

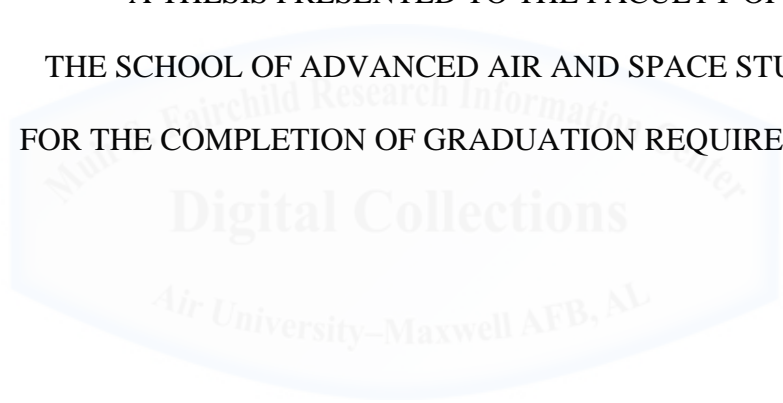
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UNMANNED BOMBER: THE EFFECTS IT WILL BRING TO THE
NUCLEAR TRIAD

BY

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APPROVAL

The undersigned certify that this thesis meets the master's level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.



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ABSTRACT

When the Cold War ended, the world shifted from a bi-polar structure to a multi-nodal structure with additional countries entering the nuclear arena. The United States' nuclear triad has provided deterrence from nuclear attacks for the past fifty-five years. Since the era of détente and the end of the Cold War, few modernizations were made to the nuclear arsenal and their delivery systems. In part, nuclear treaties placed limits on developing and testing new weapons. A problem with these treaties is the fact that they only limited the nuclear capabilities of two of the eight declared nuclear powers.

This study shows that the rest of the nuclear powers are developing new weapons and delivery systems and may reach or pass the capabilities of America's nuclear triad. To preserve deterrence stability, the US needs to keep advantages over nuclear powers. The US has the opportunity to capitalize on the success of unmanned aerial vehicle technologies demonstrated in current conventional conflicts to push forward the new Long Range Strike Bomber into the nuclear triad as an unmanned platform. Doing so will enhance America's nuclear triad and improve deterrence stability.



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Chapter 1

Introduction

Since 1959, the United States has maintained a “triad” of nuclear weapons delivery systems, which consists of nuclear-armed bombers, land-based missiles, and submarine-launched missiles. Traditionally, it has been argued that the triad, with its three distinct delivery platforms, offers the US a diverse set of options to deter adversaries, assure allies, and defeat adversaries if deterrence fails.

Kingston Reilf, Travis Sharp, and Kirk Bansak

The United States’ (US) nuclear triad is over fifty-five years old, and is supported with old, outdated technology to defend US’ national interests. These systems were developed during the Cold War; a time when nuclear operations were at an all-time high, and with full budgetary commitment. Since the end of the war, focus on nuclear operations has dwindled. Consequently, there have been few advancements within the nuclear triad, in comparison to conventional weapons and delivery systems development. For instance, Unmanned Aerial Vehicles (UAVs), are one of the fastest growing fields of new military technology on the conventional side. Is it possible for such a proven and tested technological development to have a role on the nuclear side?

The US has been a leader in military innovation over the years. “The source of this superiority varies but often rests on some technical, tactical, or strategic innovation that allows a state or coalition to dominate its opponents.”¹ In addition, the US demonstrated the effectiveness of much of this technology on the battlefield. The US also proved its success over the Soviet Union in the Cold War, but at a cost. “The cost of all nuclear forces today is \$23 billion a year, according to Deputy Defense Secretary Ashton Carter. That includes 60 nuclear bombers, 12 Trident submarines and 450 intercontinental ballistic missiles, plus their associated facilities. It also includes related nuclear laboratories and communications capability.”² These sunk costs and assets helped the US win its nuclear standoff in the Cold War, but its nuclear forces have not been updated significantly since the end of that competition over twenty-five years ago.

¹ T. V. Paul, Richard J. Harknett, and James J. Wirtz, eds., *The Absolute Weapon Revisited: Nuclear Arms and the Emerging International Order*, Revised ed. (Ann Arbor: University of Michigan Press, 2000), 1.

² Peter Huessy, Defense One, “*In Defense of the Nuclear Triad*,” October 18, 2013
<http://www.defenseone.com/ideas/2013/10/defense-nuclear-triad/72242/> retrieved on December 28, 2013.

During the Cold War, the US military developed a three-pronged approach towards nuclear deterrence for the preeminent objective of securing peace and stability. This came about as a set of decisions made early in the Cold War. The Eisenhower administration realized that the US could not match the Soviet Union on the conventional front, and therefore, the US began expanding into the nuclear arena, since it helped end the Second World War.

During the 1950s, Pres. Dwight Eisenhower believed that an American effort to maintain conventional parity with the Soviet Union would destroy the US economy and bankrupt the federal treasury. Thus, his administration turned to the nuclear arsenal as a substitute for conventional parity. In the President's view, the United States could effectively deter Soviet aggression by placing greater emphasis on nuclear weapons in American national security policy. Commonly called the "New Look," the president's emphasis on the growth of advanced nuclear weapons and delivery platforms led to development of a large fleet of nuclear bombers and, by the end of the Eisenhower administration, the nuclear triad. Composed of three legs, the triad provides the United States with three distinct delivery platforms for nuclear weapons.³

These three distinct delivery platforms provided stability, flexibility, and survivability, which in turn produced redundancy and assurance in an unpredictable environment. The number of assets involved has changed over the years, due to budgetary and treaty restrictions; however, the concept of deterrence has not changed. Nuclear deterrence is an area where the US cannot afford to fail. This deterrent credibility provides the backbone for other US military actions, "it underwrites what the US can do."⁴

The US cannot take deterrence for granted, even after a sixty-nine year period without a major war or nuclear attack. Some argue that deterrence worked while others disagree.⁵ However, the success of nuclear deterrence must not be its demise. The US allies rely on the US deterrent capabilities, since most of them do not possess their own nuclear programs. This nuclear umbrella provides them with the protection and

³ Adam B. Lowther, "Should the United States Maintain the Nuclear Triad?" Air & Space Journal – Summer 2010 March 1, 2010. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj10/sum10/04lowther.html> retrieved on February 28, 2014.

⁴ Briefing, School of Advanced Air and Space Studies. Subject: Lt Gen David Goldfein's View on Strategy, 18 February 2014.

⁵ Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996), 316.

assurance they need, through Article V of the North Atlantic Treaty signed in 1949.⁶ “The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them.”⁷ Over the years, more countries joined the North Atlantic Treaty Organization (NATO) for the assurance that the American deterrent would keep the Soviet Union at bay. With today’s budget and treaty constraints, just exactly what is the level of US deterrence? Does it still produce the same effect as it did during the Cold War? In this age of force reductions it must be realized that less is not just less, less is different. Some fear the existence of any nuclear weapon, while others see reductions in the American nuclear arsenal as an opportunity to assert themselves.⁸

As the shrinking of its nuclear deterrent force indicates, nuclear weapons have not been the main priority for the US for over twenty years. This gives hope to some smaller countries that are trying to either enter the nuclear arena and/or gain parity and credibility against the US or other nuclear powers.⁹ For the US, the triad provides the best balance of attributes for presenting a credible nuclear deterrent, even at significantly lower numbers. As the force structure decreases, the need for an even more diverse set of attributes and capabilities increases. If reduced numbers encourages some countries to proliferate, then, what will happen if a new capability is added into the US triad? That capability being an unmanned nuclear bomber. How will that fit into an enemy’s deterrence calculations?

Deterrence and assurance are difficult to quantify and measure, for either an ally or adversary. Simply put, one size does not fit all in deterrence calculations. What provides stability for an ally through either numbers or technological advancements may be perceived as destabilizing—a security dilemma—or cross a treaty restriction for an adversary. Security dilemmas are hard concepts to resolve for both entities; however,

⁶ North Atlantic Treaty Organization, “*The North Atlantic Treaty*,” April 4, 1949.

http://www.nato.int/cps/en/natolive/official_texts_17120.htm retrieved on February 28, 2014.

⁷ North Atlantic Treaty Organization, “*The North Atlantic Treaty*,” April 4, 1949.

⁸ Joshua Holdenried, “Reduced Nuclear Arms: Slimmer, but Not Smarter,” *The Heritage Network*, July 16, 2013, <http://blog.heritage.org/2013/07/16/reduced-nuclear-arms-slimmer-but-not-smarter/> retrieved April 17, 2014.

⁹ Kenneth Waltz, “The Spread of Nuclear Weapons: More May Better,” *Adelphi Papers*, Number 171 (London: International Institute for Strategic Studies, 1981)

<https://www.mtholyoke.edu/acad/intrel/waltz1.htm> retrieved April 17, 2014.

security dilemmas demonstrate that various weapons and delivery systems produce deterrent effects on different scales, depending on the audience.

The United States Air Force (USAF) has started development on the next bomber. This is due to the aging bomber fleet in the US arsenal. Since conventional and nuclear operations have been highlighted, the B-2 and the B-52 aircraft will be the focus, since the B-1 currently does not have a nuclear mission. The current project, Long Range Strike Bomber (LRSB), has the potential of providing both manned and unmanned flight options. The development of this new bomber brings a dual mission capability as well as both conventional and nuclear roles. When the LRSB is completed and provides the unmanned capability, will it become nuclear certified and become part of the US nuclear arsenal? Once the LRSB is nuclear certified, will it augment or replace one of the current triad legs, or will it become an additional part to the nuclear arsenal?

Key Definitions

The US nuclear roles and missions are based on nuclear strategy. This nuclear strategy and the assets that animate it have not changed substantially since the end of the Cold War. However, good strategy provides clear guidance, which comes from clearly defined terms. Over the years, theorists and strategists alike have debated over how deterrence and compellence fit into coercion as well as how these three key words fit into US nuclear strategy.¹⁰

Before a country can compel or deter another country to behave as desired, a country has to possess a credible force. Such a country has to do more than just make threats. It has to own a force that maintains a strike capability, in this case, in both conventional and nuclear forms. Military prestige, earned over time, takes a lot of work to obtain; however, such prestige can be lost easily. According to theorist Robert Gilpin, prestige is the reputation of power that involves the credibility of the state's power and its willingness to deter.¹¹ Power and prestige relate; when prestige drops, smaller states gain influence, and are able to make demands. "Prestige, rather than power, is the everyday currency of international relations...if your strength is recognized; you can generally

¹⁰ Thomas C. Schelling, *Arms and Influence (the Henry L. Stimson Lectures Series)* (New Haven: Yale University Press, 1967), 75.

¹¹ Robert Gilpin, *War and Change in World Politics*, Reprint ed. (Cambridge: Cambridge University Press, 1983), 31.

achieve your aims without having to use it.”¹² Both power and prestige play a role in force projection, because without one or the other, where would credibility fit into the equation?

Coercion

The US uses coercion, in both a conventional and nuclear role, as it projects military power worldwide. This power and prestige was earned throughout the years, in ways, that provided influence over potential adversaries. According to theorist Thomas Schelling, “Coercion requires finding a bargain, arranging for him (a potential adversary) to be better off doing what we want—worse off not doing what we want—when he takes the threatened penalty into account.”¹³ These bargains that Schelling refers to are concessions that other countries make, due to US presence in their theater of operations or through political actions. However, according to theorists Daniel Byman and Matthew Waxman, “Coercion is not destruction. Coercion strategies are most successful when threats need not even be carried out.”¹⁴ Coercion works when a country is able to shape the behavior of another, in either the military or political arena. This capability is only possible if the coercer’s military and political abilities have the credibility to support this mission set.

Deterrence

Deterrence will not work in a coercion strategy unless it has a credible backing. According to theorist Patrick Morgan, deterrence can be broken down into two separate types, general and immediate. “General deterrence has to do with anticipating possible or potential threats, often hypothetical and from an unspecified attacker, and adopting a posture designed to deter other actors from ever beginning to think about an attack.”¹⁵ This is a broad way of looking at deterrence, and how a country can deter every threat, or at least make them pause and think, before they act. Immediate deterrence has another take. “An immediate deterrence situation is one in which an actor realizes that another specific actor is seriously contemplating attacking and undertakes to deter that attack.”¹⁶

¹² Gilpin, *War and Change in World Politics*, 31.

¹³ Schelling, *Arms and Influence*, 4.

¹⁴ Daniel Byman and Matthew Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might* (New York: Cambridge University Press, 2002), 3.

¹⁵ Patrick M. Morgan, *Deterrence Now* (New York: Cambridge University Press, 2003), xvi.

¹⁶ Morgan, *Deterrence Now*, xvi.

Employing the LRSB as a nuclear-armed unmanned aerial vehicle (UAV) allows it to fulfill the role of an immediate deterrent.

Compellence

The last of the key definitions presented here is “compellence.” According to Thomas Schelling, compellence is a subset of coercion, alongside deterrence. Schelling views compellence, as the offensive form of deterrence. It is more than just a threat of blockade or attack. “Compellence” is an action that can make a country or military withdraw, with or without an act of violence.¹⁷ The difference between the two have been and will continue to be debated by theorists and strategists alike. For the purpose of this study, compellence will be defined as offensive actions that force a country to behave as the US desires.

The Evidentiary Base

There are several key authors that lay the foundation of this paper. To mention a few, Thomas Schelling, Patrick Morgan, Daniel Byman and Matthew Waxman. Their works provide an informed discussion for these much debated terms, and deterrence strategies. These theorists and strategists will set the foundations for discovering a place for an unmanned aerial vehicle in the nuclear triad. This cannot be accomplished without taking a look at all three legs of the triad. After analyzing Inter-Continental Ballistic Missiles (ICBMs), Submarine Launched Ballistic Missiles (SLBMs), and the current bomber force, a recommendation will be included in the conclusion of whether to augment, add to, or replace parts of the current triad to accommodate an unmanned bomber.

Thomas Schelling provides a starting point with his definitions of coercion, deterrence, and compellence. Schelling was part of the White House staff in the 1950’s and witnessed the Marshall Plan as the Director of Mutual Security. This experience in RAND corporation before setting up a Center for Arms Control in the 1960’s. During this time, Schelling devoted his studies to weapon policy issues and became chairman of several interagency committees concerned with nuclear weapons policy over the next

¹⁷ Schelling, *Arms and Influence*, 79.

several years. Thomas Schelling's influence over nuclear policy is still referenced today.¹⁸

Patrick Morgan brings about academic research to this subject. He currently teaches at University of California. "Professor Morgan has concentrated his research primarily on national and international security matters - deterrence theory, strategic surprise attack, arms control, and related subjects. He has also had a long-standing interest in theoretical approaches to the study of international politics."¹⁹

Daniel Byman and Matthew Waxmen are the last two of the notable theorists that contributed to this work. Daniel Byman is a policy analyst with RAND Corporation and has worked as a political analyst for the US government. Matthew Waxmen is an attorney and policy consultant in the Washington D.C. area. Waxmen has consulted on several American foreign and defense policy issues. Both men have published numerous articles in the field of international relations.²⁰

Methodology

Using open source literature, including contemporary and classic books, journal articles, and Internet sources, this thesis will examine deterrence and coercion theories, nuclear treaties and their limitations, as well as how to work within their framework. It will review why the US chose a nuclear triad, and determine how best to incorporate the Long Range Strike Bomber into the triad. After a careful review, the focus will be how this new technology may change or effect the US deterrence, or at least its current stance for or against unmanned aerial vehicles in a nuclear role. This requires an application of the principles of deterrence as discussed in Schelling, Morgan, Byman, and Waxman to see how new technology could affect the dynamics of coercion, in American deterrence policy.

