

NUCLEAR DETERRENCE 2035:
MILLENNIALS INHERITING THE FIGHT

BY

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APPROVAL

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

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ABSTRACT

This study comprises an analysis of the Millennial Generation and how it will impact the future of the nuclear enterprise. The author analyzes the culture of the Millennial Generation to determine how that generational culture could affect the organizational culture of the nuclear enterprise. The study assesses potential trends for nuclear deterrence and applies the analysis of the Millennial Generation to those potential trends. The study's conclusion is that the Millennial Generation will alter the organizational culture of the nuclear enterprise and that the current culture is a legacy of the Strategic Air Command; that culture is ill-suited for today's geopolitical landscape and nuclear enterprise. The concluding section of the study includes suggested further research for training, educating, and guiding the future leaders of the nuclear enterprise so that strategically literate and articulate leaders exist in 2035 to build and employ the next generation of nuclear deterrence.



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Introduction

Millennial Officers: The Future of the Nuclear Enterprise

We knew the world would not be the same. A few people laughed, a few people cried. Most people were silent. I remembered the line from the Hindu scripture, the Bhagavad Gita; Vishnu is trying to persuade the Prince that he should do his duty and, to impress him, takes on his multi-armed form and says, 'Now I am become Death, the destroyer of worlds.' I suppose we all thought that, one way or another.

Robert Oppenheimer, upon seeing
the Trinity detonation in July 1945

There are two inescapable facts facing the United States Air Force (USAF) nuclear enterprise of 2035. First, the bipolar nuclear world of the Cold War has passed, the brief moment of unipolarity in the era that followed is gone, and the world has given rise to a multipolar world that shakes the foundation of years of nuclear deterrence theory. Second, the transition from a unipolar world to a multipolar world is occurring as a new generation of nuclear warriors enters the workforce. Mocked and reviled, that generation, the Millennial Generation, is more complex than what is portrayed in news and social media. This unique generation will be in a position to inherit the USAF nuclear enterprise from their Baby Boom and Generation X predecessors at what could be a critical point in the nation's history. However, this generation has entered the nuclear enterprise at a time of tumultuous change.

The nuclear incidents of the early millennium were an embarrassment for the USAF. In 2007, nuclear weapons were inadvertently flown from Minot AFB, ND to Barksdale AFB, LA, representing a serious breach in protocol. In 2014, the nuclear enterprise made negative headlines again following the release of details related to a cheating scandal at Malmstrom AFB, MT. These incidents reduced both the credibility and influence of the nuclear enterprise as the incidents demonstrated a lack of discipline and security and raised questions regarding the United States' ability to safeguard and utilize its nuclear weapons.

These incidents occurred because of a generational divide within the Air Force. Since the end of the Cold War, the Air Force focused primarily on conventional warfare

against non-peer adversaries and non-state actors. As a result, an entire generation of Airmen that had never experienced the Cold War began to inherit the nuclear expertise at a time of rapid social and geopolitical change. If the mishaps and incidents were the results of a generational divide, it begs the question: how will the next generation, known as the Millennials, influence the nuclear enterprise? Answering this question is important because nuclear weapons are the primary weapon of US global deterrence and a major component of the nation's military power.

The question can be answered by looking at the intersection of organizational culture and generational culture. To comprehend how a single generation can affect the nuclear enterprise, one should examine what is missing from current organizational culture models.

Many authors have written on the topic of organizational culture and how to repair broken cultures. Three authors in particular focus on the military and organizational culture. The first is Stephen P. Rosen, author of *Winning the Next War: Innovation and the Modern Military*. Rosen asserts that organizations are resistant to change from outside sources and tend to suppress mavericks. He notes that organizational innovation in the military comes from "broad structural changes in the security environment in which their organizations would have to fight in the foreseeable future, not by specific capabilities or intentions of potential adversaries."¹ Rosen sees culture, with input from well-respected senior leaders, as driving strategy. In contrast to Rosen's view is Barry R. Posen, author of *The Sources of Military Doctrine*. Posen asserts that a balance of power between political leadership and geopolitical landscape informs doctrine, which in turn, shapes organizational culture.² Finally, Yuen Foong Khong, author of *Analogies at War*, offers a third alternative explanation for how organizational culture interacts with strategy. Khong asserts that historical experience informs doctrine and that doctrine is what shapes the external environment, namely, how the US goes to war.³

¹ Stephen P. Rosen, *Innovation and the Modern Military: Winning the Next War* (Ithaca, NY: Cornell University Press, 1991), 75.

² Barry R. Posen, *The Sources of Military Doctrine: France Britain, and Germany Between the World Wars War* (Ithaca, NY: Cornell University Press, 1984).

³ Yuen Foong Khong, *Analogies at War* (Princeton, New Jersey: Princeton University Press, 1992).

Each of these well-respected authors offers a different view of how organizational culture interacts with the external environment. None of these three viewpoints, however, can fully explain the effect Millennials have on the nuclear enterprise because they overlook the importance of generational culture. What is needed is a framework for incorporating the beliefs and values of generational culture within an organization. By viewing the nuclear mishaps of the early millennium through such a framework, one can see the effect of generational culture and possibly begin to predict how generational culture and historical perspective might influence the nuclear enterprise in the future.

The Millennial Generation may have the moral strength and intelligence of the generations before them; however, their perception of the nuclear enterprise differs from that of their predecessors. This is a generation that came of age after the fall of the Soviet Union and during Operations Iraqi Freedom (OIF) and Enduring Freedom (OEF). How, then, does this different perspective affect the future of the nuclear enterprise?

The characteristics and outlook of the Millennial Generation will affect how future USAF nuclear leaders view the nuclear world and the nuclear enterprise, build strategic plans, employ strategic messaging, and communicate with civilian policy makers. Nuclear deterrence requires two things: the will, both of the nation and of the crew force, and capability to use nuclear weapons. The Baby Boom Generation and Generation X are working now to ensure the capability will endure, but the Millennial Generation will be responsible for ensuring that the will remains through their ability to articulate effectively and clearly the principles of nuclear deterrence to civilian leadership.

This paper seeks to explain to current nuclear enterprise leaders the significance of the Millennial Generation. It offers a view of nuclear deterrence in 2035 framed by three potential future trends in nuclear proliferation, explains how the Millennials may impact that future, and describes what nuclear leaders can do today to grow the Millennial leaders of tomorrow. This is significant because the world is entering a time of increased international uncertainty and the risk of nuclear war is greater than at any time, perhaps, since the early 1950s. USAF leaders should be armed with the knowledge of who their future leaders are and how best to communicate with and mentor them. The USAF has historically postured itself for the wrong fight when preparing for both nuclear

and conventional warfare. In a time when the USAF is focusing on conventional warfare, its leaders must ensure they remind a generation with no direct experience in the Cold War why it is important to maintain the nuclear enterprise. It will take considerable time, effort, and money to grow the next generation of nuclear leaders. However, the USAF can hardly afford not to make this investment if the choices are to spend today and maintain continuity in nuclear leadership or simply let the knowledge and expertise wither on the vine and lose our strategic deterrent capability.

This study will break the problem of future Millennial nuclear leadership into three parts: the next generation, a possible alternative future, and how the next generation may affect and interact with that future. Finally, this study will offer a few recommendations for how to train, educate, and retain the nuclear leaders of the future.

Chapter One will explain who the Millennial Generation is and why they matter. Generation experts refer to generational groups, or cohorts, by a discreet name like “Baby Boom” or “Millennial.” These names help identify and separate the generations from one another. The generations referenced in this paper, however, are defined by their birth year: the Silent Generation, Baby Boom Generation, Generation X, Millennials, and Generation Z. Of these five cohorts, three represent the majority of Airmen serving in the Air Force today. Western news media, including social media, portray the Millennial Generation as spoiled, sheltered, “special,” and, in general, skeptical.⁴ However, as a generation, they are more than their media caricatures. Chapter One explores those traits, describing a generic generational culture, and describes how this grouping of traits will affect Millennials in the workplace.

Chapter Two examines a potential future in 2035, should current global trends continue. This chapter describes three potential trends for the future of nuclear armament: non-proliferation, nuclear disarmament, and nuclear proliferation. This chapter also describes what events and factors are most likely to impact all three trends. Finally, it presents a vision of a world in which non-proliferation is the trend. In comparison, Chapter Three describes how the current trends could diverge. It describes trends towards

⁴ Darlene E. Stafford and Henry S. Griffis, *A Review of Millennial Generation Characteristics and Military Workforce Implications* (Alexandria, VA: CNA, 2008).
Pew Research Center, *Millennials: A Portrait of Generation Next*. *Confident. Connected. Open to Change* (February 2010).

global nuclear disarmament or proliferation and offers events or factors that could lead to either of those potential trends occurring.

Chapter Four marries generational culture with the likely future of 2035. This chapter describes how Millennials' experience will color their perception of events and how they utilize analogies of "their wars" to build a strategy for the "next" war. The Millennials have distant memories of the Cold War and nuclear deterrence theory is of little importance to them as a cohort. Generational characteristics and timing mean that Millennials did not form their adult perspective on the Cold War and the nuclear enterprise during the Cold War. These factors also have a direct impact on the Millennial perspective with regards to nuclear deterrence and the nuclear enterprise. They also reflect the conflict events that shaped the Millennials' formative early adulthood: the events of 9/11, the subsequent wars in both Afghanistan and Iraq, and now the conflict in Syria. They have seen primarily conventional, asymmetric fights against terrorist or extremist groups as well as other non-state actors. The sum of these traits, characteristics, and perspectives is what the author describes as generational culture.

The differences between the Millennials and the Baby Boom or Gen X generations provide a better understanding of the incidents that occurred between 2007 and 2014. The culture that senior leaders attempted to instill within Air Force Global Strike Command (AFGSC) was at odds with the Millennial Generation's values, beliefs, and experience. When AFGSC was activated, senior leaders insisted that AFGSC not be Strategic Air Command (SAC) reborn. However, elements of the post-mortem on the Minot incident pushed not only reorganization but for the reintroduction of the SAC mindset and culture. The culture was wrong for the personnel as well as the geopolitical situation and led to trouble. Five years after AFGSC stood up, the culture of "zero defects," a SAC holdover, begat the 2014 Malmstrom AFB cheating scandal

Following the scandal, the USAF directed an investigation that illuminated many other problems that stem from traditional organizational issues: leadership, doctrine, and strategy combining to create a toxic organizational culture. However, what it lacked is an examination of the cultural divide between generations and the mismatch between the organization's culture and the external geopolitical environment: what worked for SAC does not work today. Two generations of officers above Millennials, however, have

different historical perspectives and cultures. The mismatch resulted in pressure to meet standards that many viewed as inappropriate given major changes in the geopolitical environment since the heyday of SAC.

Finally, Chapter Five will offer suggestions for educating and retaining Millennial officers. It examines the generational culture to highlight points of friction between the culture of Millennials and the culture of the nuclear enterprise. The USAF's current pilot shortage is an example of culture clash that is causing critical manning issues. This chapter offers suggestions for smoothing the friction to retain as many high caliber officers as possible; there will be no leaders in 2035 if they depart the USAF before then.

This work is intended to depict the future of the USAF nuclear enterprise. It advocates for the generation that will inherit that enterprise and offers insight into how this generation can be shaped into the leaders the enterprise will need. The cost is not easy to bear, but the USAF needs to pay the bill.



Chapter 1

Who is the Millennial Generation?

*I don't like my mind right now, stacking up problems that are so unnecessary
Wish that I could slow things down, I wanna let go but there's comfort in the panic
And I drive myself crazy, Thinking everything's about me
Yeah, I drive myself crazy, 'Cause I can't escape the gravity...
I know I'm not the center of the universe, but you keep spinning 'round me just the same*

Linkin Park, *Heavy*

The popular press and media paint the Millennial Generation as sheltered, special, and, in general, skeptical.¹ This portrayal, which helps boost media traffic, ignores many of the positive aspects of the generation. To understand how Millennials will impact the future of the USAF nuclear enterprise, first one must understand who the Millennials are. This chapter will examine the broad traits of Millennials in four parts: characteristics of the Millennial cohort; how they are like their Cold War predecessors; how they differ from their Cold War predecessors; and how events during their adolescence and early adult years impact their view of the world.²

Before analyzing details of the Millennial Generation's characteristics, one should understand some of the basic terminology used when studying a generation or cohort. Generation experts refer to each generation, or cohort, by a discreet name like "Baby Boom" or "Millennial." These names help identify and separate the generations from one another. The generations referenced in this paper are the Lost Generation, Greatest Generation, Silent Generation, Baby Boom Generation, Generation X, Millennials, and

¹ Darlene E. Stafford and Henry S. Griffis, *A Review of Millennial Generation Characteristics and Military Workforce Implications* (Alexandria, VA: CNA, 2008); Pew Research Center, *Millennials: A Portrait of Generation Next. Confident. Connected. Open to Change* (February 2010).

² Substantial portions of this chapter and portions of the following chapters are an expanded version of the author's work, used with permission, previously published by the Center for Strategic and International Studies "Project on Nuclear Issues: A Collection of Papers from the 2013 Conference Series." Maj Kera A. Rolsen. "Nuclear Deterrence: Millennials Inheriting the Fight," Center for Strategic and International Studies *Project on Nuclear Issues: A Collection of Papers from the 2013 Conference Series*, 2014, 194-206.

Generation Z. Each cohort's range of birth years, age as of 2017, and an approximation of his or her stage of life are listed in Table 1 below.

Table 1: Generations and their current stages of life

Generation Name	Birth Years	Age (2017)	Stage of life and work life
Lost Generation	1883 – 1900	117 – 134	Deceased
Greatest Generation	1901 – 1927	90 – 116	Retired, deceased
Silent Generation	1928 – 1945	72 – 89	Retired, “advisor emeritus”
Baby Boom	1946 – 1964	53 – 71	Upper management, first retirement
Generation X	1965 – 1979	38 – 52	Middle, upper management
Millennials	1980 – 2000	17 – 37	First job, middle management
Generation Z	2001 – now	0 – 16	Childhood

Source: Author's Original Work. This table is a conglomeration of data from: Stafford and Griffis, *A Review of Millennial Generation Characteristics and Military Workforce*; Neil Howe and William Strauss, *Millennials Rising: The Next Great Generation* (New York, NY: Vintage Books, 2000); Pew Research Center, *Millennials*.

If one studies the biographies of current USAF senior leaders, one can see the upper ranges of birth years and assign them to generation cohorts. Across the current USAF population, the generation ranges encompass the Baby Boom Generation, Generation X, and the Millennial Generation. (Generation Z is theoretically eligible for military service with a parental signature in 2017 but represents a statistically insignificant number of service members.) Current senior leadership (O-7 and above) in the USAF largely come from the Baby Boom Generation (Boomers), while mid-level leadership (O-4 to O-6) and a handful of general officers come from the Generation X (GenX) population. Junior officers (O-1 to O-3, with some O-4, as of 2017) come from the Millennial Generation (Millennials). Each of these three generational cohorts has distinct social characteristics and outlooks, which require different leadership and mentoring techniques than their predecessors in order to ensure the best possible performance.

The Millennial Generation

The Millennial Generation is distinct from previous generations relative to the concept of nuclear deterrence. To understand how a generation can affect the nuclear enterprise, one must first look at the generation itself and identify what markers distinguish it from its predecessors. For the purposes of this paper, the author describes these markers as “generation culture;” its elements include parental upbringing, history, and experience of world events. Before exploring the generation culture of the Millennials, one must first define the generation’s span.

Various studies on Millennials each define the term “Millennial” somewhat differently; however, there is a consensus that the Millennial Generation includes anyone born between 1980 and 2000 (see Table 1).³ The U.S. Census Bureau reports that there are 84.7 million Millennials in the United States, making them part of the largest generation in U.S. history.⁴ For comparison, the Baby Boom generation was previously the largest generation and currently includes 71.2 million Americans.⁵ As of 2017, the Millennials’ ages span from 17 to 37 years. This age range means that the youngest are either still in school or are at the bottom of the employment ladder while the oldest are, in general, just now entering USAF middle management. As they enter middle management, these older Millennials will begin to influence both civilian and military structures through their generational culture traits.

Birth years are not the only things that define a generation. Claire Raines, noted generation scholar, defines a generation as “a group of people who are programmed at about the same time.”⁶ Raines, as well as Neil Howe and William Strauss, the authors of *Millennials Rising: The Next Great Generation*, all argue that the events, nature of media,

³ There is no single definition of the “Millennial Generation” period; however, researchers generally include anyone born between approximately 1980 and 2000. The primary research focus is on anyone who came of age, or turned 18, during or after the year 2000. This could indicate no earlier than 1982; however, the preponderance of literature includes the year 1980 and 1981 for simplicity’s sake. The three primary sources used in this study are: Stafford and Griffis, *A Review of Millennial Generation Characteristics and Military Workforce*; Neil Howe and William Strauss, *Millennials Rising: The Next Great Generation* (New York, NY: Vintage Books, 2000); Pew Research Center, *Millennials*.

⁴ Stafford and Griffis, *A Review of Millennial Generation Characteristics and Military Workforce Implications*, 28.

⁵ U.S. Census Bureau, “2010 United States Census,” 2010.

⁶ Claire Raines, *Connecting Generations: The Sourcebook for a New Workplace* (Menlo Park, CA: Crisp Publications, 2003), xii.

and popular culture found in the generation's formative years shape each generation's characteristics. Generation characteristics and timing mean that Millennials did not form their own adult perspective on the Cold War. These factors also have a direct impact on the Millennial perspective with regards to the concept of nuclear deterrence. They also reflect the conflict events that shaped the Millennials' formative early adulthood: the events of 9/11, the subsequent wars in both Afghanistan and Iraq, and now the conflict in Syria. They have seen primarily conventional, asymmetric fights against terrorist or extremist groups as well as other non-state actors.

Millennials grew up in an era when parents actively wanted children and considered them precious commodities, with some studies suggesting parents saw them as "trophy children."⁷ Most generation experts agree that the "specialness" and "entitlement" attributes perceived among Millennials as a group stems from being raised in an era of child-focused parenting. This generation grew up in a time where child experts deemed the development of self-confidence as central to their upbringing; everyone "won" a participation ribbon by competing as a team and parents strove to protect their children's growing egos and bodies.⁸ Research shows a direct link between the products marketed to safety-conscious parents of Millennials and a 15-percent decrease in Millennials' teenage death rate from the generation before.⁹ All of these factors led to the Millennials' generational culture and give some insight into how the generation, as a group, will mature.

These generational culture traits have led some to label the Millennials as "entitled;" however, this is not wholly accurate. Societal and personal priorities, along with upbringing, drive their desires. Millennials in general view being a good parent, having a successful marriage, and helping others in need as some of the most important things in their lives.¹⁰ Furthermore, their priorities drive them to seek a balanced lifestyle that includes volunteer work. Eddy S. W. Ng, Linda Schweitzer, and Sean T. Lyons examined Millennials' career expectations and priorities in their study "New Generation, Great Expectations: A Field Study of the Millennial Generation." The study argues that

⁷ Howe and Strauss, *Millennials Rising*, 37.

