment has forced DoD to realize that military capabilities must be continually improved and emerging technologies exploited. Society cannot afford to wait for an opponent to gain the advantage therefore; the US military must maintain its military dominance.

An overview of existing space capabilities and mission areas was able to shed light on the omnipresent effects of space assets. The fact that the US cannot fulfill all the roles as currently depicted cannot be ignored. Space control is possible for the ground portions of our systems, but the US possesses no means to protect on-orbit assets. The USAF Transformational Flight Plan does address this shortfall, but it will take dedicated perseverance and funding to adequately protect US and allied space systems. Force application is the other shortfall that makes

space control increasingly important. The Space Commission did predict future conflict in space and reiterated that the US must address this:

> "We know from history that every medium - air, land and sea - has seen conflict. Reality indicates that space will be no different. Given this virtual certainty, the U.S. must develop the means both to deter and to defend against hostile acts in and from space. This will require superior space capabilities. … but the U.S. has not yet taken the steps necessary to develop the needed capabilities and to maintain and ensure continuing superiority.[132]

Examining the United States Air Force's fight for independence ironically highlighted some of the same issues seen today in space operations. Issues such as technology, education, doctrine and organization were all concerns of early aviation pioneers and now have been raised as concerns by the Space Commission. Even in the light of several commissions and boards, it wasn't until the US Army Air Forces proved themselves during the Second World War that they were given equal status. This twist in history is now upon military space operations.

An assessment of issues surrounding military space operations revealed that while DoD has made critical advancements, more must be accomplished. Quite frankly, the entire military space community is growing astronomically. A glance at Figure 1 in the appendix reveals the complexity being faced by DoD. Efficiently amalgamating this organizational structure between military space operations and the intelligence community would arguably control redundancy and promote expansion in an orderly and focused fashion. Hopefully, space

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[132] *Space Commission Report*…100.

professionals will not have to echo General Billy Mitchell's thoughts in 1928 as he described the US Army Air Corps as "an indescribable mess."[133]

Finally, the potential adversaries for the United States will likely be non-state actor terrorists with complicated, perhaps irrational reasons for distaste of the Western world.[134] In order to combat and defeat these adversaries, military forces must be able to deny them sanctuary – wherever they are, the US needs to be able to find, fix track, target, engage and assess their capability to strike. Space forces can play a large role in the battlespace today, but perhaps it will not be until the US can project force from space or until an on-orbit asset is attacked that space will be given due respect.

Admitting the need for change is difficult, but the Department of Defence must take a hard look at the future for military space operations. For over 40 years, the USAF has literally put space operations on autopilot until recently when Secretary Rumsfeld ordered the most sweeping changes to US military space development and operations in response to the Space Commission Report. However, due to the growing dependence on space, the dynamic security environment and the need to maintain space and military superiority, the US cannot afford to wait another 40 years to transform their space forces. The high ground must be harnessed soon.

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[133] McClendon, *Autonomy of the Air Arm*…, 60.

[134] Reinforced by the National Security Strategy of the United States of America. United States, Executive Office of the President of the United States, *The National Security Strategy of the United States of America* (Washington D.C.: US Government Printing Office, September 2002).

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Appendix

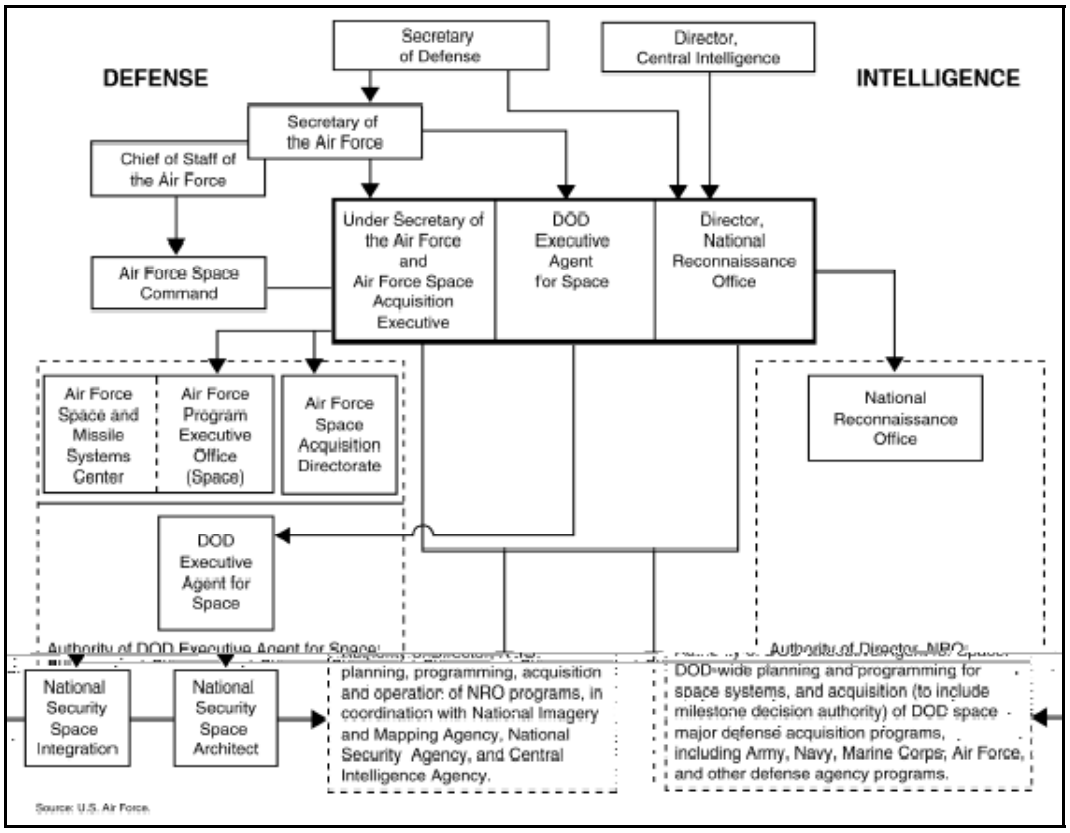

Figure 1: DoD's and the Air Force's Organization for National Security Space, as of February 2003[135]

[135] GAO-03-379 *Defence Space Activities…,* 10.