A cursory examination of nuclear treaties lies ahead for the purpose of discovering if there are any barriers that will bar this technology from serving as a delivery platform for the nuclear arsenal. These treaties will include all versions of

¹⁸ The Noble Prize, "Thomas C. Schelling – Biographical," *Nobleprize.org*, http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2005/schelling-bio.html retrieved on April 23, 2014.

¹⁹ Faculty Profile System, "Patrick Ma Morgan," http://www.faculty.uci.edu/profile.cfm?faculty_id=2456 retrieved on April 23, 2014.

²⁰ Byman and Waxmen, *The Dynamics of Coercion*, inside cover.

Strategic Arms Reduction Treaty (START), along with any restrictions on nuclear weapons, and their employment. It will also look at any plans that are or have the possibility of submission to Congress in the future that would further limit nuclear assets. However, the Strategic Arms Limitations Talks (SALT) treaties, which came out of the détente era, are not part of the research for this thesis.

The final part of the research will consist of reviewing the pros and cons of each leg of the triad, and why they were chosen for nuclear service. This is an unclassified document, which places a majority of the statistical data off limits. This review will look at how various aspects affected the triad, treaties, and employment, as well as determine whether an unmanned bomber will fit into the triad, and how or will it affect the deterrence factor of the triad?

Analytical Criteria

The US Air Force began as a nuclear force in 1947 and that remained its focus until the end of the Cold War in 1991. Over the years, treaties have placed limits on nuclear assets. These treaties are a point of interest for discovery. For instance, the START places numerical weapons limits on the US and the Soviet Union. These limits are up for review every ten to fifteen years. Coincidental or not, the START will be up for review again in 2021, the approximated delivery date of the LRSB to enter into service.²¹ This will be an important time for the US to review the numbers of bombers permitted by treaty, as key decisions will need to be made as to where the LRSB will fit into the triad, and what assets it will replace, if any.

Technology has advanced, since the establishment of the US nuclear triad, however there has been relatively little change in the nuclear arsenal, since the end of the Cold War. With the advent of the Unmanned Aerial Vehicle (UAV) and the new design of the LRSB that may possess an unmanned capability, the question arises as to how will this effect nuclear operations and the triad? The triad complies with current treaties and plans, which will need reviewing due to warhead and delivery system reductions and limits. If the current limits cannot be changed, then the question must be asked where do you replace, augment, or cut from the triad? Does it become a duet or quartet? The

²¹ Amy F. Wolf, *The New START Treaty: Central Limits and Key Provisions*, Congressional Research Service, January 8, 2014. <https://www.fas.org/sgp/crs/nuke/R41219.pdf> retrieved on February 24, 2014, 6.

advent of a nuclear UAV also raises questions about coercion theory. Since debates about morality in war with UAVs already exist, will a UAV make nuclear war more likely, due to the perception of less risk with recall ability? Will an UAV carrying nuclear weapons be publicly accepted?

Hypothesis

The hypothesis tested in this study is the assertion that an unmanned bomber will have a positive effect on the US nuclear triad. It is assumed that this technology will be accepted in order for the US to sustain its lead and maintain an edge over its adversaries while retaining credibility and providing assurance with US allies. The test of this hypothesis occurs in the presentation of evidence discussed throughout this work. Finally, this hypothesis is evaluated in the concluding chapter of this study after all the evidence has been presented and debated.

Limits of This Study

First, all data, capabilities and limitations of weapons and their delivery systems were researched from unclassified, open source material. Second, deterrence and assurance factors are difficult to measure, but are accepted as valid constructs in this work. Determining how the new bomber will affect these two constructs will be taken into consideration.

It is beyond the scope of this work to write a new nuclear strategy for the US. Instead, this work analyzes how the new technology of the LRSB might enter into the triad. The current START Treaties place limits on nuclear assets, which will be discussed, but they are used as a reference for discussing the mix of nuclear weapons and their delivery systems in terms of introducing the LRSB into the force. It is not the purpose here to argue whether the numbers are correct or not, but this study determines how and/or where an UAV would fit into this US nuclear deterrence.

There are three assumptions that are key points to this argument. First, the US will continue to possess nuclear weapons in the future and beyond treaty compliance, the appropriate number of such weapons is not addressed in this paper. Second, for the purpose of this paper, it is assumed that two person nuclear surety will be retained with unmanned flight operation. This can be achieved in several ways, to include satellite coverage and handoff procedures to two Airmen controlling the UAV at all times. Third,

unmanned flight of nuclear weapons is already a hotly debated topic, but the employment of the Long Range Strike Bomber as an unmanned platform is assumed for the conventional role, and assessed here for the nuclear role.

Ethics and risk in warfare are other points of debate that are worth mentioning, but are beyond the scope of this paper. There are multiple ongoing debates over the ethics involved in UAV strikes. Are they just and legal strikes? From an American point of view they are, but how do other countries view this technological advantage and does it raise the risk of war by taking out the risk of casualties? These debates are ongoing and will not be settled here.

Overview

The three major chapters to follow are comprised of the theory and history of the triad, a description and status of the other nuclear powers in the world, and why the US needs a new deterrent capability. However, this new deterrent will need a home in the current nuclear triad. This will require analysis of treaties, in order to determine its niche in the triad, which will be part of the conclusion.

The second chapter will take a look at the current triad. It will specifically review the capabilities and effects that each leg brings to the nuclear force. This section will address the importance of each leg, and why it boosts the coercion aspect of the current deterrence strategy. The chapter will conclude with a look at the current requirements for the LRSB, and how it will affect the triad. Emphasis will be placed on the new effects of coercion, and how a new weapon can change the old paradigm.

The third chapter will go into details of the other countries in the nuclear community and their current posture. This chapter will address how these countries are trying to extend their nuclear power at a time when the US has grown idle on the nuclear front. Of emphasis will be how these countries may be trying to match the US nuclear arsenal by attempting to build their own triad or surpass its capabilities. The chapter concludes with why the US needs to maintain an advantage in this arena with the development of the new bomber, and how it will augment the current triad. This thesis will try to answer what effect this new technology will bring to international relations.

The fourth chapter takes a hard look at current nuclear treaties. It also attempts to determine what assets the new bomber may replace, if any, using numerical limits in

current treaties. How a new asset such as the unmanned LRSB could be added to the triad (quartet) will be discussed. The question under examination here is whether or not a new type of nuclear delivery system can be worked into current nuclear plans and treaties? How will this affect the triad and nuclear operations? Will an UAV be just another form of a missile, which is also unmanned? These are just a few of the questions being addressed here.

The exciting conclusion of this thesis will make a recommendation to replace, augment, or delete a portion of the triad with the Long Range Strike Bomber. Institutionally, there is understandable reluctance to delete any part of the triad. The Air Force employs nuclear weapons and their delivery platforms every day to deter enemies and assure allies. The placement of the LRSB will be based on the current path of the treaty framework, the effects of UAV's on coercion theory, and the development requirements of the new bomber.



Chapter 2

Why the Need for a Triad

*If you have an important point to make, don't try to be subtle or clever.
Use a driver. Hit the point once. Then come back and hit it again.
Then hit it a third time – a tremendous whack.*

Winston Churchill

Historic Background

The United States compelled Japan to capitulate during World War II with nuclear attacks on Hiroshima and Nagasaki. These two attacks are the only combat use of nuclear weapons against an opponent to date. Historians debate over the actual start of the Cold War. However, some argue that the use of these bombs were the actual beginning of the Cold War with the Soviet Union.¹ Whether or not one agrees with this or not, one fact is true; nuclear weapons triggered a new kind of arms race between the two super powers of that time; the US and the Soviet Union.

Two super powers emerged from World War II pitted against each other's ideologies. The arms race that ensued became a form of hyper competition between the two. The US had developed nuclear weapons and used them against Japan. This placed the Soviet Union behind the US in terms of the ability to project destructive power with low risk. This drove the Soviets to develop their own nuclear weapons. The Cold War was in full swing with Soviet closure of movement in Eastern Europe shortly after World War II. Sensing this, the US continued to develop nuclear weapons, under the impression that the Soviet Union and other countries would develop them soon. The Soviet Union detonated their first weapon in 1949, which caused a heightened concern in the US over their capability to detect and counter this new threat.² Now that another country had demonstrated the capability to use a nuclear weapon, the race picked up its pace.

The beginning of a nuclear strategy started to form. The USAF established the Strategic Air Command (SAC) in response to the rising Soviet threat. SAC's purpose was to establish and maintain high standards, in doctrine, training, discipline, and tactics,

¹ John Lewis Gaddis, *The Cold War: a New History*, (Lawrence, KS: Penguin Books, 2006), 6. The author actually gives multiple reasons for the start of the Cold War. Some date back to 1941 with the beginning of the Grand Alliance with two countries that were born in revolution with world aspirations. For the purposes of this paper and for arguments sake, the actual use of nuclear weapons will be the start date.

² Elliott V. Converse III, *Rearming for the Cold War: 1945-1960 (1)* (Washington, D.C.: U.S. Department of Defense, 2012), 208.

in both the nuclear and conventional roles.³ Not only was their emphasis on training the crews, but also on obtaining the best aircraft for the mission. The Cold War arms race was punctuated by fears of a so-called bomber and missile gap between the two countries, as well as in warhead counts.

The newly independent US Air Force led the way for America in the beginning of this race. The initial weight and design of the first nuclear weapons limited the only means of delivery to heavy bombers. As the technology advanced, weapons became more powerful and smaller, which made it possible for delivery by other platforms. General LeMay, in a memorandum to General Spaatz, acknowledged that the Air Force's future laid in the hands of long range guided missiles in order to maintain its strategic advantage.⁴

After World War II, the Air Force led in the Cold War by maintaining a strategic nuclear deterrent with its bomber force. However, bombers were not the only solution. SAC would soon expand. National Security Council Report 68 advanced the ICBM program, named Atlas, but another hurdle slowed its progress: the Korean War.⁵ The first ICBMs struggled, as with any developing program, to meet its budgets and timelines, but the launching of the Soviet Union's Sputnik satellite in 1957 compelled the Eisenhower Administration to address the perceived "missile gap" between the US and Soviet Union.⁶ The feared missile gap became a hot political topic for the 1960 election, as the US continued to develop and build missile bases. The first squadron was activated in July 1958 at F.E. Warren Air Force Base with several more to follow.⁷ The ICBMs provided an answer to the Soviet Union, by adding capability to the US arsenal.

The Air Force was not the only service capitalizing on the swollen arms race budgets. The US Navy also engaged in the nuclear race with the Soviet Union. After an unsatisfactory initial trial with nuclear weapons on carrier based aircraft, the Navy turned to its submarine force. By the end of 1960, the first submarine carrying sixteen Polaris

³ Converse III, *Rearming for the Cold War: 1945-1960 (1)*, 209.

⁴ David N. Spires, *On Alert - an Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011* (Colorado Springs, Colorado: Air Force Space Command, 2012), 3.

⁵ Converse III, *Rearming for the Cold War: 1945-1960 (1)*, 211.

⁶ Converse III, *Rearming for the Cold War: 1945-1960 (1)*, 29.

⁷ Converse III, *Rearming for the Cold War: 1945-1960 (1)*, 38.

missiles deployed on its first long range Cold War patrol.⁸ This option gave the US another viable leg in the nuclear arsenal that was difficult to target. While the Navy's submarines may comprise the smallest part of the current triad, they pose the largest problem to the adversary, regarding how to detect, track, and counter a submarine.

Each service sought to do its part in nuclear defense against the Soviet Union. Even the US Army made a bid to enter the nuclear race as well. The Army planned on using nuclear tipped artillery shells as a last line of defense, in the European theater. This was part of the tactical nuclear plan, which did not make it into the final nuclear triad of bombers, ICBMs, and SLBMs.

The Triad: Why Three?

As the Cold War continued, the US and the Soviet Union worked to develop and refine weapons and delivery systems. The US began developing a nuclear deterrence strategy that involved three options for nuclear delivery systems: bombers, ICBMs, and SLBMs. Why three? To most people a simple answer is redundancy for assurance. Human reason seems to gravitate towards grouping concepts in groups of three. This is certainly the case within military plans, theories, and strategies promulgated in the works of classic authors, as Thucydides' reasons for war, Carl von Clausewitz and his trinity concept, and to J.F.C. Fuller who described his strategy in groupings of three as well. As the US was searching for technologies to beat the Soviet Union, they stumbled upon the benefits of having a three-prong approach as well:

Having all three legs of our triad means we have technology insurance -- if there are problems with any one of our legs, the other two can do the job while we repair the first. Bombers are recallable and subs cannot now be found. The ICBMs remain highly stabilizing in that they cannot be attacked with stealth. They require such a high number of attacking warheads to take them out that we leave an adversary with two choices: invite Armageddon or do nothing with nuclear weapons.⁹

The triad provided this stability by enabling the nuclear strategy in support of the containment policy. The ICBMs provided the quick response force, the bombers possessed flexibility and recall ability, and the SLBMs provided flexibility along with the

⁸ Phillips Payson O'Brien, *Technology and Naval Combat in the Twentieth Century and Beyond* (Portland, OR: Routledge, 2001), 207.

⁹ Peter Huessy "In Defense of the Nuclear Triad" *Defense One* Oct 18, 2013 <http://www.defenseone.com/ideas/2013/10/defense-nuclear-triad/72242/> retrieved on December 28, 13.

unknown launch locations and ensure a second strike capability. The three legs, accompanied by current intelligence helped the US defeat the Soviet Union after nearly fifty years of an arms race that included several proxy wars.¹⁰

During the Cold War, the US continued to develop these three legs into what is still referred to today as the nuclear triad. Each asset provides its own unique attributes to coercion, deterrence and compellence, as they fit into the US nuclear strategy. Another benefit of maintaining multiple options means possessing multiple ways to deter an enemy from attack. Multiple options provide coverage for almost all target sets with backup redundancy on high priority targets. A strong deterrent occurs when the opposing country has to assume that an attack is not worth the cost of its adversary's counterattack, and possessing the capability of the triad provides the US with this advantage.¹¹

Bombers

The bomber will always get through. The only defense is in offense.