⁸ Howe and Strauss, *Millennials Rising*, 88.

⁹ Howe and Strauss, *Millennials Rising*, 88.

¹⁰ Pew Research Center, *Millennials*, 18.

while Millennials have realistic expectations regarding career entry positions, they have equally high expectations for upward mobility.¹¹ Additionally, these high career expectations are at odds with their expectations of family life and cause friction between personal and professional priorities. These priorities are demonstrated by their work desires and ethics and are a direct reflection of how “Millennials have reportedly seen their [B]oomer parents work long hours, only to fall victim to corporate downsizing, frequent layoffs, and high divorce rates.”¹² As a result, they have become wary of being put in the same position, and choose ‘making a life’ over ‘making a living.’¹³ Given the culture traits of an average Millennial, one can interpolate that they now have two choices: accept a job with high pay but little room for advancement or choose a lower paying job with great prospects for advancement, which, in time, will result in higher pay.

General Millennial History

For this analysis, Millennials’ view of history is broken into two parts: their general history and their view of history as it relates to the nuclear enterprise. Millennials’ general history illuminates why they are a distinct generation. They are the first generation to grow up with the internet, mobile phones, and Smartphones, making them “tech natives.” Millennials identify their use of technology as the number one factor that differentiates them from previous generations.¹⁴ Research shows that 75 percent of all Millennials use some form of social media, and 59 percent read only online news sources.¹⁵

This generation grew up with the rapid-fire internet news cycle. As children, they may have watched history happen live with the fall of the Berlin Wall, Desert Storm, and 9/11. Consequently, they grew up expecting instantaneous access to world events. As social media grew, so did their reliance on it. Millennials’ use of social media can also be linked to the culture of the generation. They use social media so often because they “rely

¹¹ Eddy S. W. Ng, Linda Schweitzer, and Sean T. Lyons, "New Generation, Great Expectations," *Journal of Business and Psychology* 25, no. 2 (2010): 281.

¹² Ng, Schweitzer, and Lyons, "New Generation, Great Expectations," 282.

¹³ Ng, Schweitzer, and Lyons, "New Generation, Great Expectations," 282.

¹⁴ Pew Research Center, *Millennials*, 5.

¹⁵ Pew Research Center, *Millennials*, 1-35.

on social influencers and networks to make important life decisions.”¹⁶ They feel that social media is an important tool for influencing others, and like their predecessors, “[s]urveys indicate that Millennials seek to change the world around them in the workplace and in social and political arenas.”¹⁷ Millennials have nearly instant access to news and social media streams and they view history as always accessible and ongoing. This dependence on social media is something the leaders of the nuclear enterprise can capitalize on, not just to recruit and retain millennial officers, but also to shape strategic nuclear messaging. By harnessing their knowledge and technological savvy, the USAF can actively involve Millennials in shaping and pushing strategic messages.

Historical: Nuclear Generations

The nuclear enterprise has shaped the nuclear technology, strategy, and policy of America as well as life experiences of all or part of six generations of Americans. The first generations impacted by the nuclear enterprise were the Lost Generation and Greatest Generation during the revolution of modern physics and the genesis of nuclear research and technology in the 1930s and 1940s. These generations built the first-ever nuclear weapons. Both the Silent Generation and Baby Boomer generations established rigid command and control procedures to ensure the safety and effectiveness of the nuclear enterprise during the Cold War. The next nuclear generation was Generation X. Colonel Parker Northrup, USAF, retired, was the 5th Operations Group Commander at Minot AFB, ND directly following the unauthorized nuclear transfer of 2007.¹⁸ He commanded the Group during the tumultuous time following that critical failure in nuclear deterrence and assurance. He notes that his generation of nuclear experts, Generation X, “wrote precious little about nuclear weapons as they were ‘out of fashion’

¹⁶ Stafford and Griffis, *A Review of Millennial Generation Characteristics and Military Workforce Implications*, 2.

¹⁷ Stafford and Griffis, *A Review of Millennial Generation Characteristics and Military Workforce Implications*, 2.

¹⁸ The 2007 Minot incident refers to the events that led to the accidental transfer of six nuclear weapons from Minot AFB, ND to Barksdale AFB, LA. At the time, the empty nuclear missile bodies were being ferried by B-52 from Minot AFB to Barksdale AFB for decommissioning. However, a chain of incorrect procedures from the nuclear weapons storage area to the flightline led to six missiles with warheads still inside being loaded onto the aircraft. The flight crew also missed the presence of the warheads and flew the missiles to Barksdale where they sat undetected and unprotected for several hours before discovery.

for so long.”¹⁹ Several panelists at the 2013 Nuclear Deterrence Summit in Washington, D.C. also noted that the USAF lost an entire generation of nuclear experts because they entered their careers as the Cold War wound down. The end of the Cold War and shift of focus to a string of conventional conflicts degraded knowledge in nuclear weapons, their use, and the best practices for nuclear deterrence and surety. This degradation, over time, created a knowledge gap between generations. This generation gap of knowledge and peer-to-peer information sharing is a factor in recent nuclear mishaps and part of why it is so critical to encourage the development of nuclear experts in the Millennial Generation. Along with the Baby Boomers, Generation X led the nuclear enterprise’s transition out of a Cold War alert mentality into the post-Cold War era. The Millennials began picking up their nuclear duties at the beginning of the millennium and during a significant change in the geopolitical landscape.

The Millennials have seen the shift from a 2001 draft Nuclear Posture Review (NPR) that suggested a first-use policy against a non-state entity to the Obama administration’s policy of maintaining “safe, secure, and effective” nuclear weapons while reducing the arsenal.²⁰ Where the previous generations waged the Cold War against a single superpower, the Millennial Generation has seen wars characterized by asymmetric threats and non-state actors. They have witnessed these things against a backdrop of changing polarity. First, as young children, many saw a bipolar world, in which the only two major actors were the US and the former Soviet Union. Next, after the fall of the Soviet Union, they briefly saw a unipolar world where the US held a geo-strategic nuclear monopoly, with a host of allies under its nuclear umbrella. Now, they face asymmetric threats in a multipolar nuclear world.

The Millennials did not experience the era of nuclear drills, hiding under desks, and Dr. Strangelove. They did not watch the hands of the Doomsday clock tick closer to midnight during the Cuban Missile Crisis. They did not live under the constant fear of a surprise nuclear attack or MAD. Most were children or had not been born by the time the

¹⁹ Colonel (retired) Parker W. Northrup (5th Operations Group Commander, Minot AFB, ND), interviewed by author, 01 May 2014.

²⁰ Department of Defense, *Nuclear Posture Review (2001/2002)*. Washington, D.C.: Department of Defense, 2002.
President Barack Obama, "Remarks by President Barack Obama" (address, Prague, Czech Republic, April 5, 2009).

Berlin Wall fell. Most importantly, this generation was not able to understand the magnitude of the drastic change in world politics brought about by the end of the Cold War as it was not part of their adult experience. Howe and Strauss's *Millennials Rising: The Next Great Generation* provides a good example of what the high school class of 2000 found important. In their survey of that class, the Columbine shooting was the event that made the biggest impression on the class while the fall of the Berlin Wall ranked a paltry ninth place behind the O.J. Simpson trial and Monica Lewinsky scandal.²¹ Because they came of age after the end of the Cold War, Millennials have little experience with nuclear history to relate to their predecessors.

Possibly the simplest way to illustrate the difference between generations is to compare what life milestones Millennials experienced in relation to nuclear and security history over the last 30 years. Figure 1 depicts some of the milestones in the life of an early Millennial (born in 1982) compared to the historical events in the nuclear timeline. He would have been born shortly before the North Atlantic Treaty Organization (NATO) Able Archer exercise, an event that brought the US and USSR closer to a nuclear exchange than they had been since the Cuban Missile Crisis.²² He would begin elementary school shortly before President Ronald Reagan's famous "Mr. Gorbachev, tear down this wall" speech in what was then West Berlin. Around the time, that Millennial might have been entering pre-adolescence, the United States was going to war in Iraq and the USSR was dissolving, effectively ending the Cold War and changing the nuclear enterprise. From the dissolution of the USSR until Operation Shakti in 1998, a series of nuclear tests in India that resulted in the nation declaring itself a nuclear nation, he would have lived in a unipolar world, a world in which the US was the only superpower. However, around the time he might have been studying for a driver's license test, India would be testing nuclear weapons, reminding the world that the US was not the only nation with nuclear weapons. This would begin a nuclear arms race between India and Pakistan, neither of which would sign on to the Non-Proliferation Treaty (NPT). He would have become an adult, turning 18 in 2000, only to witness the events of 9/11 the

²¹ Howe and Strauss, *Millennials Rising*, 19.

²² Benjamin B. Fischer, "A Cold War Conundrum: The 1983 Soviet War Scare," Central Intelligence Agency, 19 March 2007, <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/a-cold-war-conundrum> (accessed 15 Aug 2013).

following year. He would have spent the first few years of his formal adulthood taking part in or watching Operations ENDURING FREEDOM and IRAQI FREEDOM live on television. He would then have seen “Support the Troops” Facebook pages and viewed news updates on Twitter. Around the time he may have been falling in love and getting married, the unauthorized transfer of nuclear warheads from Minot AFB, ND to Barksdale AFB, LA was undermining American trust in the nuclear enterprise’s ability to safeguard its weapons.

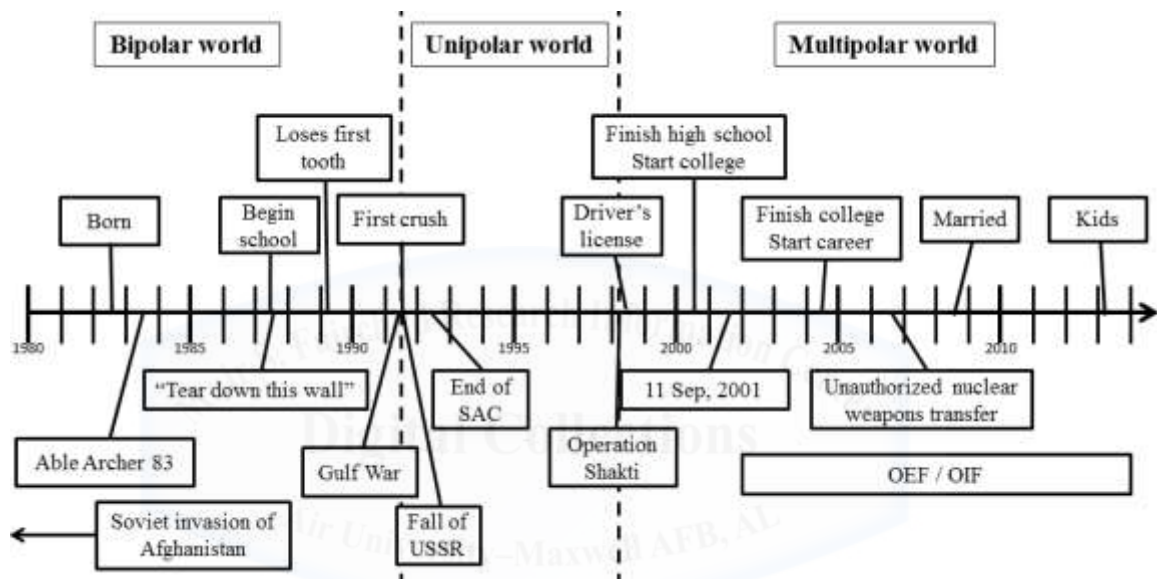


Figure 1: Millennial life versus world events

Source: Author's Original Work

Current Nuclear History

Millennials did not live and breathe the constant threat of Soviet nuclear attack like their Cold War forbearers and, therefore, have difficulty comprehending what it is like to live under that kind of looming threat. Many Millennials feel that nuclear weapons are an inconvenient relic of a by-gone era that they must now pay to maintain. This opinion is derived from an amalgamation of several articles on Millennials and nuclear weapons. It is of note that these articles are slanted towards nuclear disarmament, but pro-nuclear writing from the Millennial Generation is scarce. One can intuit from these articles, however, that in general, the US Millennial Generation is not well educated on

the topic and much of the generation's anti-nuclear stance comes from a lack of knowledge about nuclear weapons and their uses.²³

The Millennial Generation's impression of the nuclear enterprise was influenced by two important world events: the events of 9/11 and the subsequent wars in Iraq and Afghanistan. While the attack on 9/11 did not result in a nuclear exchange, the 9/11 Commission Report acknowledged that Al-Qaeda was actively looking for nuclear material.²⁴ Given the policy that was later seen in the 2001/2002 NPR and the draft Joint Publication (JP) 3-12 *Doctrine for Joint Nuclear Operations*, the United States would have responded in kind, despite the attack coming from a non-state actor.²⁵

In his 2009 address in Prague, President Barack Obama stated, "The threat of global nuclear war has gone down, but the risk of a nuclear attack has gone up."²⁶ Many Millennials do not believe nuclear weapons will be expended operationally during their lifetime, but they understand that nuclear weapons will be used as a deterrent. The taboo of nuclear weapons use is so great that most Millennials do not fear a nuclear exchange between superpowers.²⁷ However, they do understand how nuclear weapons can be used for strategic messaging between both superpowers and emerging nuclear nations. They know that nuclear weapons do not have to be detonated to be useful. However, only 39 percent of Millennials believe that peace is best achieved through military strength. In comparison, 45 percent of Generation X, 55 percent of Baby Boomers, and 60 percent of the Silent Generation agreed that peace was best achieved through military strength.²⁸ Millennials also understand that while an exchange between superpowers is unlikely,

²³ Bulletin Staff, "What do millennials have to say about nuclear weapons?," short film, <http://thebulletin.org/multimedia/what-do-millennials-have-say-about-nuclear-weapons> (accessed 28 March 2017); Lisa Perry, "Nuclear Weapons And Millennials," interviewed by National Public Radio, <http://wvik.org/post/nuclear-weapons-and-millennials#stream/0> (accessed 28 March 2017); Maryam Shahraki, Selim Can Sazak, and Beenish Pervaiz, "Millennials on the next nuclear generation," *Bulletin of the Atomic Scientists*, <http://thebulletin.org/millennials-next-nuclear-generation> (accessed 28 March 2017).

²⁴ *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States* (New York: Norton, 2004).

²⁵ *Nuclear Posture Review (2001/2002)*.

Joint Publication 3-12, *Doctrine for Joint Nuclear Operations (Final Coordination 2)*, 15 Mar 2005. Note: this was a draft document that was never published. The 2010 NPR replaced the document and added more stringent restrictions on when the US would order a nuclear strike. The "JP 3-12" has subsequently been replaced as the *Cyberspace Operations Joint Publication*.

²⁶ President Barack Obama. "Remarks by President Barack Obama."

²⁷ Pew Research Center, *Millennials*, 76.

²⁸ Pew Research Center, *Millennials*, 78.

there is always the possibility of a random actor (e.g. - rogue nation, non-state actors, or terrorist group) using a nuclear weapon or a weapon that replicates its effects. Advances in technology now allow many of the effects of a nuclear weapon to be unleashed without a nuclear detonation: extremely large blast weapons, weaponized electromagnetic pulses (EMP), high-powered microwave devices, and cyber-attacks that potentially destroy or deny municipal services across a large population. Strategic deterrence no longer means deterring with or against the threat of nuclear weapons use; it means deterring any weapon or effect with the broad destructive power comparable to that of a nuclear weapon.

The Millennial Generations' rise in the USAF nuclear enterprise is imminent and inescapable. This generation will inherit senior leadership positions within and relevant to the USAF nuclear enterprise of 2035 and their unique generation culture will directly impact how they lead it. If this generation can understand the significance and impact of their careers on nuclear deterrence and see it as a critical aspect of the military's role in the nation, they will take on this mantle with gusto. However, without guidance and motivation from their leadership, rooted in previous generations, they will likely lack the willpower and fire that is needed to lead the enterprise and clearly articulate the mission to civilian leaders.

Chapter 2

Non-proliferation

We seek the total elimination one day of nuclear weapons from the face of the Earth.

Ronald Reagan, Inaugural Address, 1985

An educated reader understands that in 20 years the way in which the world relates to and thinks about nuclear weapons will change.¹ Perhaps it will not be as drastic as the shift in thinking between the end of the Cold War and today, but time will erode the foundation of Cold War nuclear deterrence that was built in a bipolar nuclear world, and it will likely be significant enough that the current theories of strategic deterrence will be outdated and unusable. In the 25 years that have passed from the end of the Cold War until now, the US has seen a shift in the nature and number of its nuclear adversaries and has struggled to modify its doctrine to catch up with this change. Likewise, any potential changes to the nuclear world will require shifts in doctrine and in the education of the people capable of creating, sustaining, and implementing that doctrine. Therefore, one must understand what future trends are possible as well as the ways in which these trends are similar and different. With that information, one can conceptualize what training, skills, and mindsets the nuclear expert of 2035 must possess in order to lead the USAF nuclear enterprise.

First, the reader must understand the assumptions in place. First and foremost, this thesis only considers a period of 20 years into the future. There is a limited amount of change that can occur in that time frame, short of a catastrophic event. Next, given the descriptions of non-proliferation, nuclear disarmament, and proliferation, one should view the international system as anarchical. All nuclear armed nations will continue to act in their own self-interest, obeying international laws and restrictions as they currently exist but willing to break those laws if faced with an existential threat. Nations will continue to seek nuclear weapons for power, prestige, and resources. Additionally, the three nuclear superpowers, US, Russia, and China, will still exist as the same political

¹ All described future modeling and predictions are solely the opinion of the author and do not represent the opinion of the USAF.

entities they currently represent: no major changes in their respective systems of governance will occur in the next 20 years. Finally, nuclear deterrence will still be considered the actions of one nation that prevent the nuclear actions of another nation. This has been done through a combination of all instruments of national power: diplomatic, information, military, or economic, with the focus of this thesis on the military instrument of power. For the purposes of this thesis, nuclear deterrence should be viewed as generally ineffective against a non-state actor as the instruments of power cannot be directly leveraged against them, only indirectly.

Three Potential Trends

There are three potential future trends that could culminate in 2035: non-proliferation, nuclear disarmament, and proliferation. Non-proliferation is the current trend in nuclear relations, a theory that assumes that by halting proliferation, there will be fewer nations to deter and greater assurance against nuclear war; possibly leading to greater international security. There are also two trends on either side of the non-proliferation line: global nuclear disarmament and proliferation. These two trends oppose one another and are divergences from the non-proliferation trend. There are myriad things that would influence each of these futures. These potential futures can be viewed as an ever-widening path. As time progresses, events in the future will shift the trend line away from the current non-proliferation trend. The further into the future the line goes, the more potential there exists for events that can shift the line.

Before describing the three potential trendlines, one must understand the basics of each. The non-proliferation trend implies that states who are signatories of the NPT will refrain from creating or acquiring nuclear weapons and work to keep others from acquiring them as well. In both the short term (less than 20 years) and long term (greater than 20 years) this trend would promote a relatively stable and secure international nuclear environment. All NPT signatory states rely on agencies like the International Atomic Energy Agency (IAEA) to monitor each nuclear nation and the nations who might seek to acquire nuclear weapons. The threat of sanctions and censure from the international community are tools that can be employed against those who violate commitments under the NPT or who otherwise go rogue.