Stanley Baldwin

It is appropriate to begin the analysis with the bomber leg of the triad, considering the strategic bomber force and the concept of strategic bombing is what sparked the idea of an independent Air Force.¹² At the culmination of World War II, the performance of the strategic bombing campaigns from both theaters were reviewed. Historians concluded that the Combined Bomber Offensive (CBO) in Europe and General Lemay's firebombing strategy in the Pacific were effective, but not at the speed early air power theorists predicted. Air power theorist Giulio Douhet's prediction of a quick, decisive victory finally came to fruition, with the advent of nuclear weapons.¹³

The initial focus of the USAF was its bomber force, and how to develop an aircraft that was capable of delivering a nuclear weapon to its target. Just because early theorists often stated, "the bomber will always get through," did not mean that all the eggs should go into this one basket.¹⁴ The quest for aircraft development led researchers

¹⁰ Benjamin S. Lambeth, *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein* (Annapolis, Maryland: Naval Institute Press, 2013), 305.

¹¹ Thomas C. Schelling, *Arms and Influence (the Henry L. Stimson Lectures Series)* (New Haven: Yale University Press, 1967), 173.

¹² William Mitchell, *Winged Defense: the Development and Possibilities of Modern Air Power--economic and Military* (Tuscaloosa, AL: Fire Ant Books, 2010), 150.

¹³ Bernard Brodie, *Strategy in the Missile Age*, New ed. (Santa Monica, CA: Rand Publishing, 2007), 149.

¹⁴ John Andreas Olsen, ed., *A History of Air Warfare* (Washington, DC: Potomac Books Inc., 2010), 154.

through multiple aircraft designs over the years from the propeller to the jet age. This was another race buried inside the constructs of the Cold War, which helped develop the current bombers that are in service today.

Not only was the Cold War an arms race, but one could argue that it was a technological race as well. One field that advanced during this race was the jet age. Not only did the jet age advance military aircraft, but civilian transportation advanced as well.¹⁵ As technology advanced, so did the aircraft and their capabilities, but there were still problems. With jets getting faster and flying higher, so did the defensive threats that kept bombers from reaching their respective targets. Even though the idea of a bomber always getting through proved false, the bomber brought certain capabilities to the nuclear strategy that other legs of the triad do not provide.

The current nuclear strategy depends upon the three legs of the triad, with the bomber being the first to enter the nuclear service. While there were several bombers that served in the nuclear force over the years, the focus here will be on two current bombers, namely, the B-52 and B-2. Both of these bombers were developed during the Cold War. The B-52 dates back to 1955 for a service entry date, while the B-2 entered service in 1993.¹⁶ Each bomber brings niche capabilities to nuclear operations. The B-52 has the capability to launch cruise missiles without entering the opposing country's defensive range. Alternatively, while the B-2 drops traditional gravity bombs, it brings the 1990s stealth technology developments to nuclear operations. Both bombers are stationed at different bases, and provide conventional delivery capabilities for the military as well.

Since both bombers are capable of performing in either the nuclear or conventional role, this adds flexibility to their deterrent and coercive capabilities. Bombers have played significant roles in past conventional wars and conflicts.. They have also served as proving grounds for new technology.¹⁷ These aircraft and their crews have demonstrated the ability of completing combat sorties by delivering weapons on

¹⁵ Sam Howe Verhovek, *Jet Age: the Comet, the 707, and the Race to Shrink the World*, Reprint ed. (New York, NY: Avery Trade, 2011), 41.

¹⁶ Boeing, *History of B-2 Spirit*, <http://www.boeing.com/boeing/history/boeing/b2.page> retrieved on January 11, 2014.

¹⁷ Conrad C. Crane, *American Airpower Strategy in Korea, 1950-1953* (Lawrence, KS: University Press Of Kansas, 2000), 132-133.

target while evading enemy threats. This adds credibility to the esteem in which adversaries must hold them, however their long-term viability remains a consideration. For the time being, at least, this allows war strategies to be based on a type of escalation dominance, albeit a hard concept of coercion to measure.¹⁸

The US and the Soviet Union engaged in proxy wars, such as the Korean and Vietnam Wars, where they tested each other's technological advances and as a gauge to their progress in the Cold War.¹⁹ It was just a simple test of who had the better equipment and doctrine. Each was afraid of the other when it came to starting World War III, even though each used the proxy wars to promote their own agendas.

The bomber provides flexibility in the nuclear triad. Although both bombers, B-52 and B-2, are stationed in the continental US, with aerial refueling they have the capability to strike targets anywhere in the world and return to their home or forward stations. When adversary countries witnessed these long-range strikes during conventional conflicts, a type of secondary coercion was enforced.²⁰ As an example, Desert Storm showcased effective American and allied airpower. This showcase validated airpower as a tool of secondary coercion because the main effort of that war was airpower. Even though air power was asymmetrical between the US and Iraq and slanted heavily in the US's favor, the world got a new view of how airpower can work in modern coercion and deterrence. The message was simple then and remains so; either work within the social and political norms or risk the consequences of air strikes. Another form of flexibility of the bomber is having the ability to engage both pre-planned and emerging targets while in flight. This capability, demonstrated in a conventional role, carries a deterrent and coercion factor into nuclear operations as well. Flexibility to launch from different bases with the ability to cover multiple target sets is a key element within the US deterrence strategy.

The bomber force also provides another key attribute to the US deterrent force; an understood recall ability. The US has the potential to increase or decrease its deterrent

¹⁸ Daniel Byman and Matthew Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might* (New York: Cambridge University Press, 2002), 30-31.

¹⁹ Mark Clodfelter, *The Limits of Air Power: the American Bombing of North Vietnam* (Lincoln: Bison Books, 2006), 118.

²⁰ Byman and Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might*, 82.

pressure, through the use of this most visible leg of the triad. This tactic has been used in war and conflicts to force some sort of compromise.²¹ The concept of recall ability allows the President the opportunity to place crews on alert, and even launch the nuclear bombers with the potential to recall them before the strike occurs.

Survivability is the last attribute of deterrence that the bomber force brings to the triad. Survivability was one of the major concerns during the bomber gap controversy of the Cold War.²² Today, one bomber (B-52) provides the capability to destroy targets at a distance using cruise missiles, while the other (B-2) uses stealth technology to defeat modern day air defense systems. These characteristics, along with the sheer ability to launch and recover from multiple bases make the bomber force difficult to track and target. Since, these two bombers offer distinct capabilities that enable mission success against modern threats because they have benefited from the growing technology of the arms race of the Cold War.

Inter-Continental Ballistic Missiles

ICBMs are the most stabilizing part of the triad

David N. Spires

The US has relied on the Inter-Continental Ballistic Missile (ICBM) as a critical part of the Nation's deterrent force since its creation. Airmen recognized the role that missiles would play in warfare by witnessing missile attacks on London. Today, ICBMs are operated by launch crews twenty-four hours a day, 365 days a year, for an alert status that is ready to launch, when the decision is made by the President. This responsive leg of the triad brings a deterrent that no other leg can match. A quick and decisive strike was how air power theorist Giulio Douhet envisioned his air power theory.²³ The ICBM provided his answer, but without the use of aircraft.

The ICBM force has evolved over time. Their basing developed from soft above-ground facilities to hardened silos and launch complexes that spread out across the Mid-

²¹ Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996), 57.

²² Dino A. Brugioni, *Eyes in the Sky: Eisenhower, the Cia, and Cold War Aerial Espionage*, ed. Doris G. Taylor (Annapolis, MD: Naval Institute Press, 2010), 87-88.

²³ Giulio Douhet, *The Command of the Air*, ed. Joseph Patrick Harahan and Richard H. Kohn (Tuscaloosa, AL: University Alabama Press, 2009), 13 As we know today, air power comes in several forms. Missiles are a potent form of air power in modern conflicts.

Western US.²⁴ ICBMs are now the premier defensive force to counter a first strike from an aggressive opponent. “The ICBM has advantages in capability in deterring the Soviet Union, by holding particularly valuable targets at risk that the other two legs of the triad cannot match.”²⁵ With the capability to launch missiles at any target around the world, and strike those targets in roughly half-an-hour, coupled while possessing enough numbers of single-warhead missiles to back up this threat, the US holds an intimidating card in the hand of deterrence against an enemy.

ICBMs are able to provide this stabilizing force through their hardened and dispersed launch facilities. As with bombers, location matters, but now modern missiles are capable of striking targets anywhere in the world. “Their wide spread dispersal presented an assured second strike capability while ensuring the survivability of the bomber and submarine legs of the triad and providing extended deterrence to allies.”²⁶ A guaranteed second strike provides a strong deterrent from a first strike. At least that is how deterrence theory has worked for decades.

This idea of a stabilizing nuclear force through our ICBMs within the nuclear strategy, dates back to the feared missile gap theory during the Eisenhower Presidency.²⁷ As technology advanced, it brought other assets into the nuclear arsenal with smaller warheads, more efficient rocket engines, and refined targeting systems. This provided ICBMs with the capabilities to become a stabilizing deterrent force in the nuclear triad.

The Soviet Union also developed ICBMs that posed a credible threat to the US. Hence, the arms race hit full swing in the missile community. The ICBM mission was to try to out build and target more national assets than the Soviet Union and other countries possessed, therefore, voiding out a missile threat if possible.

The Minuteman III ICBM force is deployed in 450 separate locations spanning five states and an area of 34,600 square miles. Despite the fact that ICBMs are easy to individually target with publicly known silo locations, in today’s world their vulnerability is only theoretical. In reality, the broad dispersion and sheer numbers of the ICBM force make a preemptive or disarming attack on the entire force nearly impossible. Any

²⁴ Spires, *On Alert*, 40.

²⁵ John T Correll “The future of the ICBM” *Air Force Magazine* July 1987 Vol 70 No 7 <http://www.airforcemag.com/MagazineArchive/Pages/1987/July%201987/0787icbm.aspx> retrieved on January 1, 14.

²⁶ Spires, *On Alert*, 187.

²⁷ Brugioni, *Eyes in the Sky*, 228.

surviving ICBMs would pose an assured response because of their inherent characteristics. That combination has a tremendous deterrent effect.²⁸

ICBMs are the backbone and stabilizing force within the nuclear triad due to their location, harnessed speed of delivery, and numbers. ICBMs provide this capability by denying an opponents' first strike success, and are the key deterrent in the US nuclear strategy. Whereas the bombers provide flexibility and recall ability, the ICBMs drives the enemy to think about high-stakes risk when contemplating a strike.

Submarine Launched Ballistic Missiles

No one has done more to prevent conflict - no one has made a greater sacrifice for the cause for Peace - than you, America's proud missile submarine family. You stand tall among our heroes of the Cold War.

General Colin Powell

The third leg and the last addition to the triad is the Navy's Submarine Launched Ballistic Missile (SLBMs) force. The Cold War brought more technological developments than just jet engines and ballistic missiles. The Navy capitalized on nuclear propulsion to regain a central role in national strategy. Nuclear propulsion extended the Navy's reach, by increasing the range and speed of their force.²⁹ This allowed nuclear submarines the capability to complete an entire patrol without surfacing which translates into a smaller chance of detection.

Today, the US Navy is the only other service to have a place in the triad. With their nuclear submarines, they provide a unique capability of stealth and flexibility. Since three-fourths of the world is covered in water, the Navy is able to position assets, as needed, in order to fulfill its role in the overall US nuclear strategy. "The marriage of nuclear submarines to a reliable nuclear-tipped ballistic missile created the most secure, and the most credible, weapon supporting the policy of deterrence."³⁰

As the Navy continued developing missile systems from Polaris to the current Trident II, their capability and role changed as well. The SLBM force transformed from

²⁸ Senate ICBM Coalition, *The Long Pole of the Nuclear Umbrella*, (November 2009), 11. http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/policy/us-nuclear-policy/icbm_coalition_white_paper.pdf retrieved on January 1, 14.

²⁹ O'Brien, *Technology and Naval Combat in the Twentieth Century and Beyond*, 205.

³⁰ O'Brien, *Technology and Naval Combat in the Twentieth Century and Beyond*, 205-206.

a soft target retaliatory deterrent to a hard target potential first strike capability with improvements of accuracy and yield.³¹ This enabled the SLBM force to provide a primary strike role for the triad instead of covering the targets that could be possibly left from the ICBM and bomber strike.

As technology increased, one factor did not change in the realm of submarine warfare, and that is how to locate a submerged submarine. The element of surprise attack from an unknown location at sea is one of the main features that the SLBM force brings to the nuclear strategy, which added to the survivability of the nuclear force. The bomber bases and ICBM locations are known and are targetable. Of the fourteen Ohio Class SLBM submarines, the Navy maintains several submarines on patrol, while some are training and the rest are in port for maintenance. According to naval historian Phillips O'Brien, the Navy's nuclear submarine force has, "remained the most secure instrument of the country's nuclear strategy."³² The only part of this triad that is detectable are the two ports, which are located on each coast of the US. "Strategic nuclear submarines (SSBNs) and the SLBMs they carry represent the most survivable leg of the US Nuclear Triad. Today, there appears to be no viable near or mid-term threats to the survivability of US SSBNs, but such threats – or other technical problems – cannot be ruled out over the long term."³³ Currently, the US Navy possess the largest blue water navy in the world, and has the luxury of a technological advantage over its adversaries. This advantage helps conceal the "invisible" SLBM force, as it accomplishes its part in the US nuclear strategy without detection.

Conclusion

Strategists had their reasons for developing a nuclear triad to defend the US against nuclear attack. One reason was redundancy. The triad is interconnected and each leg has the ability to perform in other capacities if one leg is down due to a vulnerability or maintenance issue that can occur naturally over time. However, each leg has its own strong suit as well.

³¹ O'Brien, *Technology and Naval Combat in the Twentieth Century and Beyond*, 212.

³² O'Brien, *Technology and Naval Combat in the Twentieth Century and Beyond*, 212.

³³ Secretary of Defense, *Nuclear Posture Review Report* (Department of Defense, Pentagon: US Government 2010), 44.

<http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf> retrieved on September 22, 2013.

The bomber leg of the triad provides flexibility and recall ability as its strong suits for deterrence. According to Bernard Brodie, the airplane's recall ability gives it a decisive advantage over the missile.³⁴ This advantage plays a huge role on the political side as well. Recall ability allows the President the flexibility to increase or decrease the pressure, as needed to coerce an adversary. However, this method takes time to transit the world. A quicker option if necessary is the ICBM or prepositioned SLBM.

The SLBM brings security to the nuclear triad. The SLBM operates from nearly undetectable sea locations. The Navy provides continuous patrols in the world's oceans as a secure deterrent. It is hard to track and target an object that is undetectable with today's technology. The SLBM is a suitable backup for the ICBM.

The ICBM force remains the backbone of the US nuclear triad and strategy. Their numbers alone provide an unreasonable targeting requirement for an adversary to consider in a first strike attempt. This stability provides the main deterrent for the triad through a quick strike capability to any target in the world. ICBMs provide an unmatched deterrent and coercive power over adversaries.

The Cold War brought about a hyper arms race in which only two nations dominated. As one side made a breakthrough, the other would create a counter and so on. Technology developed on all fronts: aircraft, missiles, submarines, and in intelligence collection. The arms race of the Cold War ended for the two super powers. This action or lack thereof, allowed other nations to enter the nuclear arena.

³⁴ Brodie, *Strategy in the Missile Age*, 287.