Next, nuclear disarmament would lead to a world in which there are no nuclear weapons. This means that all nations would be completely free of nuclear weapons and agree not to build or utilize them again. One could argue that this would produce the most inherently stable of the three futures related to nuclear war; however, the reader should understand that a significant shock to the system would have to occur for this to happen. In the current anarchical international system, nuclear weapons are more than just a offensive or deterrent weapon; they are also a representative symbol of national power. It is for that reason nations like Iran and North Korea will continue to seek these weapons. It is also for this reason that the US and Russia are unlikely to give up their stockpiles willingly.

The nuclear disarmament trend is not completely unachievable and there are examples of it in the last century. Several former Soviet republics possessed nuclear weapons inherited from the defunct Soviet Union: Belarus, Kazakhstan, and Ukraine. All three nations voluntarily disarmed, relinquishing their weapons to Russia, legal successor to Soviet obligations under many treaties and agreements. The three nations also all eventually signed the NPT.² While these nations could have maintained the weapons for political leverage, the risk due to instability was far greater. Additionally, these weapons are expensive to develop and maintain, a difficult proposition in the wake of the collapse of the Soviet command economy. It is worth noting that Ukraine's decision to give up their nuclear arsenal under the terms of Budapest Memorandum on Security Assurances may not have been in their favor. Essentially, the non-Ukrainian signatories of the Budapest Memorandum reaffirmed Ukrainian sovereignty after they signed the NPT and gave up its weapons. It also gave assurances that the UK, US, and Russian would not employ "use of force against the territorial integrity or political independence of Ukraine, and that none of their weapons will ever be used against Ukraine except in self-defense."³

² Federation of American Scientists, "Belarus Special Weapons." Belarus Special Weapons. Accessed 30 Jan 2017: <https://fas.org/nuke/guide/belarus/index.html>.

Federation of American Scientists, "Kazakhstan Special Weapons." Kazakhstan Special Weapons. Accessed 30 Jan 2017: <https://fas.org/nuke/guide/Kazakhstan/index.html>.

Federation of American Scientists, "Ukraine Special Weapons." Ukraine Special Weapons. Accessed 30 Jan 2017: <https://fas.org/nuke/guide/Ukraine/index.html>.

³ United Nations, "Budapest Memorandums on Security Assurances, 1994," United Nations document A/49/765, 1994. Accessed 20 April 2017: <http://www.cfr.org/nonproliferation-arms-control-and-disarmament/budapest-memorandums-security-assurances-1994/p32484>.

After the Russian Federation annexed Crimea in 2014, one would wonder if that would have occurred had Ukraine retained the nuclear weapons in their possession.

In addition to the FSU nations, South Africa also completed voluntary nuclear disarmament. In this case, the country enhanced its international standing, albeit for different reasons from the FSU nations. South Africa began voluntary nuclear disarmament in 1989, signing the NPT in 1990, and announcing their complete weapons disassembly in 1993.⁴ This was a political move designed to enhance regional stability but also to increase the country's international reputation. The disarmament occurred as the nation transitioned from apartheid rule and was complete on 19 August 1994. This date is important because it was only four months after the April election in South Africa that allowed universal suffrage, the effective and symbolic end of apartheid policy.

The final consideration regarding nuclear disarmament is that the technology for nuclear weapons has already been discovered and cannot be unlearned. Even executing every chemist, physicist, and nuclear engineer would be insufficient. One would have to destroy every lab that was ever capable of discovering the secrets of nuclear technology and atomic sciences, then hope that human curiosity withers and dies, so that no one ever thinks to develop this technology again. Given that there are individuals still trying to discover the secrets of Greek fire dozens of centuries after its last use on Byzantine warships, this too seems unlikely. The human desire for knowledge means that nuclear weapons, their technology, and the knowledge required to create and maintain them are likely here to stay.

Proliferation, contrary to disarmament, is defined as the spread of nuclear arms to nations that did not previously possess them. Nuclear deterrence expert Kenneth Waltz argues that a slow spread of nuclear weapons enhances international stability.⁵ He argues that in an anarchical international system, states that possess nuclear weapons for self-defense build stability as the situation makes nuclear nations more cautious. Additionally, he notes that a nation that acquires nuclear weapons will feel the constraints on those

⁴ Frank V. Pabian, "South Africa's nuclear weapon program: Lessons for U.S. nonproliferation policy," *The Nonproliferation Review* 3, no. 1 (1995): 1-19, <https://www.nonproliferation.org/wp-content/uploads/npr/31pabian.pdf>.

⁵ Scott Sagan and Kenneth Waltz, *The Spread of Nuclear Weapons: An Enduring Debate*. Third ed. (New York, NY: WW Norton and Company, 2013), 4-40.

weapons that current nuclear armed nations experience, making the system more stable. However, Waltz's assertions are based on a slow proliferation of nuclear weapons. One should note, however, that Waltz does not define "rapid" or "slow" in terms of nuclear weapons per year or per nation. His assertion is that a gradual spread is relative, not absolute. Waltz notes that instability comes from an exponential increase in links between nuclear nations. For example, if two nations have nuclear weapons, there is one link between them. If three nations possess nuclear weapons, there are three links between the three nations; four nations can create six links; and five nations equal ten links between nations.

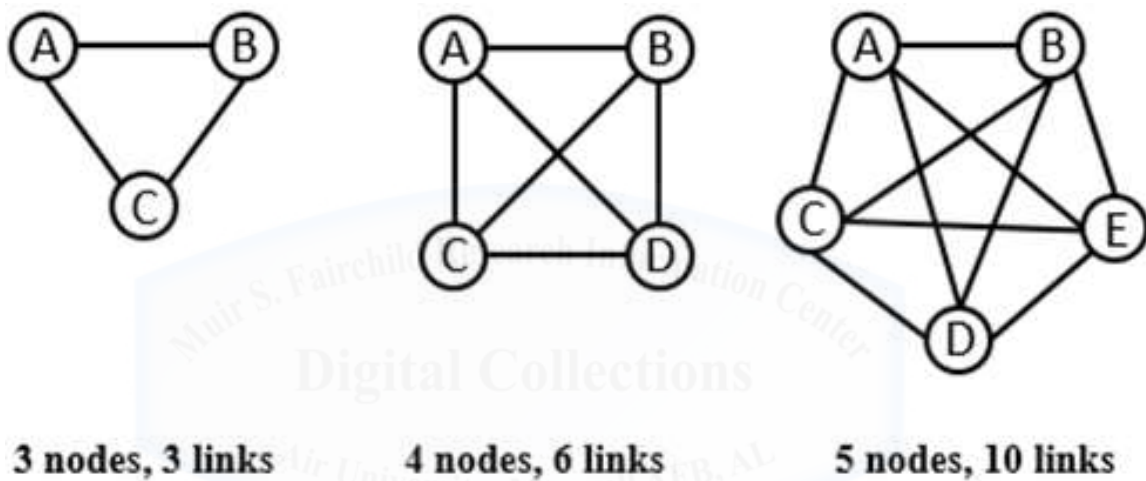


Figure 2: Nodes and links

Source: Author's Original Work

Should proliferation occur rapidly, the uncertainty of many nations or one perceived as unstable acquiring nuclear weapons in a short time span is likely to decrease stability. The counter to Waltz's argument comes from Scott Sagan who notes that more weapons create an environment that is inherently less stable. He argues that as the number of weapons increases so does the risk of a nuclear accident.⁶ Waltz does not cover the effects of a non-state actor acquiring nuclear weapons. In this case, it would decrease stability over both the short and long term. In the end, stability and security will be subject to nation states keeping their own stockpiles secure and keeping non-state entities from acquiring nuclear weapons.

⁶ Sagan and Waltz, *The Spread of Nuclear Weapons*, 72-80.



Non-Proliferation

To begin, this thesis will examine further the non-proliferation trend and lay out some events and factors that will apply to all trends. Overall, the trends will be affected by the physical environment, the geopolitical environment, and the state of the US nuclear arsenal. One should see these three factors not as discreet influences but as interconnected.

Physical Environment

The geopolitical environment in 2035 will be affected by many factors, but there are a few that will stand out as they relate to nuclear weapons. One is global competition for resources and the friction among states it creates. If global temperatures continue to rise, deserts could expand and seas rise, decreasing arable land. The increase in the global population could also diminishes arable land as populations push the boundaries of cities into what was previously farmland.⁷ As arable land decreases, so would the global food supply.⁸ Twenty years are sufficient to lose 240 million hectares of arable land to drought and desertification alone, or roughly 400 million tons of grain production over that period.⁹ This equates to roughly 20 million tons per year. For reference, the world produces 815 million tons of wheat alone each year.¹⁰ The loss would be minor at first, but even as the arable land is lost, populations will continue to expand, increasing the land loss rate each year. In 20 years, the loss is not likely to be significant enough for nations to go to war over food supplies or genetically modified crops but it could increase the tension globally, and it is plausible to assume that it could cause them to enter a conventional conflict. Based on population size and already existing conflicts over fresh water, this conflict is most likely to appear between India and China first. Any conflict between nations that possess nuclear weapons will generate discussion on the doctrine dictating their use. This will affect how nations interact in all aspects of national power.

⁷ Minghong Tan, et al., "Urban Land Expansion and Arable Land Loss in China—A Case Study of Beijing–Tianjin–Hebei Region," *Land Use Policy*, volume 22 no. 3 (July 2005): 187–196.

⁸ United Nations Convention to Combat Desertification, "Desertification Land Degradation & Drought (DLDD) - Some Global Facts & Figures,"

<http://www.un.org/en/events/desertificationday/background.shtml> (accessed 07 Dec 2015).

⁹ United Nations Convention to Combat Desertification, "DLDD - Some Global Facts & Figures."

¹⁰ Food and Agriculture Organization of the United Nations, "World Food Situation," <http://www.fao.org/worldfoodsituation/csdb/en/> (accessed 03 May 2017).

The second environmental factor that could influence the geopolitical environment is the availability of and accessibility to Arctic energy resources. Currently, the US has only five icebreakers, ships whose hulls are hardened to withstand breaking through thick ice, while Russia has forty, with an additional six under construction, and China has one.¹¹ Before, this meant that only three of the nuclear-armed nations possessed any capability to reach deep into the Arctic by ship, let alone explore for or extract oil. However, over the past 50 years, polar ice has both thinned and shrunk by 50 percent.¹² The oil-rich seabed beneath the Arctic ice cap is now more accessible than ever, opening an opportunity for a gold-rush type scramble for resources. It would not be a stretch of the imagination to see nations extend their economic exclusion zones (EEZ) through the tricks and lawfare currently seen in the South China Sea. In fact, the precedence for trying to expand these EEZs was set in 2007 when Russia planted a flag on the seabed near the North Pole in an attempt to lay claim to the resources beneath.¹³

Legal, and some possibly illegal, maneuvering for advantage is to be expected, especially over an area rich in natural resources; however, one must consider the broader impact if the region is to become more accessible to more nations. Like the South China Sea, one nation taking unilateral action to claim resources will cause friction among the other nations who could lay a legitimate claim in the area. Currently, five nations can lay claim in the Arctic Ocean: the US, Canada, Norway, Russia, and Denmark. By law, each can claim a 200 NM EEZ and the rest of the territory is considered high seas by international law. Currently, the northernmost landmass claimed by Russia is still more than 560 miles from the North Pole, meaning their 200 NM EEZ does not extend to it. Should Russia try to physically claim the area in the vicinity of their “planted” flag as Russian territory, this would greatly expand their EEZ.

It seems inconceivable to think any of the five nations would go to war over oil in the Arctic, but the physical environment is only one factor in the international setting of 2035. Therefore, while the environment and its changes may not directly impact non-

¹¹ United States Coast Guard, “Major Icebreakers of the World,” 26 June 2014, <https://www.uscg.mil/hq/cg5/cg552/images/20140626%20Major%20Icebreaker%20Chart.pdf> (accessed 30 January 2017).

¹² Lance M. Bacon, “Ice Breaker,” *Armed Forces Journal*, 01 March 2010, <http://armedforcesjournal.com/ice-breaker> (accessed 30 January 2017).

¹³ Bacon, “Ice Breaker.”

proliferation, disarmament, or armament, it will add to the decision calculus of the leaders of 2035. One can think of the physical environment as the bones on which the meat of the non-proliferation argument lies.

Geopolitical Environment

The geopolitical environment is arguably the most crucial factor in what nuclear deterrence and proliferation look like in 2035. The interplay of national actors is the stage on which nuclear deterrence plays out. That stage is set by three major factors and one uncertainty. The three major factors are treaty status, US leadership, and the alliances formed around nuclear weapons. The uncertainty is the role of non-state actors in nuclear deterrence.

The current trend of non-proliferation is based on general trends that have emerged since 1991. Since then, US policy makers and military leaders have taken measures to ensure their nuclear weapons are safe, secure, and reliable and that US nuclear policy matches the global geopolitical environment, even if the organizational cultures do not. The ultimate result of this trend was the New Strategic Arms Reduction Treaty (New START), ratified by the US Senate on 2 February 2011. New START reduced the number of deployable nuclear warheads held by both the US and Russia.¹⁴ This was in line with President Barack Obama's nuclear vision for a stable and steady reduction in nuclear arms during his two terms in office and was a powerful symbol in the US strategic narrative and messaging. It also continued the trend set by Strategic Offensive Reductions Treaty (SORT) and was preceded by treaties START I (1994), II (2000), and III (negotiated in 1997 but never implemented). Each of these treaties aimed to reduce the number of nuclear weapons until both nations reached a level of total nuclear disarmament. However, these treaties represented very small reductions in the number of deployed weapons and did not include the inactive ones, leaving the US and Russia with 7,000 and 7,300 weapons respectively. For comparison, the next largest nuclear stockpile belongs to France, with 300 nuclear weapons.¹⁵

¹⁴ US Department of State, "New START," Under Secretary for Arms Control and International Security, <https://www.state.gov/t/avc/newstart/index.htm> (accessed 01 Jan 2017).

¹⁵ Federation of American Scientists, "Status of World Nuclear Forces," <https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/> (accessed 01 Jan 2017).

Based on the implementation of these treaties, the baseline trend from now until 2035 can be understood as one of non-proliferation for the five NPT recognized nuclear weapons nations. The trend line should see a slow yet continuous reduction of nuclear weapons between the US and Russia with minimal reductions at all from the other three nuclear nations recognized in the NPT: France, China, and the United Kingdom. Furthermore, the three non-signatory nations of the NPT (Israel, India, Pakistan) that have or are presumed to have nuclear weapons will also likely maintain their stockpiles at current or higher levels. Finally, one can assume that North Korea will continue attempting to expand its nuclear arsenal slowly, increasing both the number of warheads and deploying a viable delivery vehicle.

Another factor affecting not just the quantities, but the types of stockpiled weapons as well will be the state of treaties in 2035. The most relevant treaties affecting nuclear weapons are the Comprehensive Test Ban Treaty (CTBT), the NPT, and the New START Treaty. Each treaty presents a unique problem for the US. The US has signed, but not ratified, the CTBT, meaning that the US currently abides by the stated rules but is not technically bound by them. Those rules mean the US cannot conduct tests that detonate nuclear warheads, that it is charged with prohibiting and preventing nuclear explosions in areas under its control, and that it must refrain from causing or encouraging nuclear detonations.¹⁶ This treaty is what currently drives the US to test its nuclear arsenal only in constituent parts rather than as a unit. This leads to some question of weapon reliability, eroding the credibility of America's nuclear deterrent.

As the US arsenal, both weapons and delivery platforms, continue to age, this will only become more of a burden on the country. The youngest of the venerable B-52 bombers will be 74 years old in 2035. The US has not only aging aircraft long overdue for replacement but also aging weapons, some which are years beyond the original life expectancy. The W80 warhead, designed in 1976 and produced in 1981, is 36 years old, the same age as the early Millennials. If one imagines the difficulty that comes from keeping a 36 old car in drivable condition, one can begin to understand the difficulties associated with keeping the W80 in service. These weapons will eventually need to be

¹⁶ CTBTO Preparatory Commission, "Comprehensive Nuclear-Test-Ban Treaty CTBTO," <https://www.ctbto.org/the-treaty/treaty-text/> (accessed 08 Dec 2015).

replaced; which will, in turn, require testing of the new weapons. Modern technology is far superior to that which built the original weapons, but some might be leery of a nuclear weapon design that enters active service without ever having been detonated. This means that the nuclear leaders of the future will be driven to either convincing their political leaders that they must break from their long-standing compliance to the CTBT or accept the risk of deploying an untested nuclear weapon design.

The second treaty that has a great effect on the US is the New START. Designed to draw down the arsenals of the US and Russia, it is set to expire in 2021 at the earliest, but possibly as late as 2026. Given Russian President Vladimir Putin's current posture in Russia, it seems possible that Moscow will decline to renew New START or agree to a similar treaty. A drastic change in leadership could have effects upon the state of nuclear treaties between the US and Russia. If the US and Russia choose to continue honoring New START or something similar, it is likely that they will keep their arsenals at the prescribed levels but branch into a variety of types and yields based on President Putin's recent threats of nuclear aggression in Syria¹⁷ and Turkey.¹⁸ If neither country's leader elects to renew, it is most likely that each nation will maintain the newest of their weapons, add multi-yield variety, and only eliminate their current weapons when absolutely required.

As seen with the treaties affecting nuclear weapons, the perspective and opinions of a nuclear nation's leader have a wide-ranging impact on how that nation seeks to deter others. One must only look at history to see the impact a single leader can have on nuclear deterrence. From President John F. Kennedy's handling of the Cuban Missile Crisis to President Ronald Reagan's sweeping nuclear policy changes, an American President can shape the global politics of nuclear deterrence. At the time of this writing, the US stands on the knife edge of foreign policy: the current trend of non-proliferation is

¹⁷ Natalia Antonava, "Threatening Nuclear Weapons in Syria is Putin's Attempt to Get Russia Treated Like a Superpower Again," *International Business Times*, 09 Dec 2015, <http://www.ibtimes.co.uk/threatening-nuclear-weapons-syria-putins-attempt-get-russia-treated-like-superpower-again-1532600> (Accessed 14 Mar 2016).

¹⁸ Precious Silvia, "Vladimir Putin Readies Tactical Nuclear Weapons Against Turkey," *Morning News USA*, 25 Feb 2016, <http://www.morningnewsusa.com/vladimir-putin-readies-tactical-nuclear-weapons-turkey-source-2359908.html> (accessed: 14 Mar 2016).

a thin line of possibility from which President Donald Trump could easily move away towards either proliferation or disarmament.

President Obama's two terms in office opened with the rhetoric and strategic messaging that indicated he wanted to move the US toward total nuclear disarmament. He was nominated for and subsequently won the 2009 Nobel Peace Prize, ostensibly for his disarmament comments on the campaign trail. In a speech he gave after official notification that he had won the prize, President Obama marked his win as "an affirmation of American leadership on behalf of aspirations held by people in all nations."¹⁹ He continued to work towards his stated disarmament goals of nuclear disarmament, and while he made some progress, he by no means dismantled the system during his eight years in office. Upon departing, President Obama's legacy consisted of the ratification of New START and a shift in nuclear posturing. The 2010 National Security Strategy (NSS) reflected his 2009 comments in Prague but also shifted language from countering terrorism to countering violent extremism and insurgency, one of the uncertainties confronting nuclear deterrence theory in 2035. President Obama's 2015 NSS reflects a continuation of the 2010 NSS but adds the "pivot to the Pacific" and the Islamic States in the Levant (ISIL) in Iraq and the Islamic States in Syria (ISIS) as points of national strategic focus.²⁰ However, both of these strategic documents retain the US objective of maintaining regional stability in multiple regions to support global security.

One of the final acts of the Obama administration was the execution of the Joint Comprehensive Plan of Action, or colloquially "the Iran Deal." The deal theoretically limits Iran's ability to build a nuclear weapon. The limitations in place should keep Iran from having the equipment and materials necessary to build a nuclear weapon while lifting some of the sanctions placed on them due to their desire for nuclear weapons.²¹

¹⁹ Barack Obama, speech, 09 Oct 2009.

²⁰ *National Security Strategy*, White House, February 2015.

²¹ "The Historic Deal that Will Prevent Iran from Acquiring a Nuclear Weapon," The White House: <https://obamawhitehouse.archives.gov/issues/foreign-policy/iran-deal> (accessed 30 January 2017). Richard Nephew, Joe Brazda, "The Iranian Nuclear Deal – Myths and Misinformation," lecture, Middlebury Institute of International Studies at Monterey, <http://www.nonproliferation.org/the-iranian-nuclear-deal-myths-and-misinformation/> (accessed 02 January 2017).

"Based on Breakout Timelines, the World Is Better off with the Iran Nuclear Deal than without It," The Brookings Institution (17 July 2015): <http://www.brookings.edu/blogs/markaz/posts/2015/07/17-iran-breakout-nephew> (accessed: 07 December 2015).

Now the US and the world stands at a turning point in nuclear deterrence. The US has elected a president whose vision of nuclear deterrence is unclear and confusing. President Donald Trump's strategic messaging has been wildly erratic, coming both from Twitter messages and more official sources like White House press briefings. Since winning the US election in November of 2016, President Trump has been vocal about his opposition to the Iran deal. He took to Twitter to express his dismay over the "horrible deal," expressing his frustration with the pact and with the United Nations in general.²² This message was a first step towards setting a vision of foreign policy as it relates to nuclear weapons. However, during his 2016 campaign, he vacillated between being in favor of non-proliferation and stating that he "might support Japan or South Korea developing nuclear weapons," sometimes stating both views within the same interview.²³ He went on to further elaborate his vision of the US nuclear enterprise by stating that "[t]he United States must greatly strengthen and expand its nuclear capability until such time as the world comes to its senses regarding nukes."²⁴ Based on the previous commentary, this could mean shoring up the current aging arsenal. However, it could also be strategic messaging that builds on a narrative that the US is willing to add weapons, both in types and numbers, to the nuclear arsenal. Without a clear presidential vision from a NPR or NSS, one must make logical assumptions about the president's nuclear vision at least until the expiration of New START. One can infer from his commentary that he will continue the trend of non-proliferation, neither adding to nor removing from the US nuclear arsenal. One can also infer that he will seek to build and maintain alliances that fit his vision.

The next 20 years of American nuclear deterrence policy will be based in large measure on President Trump's vision. Because of the bureaucratic processes in place, it takes time and momentum to alter nuclear trends. President Ronald Reagan was able to make progress over his eight years in office, but veering from his initial trajectory of

²² Donald Trump, Twitter post, 28 Dec 2016, 08:19 AM and 08:25 AM, <https://twitter.com/realDonaldTrump> (accessed 28 Dec 2016).

²³ Donald Trump, interviewed by Anderson Cooper, 29 Mar 16, Transcript, <http://cnnpressroom.blogs.cnn.com/2016/03/29/full-rush-transcript-donald-trump-cnn-milwaukee-republican-presidential-town-hall/> (accessed 28 Nov 2016).

²⁴ Donald Trump, Twitter post, 22 Dec 2016, 10:50 AM, <https://twitter.com/realDonaldTrump> (accessed: 27 Dec 2016).

military might to counter communism, was not instantaneous.²⁵ It had taken years of relationship building with his Soviet counterparts before he was able to make noticeable changes like the START I treaty. The Trump administration will set the nuclear armament narrative for at least the next few years and all subsequent presidencies will have to work from where his administration leaves off.

The alliances a US president and his administration build are crucial to nuclear deterrence. Alliances like NATO provide mutual support that assures US allies while deterring US adversaries. Additionally, the NATO alliance allows weapons sharing for many of the NATO nations. Most US alliances began in the Cold War and were based on the bipolar nuclear world. Now that the Cold War is long over, alliances that once worked to contain Soviet communism are facing scrutiny. President Trump is taking a different track from the previous administration's views on alliances as well. He noted several times during his campaign that he considered NATO "outdated" and too expensive.²⁶ These are strong words designed to win voters during a contentious campaign; however, they have broad effects once that individual becomes president. Since taking office on 20 January 2017, President Trump has echoed his belief that NATO is an expensive alliance, one for which the US carries a heavy burden, despite all member nations being required to contribute at least two percent of their GDP towards defense spending.²⁷ His narrative has toned down from the vitriolic campaign trail rhetoric, but reports show that he is, as of this writing, still causing dismay among other leaders of NATO nations.²⁸ While his statements do not directly impact the nuclear trendline currently, a continued strategic narrative that derides NATO, its power, and its influence could, over the long term, lead to reduced effectiveness and perceived power in the global environment.

²⁵ Beth A. Fischer, *The Reagan Reversal: Foreign Policy and the End of the Cold War* (Columbia, MO: University of Missouri Press, 1997).

²⁶ Donald Trump, interviewed by Wolfe Blitzer, 21 Mar 2016, <http://transcripts.cnn.com/TRANSCRIPTS/1603/21/se.02.html> (Accessed 31 Jan 2017). Philip Rucker and Robert Costa, "Trump questions need for NATO, outlines noninterventionist foreign policy," *Washington Post*, 21 March 2016, https://www.washingtonpost.com/news/post-politics/wp/2016/03/21/donald-trump-reveals-foreign-policy-team-in-meeting-with-the-washington-post/?utm_term=.a0cbefc95136 (accessed January 31, 2017).

²⁷ Andrea Shalal, "Trump, Merkel agree NATO members must pay fair share," Reuters, January 28, 2017, <http://www.reuters.com/article/us-usa-trump-merkel-call-idUSKBN15C0U2> (accessed January 31, 2017).

²⁸ Shalal, "Trump, Merkel agree NATO members must pay fair share."

When it was created, NATO was designed to counter the USSR in Europe. After the fall of the Soviet Union and the end of the Cold War, NATO remained in place as a cornerstone of global security, expanded democracy, and by extension, provided a check on Russia should that nation ever again threaten Europe. In a stroke that could be brilliance, madness, or possibly both, President Trump appears to be taking the opposite approach to President Richard M. Nixon's "madman deterrence" theory. In October of 1969, Nixon ordered US nuclear forces onto a higher state of readiness, ostensibly as a signal to the Soviet Union that he was willing and able to use nuclear force if necessary to deter the Soviet Union while America was at war in Vietnam.²⁹ He had hoped to appear as the "unstable madman" with his finger poised over the button despite the MAD doctrine that kept both sides from issuing or appearing to issue explicit threats.

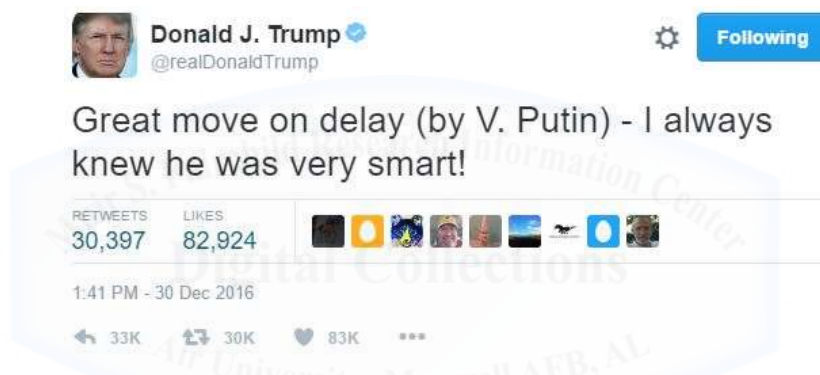


Figure 3: Representative communication regarding President Vladimir Putin

Source: Donald Trump, Twitter post, 30 Dec 2016, 1:48 PM, <https://twitter.com/realDonaldTrump> (accessed: 30 Dec 2016).

The final aspect of the geopolitical environment as it relates to nuclear deterrence is the uncertainty surrounding the rise of non-state actors and their impact on geopolitics. Examples of non-state actors include ISIS, ISIL, Al Qaida, and Boko Haram. They are insurgent or terrorist groups that, in certain areas and territories, assume some functions of a state while not being recognized as one. These groups have usurped the power of the legitimate or failed government of the territory in which they operate and are providing at least some basic level of governance and municipal services. The fear in contemporary global politics is that one of these groups would be able to acquire and use a nuclear

²⁹ Scott D. Sagan and Jeremi Suri, "The Madman Nuclear Alert," *International Security* 27, no. 4 (2003): 150-183, Military & Government Collection, EBSCOhost (accessed July 7, 2016).

weapon, whether as leverage or through detonation. These are difficult groups to deter because there is limited recourse against them. If the US were to follow its traditional example of dealing with terrorist organizations through decapitation strategies, it may prove ineffective in this case. Since they occupy the territory of a legitimate government, a first or even second strike against them would constitute an act of war against that nation, possibly risking the spread of nuclear war if that state, such as Pakistan, is itself a nuclear state.

The US has had, at best, marginal success combating and ending terrorist and insurgent groups. Because of the nature of the fight, combating these types of groups is resource and intelligence intensive. It also requires the cooperation of the nation whose territory they occupy, something the US cannot always achieve. In this case, non-proliferation and the security of the nuclear stockpile is the only way to combat these kinds of groups. As this aligns with current nuclear doctrine and treaties, it follows that this is on the trendline for non-proliferation.

US Nuclear Arsenal

The last aspect of the current trend is the state of the US nuclear arsenal. The number and type of weapons available is limited by treaties, but there are other issues that should be considered. If the number of rogue nuclear nations grows, this will affect how countries build their arsenals. With the passage of the Cold War, nations, primarily the US and Russia, recognize that they no longer need to stockpile vast quantities of high yield warheads. These weapons are no longer necessary as doctrine and strategy shifted away from MAD. The threats of 2035 will not require high-yield detonations and doctrine will likely call for a measured response against military targets, not entire cities. With this shift in doctrine, 2035 stockpiles will be in the process of shifting towards smaller, variable yield weapons. The US and Russia are likely to keep sufficient high yield weapons to hold one another at risk; however, every year away from the detonations at Hiroshima and Nagasaki only increases the nuclear taboo and decreases the likelihood that nuclear weapons will be expended operationally again.

One should also consider the age of the weapons. Table 2 depicts each of the warhead types in the US arsenal as well as their age. Of note, the youngest weapon is 23 years old, older than some of the Millennials who now operate and maintain them.

Additionally, due to US treaty obligations, none of these weapons can be tested and there are stringent restrictions on updating weapons, let alone creating new ones. This means that an aging arsenal risks what Maj Gen Stephen Wilson, the commander of Eighth Air Force, described as “disarmament by rust.”³⁰ However, as noted in the assumptions, in only 20 years the issue will not be critical but will be at a point where the leader of 2035 must face it or risk the US nuclear enterprise and the country’s ability to offer a secure and reliable nuclear force.

Table 2: Type and age of the US nuclear arsenal

Warhead	Carrier	Year Deployed
W78	ICBM	1979
W87	ICBM	1986
W76	SLBM	1992
W88	SLBM	1990
W80	ALCM/B-52	1961
B61	Bomb/B-2/B-52	1994
B83	Bomb/B-2/B-52	1994

Source: Adapted from Hans M. Kristensen and Robert S. Norris, “United States nuclear forces, 2017,” Bulletin of the Atomic Scientists, 73:1, 48-57, DOI: 10.1080/00963402.2016.1264213.

<http://www.tandfonline.com/doi/pdf/10.1080/00963402.2016.1264213?needAccess=true> (accessed 06 Mar 17).

Conclusion

The future is never certain. Any number of events and factors can alter outcomes. However, to study the effects of Millennial leaders on the future of the nuclear enterprise, this thesis narrows the myriad of options to three: non-proliferation, disarmament, and proliferation. Non-proliferation, neither expanding nor drastically reducing the US nuclear stockpile or that of other nations is the current trend, one which an educated reader can assume is the most likely future trend. The non-proliferation trend, absent any great shocks to the system, still contains issues which the leaders of 2035 must face: a changing physical environment that will place great stress on global politics, expiring treaties, unpredictable leadership, and an aging nuclear enterprise. The leader of 2035

³⁰ Major General Stephen Wilson, Commander, Eighth Air Force, (address, Washington, DC, 21 Jan 2013).

must be savvy in how to leverage all aspects of national power and work with those who wield them to combat even the baseline trend, let alone the two alternative trends.



Chapter 3

Disarmament and Proliferation

And if the development of weapons of mass destruction spreads into Iran and continues in North Korea—in the face of all ongoing negotiations—the incentives for other countries to follow the same path could become overwhelming.

Henry Kissinger, on nuclear proliferation

If non-proliferation is the current trend in nuclear affairs, then any shocks to the global system could to push the trendline away from non-proliferation towards either disarmament or proliferation. The more significant the shock, the more the line will move. However, if one views this current trend line as an ever-widening garden path, events closer to today will have a greater impact towards 2035 as their effects compound.

The “garden path” analogy is best depicted visually, as seen in Figure 4. This depiction shows several events that are most likely to occur, such as treaty expiration, US elections, and the projected date that the B-21, the USAF’s next nuclear-capable bomber, reaches full operational capabilities (FOC). It also depicts events that *could* occur and shows whether they would push the line towards disarmament or proliferation. Each event has its own probability of occurring, some very low and some very high, and no one event is likely to trigger a full swing towards one trend of the other. This visual depiction gives a basic framework, but this assertion requires further explanation.

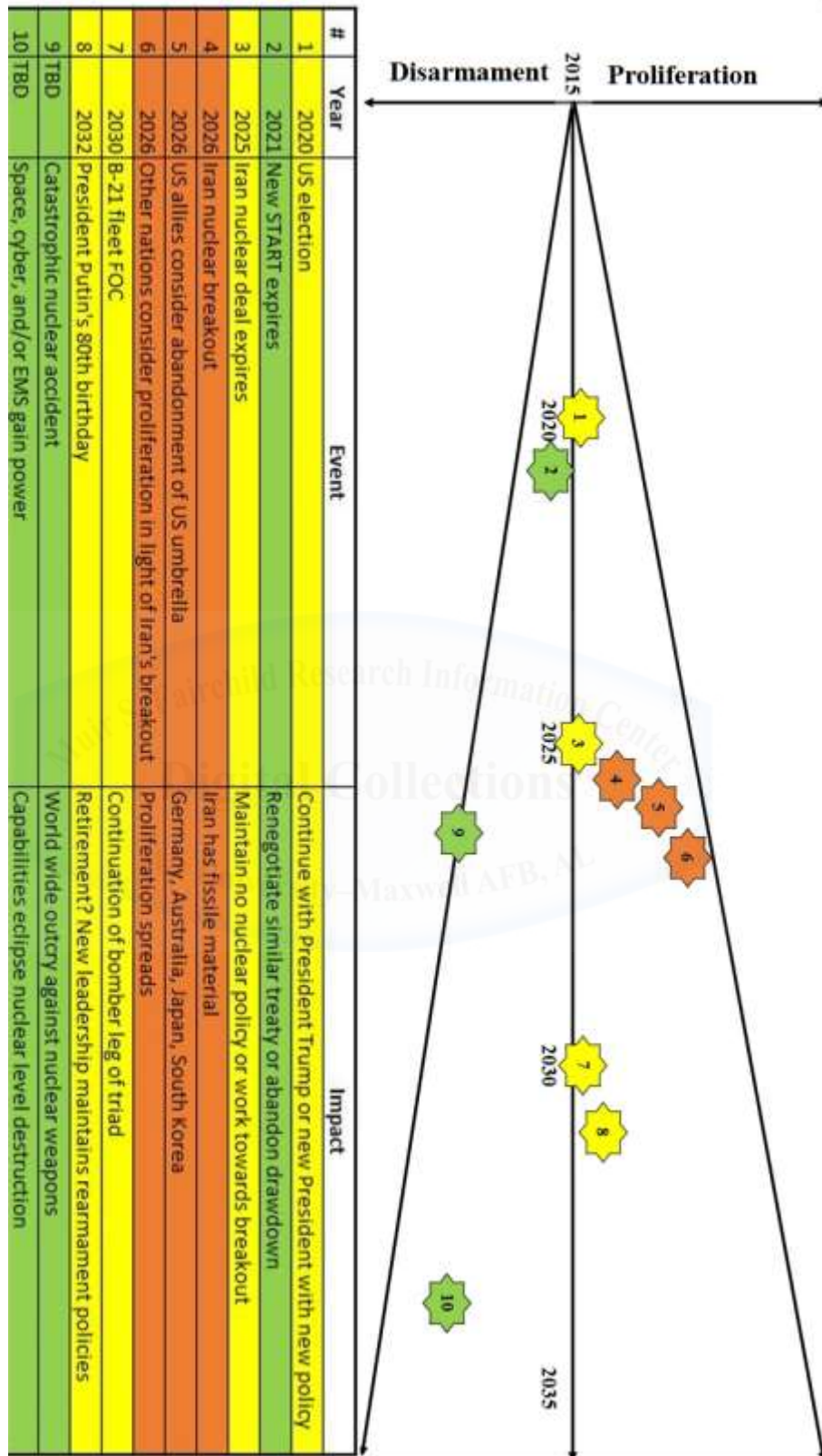


Figure 4: Examples of shocks to the system that could alter the trend line
Source: Author's Original Work

Disarmament

Disarmament, in an ideal world, would mean a trend toward the end of all nuclear weapons on Earth. Before considering what might push the trend towards global nuclear disarmament, one should first understand the full significance of such a change. Over the last 70 years, global stability and security have been founded on and underpinned by the world's nuclear forces. During the Cold War, the nuclear stockpiles of the US and the USSR balanced the bi-polar world. Every action taken by First World nations was influenced by their presence. Even after the dissolution of the USSR and the end of the Cold War, the presence of nuclear weapons still cast a looming threat to any group or nation that thought to attack a nuclear-capable nation. To remove completely nuclear weapons from the world would dramatically alter the dynamics of international politics. That said, there are still some events that could shock the global system so greatly that complete nuclear disarmament could, theoretically, be possible. Those events fall into three categories: incidents which cause extreme public fear, weapons which eclipse the destructive power of nuclear weapons, or a lack of existential threats to nuclear armed states.