Chapter 3

Why the United States Needs to Maintain an Advantage

The problem in defense is how far you can go without destroying from within what you are trying to defend from without.

Dwight D. Eisenhower

What Other Countries are Doing

The Cold War may be over, but the need for a nuclear triad still exists. While the two super powers competed over the latter part of the twentieth century, other nations quietly entered the nuclear arena. At this time, there are eight recognized countries with nuclear weapons and one that does not confirm or deny their ownership of such weapons. The countries included are the United States, the United Kingdom, Russia, China, North Korea, Pakistan, India, and France. Israel is the outlier that everyone suspects possess this capability.¹ In 1968, five countries signed the Nonproliferation Treaty. “The Nuclear-Weapon States (NWS) are the five states—China, France, Russia, United Kingdom, and the United States—officially recognized as possessing nuclear weapons by the Nonproliferation Treaty. Although the treaty legitimizes these states’ nuclear arsenals, it also establishes that they are not supposed to build and maintain such weapons in perpetuity.”² While other nations have pursued nuclear programs the Nonproliferation Treaty, Pakistan and India pose the biggest concern. Pakistan and India are consumed currently with their own Cold War of sorts.

Most of the current nuclear powers entered the nuclear arena under the Cold War umbrella that lasted from 1945 to 1991.³ The last two countries, Pakistan in 1998, and North Korea in 2006, fall outside of this timeline of the original eight countries.⁴ However, not all of these countries have stopped when it comes to nuclear procurement. With over 17,000 warheads between the US, United Kingdom, the Soviet Union, France, India, Pakistan, North Korea, China, and Israel.⁵ There have been several treaties that

¹ CNN, *Nuclear Weapons: Who has What?*, <http://www.cnn.com/interactive/2013/03/world/nuclear-weapon-states/> retrieved on January 28, 2014.

² Arms Control Association, *Nuclear Weapons: Who Has What at a Glance*, <http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat> retrieved on January 28, 2014.

³ Richard Smoke, *National Security and the Nuclear Dilemma: an Introduction to the American Experience in the Cold War*, 3rd ed. (New York: McGraw-Hill, 1993), 285.

⁴ CNN, *Nuclear Weapons: Who has What?*.

⁵ CNN, *Nuclear Weapons: Who has What?*.

have limited American and Russian building and testing of new nuclear weapons; however, this has not stopped other countries from trying to catch up to the American and Russian nuclear status. This status was achieved in America through the nuclear triad, its training, doctrine, and procedures that were established by the Strategic Air Command.

During the Cold War, the US and the Soviet Union struggled to achieve a nuclear superiority. According to international relations theorist John Mearsheimer, “In its boldest most well-known form, nuclear superiority exists when a great power had the capability to destroy an adversary’s society without fear of major retaliation against its own society.”⁶ Nuclear hegemony has not been achieved, according to John Ikenberry, also a noted international relations theorist.⁷ The US emerged successfully from the Cold War, having set the ‘gold standard’ with a multiply redundant triad that continues to form a credible deterrent force. However, this standard has enticed other countries to chase the same technological feats, and try to improve on the US model. This model is based on an ICBM, bomber, and SLBM force that is capable of striking targets around the world.

Eight other countries have released information about their nuclear delivery systems and warhead status.⁸ Some of these countries are pursuing a triad of their own, while others are developing new, more modern delivery systems.⁹ It is not feasible to cover every new development across the nuclear arena, however, a few key developments from key players are worth mentioning. These advances affect the US’s strategy, as such; they deserve attention to determine how to adjust the US nuclear triad.

Strategy was easier during the Cold War, when the world was bipolar. Since the Cold War ended, the world has transformed into a multi-nodal world, which makes life for a strategist more challenging. For the purpose of this paper, the multi-nodal world will be broken down into five main regional nodes; Asian, European, American, African, and the Middle Eastern. Now, instead of focusing on one common enemy, a strategist has to consider multiple threats in different locations around the world. It is the job of a strategist to determine the amount of deterrence needed for each node that is formed,

⁶ John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York, NY: W. W. Norton & Company, 2003), 129.

⁷ G John Ikenberry, *After Victory: Institutions, Strategic Restraint, and the Rebuilding of Order After Major Wars*, Princeton Studies in International History and Politics (Princeton: Princeton University Press, 2001), 219.

⁸ CNN, *Nuclear Weapons: Who has What?*.

⁹ CNN, *Nuclear Weapons: Who has What?*.

since the end of the Cold War. Deterrence and assurance theories are not a one-size-fits-all formula. Inside these nodes the nuclear powered countries have been busy since the end of the Cold War. Treaties have only placed limitations on two of the declared eight nuclear powers, which have allowed the other powers the opportunity to close the gap with the US nuclear triad.

Russia

The end of the Cold War was indicated with the fall of the Soviet Union. The collapse of the communist empire did not affect the status of their nuclear forces significantly. The newly established Russian Federation relied on its soft power, and previously founded nuclear force, as it emerged back on the world stage as a world power.¹⁰ “Russia is in the middle of modernizing its nuclear forces, replacing Soviet-era ballistic missiles with fewer improved missiles. In a decade, almost all Soviet-era weapons will be gone, leaving a smaller but still effective force that will be more mobile than what it replaced.”¹¹ Russia has continued to develop new systems for their existing triad, intent on retaining a credible threat.

Russia remains a formidable nuclear threat and world power. Although the once bipolar world ended over twenty years ago, the need for a US nuclear strategy still exists. “As of early 2013, Russia has a stockpile of approximately 4,500 nuclear warheads, of which roughly 1,800 strategic warheads are deployed on missiles and at bomber bases. Another 700 strategic warheads are in storage, along with 2,000 nonstrategic warheads.”¹² Russia still possesses more nuclear warheads than any other country, with an estimated 8,420 warheads.¹³ Due to varying sources and reporting procedures, the actual numbers may vary; however, the important point here is, Russia maintains the largest nuclear stockpile, and they are in the process of updating all three delivery systems: ICBMs, bombers, and SLBMs.

Russia’s ICBM force is currently being upgraded to newer models. These newer ICBMs, SS-27s Mod 2, also referred to as a RS-24, are scheduled to replace the aging

¹⁰ Dmitri Trenin, “Russia Reborn Reimagining Moscow’s Foreign Policy,” *Foreign Affairs*, <http://www.foreignaffairs.com/articles/65498/dmitri-trenin/russia-reborn> retrieved on January 28, 2014.

¹¹ Hans M. Kristensen and Robert S. Norris, “Russian Nuclear Forces 2013,” *Bulletin of the Atomic Scientists*, May 2013 vol. 69 no. 3, <http://bos.sagepub.com/content/69/3/71.full.pdf+html> retrieved on January 28, 2014, 2.

¹² Kristensen and Norris, “Russian Nuclear Forces 2013,” 2.

¹³ CNN, *Nuclear Weapons: Who has What?*.

SS-18, SS-19, and SS-25 models. These new replacements will bring down the total number of Russian ICBMs, but by 2021, 98% of the old missiles will be replaced.¹⁴ The SS-27 Mod 2s not only update the 1980's technology, but they update mobility and concealment systems of the launchers as well.¹⁵ With eighteen mobile variants of the SS-27 in service since 2010, that have the capability of carrying an unknown number of multiple warheads, combined with an unknown number of silo variants, asserts the emphasis on nuclear operations by the Russians.¹⁶ Russia is expanding its formable ICBM threat and deterrent.

The Russian bomber force is undergoing similar updates. Russia is currently developing a new long range nuclear cruise missile, designated the Kh-102.¹⁷ Russia is also looking into a new prototype for current bomber replacements that would emerge in the 2020 timeframe, while currently upgrading their aging bomber fleet.¹⁸ These new changes prove how a former competitor is trying to regain its once esteemed status in the nuclear arena, which applies pressure to the US's nuclear strategic calculus.

The Russian SLBM and SSBN forces are also benefitting from new technology and updates as well. "After more than fifteen years of design, development, and production, the first of the new Borei-class (pronounced Borey) ballistic missile submarines (SSBNs) entered into service on January 13, 2013."¹⁹ These submarines were designed to replace the aging Delta III and Delta IV, model SSBNs, that were commissioned in the late 1980s and early 1990s.²⁰ Russia has also updated existing SLBMs, in order to maintain patrol status until the complete switch over to the Borei-class in the 2020 timeframe. Russia has attempted full patrol between the old Delta class and the new Borei in 2012, to maintain a constant deterrent force.²¹

The US and Russian Federation have agreed to several treaties over the years. The latest treaty was the New Strategic Arms Reduction Treaty (START), which came

¹⁴ Kristensen and Norris, "Russian Nuclear Forces 2013," 4.

¹⁵ Kristensen and Norris, "Russian Nuclear Forces 2013," 5 – 6.

¹⁶ Kristensen and Norris, "Russian Nuclear Forces 2013," 3 – 5.

¹⁷ Kristensen and Norris, "Russian Nuclear Forces 2013," 8.

¹⁸ Kristensen and Norris, "Russian Nuclear Forces 2013," 8.

¹⁹ Kristensen and Norris, "Russian Nuclear Forces 2013," 6.

²⁰ Kristensen and Norris, "Russian Nuclear Forces 2013," 6.

²¹ Kristensen and Norris, "Russian Nuclear Forces 2013," 7.

into effect on February 5, 2011.²² There have been several iterations of this treaty in the past. The purpose of this treaty is to limit the number of nuclear warheads and delivery systems between the US and Russia. This was a way to place a cap on the uncontrolled arms race of the Cold War. Other countries that have joined the nuclear power club however, do not have the same limits as the US and Russia have placed on their nuclear forces due to treaty agreements during and after the Cold War.

China

Sometime in the future - 25, 50, 75 years hence - what will the situation be like then? By that time the Chinese will have the capability of delivery too.

General Curtis LeMay

China is an emerging threat in the nuclear arena. Unlike the established triad status of Russia, China is attempting to construct a triad of its own. China is the only one of the five original nuclear weapon states that is increasing the size and quality of its nuclear arsenal, although the pace of growth is slow.²³ China is patient in developing new strategy; nevertheless, the Chinese see the benefits of having a redundant triad and the deterrent capability it provides.

China is in the process of updating and completing their version of a nuclear triad. China's latest ICBMs, CSS-10 Mods 1 and 2, which entered service in 2006 and 2007, gives their ICBM force the capability of striking the US.²⁴ On the bomber front, the H-6 bomber can carry the newly established air launched cruise missile designated the DH-10, or better known as the Land Attack Cruise Missile (LACM).²⁵ The DH-10 is similar in capabilities to the US Air Force's Air Launched Cruise Missile (ALCM). China's last part to the triad is not operational. They have two submarines, in which they seek to fit SLBMs that are in development as this time. China sees the benefits of a survivable nuclear deterrent force, and their Navy is proceeding with the SSBN and SLBM development.

India

²² US State Department, *New START*, <http://www.state.gov/t/avc/newstart/index.htm> retrieved on January 29, 2014.

²³ Hans M. Kristensen and Robert S. Norris, "Chinese Nuclear Forces 2013," *Bulletin of the Atomic Scientists*, November 2013 vol. 69 no. 6, <http://bos.sagepub.com/content/69/6/79.full.pdf+html> retrieved on January 28, 2014, 2.

²⁴ Kristensen and Norris, "Chinese Nuclear Forces 2013," 3.

²⁵ Kristensen and Norris, "Chinese Nuclear Forces 2013," 7.

India is another nation that is on the rise in the nuclear arena. “India’s drive to develop a nuclear triad proceeds with New Delhi developing or deploying several weapon systems to realize its goal of achieving offensive nuclear forces on land, at sea, and in the air.”²⁶ India possesses an estimated amount of weapons grade plutonium to produce 100 – 130 nuclear warheads to arm their nuclear force.²⁷ India is only the fourth country in history, and the second since the end of the Cold War, to attempt to build a nuclear triad to enforce their nuclear strategy.

India plans on using their limited nuclear warheads to form a smaller version of the nuclear triad. India’s missile force is still growing in size and range. This country first entered the missile race in 1998, with their Prithvi I missile which has a range of 150 kilometers and is currently developing their latest version, the Agni V with a 5,000 kilometer range.²⁸ India’s nuclear capable Air Force consists of Mirage and Jaguar fighter/bomber variants.²⁹ Their Navy has been developing the submarine, Arihant, since 1984, and are working on SLBMs, Dhanuash and Sagarika, as well.³⁰ India may be lacking in range-projection when compared to the US nuclear triad, but they are building and developing new forces; something that the US has not done since before the end of the Cold War.

Pakistan

Pakistan is the smallest of the new growing threats in the nuclear arena. Pakistan has not entered into the triad status, but has missiles and fighters that are capable of delivering nuclear weapons. The country’s missile force does not have a long-range missile component, and therefore, like India could not be considered an intercontinental threat.³¹ Pakistan’s nuclear Air Force consists of F-16s and Mirage Vs.³² Pakistan’s

²⁶ Hans M. Kristensen and Robert S. Norris, “Indian Nuclear Forces 2012,” *Bulletin of the Atomic Scientists*, July 2012 vol. 68 no. 4, <http://bos.sagepub.com/content/68/4/96.full.pdf+html> retrieved on January 28, 2014, 2.

²⁷ Kristensen and Norris, “Indian Nuclear Forces 2012,” 2.

²⁸ Kristensen and Norris, “Indian Nuclear Forces 2012,” 6.

²⁹ Kristensen and Norris, “Indian Nuclear Forces 2012,” 6.

³⁰ Kristensen and Norris, “Indian Nuclear Forces 2012,” 5.

³¹ Hans M. Kristensen and Robert S. Norris, “Nuclear Notebook: Pakistan’s nuclear forces, 2011,” *Bulletin of the Atomic Scientists*, <http://thebulletin.org/nuclear-notebook-pakistans-nuclear-forces-2011> retrieved on January 28, 2014.

³² Hans M. Kristensen and Robert S. Norris, “Pakistan’s Nuclear Forces, 2011,” *Bulletin of the Atomic Scientists*, July 2011 vol. 67 no. 4, <http://bos.sagepub.com/content/67/4/91.full.pdf+html> retrieved on January 28, 2014, 4.

stockpile of 90-110 nuclear warheads provides them some coercive nuclear power.³³ Pakistan is considered a regional threat, due to their lack of long range delivery systems. However, a nuclear attack in any region poses a problem for all of the nuclear countries.

The Other Countries

The other nuclear countries are the United Kingdom, France, and North Korea. The United Kingdom and France are allies of the US, while North Korea and the US remain in a stalemate from the Korean War. The United Kingdom has historically worked with the US in joint testing nuclear weapons since 1954.³⁴ The United Kingdom still maintains a naval nuclear presence after retiring its air delivery platforms in 1998.³⁵ France maintains the third largest nuclear arsenal in the world, but only has the capability to deliver these weapons by air and sea.³⁶ North Korea has been unsuccessful in getting its missile delivery technology to work properly.³⁷ As mentioned, Israel shares little information about its nuclear program, but they represent a potential nuclear force in their region.