Of the three options, an incident which causes extreme public fear is the most likely. The events surrounding the 2007 accidental transfer of nuclear weapons from Minot AFB, ND to Barksdale AFB, LA stirred public interest in nuclear weapons, arguably for the first time since the end of the Cold War, but it was not sufficiently grave to generate the kind of global public fear and outcry that would lead to global nuclear disarmament. To cause that kind of outcry, both in the US and abroad, the event would have to be catastrophic.

Events that could be considered catastrophic would need to create a risk of nuclear war. These catastrophic events would have to include nuclear technology and be an extreme risk to public safety. There are several things which could fit that category and not all involve nuclear weapons. Though the Three Mile Island and Chernobyl incidents could be considered disasters involving nuclear technology and both placed the

public at risk, they were not sufficiently catastrophic to incite a global public outcry.¹ The Three Mile Island and Chernobyl accidents are also not on the same order of magnitude with one another for threat to public safety; however, both had an impact on nuclear regulations which implies their respective governments received enough public pressure to make changes.

The first possible incident that could fit the criteria listed above is the loss of a nuclear weapon, known as an Empty Quiver incident. An Empty Quiver incident is a DoD code that specifically refers to “the seizure, theft, or loss of a U.S. nuclear weapon.”² This is one of the ways in which a non-state actor or group could come to possess a nuclear weapon and why the current trend of security and safeguarding (as part of the 1968 NPT) is one of the few ways to prevent that event. The other possibility is that a nuclear weapon is procured by a hostile nation who then uses it as a political tool to demonstrate the loss of US nuclear reliability. Either case could generate extreme public fear and an outcry at the idea of an enemy compromising the security of our nuclear arsenal. Should an enemy obtain a nuclear weapon and detonate it, the US would be likely to counter with a nuclear response. The author views this as one of the few possible cases in which the US, attacked with nuclear weapons, might consider a nuclear response even against a non-state actor. Failure to retaliate in kind over a nuclear attack is a greater detriment to the US nuclear umbrella than the loss of a weapon because it indicates a lack of will to use the weapons and might embolden other non-state or even rogue state actors.

The next type of event that could risk nuclear war is called a NUCFLASH. Air Force Instruction (AFI) 10-206, Operational Reporting, defines NUCFLASH as “an event, accident, or incident that could create the risk of a nuclear war” and due to the risk for nuclear war, it is the highest priority code in the AFI.³ While the terminology covers events such as objects entering the atmosphere from space and unauthorized flight or

¹ Office of Public Affairs, "Backgrounder on the Three Mile Island Accident." United States Nuclear Regulatory Commission, <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html> (accessed 06 March 2017).

² Air Force Instruction (AFI) 10-206 Air Force Materiel Command Supplement (AFMCSUP) I, *Operational Reporting*, 11 March 2015, 12-14.

³ AFI 10-206 AFMCSUP I, *Operational Reporting*, 12.

deviation of flight of a nuclear-loaded and attack capable aircraft, it also covers any nuclear detonation that produces a nuclear yield.⁴

The DoD recognizes 32 incidents of this nature from 1950 to 1980, with the worst being the B-52 crash off the coast of Thule, Greenland on 21 January 1968 and an ICBM explosion on 19 September 1980.⁵ Both were chilling to the public, not just because of the resultant explosions and loss of life, but because both were the results of accidents. In the case of the Thule B-52 crash, the aircraft was crippled by a cabin fire when a crewmember placed seat cushions near a hot air duct, igniting them during flight.⁶ In the ICBM incident, a missile maintenance specialist accidentally dropped a socket wrench which, as it fell down the missile shaft, tore a hole in a fuel tank.⁷ In both cases, the accidents were the result of human error, not malicious intent, which implies that similar incidents could happen in the future. While a little more than 30 incidents in 30 years is much higher than the rate seen currently, one can assign the lack of outcry to the presence of the Cold War. A constant, existential threat would make risk worth the reward of a working deterrent. Without the persistent threat of extermination from nuclear war the acceptable level of risk is much lower. In a world that is more safety-conscious than nuclear-conscious, this frequency of nuclear incident is not only unacceptable but almost inconceivable. Therefore, an incident of this nature could cause enough public fear to push American leadership towards removing the nuclear threat permanently via disarmament.

The next way in which an event could trigger a move toward nuclear disarmament is the eclipsing of the destructive capability of nuclear weapons by a more powerful weapon. This theoretical weapon would thus render nuclear weapons obsolete, allowing full disarmament. The most likely domain for a weapon of this type are in space, cyberspace, or across the electromagnetic spectrum (EMS). However, each vector is currently only theoretical. There are treaty limitations that restrict war in space and

⁴ AFI 10-206 AFMCSUP I, *Operational Reporting*, 12-13.

⁵ "Narrative Summaries of Accidents Involving US Nuclear Weapons: 1950-1980," Department of Defense. April 1981.

⁶ History and Research Division, "Project Crested Ice: The Thule Nuclear Accident Vol I. SAC Historical Study #113," Headquarters Strategic Air Command, 23 April 1969.

⁷ Mark C. Christ, "Titan II Missile Explosion (1980) - Encyclopedia of Arkansas," Encyclopedia of Arkansas, <http://www.encyclopediaofarkansas.net/encyclopedia/entry-detail.aspx?entryID=2543> (accessed 01 February 2017).

cyberspace and hinder the development of a weapon in those domains. A weapon with effects in the EMS is most likely and its physical effects would be closest to the detonation of a nuclear weapon. In the first microseconds after a detonation, the weapon creates an electromagnetic pulse (EMP) that can have effects up to thousands of miles away.

An EMP does not wreak physical destruction in the same manner as the blast, thermal, or radiation effects of a nuclear detonation; it still creates physical effects that can be incredibly destructive. Starfish Prime, a high altitude nuclear test the US military conducted on 09 July 1962, showed that a high altitude (400 km, roughly 250 NM above the Earth) detonation could have broad, lasting effects.⁸ Notably, it blew out streetlights, disrupted microwave signals, and turned on burglar alarms as far as 800 NM away on the Hawaiian Islands.⁹ In simple terms, the EMP created a wave of electromagnetic energy that traveled the distance from the explosion to the Hawaiian islands and presumably beyond. (Because of the vastness of the Pacific Ocean, no stations were set up between Hawaii and the mainland to register effects.) Upon reaching the islands, the energy sought any object that could be used as an antenna or wire to conduct electricity. That electricity then overloaded circuits, blowing fuses and damaging electronics.¹⁰

There are two things to note about this incident. First, there was little land mass or civilization in the 800 NM between ground zero and Hawaii, mostly open ocean, so there is little actual evidence upon which to judge effects closer to the source of the detonation. However, research conducted after the incident at the Lawrence Livermore Labs noted that most of the damage was caused by a sharp rise in the amplitude of the energy. It also noted that being closer to ground zero, especially in a densely-populated area, would have greater effects as there would be more “unintentional antennas” available to carry the massive energy pulse.¹¹ The second note is that this test was conducted in 1962, before the advent of personal computers, smartphones, and a host of goods and services that are wholly dependent on wireless communication. An attack using an EMP now, or

⁸ P. Dyland, “Operation Dominic, Fish Bowl Series: Project Officer’s Report – Project 6.7” (Kirtland AFB, NM: Air Force Weapons Laboratory, 10 December 1965).

⁹ Charles N. Vittitoe, “Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?” Sandia National Laboratories, June 1989.

¹⁰ Vittitoe, “Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?”

¹¹ Vittitoe, “Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?” 10.

in the near future, would have devastating consequences as it would cause rolling power failures, loss of internet, and the loss of control over computers running, among many other things, municipal systems like water and electricity. While the initial impact would not be life threatening on a mass scale, the attack would cripple US financial networks, bring cities to a halt, and result in loss of life due to secondary effects. Additionally, it is not too far of a logical leap to imagine the US military, with its highly-computerized weapons platforms, having to fight while advanced systems are crippled during the blackout window of an EMP.

Currently, an EMP of the magnitude seen in Starfish Prime is very difficult to create without a nuclear weapon. However, due to the enormous cost and relative scarcity of nuclear weapons, using the nascent EMP technology is the most likely vector for such an attack. Therefore, it is a reasonable assumption that if a nation or non-state actor possessed a nuclear weapon capable of producing a large EMP, they would simply use it as a nuclear weapon rather than an EMP weapon. However, as technology improves and the other devices capable of creating a powerful EMP shrink in size and weight, the possibility of creating a device that can be put on a ballistic missile increases.¹² While it seems unlikely that a weapon could ever match a nuclear weapon's physical destructive power, one can begin to comprehend how a weapon like an EMP could eventually eclipse the nuclear weapon, rendering it obsolete.

Finally, the last way in which the world might find itself trending towards disarmament is a lack of existential threats. One can argue that there will always be

¹² There are several devices that can produce the EMP effect. A device like an explosively pumped flux compression generator would be the most likely vector. However, while the technology involved in manufacturing and utilizing the explosively pumped flux compression generator is mature, it still requires additional research and funding. This research and funding is needed to bring it to a ballistic deliverable level. Additionally, industrial and research laboratories with plasma generating mechanisms (such as the one at the West Virginia University physics lab) can generate small EMPs but are massive structures (WVU's is housed in the sub-sub-basement and takes up almost an entire classroom, certainly not suitable to being mobile). Weapons like the B-52 carried Counter-electronics High Power Microwave Advanced Missile Project (CHAMP) begin to explore the feasibility of missile based electromagnetic weapons but is low on the funding list, meaning long waits until such weapons are available.

Sources: Arthur Beiser, *Concepts of Modern Physics*, Fifth ed. (New York, NY: McGraw-Hill Higher Education, 1995); Dyland, "Operation Dominic, Fish Bowl Series: Project Officer's Report – Project 6.7." Carlo Kopp, "The Electromagnetic Bomb - a Weapon of Electrical Mass Destruction" (Victoria, Australia: Monash University Australia, October 1996); Robert B. Leighton, *Principles of Modern Physics* (New York, NY: McGraw-Hill Book Company, 1959); Vittitoe, "Did High-Altitude EMP Cause the Hawaiian Streetlight Incident?"

existential threats of Biblical proportions: floods, fire, drought, famine, and plague; however, humanity has not figured out a way to counter acts of God. Therefore, the focus turns to manmade existential threats. Since there are so many ways in which humanity could extinguish itself either through malice or accident, this seems the least likely of least likely scenarios. However, one should bear in mind that in the absence of existential threats, nuclear weapons would be unnecessary and disarmament would be the logical outcome.

Complete nuclear disarmament is the safest, most secure, but most unlikely outcome of the three possible international trends offered in this thesis. It requires the confluence of many unlikely events and possibly a change to not just the character, but the fundamental nature of war and human political interactions.

Proliferation

Proliferation is the third trend that could develop between now and 2035. Unlike disarmament, the proliferation trend is based on real and likely events that will or could occur in the near future. Events that could push the trend towards proliferation fall into three categories: rogue nations increasing the determination with which they seek nuclear weapons, dissolution or expiration of current nuclear treaties, and the loss or erosion of the US nuclear umbrella to allies.

The current non-proliferation trend includes nations that currently seek nuclear weapons but sanctions and prohibitions against them have halted, slowed, or greatly impaired their success. North Korea is the best example of this trend. North Korea has slowly gained the materials required to create nuclear weapons, but as of this writing, they do not possess a viable delivery vehicle. If the trend is to move towards proliferation, a nation like North Korea would have to gain greater access to the knowledge and materials required to realize the regime's vision of itself as a nuclear power. Alternatively, Iran could abandon their current deal or, at the expiration of the recent agreement in ten years (2026), they could be unwilling to agree to further deals and strive to create the weapons they desire. The acquisition of nuclear weapons would then push either region – East Asia or the Middle East – into what Robert Jervis describes

as a spiral model.¹³ For example, nations in the Middle East would feel that a security dilemma exists and seek to counter the perceived threat from Tehran. Nations within the range of Iran's nuclear arsenal would seek nuclear weapons of their own to counter the perceived threat. This would result in an arms race similar to the one seen between the US and USSR during the Cold War. Likewise, if North Korea were able to build and test a viable delivery platform, both South Korea and Japan might feel intense domestic political pressure to depart from under the US nuclear umbrella and create nuclear arsenals of their own.

This "spiraling" is also a potential outcome if certain treaties expire without extension or renegotiation. The New START treaty is only valid until 2021, with an option to extend until 2026. Should the leadership of either the US or Russia decline to extend it or negotiate another treaty, it could lead to either side increasing their stockpile once again. There are also cases of treaties being abrogated. For example, a nation can exit the NPT under Article X of the treaty as North Korea did in 2003. This would be a legal and valid exit from a treaty that would then allow a nation to pursue a nuclear weapons program. Finally, there are treaties like the CTBT that are not fully ratified and enforced. Several nations, including the US, did not ratify the treaty, rather adhering to its strictures while remaining outside its rules. Under these types of cases, a nation that is held by a treaty could legally exit its restrictions and begin a nuclear program. They would violate accepted norms and face international censure but would be within their legal right to build the program. These actions could spark a proliferation spiral in the region similar to the spiral possible due to rogue nations.

Finally, there is the loss or erosion of the so-called US nuclear umbrella. The nuclear umbrella refers to the extended nuclear deterrence protection the US has pledged to allies across the world. If a nation is attacked with nuclear weapons, as this pledge goes, the US will retaliate in kind on behalf of that nation. It allows these nations to refrain from pursuing and maintaining a nuclear arsenal and in part provides a reason for the US to maintain its vast stockpile.

¹³ Robert Jervis, *Perception and Misperception in International Politics* (Princeton, NJ: Princeton University Press, 1976).

There are many ways in which the US could lose its nuclear umbrella. First is a minor nuclear incident. This incident would have to be less disastrous than the incidents described under the disarmament section and not risk nuclear war. A Bent Spear or Dull Sword event, both minor incidents that impair or degrade the ability of the nuclear arsenal, would be examples. The 2007 Minot unauthorized transfer also falls into the category. These incidents are likely to become known publicly and internationally, causing loss of faith and confidence in the US nuclear umbrella. A single event of sufficient consequence or a string of minor events could be enough to cause nations to feel that the US is no longer capable of maintaining a secure and reliable nuclear deterrent. This could then push those nations to seek weapons of their own.

This loss of capability resulting in the erosion of the umbrella to our allies could also come from neglect rather than mishandling. As previously noted, the US arsenal is aging and requires both money and expertise to keep it viable. Rather than mistaken actions, a neglectful lack of action could also render the arsenal impotent. Politicians who do not understand the importance of the nuclear arsenal could withhold the funding necessary to keep the arsenal effective and intact. The US's own disarmament through rust could also push other nations to seek their own viable protection.

Finally, an event that causes sanctions against the US or that involve the US arsenal could cause the umbrella to dissolve. Like Iran's nuclear sanctions, there is always the possibility that the US is involved in an incident that draws international ire and censure. Whether it be another OIF type war or an international incident, any sanction that hinders the US nuclear arsenal degrades the potency of the force.

Conclusion

The time between now and 2035 is likely to be filled with changes in the global physical environment, the geopolitical landscape, and the US nuclear arsenal. How these changes occur will depend on whether the future remains on the current trend of general non-proliferation and maintenance of existing arsenals or if events push it towards disarmament or proliferation. There are some discreet events that are likely regardless of any trend. Changes in the physical environment will add additional friction as resources availability changes. The US nuclear arsenal will continue to age and decay. Cold War ties will weaken, altering the balance of power between allies and former adversaries.

Finally, non-state actors will continue to expand their influence on the geopolitical structure. These effects must be dealt with by the leaders of 2035, therefore an examination of what can be done now to train those leaders today is necessary.



Chapter 4

The Effect of Millennials on Nuclear Deterrence

Flying intimidation missions with the B2 bombers. Suck it North Korea.

Matthew Boling, upon witnessing the B-2 flyover of Osan AB 27 Mar 2013

Every generation leaves its mark upon history and the Millennial Generation will be no different. This spawns the question: what will that mark be? Specifically, how will the Millennials affect nuclear deterrence in 2035? These questions can be answered by looking at the traits and characteristics of the Millennial Generation and applying them to potential future trends in nuclear deterrence.

Popular culture and social media portray Millennials as spoiled and entitled, but the Millennial Generation's unique traits and mindsets will enhance, rather than detract from the future of the nuclear enterprise. Their unique outlook allowed them to be relatively free of Cold War mentalities and capable of looking at the enterprise with fresh eyes. Their innate ability to embrace the rapid change of technology sets them up to be better able to innovate at a core level, not fumbling through the rapid technological changes that faced their predecessors. Finally, they have grown up with rapid fire messaging and have an innate understanding of how to craft messages that reach worldwide at the speed of an electron. Millennials, like generations before, stand upon the shoulders of giants and they will be ready to inherit the nuclear enterprise.

The future of nuclear deterrence, like any future, is uncertain. However, there are some common themes in this paper's three proposed future trends. First, the global physical environment will change and that change will create a starker competition for resources. This increased competition will engender friction between nations and increase the need for diplomatic and, possibly, military resolution of the friction. Second, the geopolitical landscape will remain dynamic: there will be rogue nuclear states, non-state actors will continue to affect the geopolitical environment, and the shifting relative power between nuclear nations will cause friction globally. Third, the changes in geopolitics will be driven not just by resources, but by the existence of nuclear weapons. This increasingly multi-polar nuclear landscape will drive changes in nuclear theory and

doctrine. Whether nuclear weapons remain in a state of non-proliferation, disarmament, or proliferation, they will have a major impact on international relations and politics. The question at hand is how the Millennial Generation will direct that impact.

Analogies

In *Analogies at War*, Yuen Foong Khong describes how political decision makers often employ historical analogies to conceptualize the character of a given conflict, whether it is accurate or not.¹ He asserts that this study of conflicts through the use of analogies allows policy- and decision-makers to learn from history, examine what outcomes are possible if the two events bear similarities, and avoid “another X” where “X” is the most terrible defeat or loss of life in recent memory.² For example, in Khong’s book, “X” is Korea or Vietnam but one can see this phenomena at work in phrases like “we will remember the Somme,” “9/11, never forget,” and a tendency for strategists and pundits alike to refer to a possible massive future cyber-attack as a “cyber Pearl Harbor.” This is a phenomenon that is consistent across American culture and is not confined to any one generation. The Greatest Generation and Silent Generation applied lessons they learned from World War II to the wars in Korea and Vietnam. Baby Boomers and Generation X applied the lessons learned from Vietnam to Desert Storm and Deliberate Force. It follows that the Millennial Generation will apply lessons learned from “their wars” to future conflict, regardless of which nuclear deterrence trend occurs. As stated previously, the Millennials have no direct experience as adults during the Cold War, so it is important to examine the conflicts Millennials have experienced.

To Millennials, “their” wars started with OIF and OEF, both of which began shortly after the Millennial Generation started coming of age. As noted, the events that occur early in a person’s life have the strongest impact.³ Additionally, he described generational analogy as “historical experience that impresses itself upon an entire generation of individuals.”⁴ Therefore, the early Millennials (born 1980-1990) will be the ones who are most strongly impacted by OEF and OIF. Later Millennials (born 1990-2000) will be most impacted by Operation Odyssey Dawn (OOD) and Operation Inherent

¹ Yuen Foong Khong, *Analogies at War* (Princeton, New Jersey: Princeton University Press, 1992).

² Khong, *Analogies at War*, 6-7.

³ Khong, *Analogies at War*, 33-34.

⁴ Khong, *Analogies at War*, 33.

Resolve (OIR). These conflicts bear examination to see what lessons Millennials are likely to infer from them as they conceptualize how to shape future strategy.

In OEF, the US fought against Osama bin Laden and al Qaeda across many nations in Southwest Asia. The war was characterized by long-range strikes from air bases and aircraft carriers well outside the combat zone. Air strikes were interconnected with SOF units, enabling US forces to move rapidly across Afghanistan.⁵ In later phases, remotely piloted aircraft (RPAs) provided persistent Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) but risked the political sensitivity linked to their use, namely arguments that it was dishonorable and akin to assassination.⁶ Finally, both military and civilian leaders gained an ability to get very close to the fight, enabling real-time decisions.⁷ In earlier conflicts, commanding generals might have had access to the Air Operations Center (AOC) main floor but lacked full motion video feeds from airborne assets. Now, they have access to those feeds as well as direct communications links to the asset's controller, leading to possibly apocryphal stories of generals directing weapons releases on targets hundreds of miles away.

During OIF the US toppled the Saddam Hussein regime in Iraq amid fears that the regime possessed weapons of mass destruction (WMD). This is a prime example of Khong's analogies at war and illustrates his main point that these analogies can lead policy- and decision-makers to the wrong conclusion when used poorly. The George W. Bush administration received intelligence that there could be WMDs in Iraq. Because of the experience President Bush had observing his father, then-President George H. W. Bush, during Desert Storm, the latter President Bush chose to believe the intelligence report, despite it being based on the word of a single individual.⁸ (Intelligence requires verification from multiple sources to be deemed credible.) The US was able to overwhelm and topple the regime but fumbled when the operation transitioned to

⁵ Benjamin S. Lambeth, "Operation Enduring Freedom: An Assessment," RAND Research Brief, 2005.

⁶ International Human Rights and Conflict Resolution Clinic at Stanford Law School and Global Justice Clinic at NYU School of Law, *Living Under Drones: Death, Injury, and Trauma to Civilians from US Drone Practices in Pakistan* (2012).

⁷ John A. Olsen, *A History of Air Warfare* (Dulles, VA: Potomac Books, 2010).

⁸ Robert Jervis, *Why Intelligence Fails* (Ithaca, NY: Cornell University Press, 2010), 123-155.

stabilizing the nation.⁹ The operation dragged on for years as planners and political leaders had no exit strategy following the transition from Saddam's regime.

Odyssey Dawn was a quick NATO action in Libya aimed at removing the regime of Colonel Muammar Qaddafi and was authorized by a UN Resolution.¹⁰ This conflict featured NATO forces working to intervene in the existing civil war. It gives a Millennial example of coalition fighting rather than unilateral action.

Currently, OIR is aimed at taking down the group whose members call themselves "the Islamic State." OIR's stated mission "is to militarily defeat Da'esh [ISIS/ISIL] in the Combined Joint Operations Area in order to enable whole-of-coalition governmental actions."¹¹ Like OEF, the US is fighting a non-state actor across multiple nations. As this too is a fight against an ideology (Da'esh), one can also draw analogies to the fight against the spread of Communism in the Cold War.

These four conflicts can be characterized by two primary factors: regime change within a nation or countering an ideology and terrorist activity from a non-state actor. OIF and OOD both aimed to oust an established national leader while OEF and OIR are components of the Global War on Terror, countering ideologies spread by non-state actors across multiple nations. Another common theme among the operations is the achievement of decisive effects during the initial, conventional phases but fumbling when the operations transitioned to peacekeeping and nation building. Both OIF and OEF transitioned to counterinsurgency fights after their initial phases.¹²

The final similarity among these four operations is they are all auxiliary to direct nuclear deterrence. None of the nations in which conflict occurred possessed nuclear weapons and none of them threatened vital national interests. One could argue that there is a deterrence aspect with Russia backing Syria, but it is a tenuous link.

The future of strategic deterrence belongs to a group whose focus has been on limited and asymmetric wars in which US forces were militarily superior to the

⁹ Walt L. Perry, Richard E. Darilek, Laurinda L. Rohn, and Jerry M. Sollinger, eds. *Operation Iraqi Freedom: Decisive War, Elusive Peace* (Santa Monica, CA: RAND Corporation, 2015).

¹⁰ Karl P. Mueller, ed., *Precision and Purpose: Airpower in the Libyan Civil War* (Santa Monica, CA: Rand Corporation, 2015).

¹¹ "About CJTF-OIR," Operation Inherent Resolve, <http://www.inherentresolve.mil/About-Us/> (accessed March 01, 2017).

¹² Olsen, *A History of Air Warfare*.

adversary; unsuitable to nuclear warfare; and which focused on short-duration kinetic fights followed by years of nation-building and counter-insurgency. This will leave future Millennial leaders with no direct analogous experience from which to draw for thinking about and planning for deterrence and waging nuclear war and only the watered-down knowledge of their predecessors. However, there is a positive aspect to this lack of analogous experience. These recent conflicts have forced the DoD to work within a whole-of-government approach. By learning early in their careers to work with all aspects of national power, future Millennial strategists will have not only knowledge but personal experience from which to draw. This means that should a potential nuclear conflict arise, they will be ready to work a solution that views the matter as a system, one in which there are more aspects of national power to use than just the military and nuclear arsenal.

Culture

The differences between the three current generations of nuclear Airmen provide a better understanding for the incidents that occurred between 2007 and 2014. The culture that senior leaders attempted to instill within AFGSC was at odds with the Millennial Generation's values, beliefs, and experience. When AFGSC was activated in 2009, senior leaders insisted that the new command was not SAC reborn. However, these same senior leaders had served in SAC and those experiences had left an indelible mark on their perspective of the nuclear enterprise. Unfortunately, this stems from the results of the Blue Ribbon panel empowered in reaction to the 2007 incident at Minot AFB. The USAF invited retired General Larry Welch, a former SAC commander and member of the Silent Generation, to preside over the board as an advisor emeritus. This choice is unfortunate as General Welch's experience heavily influenced his perspective on the situation. He had already determined that SAC needed to be brought back and the failures under examination resulted from the disestablishment of SAC. Rather than attempt to solicit honest answers to their queries, panel members questioned and re-questioned Minot personnel until they received the answers they desired.¹³ Gen Welch's bottom line in the 2008 *Report on Unauthorized Movement of Nuclear Weapons* bluntly stated that "the process and systemic problems that allow such an incident have developed over more

¹³ Major Jarred Prier, interviewed by author, 20 April 2017.

than a decade and have the potential for much more serious consequences...*There is little mystery regarding what needs to be done or how to do it.* The nuclear enterprise performed at all levels with the needed competence for decades.” His perspectives, based on his own experience and beliefs, not the ground truth from the Airmen involved in the incident, were the basis for his recommendations. He recommended segregating the nuclear enterprise once again based on Cold War experience, a move that mismatched the needs of the new organization and its personnel. This mismatch led to further issues in the command five years later.

A culture of “zero defects” prevailed in SAC. This outlook precipitated the 2014 Malmstrom AFB cheating scandal, a scandal which exposed a group of ICBM officers cheating on monthly nuclear testing. The young officers, almost all Millennials, were caught sharing test answers; the resultant investigation exposed significant cultural and leadership issues within the ICBM community. A report published afterward noted that the culture of zero tolerance for failure resulted in senior leaders demanding a zero-defect performance from all ICBM officers. This pressure made many believe that any score less than perfect would negatively impact their careers. These officers also believed that scores, rather than overall officer performance and ethics, drove promotions. This led to proctors “helping” exam takers and later allowing outright cheating on monthly tests. Even those who were aware of the cheating but did not partake were hesitant to report it due to a perceived friction between leaders and subordinates. A previous 20th AF commander, speaking on the topic of the zero-failure performance, said that it was a cultural artifact leftover from a bygone generation.

The report illuminated many other problems that stemmed from traditional organizational issues: leadership, doctrine, and strategy, all combining to create a toxic organizational culture. However, what the report lacked was an examination of the cultural divide between generations and the mismatch between the organization’s culture and the external geopolitical environment; what worked for SAC would not work in today’s geopolitical environment.

The Cold War era USAF bears some examining to illuminate the differences in SAC culture versus the culture needed today. During the Cold War, the US faced an existential threat from the Soviet Union. Nuclear forces were on alert 24 hours a day, 365

days a year. A degradation of one leg of the nuclear triad meant an immediate increase in readiness within the other two legs. The daily, looming threat of annihilation meant that a single mistake could risk readiness and the ability to retaliate against a Soviet nuclear strike. To this end, SAC dominated USAF politics and the “Bomber Mafia” drove the USAF.

In comparison, one could argue that today the US faces no existential threats. The Russian Federation still maintains a nuclear arsenal capable of erasing the American way of life, but the geopolitical landscape is such that neither nation’s arsenal is aimed directly at one another. Rather than two superpowers eyeing each other from across the oceans and over the pole, both nations have turned their attention to lower intensity conflicts, only tangentially sparring with one another. The broad spectrum of conflicts the US engages in requires more than just nuclear capable bombers and with that shift, the so-called Bomber Mafia has faded away to make way for fighter pilots, RPA pilots, space, and cyberspace warriors. The USAF as a whole has changed its organization and culture to match the current geopolitical landscape, but the specter of SAC still lingers in its offspring, AFGSC. This means that the Airmen in the nuclear enterprise live in an external environment in which they were no longer the CSAF’s or even DoD’s priority. Two generations of officers above them, however, have different historical perspectives and cultures. The mismatch resulted in pressure to meet standards that many viewed as inappropriate given these changes in the geopolitical environment.

One of the most impactful, but difficult to study or predict, ways in which Millennials will impact the future of nuclear deterrence is through their generation culture, the summation of traits associated with the majority of the generation. As discussed in Chapter 1, Millennials tend to be more highly educated than their predecessors but more likely to chafe under the current structure of the nuclear enterprise. Because the order to execute a nuclear mission can only come from the President of the US, the nuclear enterprise is a rigidly vertical command structure. Unlike the rest of the military which employs centralized control and decentralized execution, the nuclear enterprise is unique in that both control and execution are centralized. Nuclear operators are not much more than a cog in the giant nuclear machine that begins with the President and ends in a detonation. Those who execute the nuclear mission can only do so when

directed and may take zero liberties with this order. The technical orders and AFIs associated with maintaining the weapons and delivery platforms are equally rigid, leading to the zero-failure culture that has led to cultural and leadership failures in the last decade. Millennials prefer a horizontal organizational structure and careers that allow a balance between work and life.¹⁴ As more Millennials enter the nuclear enterprise, they will push against the current organizational culture, demanding the work structure to which they feel entitled. However, the nuclear enterprise, especially the parts that must fall under the nuclear command and control (NC2) structure, are exceptionally rigid and vertical organizations. This is a necessity and one aspect of the enterprise Millennials are unlikely to change. However, while they may not be able to change the structure of the organization, they will be able to change the culture.

Millennials will likely succeed in their fight to change culture and improve work-life balance. In fact, their impact can already be seen in the results of the 2014 Bomber Force Improvement Program (BFIP) Report to the Commander of AFGSC. The 2014 BFIP followed the 2013 Force Improvement Program (FIP) that studied the ICBM career field following the Malmstrom AFB cheating scandal.¹⁵ Both reports studied the personnel and mission at the respective bases of each USAF leg of the nuclear triad and looked for areas in which the enterprise could and should improve. Many of the recommendations were specific to leadership and mission accomplishment, but one stands out as it relates to Millennials and their future impact. The report notes that the bomber crews were unable to identify their mission from week to week and that the

¹⁴ Ng, Schweitzer, and Lyons, "New Generation, Great Expectations," 282.

¹⁵ Lieutenant General James M. Holmes' report, published 26 February 2014, illuminates how this scandal evolved. Given what one knows of the Millennial generational personality and how they chafe under rigid hierarchical structures, one can see how bad leadership and culture allowed this behavior to grow like a cancer. The nuclear community strives for zero failures with the nation's most critical weapons. However, in this case, the report notes that the culture of zero tolerance for failure resulted in senior leaders demanding a zero-defect performance from all ICBM officers. This pressure made many believe that any less than one hundred percent on their monthly testing would negatively impact their careers and that scores, rather than overall officer performance and ethics, drove promotions. This led to proctors "helping" exam takers and later allowing outright cheating on monthly tests. Even those who were aware of the cheating but did not partake were hesitant to report is due to a perceived fraction between leaders and subordinates. Source: Lieutenant General James M. Holmes, investigating officer, "Report of Commander Directed Investigation Prepared by Lt Gen James M. Holmes Concerning Test Compromise at Malmstrom Air Force Base, Montana and Assessment of Twentieth Air Force ICBM Training, Evaluation, and Testing Culture," 26 February 2014.

operational tempo was unsustainable.¹⁶ Additionally, the report recommended creating “white space,” or days free of events and inspections, to allow recovery for both aircraft and personnel.¹⁷ This is significant because it is the first time the generation had more than a minor role in the study of the USAF nuclear enterprise.

The 2007 accidental transfer of nuclear weapons from Minot AFB, ND to Barksdale AFB, LA is, without a doubt, the most significant event to happen to the nuclear enterprise since the end of the Cold War. It spawned multiple studies and reports as well as the resignation or firing of a number of USAF nuclear enterprise leaders.¹⁸ However, this event occurred early enough in the new millennium that there were very few Millennials in the nuclear enterprise at the time. Additionally, those who were in the enterprise were very low ranking. (For example – in 2007, a Millennial would have been at most 27 years old and likely a 1Lt or very junior Captain.) Due to this, the majority of personnel interviewed for the myriad reports on the incident were from Generation X or the Baby Boom generation; little data exists from the Millennials.

The BFIP, conducted in 2014, came at a time where Millennials made up the majority of personnel in most operational units; ages 18-32 and holding ranks from Airman to NCO and 2Lt through Major.) This report shows their first direct impact on both the current nuclear enterprise and likely impacts on its future.

Perhaps the most critical issue regarding the future of the enterprise is the BFIP observation that nuclear deterrence was not understood, even by those who were at the forefront of the mission. It cites the change in the nuclear mission from how it was conducted under SAC to the hybrid deterrence today and a lack of nuclear-focused military education. Both the BFIP and the USAF Blue Ribbon Panel note the decrease in nuclear experience as SAC-trained experts retired.¹⁹ Every year the USAF loses more of its SAC-trained instructors, leaving the SAC training and mentality more and more watered down. This expertise will continue to shrink in the future as senior leaders retire,

¹⁶ *Bomber Force Improvement Program: Final Report*. Air Force Global Strike Command, 31 Jul 2014, 17.

¹⁷ *Bomber Force Improvement Program: Final Report*. Air Force Global Strike Command, 31 Jul 2014, 17.

¹⁸ Michelle Spencer, Aadina Ludin, and Heather Nelson. “The Unauthorized Movement of Nuclear Weapons and Mistaken Shipment of Classified Missile Components: An Assessment,” *The Counterproliferation Papers*, Future Warfare Series No. 56, January 2012.

¹⁹ “Blue Ribbon Review Report on the 2007 Minot Incident,” US Air Force, 08 Feb 2008, https://fas.org/nuke/guide/usa/doctrine/usaf/Minot_BRR020808.pdf (accessed: 02 Mar 2017).

taking their expertise with them, and the bomber leg of the triad continues to support both nuclear and conventional missions.

Shrinking Cold War expertise may not be as large a problem as it seems, however, when viewed through the lens of aligning generational and organizational culture. As the last of the SAC-era mindset and training fades, this allows room for growth in the Millennial mindset and worldview. The percentage of Millennial officers will overtake other generations soon, allowing skills and insight that match the current geopolitical situation to overcome the outdated Cold War mentality. Perhaps then the Cold War mentality, ill-suited to tomorrow's strategic paradigm, will die at last.

The need for a shift in culture and how the culture shifts will be based upon which trend occurs. In the case of non-proliferation, arguably the current status quo, the culture will shift as described above: Millennials will seek to alter their work environments to suit their needs. The risk of nuclear war is low and the international relationships are relatively stable, therefore they may be able to make the changes happen. However, in the cases of proliferation, especially among rogue nations, or global nuclear disarmament the culture may actually be more suited for a Cold War-era culture. Proliferation, especially rapid or rogue nation proliferation, will cause geopolitical turmoil and instability. This increases the risk of misinterpreted messaging, political friction, and the potential for nuclear war. If that is the trend that occurs, then nuclear forces would need to be at a higher ready state as the specter of nuclear annihilation looms. Conversely, if the trend follows global disarmament, depending on the shock to the system that engendered disarmament, there could also be an increased risk of nuclear war, necessitating a higher alert posture.

Technology and Messaging

The Millennials' knowledge of and ability to embrace new technology will likely have a large impact on the future of the nuclear enterprise. This trait will impact the enterprise in two ways. First, it will influence what technology Millennials adopt as it relates to the weapons and delivery platforms. Second, it will influence how future Millennial leaders conduct strategic messaging and craft strategic narratives.

The Millennial Generation is the first generation to grow up with the internet, PCs, and handheld communications technology. Their ability to use and adapt to new

technology is seemingly innate, inborn. Having grown up with that kind of technology, Millennials will work to incorporate it into their world, including the nuclear enterprise. A common joke among crews assigned to the two USAF nuclear-capable types of bombers is that they want the NC2 structure to be more simple, joking that their respective aircraft should simply come equipped with signals as simple as a green light and a red light for “nuke!” or “don’t nuke!” While these comments are said in jest, the NC2 procedures are incredibly complex, rigid, and any errors put both the crewmember’s and the bases’ nuclear certification, or ability to do the job, in peril. As Millennials are finally professionally experienced enough to take positions within the staff of United States Strategic Command (USSTRACOM) and AFGSC it is likely they will begin struggling against the Cold War era NC2 structure, seeking ways to alter, adapt, and update the NC2 procedures as well as the technology that supports it.

Millennials and their technology will also drive how the US does strategic messaging. It is unlikely that there will be significant changes to how ICBMs, submarine launched ballistic missiles (SLBM), and the bomber forces are postured to convey a message; however, the means of spreading that message is changing. One does not need to look beyond the current giants of social media to see how US leadership is affecting strategic messaging. President Donald Trump uses Twitter regularly to communicate not only domestic issues to American citizens but also matters of foreign relations and strategic messaging. Most significant is his recent message regarding his desire to “greatly strengthen and expand” US nuclear capabilities, a message that is a sharp change from President Obama’s nuclear vision.²⁰

²⁰ Donald Trump, Twitter post, 22 Dec 2016, 10:50 AM, <https://twitter.com/realDonaldTrump> (Accessed: 28 Dec 2016).