Israel refuses to confirm or deny the widespread belief that it has the bomb, but it is thought to have about 80 atomic weapons and enough plutonium for as many as 200, according to the Federation of American Scientists... Over the years, Israel has acquired submarines and aircraft capable of carrying nuclear warheads, but it isn't confirmed whether they've been modified to do so. Many estimate that Israel's land-based Jericho missiles are also nuclear-capable.³⁸

The countries discussed above are the remainder of the nuclear powers in the world at this time. Some of which are allies of the US while others are not. All, however, acquired nuclear weapons for their country's self-interest. Alliances aside, these countries for the most part are maintaining their nuclear status or are trying to improve their nuclear capabilities.

United States

³³ Kristensen and Norris, "Nuclear Notebook: Pakistan's Nuclear Forces, 2011."

³⁴ CNN, *Nuclear Weapons: Who has What?*.

³⁵ CNN, *Nuclear Weapons: Who has What?*.

³⁶ CNN, *Nuclear Weapons: Who has What?*.

³⁷ CNN, *Nuclear Weapons: Who has What?*.

³⁸ CNN, *Nuclear Weapons: Who has What?*.

The United States started out as the only nuclear power in 1945.³⁹ The rest of the world witnessed the power of these new weapons when the US dropped two atomic weapons on Hiroshima and Nagasaki against Japan at the end of World War II. The US is currently the only country to have used nuclear weapons in combat. However, this US military power and prestige may be an enticer to for other countries working towards entry into this nuclear arena. The US established a nuclear triad; a strategy of redundant deterrence that not only prevents war, but has the potential to coerce adversary countries to comply with US demands, under the fear of the consequences. While it is impossible to attribute with certainty the relative stability of the Cold- and Post-Cold War eras rest on this strategy, it may be fair to consider it successful. There has not been a nuclear attack since 1945. But other countries have witnessed this strategy for fifty years and are trying to copy the triad, or develop more advanced weapon systems, as indicated in Table 1 below:



Table 1. Countries with Nuclear Status

| | Estimated Warheads | International or Regional Power | Missiles | Submarines | Aircraft |
|----------------------|---------------------------|--|-----------------|-------------------|-----------------|
| United States | 7,650 | International | X | X | X |

³⁹ Phillip S. Meilinger, *Bomber: the Formation and Early Years of Strategic Air Command* (Maxwell Air Force Base, AL: Air University, 2012), 314.

| | | | | | |
|--------------------|--------|---------------|---|---|---|
| Russia | 8,420 | International | X | X | X |
| China | 240 | International | X | | X |
| India | 80-100 | Regional | X | | X |
| Pakistan | 90-110 | Regional | X | | X |
| France | 300 | International | | X | X |
| England | 225 | International | | X | |
| North Korea | 10 | Regional | | | |
| Israel | 80 | Regional | | | |

*Source: Produced by Author⁴⁰

The US and Soviet Union engaged in an arms race, and the Soviet Union collapsed at the end of the Cold War. Other countries are closing in on nuclear arsenal gap. Since the end of the Cold War, the US has been reducing its nuclear stockpile, in an attempt to make the world free from nuclear weapons and their destructive capability.⁴¹ In the 2010 Nuclear Posture Review stated, there were five key objectives of the US nuclear policies and postures:

1. Preventing nuclear proliferation and nuclear terrorism
2. Reducing the role of US nuclear weapons in US national security strategy
3. Maintaining strategic deterrence and stability at reduced nuclear force levels
4. Strengthening regional deterrence and reassuring US allies and partners
5. Sustaining a safe, secure, and effective nuclear arsenal⁴²

Several nations are advancing in the nuclear arena at a time when the US is not focused on nuclear deterrence. These countries are adding to their nuclear stockpiles, adding new

⁴⁰ Author, This table was put together using multiple open source documents discovered during research for this topic. The table is a simple collaboration for a quick reference of nuclear status between those countries. The Strategic or Regional call was determined on delivery capability.

⁴¹ Barack Obama, The White House Office of the Press Secretary, “*REMARKS BY PRESIDENT BARACK OBAMA*,” April 5, 2009 at Hradcany Square Prague, Czech Republic. http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered retrieved on March 4, 2014.

⁴² Department of Defense, *Nuclear Posture Review Report, April 2010*, (Washington DC: Government Printing Office, 2010), iii.

delivery systems to their inventory, and are striving for a triad of equal or higher status to the US's current model.⁴³

The US is walking a fine line when it comes to coercion and deterrence theory in regards to nuclear status. Nuclear deterrence theorists argue to this day on how many warheads and delivery systems are enough. The better question is when will the US arsenal become so small that no coercive power remains?

The five objectives from the Nuclear Posture Review try to balance the deterrence and assurance that our adversaries and allies respect. President Obama advocates for strengthening the Nuclear Non-Proliferation Treaty as a basis for cooperation for a disarmament for the countries that possess nuclear weapons and to ensure countries without them will not acquire them.⁴⁴ This poses another concern. Since the Cold War ended and the bipolar world that was easily defined turned into a multi-nodal regional power world, how can the US lead in this environment if it does not possess the dominant coercive power?

In the past seven years the US has returned much of its focus on its nuclear enterprise. This return was not due to strategic planning, but due to incidents that placed nuclear surety in question. These events shifted the focus back onto the strategic nuclear forces after a twenty-year neglect due to overarching foreign policy issues and domestic concerns. The US Strategic nuclear triad, consists of ICBMs, bombers, and SLBMs that have been in service for decades. The platforms themselves have received service life updates or extensions, but no new assets have been acquired. Current treaties, such as START, put limits on numbers of nuclear warheads, delivery systems, platforms in service, new weapons development, and testing.⁴⁵ But these treaties do not prevent other countries from developing their nuclear enterprise.

The US has a new delivery system in development that can give a needed boost to the coercive power of its nuclear force. The US is developing currently a new bomber to augment or replace existing bombers. The Long Range Strike Bomber (LRSB) should enter service somewhere in the middle of the next decade, and perform in both nuclear

⁴³ CNN, *Nuclear Weapons: Who has What?*.

⁴⁴ Obama, "REMARKS BY PRESIDENT BARACK OBAMA," April 5, 2009.

⁴⁵ US State Department, *New START*.

and conventional roles.⁴⁶ The US recognizes a recapitalization need in all portions of the triad; however, the primary focus currently will be on the US's aging bomber fleet.

The LRSB is the planned replacement for the aging bomber fleet. "Current plans call for the Air Force to keep the B-52H until 2040. By that time, the last aircraft that rolled off the Boeing assembly line in 1962 will be 78 years old."⁴⁷ The B-2 has a shelf life that is projected to last until 2058.⁴⁸ Both of these bombers are still very capable aircraft that bring their own separate coercive capabilities to the table. However, both bombers are beginning to show their age and limitations as potential adversary countries develop countermeasures to defeat long-range bomber attacks.

As technology has progressed over the years, countries around the world have benefitted from advances in their newer Integrated Air Defense Systems (IADS). These advances make it difficult for bombers to penetrate without extensive support. "When faced with high-threat environments, all three current bombers will eventually fall back to a role of launching standoff missiles. As they age, they will increasingly need to stay well outside the reach of enemy defensive systems."⁴⁹ The LRSB is the next generation bomber designed to penetrate modern air defenses despite adversary counter measures. The LRSB will be certified for both nuclear and convention roles, but it also will provide manned or unmanned options.⁵⁰ Serving in a dual role is not a new concept for the bomber fleet, but possessing the capability of unmanned piloting brings a new capability to the nuclear triad. This drives the question of where will it fit in?

⁴⁶ Julian E. Barnes, "Pentagon Toils to Build a Bomber on a Budget," *Wall Street Journal*, Monday November 4, 2013, sec A.

⁴⁷ National Defense, *B-52 Flies in the Face of Critics*, http://www.nationaldefensemagazine.org/archive/2006/January/Pages/UF_B-525458.aspx retrieved on January 31, 2014.

⁴⁸ John Tirpak, *Time to get Started*, Air Force Magazine February 2012, 31 <http://www.airforcemag.com/MagazineArchive/Documents/2012/February%202012/0212time.pdf> retrieved on January 31, 2014.

⁴⁹ John Tirpak, *Time to get Started*, Air Force Magazine February 2012, 34.

⁵⁰ Michael B. Donley, Secretary of the Air Force, US Air Force, Memorandum For Record, June 3, 2013.

Chapter 4

The New American Deterrent

In the future, what our president is going to need is options, options to project power anywhere in the world within hours. This Long-Range Strike Bomber is going to be that option the president can use when there are no other options.

Major General Steve Kwast

Striving to Remain the Top Contender

Presently, the United States possesses the lone military superpower status in the world regime, due to its military dominance in both the conventional and nuclear realms. In other countries efforts are underway to modernize and develop to achieve comparable or superior arsenals. According to John Mearsheimer, contender states never lose the appetite for power, they continually look for opportunities to gain power, and take advantage of them when they arise.¹ Referring to table 1, a conclusion could be reached that the other states are looking to gain an advantage. The US is no longer the leader in nuclear warhead count. Other countries are currently developing newer more advanced delivery systems without the hindrance of nuclear treaties. Since the end of the Cold War, the US has placed nuclear development on hold. With conventional conflicts that range from Desert Storm, Operation Allied Force, Operation Iraqi Freedom, and Operation Enduring Freedom, the US lost its emphasis on the nuclear forces, and opened the door for other states to gain ground.

Currently, the US is developing the Long Range Strike Bomber (LRSB) as a replacement to the aging B-1, B-2, and B-52 fleet. Over time, relying on these older bombers cedes an advantage to adversaries with newer, well-developed defenses.

As potential adversaries acquire better defenses, the existing bombers' ability to get close enough to targets to be effective will continue to deteriorate. Already, against today's toughest air defenses, the B-52 and B-1 are largely relegated to a standoff role; only the B-2 is expected to get through. In the years to come, the B-2's ability to penetrate will also

¹ John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York, NY: W. W. Norton & Company, 2003), 168.

decline. This will be true even though USAF will upgrade all three bombers with new systems and weapons.²

The LRSB will be able to compete in a heavily defended environment, while performing both conventional and nuclear roles, and providing a new unmanned option. The LRSB brings new technology, advancements, and a new deterrent capability to the aging bomber fleet.

The nuclear triad was designed to provide the president with the option to hold any target at risk around the world. Bombers remain a highly attractive element of nuclear deterrence, mainly due to their ability to be recalled. In January 2012, the Secretary of Defense stated, “The US military will invest as required to ensure its ability to operate effectively in anti-access and area denial (A2/AD) environments. This will include developing a new stealth bomber.”³ The bomber is the most visible portion of the nuclear triad and possesses potentially the largest deterrent value. More countries can relate to a bomber threat than an ICBM or SLBM, due to the feasibility and or possibility of obtaining bombers themselves or defending against them.

The LRSB is still a new concept under development within the Department of Defense (DoD), with the majority of its capabilities and limitations remaining classified. The DoD is planning on building between 80 to 100 of these new bombers.⁴ The LRSB is projected to have combat ranges similar to its counterparts of around 6,000 nautical miles.⁵ The LRSB is designed to carry both conventional or nuclear payloads, with no specific basing location requirements. The LRSB is designed to work within current bomber operating restrictions. This is a key point in building a new bomber. For example, the B-52H has a requirement of 150 foot wide runway and taxiways, due to its

² John Tirpak, *Time to get Started*, Air Force Magazine February 2012, 31
<http://www.airforcemag.com/MagazineArchive/Documents/2012/February%202012/0212time.pdf>
retrieved on January 31, 2014.

³ Michael B. Donley, Secretary of the Air Force, US Air Force, Memorandum For Record, June 3, 2013.

⁴ Defense News, *Boeing, Lockheed Team on Long Range Strike Bomber*, October 25, 2013.
<http://www.defensenews.com/article/20131025/DEFREG02/310250017/Boeing-Lockheed-Team-Long-Range-Strike-Bomber> retrieved on February 21 2014. The total number of new bombers to be built has varied from multiple sources; however, it consistently stays within this range.

⁵ Michael Hatamoto, Daily Tech, *U.S. Air Force Looks to Develop Long-Range Strike Bomber on a Budget*, November 7, 2013.
<http://www.dailytech.com/US+Air+Force+Looks+to+Develop+LongRange+Strike+Bomber+on+a+Budget/article33696.htm> retrieved on February 21, 2014.

platform-designed use of wing tip gear. This limits operating locations for the B-52H, since most airfields do not meet this requirement.

Although the LRSB project remains under close security, there are several assumptions that can be drawn about the new bomber. Table 2 provides a comparison between the current bomber capabilities, and those projected by the LRSB.

Table 2. Bomber Comparison Chart

| | LRSB Requirements | B-2 | B-52 |
|---------------------------|-----------------------------|-----------------------------|-----------------------------|
| Payload | Mixed Conventional | Mixed Conventional | Mixed Conventional |
| Nuclear | Yes | Yes | Yes |
| Survivable | Stealth | Stealth | Self-Defense |
| Range | Similar | 7,000 NM | 8,700 NM |
| Speed | Subsonic | Subsonic | Subsonic |
| Radio Connectivity | Long Range and Localized | Long Range and Localized | Long Range and Localized |
| Manned | Yes | Yes | Yes |
| Unmanned | Yes | No | No |

Source: Produced by Author.⁶

The LRSB program is expected to enter service in the mid-2020s, while the B-52 and B-2 will remain in service until the middle of the century.⁷ With much anticipation, a new bomber will address the problem of sustaining the bomber force, but not the aging weapons.

When it comes to nuclear weapons, the current Strategic Arms Reduction Treaty (START) does not allow for new nuclear weapon development or testing. To be specific,

⁶ Author, There is not a lot of releasable information regarding the LRSB. Multiple sites and sources provide the generic data, but a comparison is necessary. Some categories may need further explanation: Payload's mixed conventional follows the same as the current bombers each store can carry a different type of weapon but no inter mixing within the stores and radio connectivity is basic in either local or beyond line of sight for range capacity.

⁷ Michael B. Donley, Secretary of the Air Force, US Air Force, Memorandum For Record, June 3, 2013.

it relates to the warheads themselves, but this requirement applies only to the US and Russia. For example, the Air Launched Cruise Missile (ALCM) is specific to the B-52H platform. There are finite quantities remaining in the inventory, due to testing and maintenance issues. When this asset is depleted, the B-52H will no longer have its nuclear capability. This is yet another pitfall of restraints in regards to a treaty with one nation, while the other nuclear countries are free to design and build new nuclear assets in this new multi-nodal world.

Where to Place the Long Range Strike Bomber

The nuclear triad was developed during the Cold War. This occurred at a time when the DoD's budget was not constrained by numerical platform or warhead concerns, and the main objective was to out-arm the Soviet Union. For instance, the USAF built 744 total B-52Hs from 1952-1962, making the number of approximately 100 LRSBs look small in comparison of fleets.⁸ However, according to Phillip Meilinger, at the end of 1961, the US possessed 23,000 nuclear warheads in its stockpile.⁹ These numbers seem ridiculously high in comparison to today's limits. According to CNN, currently the US maintains 7,650 nuclear warheads, a third of the total from the Cold War.¹⁰

As the Cold War drew to an end, the two powers realized that they needed to put limits on their weapons of mass destruction. The US and the Soviet Union started to talk about treaties, and the regulations that both countries would tolerate. The Strategic Arms Reduction Treaty or START I was signed on July 31, 1991.¹¹ The START I was in effect for fifteen years. It began limiting the number of operational warheads, ICBMs, SLBMs, and missiles on bombers.¹² The treaty also laid out guidelines of how to count and report nuclear status. Article III of START I lay out these rules in detail, which include the

⁸ Boeing, *History of B-52 Stratofortress*, <http://www.boeing.com/boeing/history/boeing/b52.page> retrieved on February 23, 2014. The reasoning behind the numbers is to point out an extreme outlier.

⁹ Phillip S. Meilinger, *Bomber: the Formation and Early Years of Strategic Air Command* (Maxwell Air Force Base, AL: Air University, 2012), 315. The same reasoning follows this number as well. Since this number in 1961 is higher than all the nuclear power states numbers combined in today's count.

¹⁰ CNN, *Nuclear Weapons: Who has What?*, <http://www.cnn.com/interactive/2013/03/world/nuclear-weapon-states/> retrieved on January 28, 2014.

¹¹ Arms Control Association, *START I at a Glance*, <https://www.armscontrol.org/factsheets/start1> retrieved on February 23, 2014.

¹² Arms Control Association, *START I at a Glance*.

allowable warhead count and how to count each delivery system in relation to the total of allowable warheads.¹³

Of the eight declared countries with nuclear weapons, two countries now have warhead and platform monitoring and reduction treaties. The other six countries do not currently have any restrictions, except the five countries of the Nonproliferation Treaty, which include China, France, Russia, the United Kingdom, and the US.¹⁴ India, Pakistan, North Korea, and Israel are not tied to treaties at this time, but live under the umbrella of these treaties. These countries know what the world reaction of a nuclear communication,¹⁵ act, or accidental detonation would be, as well as the consequences of providing weapons technology to another state or non-state actor that is trying to enter the nuclear arena.

The original START I treaty should have expired in 2006; however, with the collapse of the Soviet Union occurring only months after the initial treaty was signed and ratified, the treaty was invalidated. The breakup of the Soviet Union left nuclear weapons in the possession of newly formed Russian states.¹⁶ The US and the four independent nations of Russia, Belarus, Ukraine, and Kazakhstan agreed to the Lisbon Protocol which did not go into effect until December 5, 1994.¹⁷ This agreement was similar to the START I in regards to reduction deadlines, inspections, and weapons reporting procedures. This agreement between the five nations ensured that the Cold War was over and that the Soviet Union collapse did not bring four more nations into the nuclear power status.

START II became the gap filler that tied the original agreement from START I and the Lisbon Protocol together. START II also provided guidance on multiple warheads on ICBMs.

¹³ Arms Control Association, *START I at a Glance*, <http://www.state.gov/www/global/arms/starthtm/start/start1.html#art3> retrieved on February 23, 2014.

¹⁴ Arms Control Association, *Nuclear Weapons: Who Has What at a Glance*, <http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat> retrieved on January 28, 2014.

¹⁵ Author, A nuclear communication refers to any form of nuclear development that could change a posture of status of a country.

¹⁶ Arms Control Association, *START I at a Glance*, <https://www.armscontrol.org/factsheets/startI> retrieved on February 23, 2014.

¹⁷ Arms Control Association, *START I at a Glance*, <http://www.state.gov/www/global/arms/starthtm/start/lisbon.html#lisbonPROTOCOL> retrieved on February 24, 2014.

START II, when implemented, will eliminate heavy intercontinental ballistic missiles (ICBMS) and all other multiple-warhead (MIRVed) ICBMS. It will also reduce the total number of strategic nuclear weapons deployed by both countries, by two-thirds below pre-START levels. By the end of the first phase, each side must have reduced its total deployed strategic nuclear warheads to 3,800-4,250. By the end of the second and final phase, each side reduce its total deployed strategic nuclear warheads to 3,000-3,500. Of those, none may be on MIRVed ICBMS, including heavy ICBMS; only ICBMs carrying a single-warhead will be allowed. No more than 1,700-1,750 deployed warheads may be on SLBMS, which may be MIRVed.¹⁸

It is often overlooked that Russia does not honor this section of START II due to the US backing out of the Anti-Ballistic Missile (ABM) Treaty.¹⁹ Russia stopped observing this in 2002 when the US officially withdrew, however both countries followed the protocol of START I which expired in 2009. The treaties did accomplish their primary goal of placing a ceiling on the nuclear weapon stockpiles and establishing inspection and reporting procedures between the two countries.²⁰

The New START went into effect on February 5, 2011 between the US and Russia, after the first START treaty expired on December 5, 2009.²¹ Since the beginning of the treaty process, the number of nuclear warheads and delivery platforms plummeted over the years. Table 3 displays these dwindling numbers that both the US and Russia must sustain and verify through the treaty inspection process. Although the US and Russia have placed limits on their respected nuclear arsenals, the other remaining seven nuclear powers are not limited by treaty with the other nuclear powers. These countries are free to expand their arsenal, and build newer, more capable delivery platforms.

¹⁸ Federation of American Scientists, *Strategic Arms Reduction Treaty (START II)*, <http://www.fas.org/nuke/control/start2/> retrieved on March 25, 2014.

¹⁹ RIANOVOSTI, *History of START I and START II*, <http://en.ria.ru/world/20090622/155316207.html> retrieved on March 25, 2014.

²⁰ RIANOVOSTI, *History of START I and START II*.

²¹ Amy F. Wolf, *The New START Treaty: Central Limits and Key Provisions*, Congressional Research Service, January 8, 2014. <https://www.fas.org/sgp/crs/nuke/R41219.pdf> retrieved on February 24, 2014, 2.

Table 3. Comparison of Nuclear Treaties

| | START I | Moscow Treaty | New START |
|--------------------------|--|--|---|
| Warheads | 6,000 warheads attributed to deployed ICBMs and SLBMs, and heavy bombers | 1,700 – 2,200 strategic nuclear warheads | 1,550 deployed warheads* |
| Delivery Vehicles | 1,600 strategic nuclear delivery vehicles (deployed ICBMs and SLBMs and their associated launchers, and heavy bombers) | Not limited | 700 deployed ICBMs, SLBMs, and heavy bombers equipped for nuclear armaments 800 deployed and non-deployed ICBM and SLBM launchers and deployed and non-deployed heavy bombers equipped for nuclear armaments |

Source: US Department of State, “*Comparison of the START Treaty, Moscow Treaty, and New START Treaty, April 8, 2010.*”

*All inclusive number since it includes warheads on deployed ICBMs and deployed SLBMs, and nuclear warheads counted for deployed heavy bombers.²²

The New START treaty places more restrictions on the US nuclear forces than the Russians. Since the end of the Cold War, nuclear development has been on idle within the US. Previous and current US administrations have agreed to the START rules and regulations in attempts to make the world free from nuclear weapons. This mentality places the US at a disadvantage by allowing other countries to grow their military power, while the US nuclear deterrent has been coasting since the Cold War ended.

While the emphasis is on meeting treaty numbers, the US has specific plans of how to manage the aging nuclear fleet.

“The Administration clarified its plans for US forces under New START in the 1251 plan that it submitted to the Senate with the treaty documents on May 13, 2010. This plan indicated that the United States would

²² US Department of State, *Comparison of the START Treaty, Moscow Treaty, and New START Treaty*, April 8, 2010. <http://www.state.gov/t/avc/rls/139901.htm> retrieved on February 24, 2014.

eliminate at least 30 ICBM silos, retaining a force of up to 420 launchers under the treaty limits. It would also retain 14 Trident submarines, but each submarine would contain only 20 launchers, and two of the submarines would be in overhaul at any time, so only 240 launchers would count under the limit on deployed launchers. In addition, the report indicated that the United States would retain up to 60 bombers equipped for nuclear weapons, including all 18 B-2 bombers in the current force.”²³

The numbers and plans concerning ICBMs and SSBNs are unique, but the focus here is on the bomber fleet. The US has 19 B-2s and 76 B-52Hs in its current bomber force; however, only 60 are allowed to be readied for nuclear weapons at any given time.²⁴ This number of 60 is a point of concern for the LRSB, since current models predict a range of 80 to 100 aircraft are to be built. This number is acceptable for a complete replacement of the two aging platforms, but there will be overlap and as much as a two-year delay on nuclear certification for the LRSB, after the system is operational.²⁵

The New START that went into effect in 2011 has an expiration date in ten years.²⁶ This provides the US with the opportunity to rework certain portions of the treaty. The New START expires at a convenient time for the US. The LRSB should be in testing phases with an initial operations concept close to the beginning of the next START phase. Congress has approved the implementation of the New START, which has been renamed to plan 1043 in the National Defense Authorization Act of 2012.²⁷ Currently this plan lays out ICBM, SSBN, SLBM, bomber, and ALCM upgrades, follow-ons, and life extensions.²⁸ This plan has the potential to dictate how many nuclear assets the US will have in 2021 when the next version of START will go into effect.

Augment the Triad

²³ Amy F. Wolf, *The New START Treaty: Central Limits and Key Provisions*, Congressional Research Service, January 8, 2014. <https://www.fas.org/sgp/crs/nuke/R41219.pdf> retrieved on February 24, 2014, 21.

²⁴ US Department of State, *New START Treaty Aggregate Numbers of Strategic Offensive Arms*, January 1, 2014. <http://www.state.gov/t/avc/rs/219222.htm> retrieved on February 24, 2014.

²⁵ Michael B. Donley, Secretary of the Air Force, US Air Force, Memorandum For Record, June 3, 2013.

²⁶ Wolf, *The New START Treaty*, 2.

²⁷ Madelyn R. Creedon, *FISCAL YEAR 2013 BUDGET REQUEST FOR ATOMIC ENERGY DEFENSE ACTIVITIES AND NUCLEAR FORCES PROGRAMS*, April 17, 2012. http://armedservices.house.gov/index.cfm/files/serve?File_id=83ae4594-87b1-4bea-8389-3c030c860e8f retrieved on March 22, 2014, 2.

²⁸ Creedon, *FISCAL YEAR 2013 BUDGET REQUEST FOR ATOMIC ENERGY DEFENSE ACTIVITIES AND NUCLEAR FORCES PROGRAMS*, 7.

One way of working with this plan is to add to the number of aircraft allowed. This will allow the LRSB time to acquire "fully mission capable" status, and achieve its nuclear certification, while the older B-52H and B-2 maintain their roles as a nuclear and conventional deterrent to potential adversaries. This is possible by using the larger 800 number of deployed and non-deployed strategic delivery vehicles and launchers allowed from the New START, getting the 39 no longer in service B-52G models off the inspection reports, and by not counting all the new LRSBs as nuclear capable, similar to the B-52H method of accountability. This will allow the LRSB to maintain a nuclear or conventional role, as it replaces both of the current dual role bombers. By adding 40 LRSBs to the nuclear bomber fleet for an additional new deterrent factor, this will bring up the total of reportable bombers to an even 100.

Of course, this presents the potential problem of placing a temporary halt to the reduction of nuclear assets. However, the LRSB is a dual capable asset that has the potential to effect deterrence in both the conventional and nuclear fields. This is not a request for an increase in warheads, which is not allowed, but a change to the proposal that produced plan 1251. Why place such restrictions on the US ability to continue to be the world leading power, by placing limits on key assets, especially when other countries are trying to match or exceed the current model of the US nuclear triad?²⁹

Replacing Assets

Another alternative would be to replace other assets from the triad in order to make room for the new LRSB. The first assessment should focus on the bomber leg of the triad and raise the question as to which bomber the LRSB will replace? The choice is between the aging B-52H, which is currently the only aircraft that can carry and launch the ALCM, or the B-2. The B-2 is a first generation stealth bomber that countries are updating their Integrated Air Defense System (IADS) currently to defend against. The B-52H's nuclear portion of its abilities is limited to the ALCM. The ALCM has not been in production for over thirty years and once the missiles are used or their service life expires the B-52H will lose its nuclear capability.³⁰ Additionally, only 18 of the 19 B-2's in the

²⁹ CNN, *Nuclear Weapons: Who has What?*.

³⁰ John Tirpak, *Time to get Started*, Air Force Magazine February 2012, 34
<http://www.airforcemag.com/MagazineArchive/Documents/2012/February%202012/0212time.pdf>
retrieved on January 31, 2014.

US's inventory are nuclear capable.³¹ While the B-2 brings a potent deterrent with their ability to strike targets worldwide while avoiding modern IADS detection, it is limited in numbers with IADS becoming larger and more redundant.

The ICBMs and SLBMs make up the other parts of the triad. The ICBMs bring stability to the triad, with their quick response and natural deterrent. They provide adversaries with targeting of too many to targets while retaining a second strike capability. The SLBMs provide additional security to the triad with their nearly undetectable sea operations, but consideration has to be made as to how the three parts of the triad bring redundancy. This allows each part to cover the other while normal maintenance is taking place or while an update/upgrade is being installed.

Deleting Assets

The last option is to delete a leg of the triad completely to make available the counting numbers needed to accommodate the LRSB. Is this a realistic option to consider? The triad was and still is built on redundancy, creating a superior deterrent effect. This is why other countries are trying to mirror or exceed the US' strengths in this area of military power. The key to the triad is its redundancy. Each leg has the ability to cover the other targets when necessary. This concept makes deleting a leg an unviable option while requiring innovations and capabilities, such as the LRSB.

The bigger question to ask is how would deleting a leg from the established US nuclear triad effect overall deterrence of adversaries and assurance of allies? There is no one-size-fits-all answer. The synergies created among ICBMs, bombers, SLBMs, and the effective command and control capabilities provide a wide-range of essential attributes. One of these key attributes is a favorable avenue of attack ratio over adversaries. This attack ratio is comprised of the three legs of the triad. More is usually better, especially when each leg brings about a unique characteristic of both offense and defense for this ratio. If a leg is deleted would this provide an adversary with enough force to consider a first strike opportunity?

The Effects a Bomber Produces

³¹ US Department of State, *New START Treaty Aggregate Numbers of Strategic Offensive Arms*, January 1, 2014. <http://www.state.gov/t/avc/rls/219222.htm> retrieved on February 24, 2014.

From Giulio Douhet to modern day air power theorists, one sentiment remains the same; credibility of the bomber helps deter adversaries and assure allies as the US develops new strategy, doctrine, and policies. “Bombers can send messages. They can influence or initiate action, and they are credible because of what they have done in the past, specifically citing events last year when a B-2 bomber flew near North Korea and a B-52 was flown through China’s new air defense zone. Bombers can send messages fast, and they send messages with credibility.”³² The Air Force provides two of the three legs of the nuclear triad, which is considered the backbone of extended deterrence and assurance capabilities to our adversaries and allies, respectively.