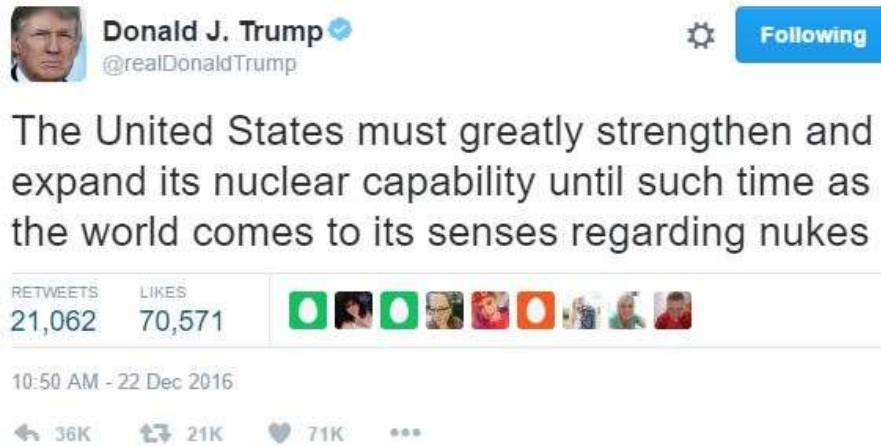


Figure 5: President Trump's views on the current US nuclear arsenal

Source: Donald Trump, Twitter post, 22 Dec 2016, 10:50 AM, <https://twitter.com/realDonaldTrump> (Accessed: 28 Dec 2016).

President Trump is by no means the first leader to use Twitter or other social media platforms to build a strategic narrative. President Obama utilized his Twitter stream to message both foreign and domestic issues. The commanders of USSTRATCOM, AFGSC, 8th and 20th AF, and the CSAF also utilize social media for messaging. However, these feeds are generally run by staff officers who craft their boss's message. Millennials are the ones most likely to be using the platform and in many cases, are ensuring a message gets across, in some cases faster than the standard media cycle.

Millennials Messaging: An Example

If the message is the weapon, as it often is with nuclear deterrence, then the Millennial Generation is perfectly poised to undertake the next step in strategic and nuclear deterrence. Rather than exploring more facts and figures, it is easiest to use a specific example of how Millennial culture, with their tech-savvy, and rapid-fire media is the perfect conduit for strategic messaging and deterrence. The author was present for the events described in the following section. This is the author's personal experience and insight from the 608th AOC floor during the events of 26-27 Mar 2013. All times are given in Central Standard Time although events primarily occurred over Seoul, South Korea.

Before March of 2013, North Korea unleashed an unusually excessive campaign of hostile rhetoric through its state-run media. In mid-February, they conducted a nuclear weapon test and informed China of a possible second or third test. During the early

March Exercise FOAL EAGLE between the Republic of Korea and the United States, North Korea threatened to, and then abandoned, the armistice reached at the cessation of violence during the Korean War. (This is one of several examples of the North Koreans abandoning the armistice.) Finally, on 27 March 2013, the North Koreans severed their hotline between North and South. Unbeknownst to them, at roughly this time, nuclear-capable B-2 Spirit bombers had launched from Whiteman AFB, MO to fly over South Korea. Within days, the flow of North Korea's public rhetoric slowed to a halt, a distinct shift in the nature of their strategic narrative.

This event was entirely about strategic messaging and the ability to craft a narrative. It is important to note that during this event the bombers were not referred to as "stealth B-2s," but rather as "nuclear-capable B-2s." The purpose of this flight was to demonstrate that the United States not only had the ability but also the will to put nuclear-capable assets within range of North Korea, a move that both assured our allies and dissuaded further North Korean belligerence. The story was the headline on every major news site for approximately eight hours, a relative eternity in the current 24 hour media cycle. If the message is the weapon, then this flyover was one of the more effective weapons utilized to counter North Korea's rhetoric and alter their strategic narrative during this period.

What was unique about this particular mission was that the USAF combined the B-2 flyover with the use of news and social media to present their strategic message to the world. Aspects of the event were designed to engage the Millennial Generation specifically and Twitter began reporting the flyover within minutes of the event and several hours before regular news media.

One of the greatest aspects of using Twitter as the strategic message "weapon" was that, unlike a conventional (or nuclear) kinetic weapon, Twitter is a free social media platform and its use was at no cost to the government. During a time of fiscal austerity, the nuclear enterprise could, and should, include more weapons like this in its arsenal. The use of Twitter to continue the strategic narrative positively highlights the members of the Millennial Generation, as most of the key players in the social media aspects of the event were members of the Millennial Generation utilizing tools that they and their peers designed, implemented, and executed.

At the exact moment the B-2 made its low approach at Osan AB, a crowd in their 20s and early 30s waited and watched Twitter with bated breath. Within five minutes the first posts appeared as seen in Figure 6: “Flying intimidation missions with the b2 bombers. Suck it North Korea” and “Just witness (sic) a B2 flyover Osan AB, great way to start my AF day.” These two Tweets started bringing immediate attention to the strategic message, faster than AP, Reuters, and the US Embassy Seoul.



Figure 6: First Twitter reaction to the B-2 flyover

Source: US Embassy Seoul, Twitter post, 12:23 AM, <https://twitter.com/USEmbassySeoul> (accessed 28 March 2013, retrieved from author’s Twitter feed).

The Millennials who helped make this specific strategic deterrence mission’s message are an example of the culture that defines the generation: driven to achieve, confident, team-oriented, and they believe in the cause and values of the mission. These traits ensured mission success despite several setbacks during the mission that could have driven it to a negative media event.

The lessons learned from this event should have lasting effects, regardless of the future trend that occurs. Whatever the future trend, Millennial leaders should understand that messaging is more complex than it was in the Cold War. In the Cold War, strategic

messaging had a limited audience: the Soviet Union and its allies, the US domestic audience, or US allies. Because it was a peer to peer fight, there was no upper echelon of communication that needed to occur. Now, with nations like North Korea in possession of nuclear weapons, there are multiple audiences on multiple levels. A strategic message now must be designed to communicate on multiple levels. The example above demonstrated US resolve not only to North Korea, but to China as their political and financial backer as well. Strategic messaging and narrative goes beyond nuclear to conventional fights as well. Any combat action in support of OIR in Syria must be considered from a strategic perspective as both the US and Russia are operating in the area and on opposite sides of the conflict, while not in direct conflict with each other. This exponentially increases the complexity of messaging and requires a strategically articulate and literate nuclear leader.

Speed of Messaging

Given the potential of social media to reach a global audience in seconds, one could assume this will lead to an increase in the speed of strategic messaging. However, while social media and the depth to which Millennials have embraced it can speed communication as a whole, it only changes the character of strategic messaging, not the speed. Millennials are currently learning that rapid dissemination of a message does not equal an accurate message. At best, a message pushed quickly over social media gives rapid access to data; however, it does not give a complete message with data processed into knowledge. As with the example above, Twitter users were able to message the presence of a B-2 over Osan AB, but they were able to give little else. Some of that difficulty comes from the 140-character restraint placed on Twitter messages, but it also comes from not having the whole picture. A more effective and complete strategic message could have been accomplished by preparing the Public Affairs offices at Osan and Whiteman AFB beforehand to have a strategic narrative prepared and ready to transmit as soon as the aircraft was spotted. However, this runs a risk of violating operational security (OPSEC) and risking public embarrassment should the aircraft encounter any problems returning to the US. The blunder of being forced to land nuclear capable bombers in Japan would have far outweighed the message of American will and capability. This tension between rapid messaging and OPSEC will exist well into the

future and is why the speed of messaging will remain the same, only the character of the messaging will change to suit the desires of Millennials.

The changes to the character of messaging will be more a function of technology: however, that technology will be driven by Millennials and the yet unnamed generation that will follow them. As previous generations advanced from telegraphs to radio, and newspapers to televised news programming, Millennials have seen “nightly news” change to a 24-hour news cycle; their technology will continue to alter how the US population will receive information. While one could speculate endlessly about the technology possible in 20 or more years, it is best to examine it from the perspective of Millennial culture. Millennials prefer quick or near instantaneous communication as well as the positive reinforcement of their peers.²¹ This means that social media platforms will likely continue the trend of not only allowing news links as a post, but to show “trending” items as well to reinforce the peer feedback.

However, this desire to post/publish articles quickly and for peer feedback has led to the alarming trend of fake news: articles with deceptive, alarmist titles and little factual or patently false information, often accompanied by photos that are not linked to the described event. With that in mind, Millennials will have to move forward as their predecessors did, with carefully crafted, factual messages. They will need to ensure their messages go out right the first time or risk it being lost in the noise of fake news.

Messaging on the various social media platforms will likely be the more visible mark Millennials make on strategic messaging, they will always be harnessed to the real messaging that happens between nations and their leaders. Social media messaging will remain a tool by which the nuclear enterprise and its leaders communicate a strategic narrative to the American people and global audiences. However, diplomatic messaging systems will need to remain in place for those messages that are too sensitive for general consumption.

Weapons in 2035

The final big impact the Millennial Generation will have on the future of nuclear weapons is on the sustainment of and upgrades to the weapons and their delivery

²¹ Ron Prindle, "Social Media as a Military Communication Competency," *International Journal of Humanities and Social Science* 1, no. 12 (September 2011): 203-07.

platforms. The Millennial leader of 2035 will face problems similar to their Baby Boomer and Gen X predecessors, but what they will face will bear examining. By knowing what difficulties and resistance the leaders of 2035 will likely confront, one can better predict what education those future leaders need to ensure the survival of the enterprise and security of the country.

The B-52's airframe is projected to stay in service until 2040 and beyond, which makes it highly likely that it will still be an active part of the nuclear triad in 2035.²² The B-21 Mitchell Bomber, which should replace either the B-52 or B-1, is not supposed to enter service until 2025.²³ However, even then, it will require another two years to complete its nuclear certification. This means that the earliest a B-21 might be available for nuclear missions is 2027. A nuclear leader in 2035 will be faced with phasing out the B-52 and standing up the new B-21 units. This problem will require some knowledge of the nuclear enterprise but a greater understanding of the political process. Undoubtedly, politicians from North Dakota and Louisiana will work hard to put the B-21 in their states, keeping the bases that support the nuclear enterprise open for the sake of their constituents. The leader of the future will need to take into consideration whether this will best serve the safety and security of the fleet. In a bipolar world with the adversary on the other side of the globe, keeping the fleet near the geographic center of North America made sense. In a multipolar world, where threats and their vectors have evolved, this leader must look at all possible threats and utilization of the fleet. The possibility of moving the fleet and its infrastructure will require a leader who can speak the language of politicians to ensure a strong enterprise.

Previous generations of nuclear enterprise leaders have brought new bombers into service but this will be the first new bomber since the B-2's first flight in 1989. This means it will have been 38 years between the two IOCs. Put another way, there is a low probability that one who will be on active duty in 2027 will have been on active duty in

²² Jeremiah Gertler, "U.S. Air Force Bomber Sustainment and Modernization: Background and Issues for Congress," Congressional Research Service, 04 Jun 2014.

²³ Christian Davenport, "Northrop Grumman wins Long Range Strike Bomber contract," *The Washington Post*, 27 Oct 2015, https://www.washingtonpost.com/business/economy/pentagon-to-award-long-range-strike-bomber-contract-tuesday/2015/10/27/7f299748-7cc3-11e5-beba-927fd8634498_story.html (accessed 08 Dec 2015).

1989.²⁴ Therefore, the Millennials will bear the brunt of the IOC process. This entire process will be affected by the will and views of the American people towards nuclear weapons and their place in strategic deterrence. Without the support of the American people and their political leaders, Air Force leaders will have a difficult time executing change.

Like the B-52s and B-2s, the ICBM leg of the nuclear triad is aging and in need of replacement. The Ground Based Strategic Deterrent (GBSD) is Boeing's proposal for an ICBM replacement. The USAF wants to replace the current Minuteman III missile with a missile capable of staying fielded until 2075, which means the GBSD program, like the B-21, will fall squarely on the shoulders of Millennials.²⁵ They will likely encounter similar difficulties as seen in the B-21 example. They will need to be able to effectively articulate the role and mission of the nuclear enterprise to lawmakers and civilian leaders while keeping the interests of the triad at the forefront.

Conclusion

The future of nuclear deterrence and the nuclear enterprise belongs to those Millennials currently filling the ranks of the USAF nuclear enterprise. They will have a large impact upon the future of the enterprise through their unique experiences in their early career, the change they will bring to the organizational culture of the nuclear enterprise, their distinct messaging style, and the next generation of nuclear weapons. However, this is predicated on the theory that Millennials will remain in the enterprise to push these critical aspects forward. The generation maintains a career mindedness that differs from their predecessors and in some aspects, directly conflicts with how the enterprise is run. It will take careful career shaping and management to create a force present for duty when the time comes.

²⁴ "B-2 Spirit Factsheet," US Air Force, 16 December 2015, <http://www.af.mil/AboutUs/FactSheets/Display/tabid/224/Article/104482/b-2-spirit.aspx> (accessed 26 Mar 17).

²⁵ Jenn Rowell, "James Wraps Up Farewell Tour of ICBM Bases," Air Force Magazine, <http://www.airforcemag.com/Features/Pages/2017/January%202017/James-Wraps-Up-Farewell-Tour-of-ICBM-Bases.aspx> (accessed 06 Mar 17).

Chapter 5

On the Shoulders of Giants

Mr. President, it is not only possible, it is essential. That is the whole idea of this machine, you know. Deterrence is the art of producing in the mind of the enemy... the FEAR to attack. And so, because of the automated and irrevocable decision-making process which rules out human meddling, the Doomsday machine is terrifying and simple to understand... and completely credible and convincing.

Peter Sellers as Dr. Strangelove, *Dr. Strangelove*

The future of nuclear deterrence belongs to those who show up. It is not enough to recruit the best and brightest minds to the nuclear enterprise; the USAF must work to educate and retain them as well. Education will ensure a smart, knowledgeable cadre of leaders capable of communicating the needs of the USAF nuclear enterprise to those who control it. Retention ensures that the cadre of educated leaders remains within the nuclear enterprise to carry it forward. The retention of talented nuclear officers is a topic that should be explored in great depth, but due to length limitations, this paper will only offer some recommendations to generate conversation.

Educating the Nuclear Leader of 2035

The year 2035 will likely hold challenges unseen by the previous generations of nuclear leaders. There will be a shifting international political landscape, rapidly changing and increasingly capable technologies at odds with an aging nuclear infrastructure, and the constant desire among young officers to seek greater monetary rewards elsewhere. This means that the nuclear leaders of the Millennial Generation will need to be technologically savvy, grasp the nature of international politics, comprehend the intricacies of national and international security, and most importantly, they must be present for duty with fire in their hearts. The way to build these leaders is through education, civilian-military crossflow, and retention.

Finding leaders among Millennials who are technologically savvy will not pose a problem. As stated in the first chapter, Millennials identify their use of technology as the

number one factor that differentiates them from previous generations.¹ However, advancing their innate understanding of technology through education will be paramount. While this generation grew up with gaming platforms, the internet, and smartphones, they did not grow up playing with nuclear weapons or their infrastructure.² This means that they will need to be educated on the weapons they would employ. This does not mean that everyone needs a degree in nuclear physics. We do not require Americans to understand how a four-stroke engine works to obtain a driver's license; however, we do ask that they understand the basic functions of their car and the rules of the road. Currently, nuclear operators receive a basic education in their warheads and delivery systems as well as the rules that pertain to their authorized expenditure. However, those asked to lead the enterprise should know considerably more. At Kirtland AFB, NM, there are several classes about nuclear weapons: Nuclear 100, 200, 300, and 400. However, these classes total only five days each and should be expanded to offer a greater depth of knowledge. These classes should not be offered just to O-6s in leadership positions, as they currently are, but to any officer or NCO identified as having the potential to serve later as a mid-level or senior leader.

The next way to help build the nuclear leader of 2035 is to enhance their understanding of foreign affairs and national security. Before the Budget Control Act of 2011, the USAF Tuition Assistance (TA) program paid for a single degree for any individual in the military. For officers, this usually meant a way to obtain their first master's degree. At the time, as now, TA could not be applied to a lateral or lower level degree.³ This means that if the individual already held a master's, they could not obtain another with one exception: if the degree was in a foreign language or the subject of foreign policy. One way of ensuring an educated pool of candidates to be leaders of the nuclear enterprise would be to reinstate this option for anyone in the nuclear career field who wants to obtain a degree in national or global security, international affairs, or a regional specialty (e.g. – Middle East Affairs). This will enable a force that is better

¹ Pew Research Center, *Millennials: A Portrait of Generation Next. Confident. Connected. Open to Change* (February 2010) 5.

² At least, one would seriously hope not!

³ Air Force Instruction (AFI) 36-2649, *Voluntary Education Program*, 01 Oct 2014, http://static.e-publishing.af.mil/production/1/af_a1/publication/afi36-2649/afi36-2649.pdf (accessed 27 Mar 17).

educated in the broad implications of strategic deterrence, building the foundation of a professional knowledge base that can be both broad and deep.

One could argue that aspects of this suggestion are already reflected in various professional military education (PME) courses. Most in-residence courses at Air University offer a section or elective that covers Cold War history or strategy; however, only a small percentage of the USAF personnel attend the higher level PME courses. Additionally, there is no way to gauge how those who receive their PME through online courses receive and internalize the importance of the nuclear mission. The level of knowledge needs to be raised Air Force wide, which requires nuclear education to be more than a box to check as one goes through PME. Basic nuclear education needs to be added to all PME courses and nuclear specific courses created for all officer career fields. This would not require that all officers attend, but a sufficient percentage to promulgate the information back through their career fields. This education must also be seen as important, with units sending their best officers, not those whom they can part with for the duration of training.

The second aspect of growing Millennial nuclear leadership is creating officers that can speak to their civilian counterparts and leaders. Military officers run the military but they are accountable to civilians. More importantly, the only person who can authorize the use of nuclear weapons is the President, a civilian. Although some Presidents have a background in the military, the time required in the civilian sector to be elected generally means they are far from their military service. They probably will have never served in a nuclear billet. Time and distance from nuclear operations means it will be of paramount importance that their military advisors and leaders are literate in nuclear deterrence and able to articulate strategic deterrence. Being literate and articulate on the topic of nuclear and strategic deterrence will also allow them to communicate how to fund the infrastructure and warhead updates that will be required before 2035.

There currently is no school dedicated primarily to teaching military members to interact with civilians, nor is one required. However, there should be a way to get more military members interacting with their civilian leadership and think tanks. Currently, a chosen few can go to legislative liaison billets, attend fellowships at think tanks, and work as military advisors. This gives them the daily contact with the environment where

they can influence the people who fund and lead the enterprise; however, more future leaders should be given this opportunity. It will mean the nuclear enterprise will have to sacrifice high caliber officers to billets outside of the nuclear realm, but the benefit will pay off later in the form of officers who will be able to communicate with civilian leadership in a manner they understand and conveys the needs of the nuclear enterprise.