An established bomber force provides several attributes that are key to their unique effects. Bombers are recallable, survivable, flexible, and provide a way to signal restraint, when used in a strategic political role. For starters, a bomber is the best means of providing extended deterrence and assurance, due to its inherent flexibility and visibility to both adversaries and allies. For instance, a bomber exercise provides this nuclear communication allowing allies and adversaries the ability to monitor for their own deterrence and assurance purposes. However, both deterrence and assurance are hard metrics to measure and analyze. What works for one country may not even factor into another’s analysis or better yet, the same action may produce different perceptions and responses elsewhere. Therefore, deterrence and assurance is not a one-size-fits-all formula for every country. For example the National Security Strategy states, “We are reducing our nuclear arsenal and reliance on nuclear weapons, while ensuring the reliability and effectiveness of our deterrent.”³³ This statement alone provides conflicting guidance. It suggests that the US is reducing nuclear numbers to meet treaty requirements and will not affect our nuclear deterrent capabilities. This goes against some states and international relations theorists’ beliefs that strength and size matters when related to military power.³⁴ The overall proportion of the military does have some

³² Arron Mehta, Military Times, *USAF Defends Need for a New Long Range Bomber*, February 20, 2014 <http://www.militarytimes.com/article/20140220/NEWS04/302200038/> retrieved on February 21, 2014.

³³ National Security Strategy May 2010, http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf retrieved on February 27, 2014.

³⁴ Mearsheimer, *The Tragedy of Great Power Politics*, 21. This primary goes against John Mearsheimer’s argument of latent and military power is what gives a state its strength. If the state losses this power, in this case by treaty reduction it is therefore giving up power and prestige that was earned.

weight, but not all of it. As the military continues to draw down, how will the new LRSB fit into its deterrence role?

The LRSB is the new military development on the horizon, but it builds upon proven concept of operations. A new bomber is not a new concept; the US has developed aircraft in the past, but not a nuclear capable 'unmanned' bomber. The UAV is a new concept. The USAF has achieved credibility in the Unmanned Aerial Vehicle (UAV) realm of flight with its success in Iraq and Afghanistan. While, this may be an apples and oranges comparison between current UAVs and the LRSB, but with regards to unmanned operations nothing changes except for the weapon(s) on board. Will current conventional credibility transfer over to an unmanned bomber carrying nuclear weapons?

The LRSB will be the next bomber in the US inventory, but will it achieve a credible world status like its predecessors? There are several hurdles that the LRSB must overcome before it can get there. For starters, in the treatment of nuclear weapons there is a two person control procedure for all management of nuclear weapons. How will an unmanned bomber accommodate this requirement? Current UAVs are susceptible to jamming interference; how will the LRSB counter this, because losing a nuclear weapon would not only result in the loss of credibility, but also of nuclear weapons! Finally, will an unmanned nuclear-armed variant of the LRSB increase the risk of nuclear war because it eliminates the risk to the crew flying the aircraft? One high point of interest in conventional strikes is that lower risk to aircrew incentivizes the conduct of more strikes because the potential target payoff is greater. This leaves room for debate about nuclear strikes with UAVs, but this should not be part of the consideration because unmanned ICBM and SLBM capabilities are already present in the triad. This debate is covered by assumption two. The LRSB will maintain a positive two person control in order to meet nuclear surety standards while adding the recall ability option that a manned bomber currently provides. Will the demonstrated success of UAVs in conventional operations translate into credibility of an unmanned variant of the LRSB that will enhance the bomber leg of the triad?

Chapter Five

Conclusion

Strategy is a balance of the ends, ways, and means...nuclear deterrence underwrites what we do.

Lt. Gen. David Goldfein

The United States nuclear triad was built as a deterrent force over fifty-five years ago, and is still the bedrock of US military strength. This type of deterrence came with the advent of nuclear weapons and their multiple delivery systems. The US Air Force took the lead in this venture with the Navy providing the third leg of the triad with their submarines that carry multiple SLBMs. In part, the Air Force gained its independence from the Army because of this unique nuclear capability shortly after the conclusion of World War II. The atomic bombs dropped on Japan's cities proved the destructive capability of the last Revolution in Military Affairs (RMAs), the nuclear revolution, which led to the next conflict, namely, the Cold War.

Deterrence is part of the US military strategy. It comes in many forms, but is most discussed as a product of nuclear forces. However, the US nuclear forces have not been the focus over the years since the end of the Cold War. By focusing elsewhere, the US has allowed other nations the opportunity to catch up.¹ Even with other countries entering the nuclear arena, the US continued to focus on the Soviet Union especially during the Cold War. After the Cold War, the world went from bi-polar to a multi-nodal regional powered world, with the US the lone superpower.

The US Air Force inherited the nuclear mission out of convenience of delivery method, with the Navy providing submarine operations, when technology became available² These capabilities turned into in the nuclear triad, which consists of ICBMs, SLBMs, and bombers. Each leg brings about its own characteristic of deterrence and responsibility to the overall mission. These characteristics provide a credible deterrence and assurance that is essential to US security and that of its allies.

The nuclear strategy was simpler during the Cold War, which pitted only two states against each other. However, the world today is not always simple. The world has

¹ CNN, *Nuclear Weapons: Who has What?*, <http://www.cnn.com/interactive/2013/03/world/nuclear-weapon-states/> retrieved on January 28, 2014.

² Phillip S. Meilinger, *Bomber: The Formation and Early Years of Strategic Air Command* (Maxwell Air Force Base, Ala.: Air University Press, Air Force Research Institute, 2012), 162.

changed into a system of multi-nodal regional powers. This leads to needed changes within nuclear strategy. This multi-nodal power shift in an age of rapid technological advances drives the need to update the aging triad. “The problem is, however, that deterrence only works if the other side is listening.”³

There are several attributes of deterrence that the triad provides for US nuclear strategy. The preeminent objective of stability is the overall goal that the triad provides through deterrence of aggression. Deterrence is an area where the US cannot afford to fail. Since the world is changing, any change in the nuclear force structure has to be based on a sound strategy, and one that will account for this new multi-nodal format. The next attribute of deterrence refers to this one-size-does-not-fit-all strategy. In this ever changing security environment, variations are required to the Cold War framework. However, these variations need to account for both adversaries and allies, and for both deterrence and assurance. Over the years, the START variations have limited the US and Russian nuclear stockpiles. Fewer weapons due to restrictions does not necessarily dictate a change in force structure. A change in force structure could affect the perceptions of both allies and adversaries. One reason why the reductions went unnoticed is due to the triad, and its ability to balance attributes of each leg at lower numbers. This works well when the two players are in agreement and downsizing, but what about other countries that are not tied to any treaty arrangements?

The other countries of interest are China, India, and Pakistan.⁴ North Korea is a risk, but there is not much data on the arms race status. While the US and Russia focused on downsizing their arsenals, these countries have built theirs up in size and modernized their fleets in the process. Many strategists have said in the past that the enemy gets a vote. In this instance, US adversaries have made several votes in the security environment without the US changing its nuclear posture. Over the past two decades, the US attention has focused on the conventional side due to multiple conflicts that have erupted in this new multi-nodal security environment. This led to neglect of the nuclear

³ Richard A. Clarke and Robert K. Knake, *Cyber War: The Next Threat to National Security and What to Do About It* (New York: Ecco, 2010), 62.

⁴ CNN, *Nuclear Weapons: Who has What*.

force while downsizing to meet the restrictions of the START. This needs to be redressed.

The Nuclear Posture Review that was conducted in 2010 had five key objectives of US nuclear policies and postures.⁵ With a close look at these objectives, adversaries and allies would take away a sense that the US has placed nuclear strategy out of the first priority that it once held. There is a dilemma of how to strengthen deterrence while downsizing. One solution is to continue to modernize current assets, while another solution being either to add or to replace aging assets with follow-on systems.

The US nuclear triad has served the country well over the past fifty-five years. It is possible to make the argument that nuclear deterrence achieved a perfect record, considering no other nuclear weapons have been used in combat since the end of World War II. With such a successful foundation of coercion, deterrence, and compellence that has been earned over the years, the straight forward solution to the dilemma is to add to this capability. This will allow the LRSB to achieve the needed credibility as a new system, while relying on the established credibility that the past fifty-five years has acquired. Strategy does not cease to operate in the nuclear realm; rather it becomes a more challenging task in a multi-nodal security environment.⁶

This multi-nodal security environment challenges each leg of the nuclear triad. Each leg brings about different attributes that contribute to the overall objective of stability. By adding the Long Range Strike Bomber (LRSB) to this triad, this adds the potential for the unproven aspect of Unmanned Aerial Vehicles (UAVs) into the nuclear realm. As theorist Colin Gray points out, "For the United States as the world's leading air power, the obligations imply a force structure balanced in external integrity, balanced against national needs and culture, balanced by strategic reasoning, and balanced against a reasonable range of conflict scenarios."⁷ The LRSB is an Air Force evolution in bomber advancement that is riding the coat tails of other UAV successes. However, adding such a capability forces the consideration of other effects across the nuclear strategy, as well as the triad, and how adversaries and allies will view deterrence, while

⁵ Department of Defense, *Nuclear Posture Review Report, April 2010*, (Washington DC: Government Printing Office, 2010), iii.

⁶ David J. Lonsdale, *Cass Series--strategy and History*, vol. 9, *The Nature of War in the Information Age: Clausewitzian Future* (London: Frank Cass, 2004), 27.

⁷ Colin S. Gray, *Explorations in Strategy* (Westport, CT: Praeger, 1998), 131.

being mindful of how each leg contributes to the overall strategic deterrent in both conventional and nuclear means.

The nuclear triad's three legs provide attributes that have served as the foundation for its success over the years. The ICBM force provides key attributes of stability, lethality, responsiveness, credibility, and survivability. The SLBM force provides flexibility, responsiveness, lethality, and survivability. The bomber force is both survivable and responsive when generated, and is inherently resilient and flexible to signal while exercising restraint with their recall ability. By adding the LRSB into the bomber leg of the triad, this leg will possess both manned and unmanned options. These options will provide more flexibility to the launch and use calculus as crew force factors are no longer a limit. The bomber provides the best means of providing extended deterrence and assurance, with the ability to show resolve at tactical, operational, and strategic levels, with the versatility to shift effectively from one objective to another.

The Hypothesis is Accepted

The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.

Albert Einstein

This study accepts the hypothesis that a new bomber possessing both manned and unmanned employment opportunities will have a positive effect on the nuclear triad, but this comes with several caveats. The first caveat is the fact that the LRSB has not been built yet although it is being funded currently. The second caveat deals with nuclear operations plans that are currently being debated in Congress, and have the potential to determine the future of the US nuclear forces since they control the funding and modernization components of the current nuclear force.⁸ The third caveat is the New START treaty that will expire in 2021; just before the current timeline for the LRSB to become operational.⁹ The fourth and final caveat is the credibility and acceptability of an

⁸ The Center for Arms Control and Non-Proliferation, *Fact Sheet: New START and Nuclear Modernization Funding*, http://armscontrolcenter.org/issues/nuclearweapons/articles/fact_sheet_new_start_and_nuclear_modernization_funding/ retrieved on March 22, 2014.

⁹ Amy F. Wolf, *The New START Treaty: Central Limits and Key Provisions*, Congressional Research Service, January 8, 2014. <https://www.fas.org/sgp/crs/nuke/R41219.pdf> retrieved on February 24, 2014, 2.

unmanned bomber operating in a tightly controlled and procedurally rich environment with a tradition resistant to change.

Perusing the first caveat, the LRSB is still in development, which means that it has the possibility of changing, or not even becoming part of the US military inventory. According to Stephen Rosen, an innovation occurs in three categories: Peacetime, Wartime, and Technological.¹⁰ These three categories that Stephen Rosen references as times of innovation are continuous and overlapping. However, depending on which category is prominent at the time, it will play a more significant role in determining how innovation will affect deterrence. According to Barry Posen, “a grand strategy must identify likely threats to the state’s security, and it must devise political, economic, military, and other remedies for those threats with priorities established for both threats and remedies.”¹¹ For instance, according to Stephen Rosen, during peacetime a strategist needs to consider a twenty to thirty year period, before innovations will take effect.¹² There is no timetable for wartime, since it is impossible to predict how long a conflict will last. History reveals that the side that innovates faster, and is lucky or skilled enough to choose the best strategy, will prevail in time. The same is true with technology. It ebbs and flows with time, and if groundbreaking enough, technology possess the capability to change the status quo.

The second caveat reflects how the US can change the status quo through legal means. The National Defense Authorization Act of 2012 contains section 1043, which provides the annual report on the plan for the nuclear weapons stockpile, nuclear weapons complex, nuclear weapons delivery systems, and the nuclear weapons command and control system.¹³ This section describes in part C, “A detailed description of the plan to maintain, modernize, and replace delivery systems for nuclear weapons.”¹⁴ Since this

¹⁰ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Cornell Studies in Security Affairs) (Stanford, CA: Cornell University Press, 1994), 5.

¹¹ Barry Posen, *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars* (Cornell Studies in Security Affairs) (Ithaca: Cornell University Press, 1894), 13.

¹² Rosen, *Winning the Next War*, 257.

¹³ The Library of Congress, “Committee Reports 112th Congress (2011-2012) House Report 112-329 - Part I,” http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp112c3F00&r_n=hr329p1.112&dbname=cp112&&sel=TOC_1118388& retrieved on March 22, 2014.

¹⁴ The Library of Congress, “Committee Reports 112th Congress (2011-2012) House Report 112-329 - Part I.

is just a plan that has not been approved yet, three more words need adding to this part: 'add to or.' By placing these three key words in the section provides the US an opportunity to add to its nuclear bomber force when the current START expires. The US can modify the language in this area since the current START does not expire for seven more years. The precedent has already been established, when the US backed out of the Anti-Ballistic Missile Treaty in 2002. This provided Russia with the excuse of not honoring the rest of the START II restrictions. The door has been opened for change in this multi-nodal world, so why should the US limit its capability in a bilateral agreement with one country when there are other nuclear powers that continue to seek out better technology that affects nuclear weapons and their delivery systems?

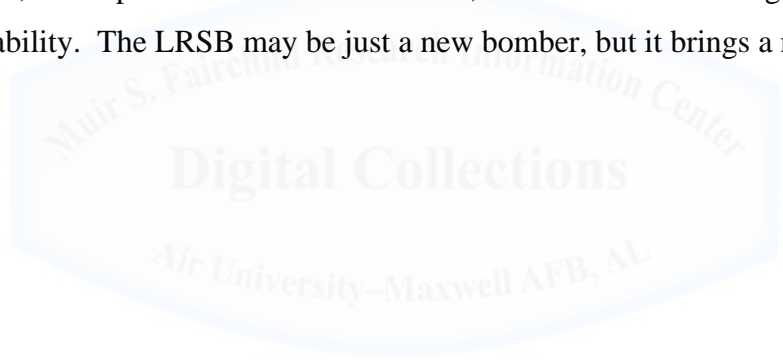
The third caveat deals with the future expiration of the New START that went into effect in 2011. This current version is tied to the Nuclear Posture Review in which the US limited itself to the sixty bomber total. The New START just limited the total warhead status with direction of how to report them.¹⁵ This is another area where the US can be proactive and set a new number of allowable bombers. One easy number to work with is one hundred total bombers without cutting numbers from another leg of the nuclear triad. This caveat is an immense political hurdle to overcome. Change needs to occur, since the world has evolved from a bi-polar environment to a multi-nodal environment and providing assurance to allies while deterring various adversaries requires flexibility.

The fourth caveat considers how well a new technology will enter into and be accepted in an established nuclear culture. Nuclear operations got their start on the coat tails of the bombing campaign successes in World War II. Since the success of conventional operations worked in the past, there is no reason why the LRSB cannot benefit from the success of current operational UAVs. Considering the fact that current UAVs have the ability to drop bombs in ongoing operations, there should not be any difference in an unmanned bomber fulfilling the same role with either payload option. Referencing the assumptions for this paper, there will be resistance from the arms control community; however, moral, ethical, and international differences are left for other

¹⁵ US Department of State, *New START*, <http://www.state.gov/t/avc/newstart/index.htm> retrieved on February 24, 2014.

authors to contemplate. Of course, the LRSB will need its own credibility of operational success, but that can be derived from current operations and the testing phases, before the LRSB becomes operational. For instance, the current triad has never launched a weapon in combat, but it has been tested and exercised extensively. With credibility comes acceptability, in which proven safety and operation records should put peoples' minds at ease of an unmanned aircraft carrying nuclear weapons. At least this unmanned option can be recalled, unlike an ICBM or SLBM after launch.

The US nuclear triad is in much need of an addition. This addition will continue to carry US deterrence into the future, as other countries are trying to counter US strength. According to Colin Gray, "Deterrence leans heavily upon what is recognized as the defender's advantage."¹⁶ The nuclear triad has been that advantage for over fifty-five years. In order to maintain that advantage the US needs to innovate by adding the LRSB to the triad, as the platform becomes available, and without sacrificing any of the current triad capability. The LRSB may be just a new bomber, but it brings a new look to the triad.



¹⁶ Gray, *Explorations in Strategy*, 37.

Bibliography

Books

- Brodie, Bernard. *Strategy in the Missile Age*. New ed. Santa Monica, CA: Rand Publishing, 2007.
- Brugioni, Dino A. *Eyes in the Sky: Eisenhower, the Cia, and Cold War Aerial Espionage*. Edited by Doris G. Taylor. Annapolis, MD: Naval Institute Press, 2010.
- Byman, Daniel, and Matthew Waxman. *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might*. New York: Cambridge University Press, 2002.
- Clarke, Richard A., and Robert K. Knake. *Cyber War: The Next Threat to National Security and What to Do About It*. New York: Ecco, 2010.
- Clodfelter, Mark *The Limits of Air Power: the American Bombing of North Vietnam*. Lincoln: Bison Books, 2006.
- III, Elliott V. Converse. *Rearming for the Cold War: 1945-1960 (1)*. Washington, D.C.: U.S. Department of Defense, 2012.
- Crane, Conrad C. *American Airpower Strategy in Korea, 1950-1953*. Lawrence, KS: University Press Of Kansas, 2000.
- Douhet, Giulio. *The Command of the Air*. Edited by Joseph Patrick Harahan and Richard H. Kohn. Tuscaloosa, AL: University Alabama Press, 2009.
- Gaddis, John Lewis. *The Cold War: a New History*. 0 ed. Lawrence, Kan.: Penguin Books, 2006.
- Gilpin, Robert. *War and Change in World Politics*. Reprint ed. Cambridge: Cambridge University Press, 1983.
- Gray, Colin S. *Explorations in Strategy*. Westport, CT: Praeger, 1998.
- Ikenberry, G John. *After Victory: Institutions, Strategic Restraint, and the Rebuilding of Order After Major Wars*. Princeton Studies in International History and Politics. Princeton: Princeton University Press, 2001.
- Lambeth, Benjamin S. *The Unseen War: Allied Air Power and the Takedown of Saddam Hussein*. Annapolis, Maryland: Naval Institute Press, 2013.
- Lonsdale, David J. *Cass Series--strategy and History*. Vol. 9, *The Nature of War in the Information Age: Clausewitzian Future*. London: Frank Cass, 2004.

- Mearsheimer, John J. *The Tragedy of Great Power Politics*. New York, NY: W. W. Norton & Company, 2003.
- Meilinger, Phillip S. *Bomber: the Formation and Early Years of Strategic Air Command*. Maxwell Air Force Base, AL: Air University, 2012.
- Mitchell, William. *Winged Defense: the Development and Possibilities of Modern Air Power--economic and Military*. Tuscaloosa, AL: Fire Ant Books, 2010.
- Morgan, Patrick M. *Deterrence Now*. New York: Cambridge University Press, 2003.
- O'Brien, Phillips Payson. *Technology and Naval Combat in the Twentieth Century and Beyond*. Portland, OR: Routledge, 2001.
- Olsen, John Andreas, ed. *A History of Air Warfare*. Washington, DC: Potomac Books Inc., 2010.
- Pape, Robert A. *Bombing to Win: Air Power and Coercion in War*. Ithaca, NY: Cornell University Press, 1996.
- Paul, T. V., Richard J. Harknett, and James J. Wirtz, eds. *The Absolute Weapon Revisited: Nuclear Arms and the Emerging International Order*. Revised ed. Ann Arbor: University of Michigan Press, 2000.
- Posen, Barry. *The Sources of Military Doctrine: France, Britain, and Germany between the World Wars*. Cornell Studies in Security Affairs. Ithaca: Cornell University Press, 1984.
- Rosen, Stephen Peter. *Winning the Next War: Innovation and the Modern Military*. Cornell Studies in Security Affairs. Ithaca: Cornell University Press, 1991.
- Smoke, Richard. *National Security and the Nuclear Dilemma: an Introduction to the American Experience in the Cold War*. 3rd ed. New York: McGraw-Hill, 1993.
- Schelling, Thomas C. *Arms and Influence (the Henry L. Stimson Lectures Series)*. New Haven: Yale University Press, 1967.
- Spires, David N. *On Alert - an Operational History of the United States Air Force Intercontinental Ballistic Missile Program, 1945-2011*, Colorado Springs, Colorado: Air Force Space Command, 2012.
- Verhovek, Sam Howe. *Jet Age: the Comet, the 707, and the Race to Shrink the World*. Reprint ed. New York, New York: Avery Trade, 2011.

White Papers

Donley, Michael B., Secretary of the Air Force, US Air Force, Memorandum For Record, June 3, 2013.

National Security Strategy May 2010,
http://www.whitehouse.gov/sites/default/files/rss_viewer/national_security_strategy.pdf retrieved on February 27, 2014.

Secretary of Defense, *Nuclear Posture Review Report*, Department of Defense, Pentagon: US Government 2010.
<http://www.defense.gov/npr/docs/2010%20nuclear%20posture%20review%20report.pdf> retrieved on September 22, 2013

Senate ICBM Coalition, *The Long Pole of the Nuclear Umbrella*, (November 2009), 11
http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/policy/us-nuclear-policy/icbm_coalition_white_paper.pdf retrieved on January 1, 14.

Periodicals

Barnes, Julian E., “Pentagon Toils to Build a Bomber on a Budget,” *Wall Street Journal*, Monday November 4, 2013.

Correll, John T. “The future of the ICBM” *Air Force Magazine* July 1987 Vol 70 No 7
<http://www.airforcemag.com/MagazineArchive/Pages/1987/July%201987/0787icbm.aspx> retrieved on January 1, 14

Huessy, Peter “In Defense of the Nuclear Triad” *Defense One* Oct 18, 2013
<http://www.defenseone.com/ideas/2013/10/defense-nuclear-triad/72242/> retrieved on 28 December 13

Electronic Media

Arms Control Association, *Nuclear Weapons: Who Has What at a Glance*,
<http://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat> retrieved on January 28, 2014.

Arms Control Association, *START I at a Glance*,
<https://www.armscontrol.org/factsheets/start1> retrieved on February 23, 2014

Boeing, *History of B-2 Spirit*, <http://www.boeing.com/boeing/history/boeing/b2.page> retrieved on January 11, 2014

Boeing, *History of B-52 Stratofortress*,
<http://www.boeing.com/boeing/history/boeing/b52.page> retrieved on February 23, 2014.

- CNN, *Nuclear Weapons: Who has What?*,
<http://www.cnn.com/interactive/2013/03/world/nuclear-weapon-states/> retrieved on January 28, 2014.
- Creedon, Madelyn R. *FISCAL YEAR 2013 BUDGET REQUEST FOR ATOMIC ENERGY DEFENSE ACTIVITIES AND NUCLEAR FORCES PROGRAMS*, April 17, 2012.
http://armedservices.house.gov/index.cfm/files/serve?File_id=83ae4594-87b1-4bea-8389-3c030c860e8f retrieved on March 22, 2014,
- Defense News, *Boeing, Lockheed Team on Long Range Strike Bomber*, October 25, 2013.
<http://www.defensenews.com/article/20131025/DEFREG02/310250017/Boeing-Lockheed-Team-Long-Range-Strike-Bomber> retrieved on February 21 2014.
- Department of Defense, *Nuclear Posture Review Report, April 2010*, (Washington DC: Government Printing Office, 2010).
- Faculty Profile System, “Patrick Ma Morgan,”
http://www.faculty.uci.edu/profile.cfm?faculty_id=2456 retrieved on April 23, 2014.
- Federation of American Scientists, *Strategic Arms Reduction Treaty (START II)*,
<http://www.fas.org/nuke/control/start2/> retrieved on March 25, 2014.
- Hatamoto, Michael, Daily Tech, *U.S. Air Force Looks to Develop Long-Range Strike Bomber on a Budget*, November 7, 2013.
<http://www.dailytech.com/US+Air+Force+Looks+to+Develop+LongRange+Strike+Bomber+on+a+Budget/article33696.htm> retrieved on February 21, 2014.
- Holdenried, Joshua “Reduced Nuclear Arms: Slimmer, but Not Smarter,” The Heritage Network, July 16, 2013, <http://blog.heritage.org/2013/07/16/reduced-nuclear-arms-slimmer-but-not-smarter/> retrieved April 17, 2014.
- Kristensen, Hans M. and Norris, Robert S., “Chinese Nuclear Forces 2013,” *Bulletin of the Atomic Scientists*, November 2013 vol. 69 no. 6,
<http://bos.sagepub.com/content/69/6/79.full.pdf+html> retrieved on January 28, 2014.
- Kristensen, Hans M. and Norris, Robert S., “Indian Nuclear Forces 2012,” *Bulletin of the Atomic Scientists*, July 2012 vol. 68 no. 4,
<http://bos.sagepub.com/content/68/4/96.full.pdf+html> retrieved on January 28, 2014.

- Kristensen, Hans M. and Norris, Robert S., “Nuclear Notebook: Pakistan's nuclear forces, 2011,” *Bulletin of the Atomic Scientists*, <http://thebulletin.org/nuclear-notebook-pakistans-nuclear-forces-2011> retrieved on January 28, 2014.
- Kristensen, Hans M. and Norris, Robert S., “Pakistan’s Nuclear Forces, 2011,” *Bulletin of the Atomic Scientists*, July 2011 vol. 67 no. 4, <http://bos.sagepub.com/content/67/4/91.full.pdf+html> retrieved on January 28, 2014.
- Kristensen, Hans M. and Norris, Robert S., “Russian Nuclear Forces 2013,” *Bulletin of the Atomic Scientists*, May 2013 vol. 69 no. 3, <http://bos.sagepub.com/content/69/3/71.full.pdf+html> retrieved on January 28, 2014.
- Lowther, Adam B. “*Should the United States Maintain the Nuclear Triad?*” *Air & Space Journal* – Summer 2010 March 1, 2010. <http://www.airpower.maxwell.af.mil/airchronicles/apj/apj10/sum10/04lowther.html> retrieved on February 28, 2014.
- Mehta, Arron, *Military Times*, *USAF Defends Need for a New Long Range Bomber*, February 20, 2014 <http://www.militarytimes.com/article/20140220/NEWS04/302200038/> retrieved on February 21, 2014.
- National Defense, *B-52 Flies in the Face of Critics*, http://www.nationaldefensemagazine.org/archive/2006/January/Pages/UF_B-525458.aspx retrieved on January 31, 2014.
- North Atlantic Treaty Organization, “*The North Atlantic Treaty*,” April 4, 1949. http://www.nato.int/cps/en/natolive/official_texts_17120.htm retrieved on February 28, 2014.
- Obama, Barack, The White House Office of the Press Secretary, “*REMARKS BY PRESIDENT BARACK OBAMA*,” April 5, 2009 at Hradcany Square Prague, Czech Republic. http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered retrieved on March 4, 2014.
- RIANOVOSTI, *History of START I and START II*, <http://en.ria.ru/world/20090622/155316207.html> retrieved on March 25, 2014.
- The Center for Arms Control and Non-Proliferation, *Fact Sheet: New START and Nuclear Modernization Funding*, http://armscontrolcenter.org/issues/nuclearweapons/articles/fact_sheet_new_start_and_nuclear_modernization_funding/ retrieved on March 22, 2014.

The Library of Congress, “*Committee Reports 112th Congress (2011-2012) House Report 112-329 - Part 1*,” http://thomas.loc.gov/cgi-bin/cpquery/?&sid=cp112c3F00&r_n=hr329p1.112&dbname=cp112&&sel=TOC_1118388 retrieved on March 22, 2014.

The Noble Prize, “Thomas C. Schelling – Biographical,” *Nobleprize.org*, http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2005/schelling-bio.html retrieved on April 23, 2014.

Tirpak, John, *Time to get Started*, Air Force Magazine February 2012, 31
<http://www.airforcemag.com/MagazineArchive/Documents/2012/February%202012/0212time.pdf> retrieved on January 31, 2014.

Trenin, Dmitri, “Russia Reborn Reimagining Moscow’s Foreign Policy,” *Foreign Affairs*, <http://www.foreignaffairs.com/articles/65498/dmitri-trenin/russia-reborn> retrieved on January 28, 2014.

US Department of State, *Comparison of the START Treaty, Moscow Treaty, and New START Treaty*, April 8, 2010. <http://www.state.gov/t/avc/rls/139901.htm> retrieved on February 24, 2014.

US State Department, *New START*, <http://www.state.gov/t/avc/newstart/index.htm> retrieved on January 29, 2014.

US Department of State, *New START Treaty Aggregate Numbers of Strategic Offensive Arms*, January 1, 2014. <http://www.state.gov/t/avc/rls/219222.htm> retrieved on February 24, 2014.

Waltz, Kenneth, “The Spread of Nuclear Weapons: More May Better,” *Adelphi Papers*, Number 171 (London: International Institute for Strategic Studies, 1981)
<https://www.mtholyoke.edu/acad/intrel/waltz1.htm> retrieved April 17, 2014.

Wolf, Amy F. *The New START Treaty: Central Limits and Key Provisions*, Congressional Research Service, January 8, 2014.
<https://www.fas.org/sgp/crs/nuke/R41219.pdf> retrieved on February 24, 2014.

Briefing

Briefing, School of Advanced Air and Space Studies, Lt Gen David Goldfein’s View on Strategy, 18 February 2014.