Alternatively, if taking bodies “out of hide” for two years is too great a burden to bear, then there is the possibility of expanding the current military sabbatical, the Career Intermission Pilot Program. The program allows 20 officers and 20 enlisted members up to three years away from the Air Force to pursue a degree or have time to build a family. The program should add 10-15 spots solely for nuclear officers and NCOs who desire to work in the civilian portion of the nuclear enterprise at such places like national labs or the Department of Energy.

Another way to increase understanding between military officers and civilian leaders is to incorporate civilians into line units, not as administrative assistants, but in positions that allow them to interact with the day-to-day operations. Like the military members going to work in the civilian realm, civilians working in the military side should be identified as highly capable people with a potential to serve as leaders in the field later in their careers. This ensures that the communication flows in both directions: military members speaking the civilian dialects and civilians able to speak the military dialects.

The final aspect of securing the leaders of the 2035 nuclear enterprise is retention. The efforts noted above will cost time and money; it will do no good if individuals who have had resources invested in them depart the Air Force because they feel mistreated, burnt out, or underappreciated.

Retaining a National Treasure

The USAF has endured several years of reductions in its budget and the size of the force.⁴ Both aspects of general fiscal austerity have affected the service’s ability to recruit and keep the talented and highly motivated officers the USAF will need in the

⁴ At the time of writing, the USAF had endured the Budget Control Act in 2013 and various Reduction in Force (RIF) boards since 2013. However, under President Trump’s administration, these austerity measures may be removed. This could lead to an increased budget and the end of measure designed to cut the force. However, attempting to increase the size of the personnel force will fill the lower ranks with no additions to the middle and upper level ranks unless the USAF authorizes direct accession.

future to lead the nuclear forces. Unfortunately, these are not the only things that hinder the USAF's ability to create successful future leaders. It is also hampered by sagging morale, a force that feels frustrated, confused, underappreciated, and micromanaged.⁵

The second and third generations of nuclear experts, the Baby Boomers and Generation X, had similar views of the workforce. They chose jobs that they could make into 20-year careers and did not expect high entering salary or early advancement. However, Millennials want more from their jobs than a paycheck. Ng, Schweitzer, and Lyons note "Millennials are increasingly looking at a company's values and mission and want to work for those firms that go beyond simply making money" and "[t]hey have low tolerance for less-than challenging work, and often perform poorly in high-volume and non-stimulating work."⁶ Millennials want a cause they can believe in, something upon which the nuclear enterprise can capitalize.

Without a doubt, the nuclear enterprise is one of the most important corporate and military entities in the United States. By marketing it as an enterprise that respects its employees, their time, their values, and couching its mission in terms Millennials will identify with, the current leaders of the nuclear enterprise should be able to recruit and retain the high caliber individuals they need. The Air Force has done a good job in recent years changing their recruiting slogans to fit the Millennial culture. For years, the recruiting slogan was "Aim High"; however, recently, they have gone with "We've been waiting for you," "Do Something Amazing," and "Above All." All three capitalize on the Millennial desire to feel special ("We've been waiting for you"/ "Above All") or a sense of achievement ("Do Something Amazing").

On the other side, not recognizing the things that drive Millennials and their culture traits can lead to dire consequences within the nuclear enterprise. In the wake of the 2007 Minot incident, the Task Force on Nuclear Weapons Management published the "Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management." The report notes, "[a]n essential part of leadership is inspiring people to

⁵ *Bomber Force Improvement Program: Final Report*, Air Force Global Strike Command, 31 Jul 2014.
ICBM Force Improvement Program, Air Force Global Strike Command, 12 Mar 2014.

⁶ Eddy S. W. Ng, Linda Schweitzer, and Sean T. Lyons, "New Generation, Great Expectations," *Journal of Business and Psychology* 25, no. 2 (2010): 283.

believe they are doing important work and are valued for it”⁷ and that the spirit of the enterprise was failing. The Air Force responded by unifying their assets under AFGSC and rigorously testing the command’s nuclear units to ensure compliance.

This move was touted as a way to “reinvigorate the nuclear enterprise” following years of neglect in a post-Cold War era. At the time, Millennials, with a few Generations Xers in leadership positions, made up the majority of personnel in B-52 operations and maintenance squadrons. These members experienced back-to-back-to-back nuclear inspections and exercises as well as increased procedural training running concurrently with conventional weapons training. The increased workload meant evenings and weekends away from family and a growing sense of resentment towards the nuclear enterprise. Given the Millennials’ strong desire to balance home life with work, their need to feel like their actions matter, and a desire to feel that their thoughts and opinions are heard by their leaders, these actions went against the culture of the generation. Rather than “reinvigorate the nuclear enterprise” these aviators settled into a nuclear fatigue. The buzzwords and culture had been overused and now no longer reached them. When a manning problem in other parts of the Air Force aviation world created a large number of billets outside the B-52 community, many of these aviators gleefully left the nuclear enterprise behind.

Whatever cultural values the Air Force intended to instill in their nuclear warriors was subsequently lost over the next six years, creating a culture in which the missileer cheating scandal occurred at Malmstrom AFB, MT. One can understand that, given the Millennial Generation’s culture, the combination of high expectation to perform flawlessly, a large amount of training and exams during their non-alert time, and a high volume of repetitive shifts in a missile capsule led to a core of nuclear officers who suffered high levels of stress, fatigue, and burn-out. Their seemingly endless hours staring at “the big red button,” which Millennials do not believe they will ever push, left the Air Force missileer community ripe for a scandal. The nuclear community’s culture has largely been blamed for the scandal, but the generation’s culture is fundamentally

⁷ Defense Task Force, “Report of the Secretary of Defense Task Force on DoD Nuclear Weapons Management,” September 2008.

entwined in that culture. The Millennial Generation is highly capable, but still human, and even the strongest still fall prey to resentment and fatigue.

Millennials can tell when their employers are not honest with them. It behooves leaders to understand not only what drives Millennials to failure or success, but also what drives them to distraction. While their Baby Boomer counterparts may have had unofficial mottos to “question everything” and “don’t trust anyone over thirty,” Millennials are open to suggestion from their senior leaders provided they feel they are being respected. Major General Jack Weinstein, then Commander of the USAF’s Twentieth Air Force, which controls all US ICBMs, stated that what he learned from the Millennials in his command is that they are sensitive to wording. For example, he noted that they had come to interpret the phrase “get your buy-in” as “here is something I’m telling you to do and I don’t care how you feel about it.”⁸ He stated that he has since learned to avoid that phrase, so he does not accidentally alienate his subordinates.

Another way to avoid these dangerous paths is to foster a work environment that is respectful of work/life balance. As noted earlier, Millennials have seen their parents’ divorces because of long hours and layoffs. This generation, like the ones before, still consider having a family and a stable marriage a sign of a successful life. Moreover, they do not believe in chaining themselves to a time-demanding job at the cost of deserting their family. They put as much energy and devotion into their pursuits outside of work as the ones at work. The Air Force should not just pay lip service to the idea of work/life balance but offer flexible work schedules to salaried employees. By creating flexibility, they will enable Millennials to attend to obligations outside of work while sourcing the Millennials’ drive to achieve to ensure their work is still accomplished. This flexibility can be achieved through alterations to missile alert shifts balanced with training at home station to allow for greater down time; reducing exercises and inspections to a bare minimum for both bombers and missileers; and ensuring balance between nuclear training and conventional bomber deployments.

Knowing the traits of the Millennial Generation can allow one to create an environment that is conducive to nurturing their careers and desire to remain in the

⁸ Major General Jack Weinstein, Commander Twentieth Air Force (address, Air Force Global Strike Command Commander’s Conference, Barksdale AFB, LA, 8 April 2014).

USAF; however, the opposite is also true. Not understanding the generation culture fosters the existence of a negative work place environment, the kind that drives Millennial leaders away, and creates a fertile ground for those attributes to grow. Those who are intelligent, articulate, and have the ability to find creative solutions are “mired by bureaucracy, paperwork, and redundancies” and live in a culture where perfection is the standard.⁹ It should be no wonder that when offered an opportunity to depart the Air Force with a fair severance package, officers and NCOs alike applied at such a rate that the AFPC website crashed.¹⁰ Both the Bomber and ICBM FIPs offered recommendations for their various observations, and AFGSC is working to implement the vast majority of them. However, there are things that must be addressed that go beyond AFGSC’s control to the Air Force level.

One of the first things for current Air Force leaders to consider is incentives. Incentives can be broken down into three categories: work/life balance, retention, and monetary incentives. Firstly, most Air Force bases in the nuclear enterprise are geographically isolated in the “northern tier.” Malmstrom AFB, MT, F.E. Warren AFB, WY, and Minot AFB, ND are all considered the Northern Tier and are subject to bitterly cold winters in addition to geographic isolation. Whiteman AFB, MO, the USAF’s sole B-2 base, enjoys a somewhat warmer climate but is also geographically isolated and almost 100 miles from the nearest major commercial airport. Barksdale AFB, LA, the only other B-52 base, enjoys a warm climate and is within a relatively short drive to several large cities with major airports as well as several large ports. If the Air Force expects their members to maintain a work/life balance, they should be allowed time away from a job that has a high operational tempo and is high stress. All bases except for Barksdale AFB are almost 100 miles from the closest major airport. This means that any personnel who seek to escape a harsh winter, desire to visit family, or engage in leisure activities that cannot be done nearby are paying for more expensive airline tickets at local, regional airports or spending more time driving to reach their destinations. For this reason, the Air Force should consider a pay function similar to the cost of living allowance (COLA) for members stationed at these bases to help offset the increased costs

⁹ *ICBM Force Improvement Program*, Air Force Global Strike Command, 12 Mar 2014.

¹⁰ Author’s personal observation from 29 Jan 2014. <https://www.afpc.af.mil/>

associated with living there. Those in the Northern Tier or similarly isolated nuclear bases should the first priority to ensure that when they are off duty, those in the nuclear enterprise can find ways to escape and recharge so they are refreshed and ready to face the rigors of the nuclear enterprise.

The skewed work/life balance can also be made easier to handle when the USAF recognizes the nuclear enterprise as a high priority. The Air Force has messaged the strategic importance of the nuclear enterprise more in the last decade than in the previous post-Cold War decade. The USAF stood up AFGSC as a strategic message that instilled a sense of importance both within the enterprise and as an outward symbol of their commitment to reinvigorating the nuclear enterprise to the American people and allies. However, one has only to look at the enterprise in the years that followed to see that this was a hollow promise. Notably, the USAF added the Nuclear Deterrence Operations Service Medal (NDOSM) in May 2014. This medal is awarded to those who “while assigned, attached, deployed or mobilized to a unit (wing, center or below), provided support to the Nuclear Enterprise for 120 consecutive or 179 non-consecutive.”¹¹ Airman can also receive an “N” device for the ribbon to signify they have performed 179 non-consecutive days of duty in direct support of the nuclear enterprise. However, while this medal is a step toward recognizing the importance of nuclear Airman, its place in the order of precedence makes it an example of bureaucratic self-sabotage. The order of precedence lists the NDOSM lower than the Humanitarian Service Medal, meaning that those non-nuclear Airman stationed at Minot AFB who volunteered during the historic 2011 flood received the Humanitarian Service Medal which was ranked higher in the order of precedence than the NDOSM given to nuclear Airman who were responsible for the nation’s most precious nuclear assets. It is difficult to justify days and weeks on alert to one’s family when weekend volunteer work could yield a medal considered to hold a higher degree of prestige.

The second way the USAF can make an impact on Millennial retention can be done through direct action. They can limit how the next round of Reduction In Force

¹¹ “Nuclear Deterrence Operations Service Medal Fact Sheet,” Air Force Personnel Center, 29 June 2016: <http://www.afpc.af.mil/About-Us/Fact-Sheets/Display/Article/856019/nuclear-deterrence-operations-service-medal/> (accessed 17 Apr 2017).

(RIF) and Voluntary Separation Pay (VSP) boards affect the nuclear enterprise. As the force continues to draw down or “right size” the number of personnel in the USAF, higher headquarters personnel need to take a very serious look at the number of personnel they need to fill key nuclear billets (KNB) balanced against the current attrition rate. To ensure adequate manning, those in KNBs should not be allowed to take VSP. Conversely, only those with an Unfavorable Information File (UIF) should be considered for the RIF. This will help ensure that talented officers are retained while those with negative indicators are removed.

Finally, and in concert with the paragraph above, the Air Force needs to consider retention bonuses for those in KNBs. While research shows that Millennials are motivated by more than money, that does not mean that they cannot be enticed by monetary incentives. Just as the Air Force offers retention bonuses to pilots, nuclear Airmen should be offered retention bonuses to keep them from taking their considerable leadership skills and top secret clearances to organizations and companies outside the Air Force. Bonuses should be commensurate with the pilot and RPA operator bonuses being offered at the time. This will incentivize nuclear Airmen to stay, show that their skills are regarded as highly as other career fields, and sends a powerful message of their value.

Conclusion

The leaders of tomorrow, like their predecessors, will lead by standing on the shoulders of the proverbial giants. Nothing the Millennials will do or achieve is possible without the theories, training, and strategies devised by their forefathers. However, to achieve the next level of strategic thinking, they will require education, guidance, and mentoring from their “nuclear elders.” This education will come from nuclear specific PME, tuition assistance focused on educating future strategists in international relations, and crossflow with civilian counterparts to ensure they can articulate the needs of the USAF nuclear enterprise with a common language. This will ensure that the leaders of today are able to shape and educate the cadre of leaders for 2035.

Additionally, today’s leaders will need to take steps to ensure that the cadre of future leaders they build is retained until 2035. These steps will speak directly to the Millennial’s generational culture. By offering bonuses commensurate with those offered to other career fields, it will show Millennial nuclear officers that they are valued and that

the sacrifices they make are making a difference in their world. These steps will be the first in correcting an organizational culture that is mismatched to today's geopolitical situation.

The nuclear leaders of the future require an education that gives them a strong foundation of nuclear expertise and strategy, the ability to communicate and articulate the needs of the nuclear enterprise with civilian leaders, and the ability to lead their peers and subordinates in what is a no-fail career field.



Chapter 6

Conclusions

The Millennial Generation is poised to inherit the senior leadership of the nuclear enterprise from their Baby Boomer and Gen X leaders. Like their predecessors, they are talented and honorable officers who strive to be a positive force in the nuclear enterprise and in service to their country. Unfortunately, the difference in generational culture is causing friction between the three generations and with the organizational culture that currently exists in the USAF nuclear enterprise. This has led to leadership breakdowns and scandal which erodes the deterrent capability of the nuclear arsenal and American puissance. However, by knowing what traits constitute Millennial culture, current leaders can harness those traits and begin to groom their replacements. This will ensure educated and articulate strategic leaders are ready to command the USAF nuclear enterprise in 2035.

The Millennial Generation will go forth with the guidance their leaders give them. To ensure they get the best guidance, tailored to their generational culture, their leaders should understand who the Millennials are: educated, passionate, values-driven, and tech-savvy. They seek careers that not only fulfill their desire to make a positive impact on the world but also one that enables them to balance work and life. They understand the importance of prioritizing that balance. When a leader understands these traits and the culture it engenders in the Millennial Generation, it will allow them to communicate in a way the Millennials will understand.

This knowledge of Millennial culture will also help leaders shape the organization in ways that reduce the friction between organizational culture and Millennial culture. It will also help them find areas in which the organization's culture needs to be refreshed so that organization meets the needs of the Air Force and the geopolitical situation of the day. AFGSC struggled with an organizational and cultural mismatch for five years, resulting in the Malmstrom AFB cheating scandal. As the organization and nuclear enterprise move towards 2035, positive changes in the culture will reduce the chance that a needless scandal like the 2014 incident could occur again.

The future is always uncertain but there are trends one can consider as they relate to the nuclear enterprise and future of deterrence. Whether 2035 will hold to the trend of non-proliferation, nuclear disarmament, or proliferation, there are things that will occur regardless. These events and occurrences should guide the education and training of Millennials. First, several treaties related to the US nuclear arsenal will expire before 2035. Should the US and Russia decline to renew the New START Treaty, this could lead to a second arms race. Both nations will likely attempt to increase the number of small yield nuclear weapons in their arsenal. This will require both nations to create new weapons and likely test them which could violate international norms. This will increase the friction within many international relationships and organizations. This means that future Millennial leaders will need to be educated in international relations and articulately communicate strategic messages and narratives that enhance deterrence effects.

The age of the nuclear arsenal and delivery platforms will also affect the nuclear enterprise in 2035. The B-21 Mitchell bomber will replace either or both the B-1 and venerable B-52 and the Ground Based Strategic Deterrent (GBSD) will come on as the newest ICBM. This will require leaders who are able to communicate with their civilian leadership to ensure the allocation of funds for updating and maintaining the nuclear arsenal.

Finally, the culture of the Millennials is shaped in part by the events and conflicts they have personally and professionally experienced. These events and conflicts will profoundly shape how they perceive and analyze future conflicts. These officers have grown up watching conflicts in Iraq, Bosnia, and Kosovo with no direct, adult experience with the Cold War. Their adult perception and experience of war and conflict began with the events of 9/11, OIEF, and OIF. From these events and conflicts, they grew to understand the impact non-state actors could have upon a nation. Additionally, they saw the US take unilateral actions and the international backlash that occurred from those actions. Next, they experienced OIR and OOD, seeing the US work within a coalition. Their perceptions of how the US utilizes nuclear weapons would have been shaped by how the US does strategic messaging, like bomber overflights of trouble areas, and the diplomatic actions associated with the Iran Deal. This stands in rather stark contrast to

the Cold War stance against a single superpower. This conglomeration of experience will build a mental picture of a nation that fights jointly and within coalitions but will act unilaterally if no coalition exists. Finally, it builds a mental picture that nuclear weapons are a political weapon, and that diplomacy is a powerful tool. This will create a group of leaders who understand the military's role in US grand national strategy: the big stick to back up diplomacy and one that should not be swung except in the most extreme of circumstances.

This thesis is not intended to be a tool for prognostication, merely a tool for understanding the generation of leaders to come and what their potential impact will be on the future of the nuclear enterprise and nuclear deterrence. Additional research is needed to fill in gaps in the study. The USAF should study the effects of the "up or out" retention and promotion model upon a force which is becoming manned primarily by Millennials. They should study the effects this model has on career decision making and whether otherwise talented officers feel they are being forced out "early." The USAF should also seek recruiting tools that match the generation and its culture: shorter contracts that allow time for career intermission, direct accession hiring, and career operator programs that allow talented operators to continue operating and building corporate knowledge. Finally, the USAF should investigate and implement ways to develop a culture that reflects the current environment while honoring its heritage.

Leading the Millennial leaders of the future will be like altering the flow of a river. One cannot dam the flow and expect to dig out a valley. One can only gently guide the flow until it carves the desired path. Senior USAF leaders of today should know the Millennial culture and its values intimately so that they can entice and coerce, gently guiding the flow of the culture so that over time it shapes the valley.

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