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A Nuclear Option: An Assessment of U.S. Preparedness for Modern Nuclear Conflict

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Abstract

This paper serves to explore the current state of preparedness for nuclear war that is held by the United States. This research project seeks to answer two main questions: what preparedness for nuclear war is, as well as if the United States is prepared. This case study considered preparedness to be a combination of multiple factors: the state of the nuclear arsenals of the U.S> and potential adversaries, the attitude towards the use of nuclear weapons, the global threat environment, nuclear conflict theory, and the defensive capabilities of the United States to detect and intercept nuclear projectiles targeting their assets and territories. The research showed that the original nuclear theories, Deterrence Theory and Mutually Assured Destruction, are still the dominant theories in use across the globe, however the United States has shifted its attitude towards the use of nuclear weaponry, with the Trump Administration stating it is willing to engage in nuclear conflict in defense of its allies. The American nuclear arsenal is aging, with the majority of it being constructed in the 1980s based on designs from previous decades. Compared to potential nuclear adversaries such as Russia, China, and North Korea, the U.S. has maintained an aging arsenal without developing new capabilities. The research shows that the United States, according to the definition used in this analysis, is not prepared for an extended nuclear conflict.

How prepared is the United States for modern nuclear conflict? With tensions rising, from Russian aggression in Eastern Europe, specifically Ukraine and the Crimean Peninsula, to unfolding events in Asia and the Middle East, it is an important question to consider. As far as public knowledge goes, the United States has not openly prepared for potential nuclear strikes since the official close of the Cold War. Another factor to consider are the recent developments out of North Korea, with Kim Jong-un's regime placing an emphasis on achieving nuclear capabilities and developing long-range intercontinental ballistic missiles (ICBM) capable of reaching the mainland United States and other targets. These two threats alone barely scratch the surface of the potential nuclear threats to the United States, or how vulnerable the nation may be to such an attack. This paper serves to analyze the preparedness of the United States in relation to the most likely nuclear threats: Russia, China, and North Korea.

Before delving into modern geopolitics and international tensions, it is imperative to understand past and present ideologies or theories surrounding nuclear capabilities and escalation. For much of the nuclear age, the status-quo has been a balance of nuclear deterrence theories and mutually assured destruction (MAD). Deterrence theory is a general theory that focuses on interstate conflict, applicable to both conventional and nuclear warfare. Deterrence theory holds that adversaries may be deterred due to the destructive capabilities of a force, whether conventional or nuclear. MAD is an extension of this ideology. For the unaware, the MAD doctrine holds that initial use of nuclear weaponry against a nuclear-capable adversary will result in retaliatory attacks, potentially leading to the total annihilation of both parties. These Cold War theories are relatively still in place today, with little to no changes in the dominant nuclear ideologies across the globe.

With traditional, or ‘classic’, nuclear theories out of the way, it is equally important to discuss a handful of contextual information associated with this topic. It is well known that Russia and China have nuclear capabilities, but the extent of their arsenal or the potential damage their weapons could do may remain largely unknown. It is also well known that both Iran and North Korea have been attempting to achieve nuclear capabilities for some time and may be close to completing or have already completed such capabilities. North Korea, under Kim Jong-un’s regime, has increasingly focused on the development of their own long-range intercontinental ballistic missiles (ICBM) capable of reaching the mainland United States and other targets, as well as developing their own nuclear capabilities. Furthermore, the nuclear and ballistic capabilities of North Korea, Russia, and China are often entirely speculative. It is well known that Russia and China have nuclear capabilities, but the extent of their arsenal or the potential destructive capacities of their weapons remain largely unknown. The same could be said of Iran and North Korea, as the progress of their respective ICBM and nuclear projects is essentially unknown, or at least entirely subject to speculation. However, recent developments in the Middle East show that Iran just might be capable of delivering attacks utilizing drones and low-flying cruise missiles, as it is suspected that the Iranians are behind a recent drone strike on Saudi Arabian oil fields, (Brumfiel, 2019).

Literature Review

Nuclear proliferation, theory, and preparedness date back to the dawn of the nuclear age at the end of World War II. To understand preparedness for conflict of any kind, especially nuclear aggression or conflict, it is important to first consider those concepts that could potentially contribute to escalation and eventual nuclear strikes. Beginning in the Cold War, there has typically been two different approaches to preparedness and defense in terms of the risk

of nuclear aggression or attacks. During this era, Switzerland opted for a defensive strategy, constructing vast shelter networks designed to protect the population. However, several countries in this era adopted an offensive strategy, such as the United States, France, and the United Kingdom: an arsenal build-up typical of a deterrence or mutually assured destruction mentality (Deville & Guggenheim, 2018).

Deterrence Theory and Mutually Assured Destruction have persisted as the dominant stances on nuclear ideology to this day, with very minor changes to the theories, if any. The obvious presence of this theory, and informal international policy, is still evident today between the United States and Russia (Hynek, 2010). Another form of deterrence theory comes in Perfect Deterrence Theory, an interstate conflict theory applicable to crises, conventional, and nuclear deterrence scenarios (Zagare, 2013). Of course, the effectiveness of Deterrence Theory is still largely up for debate, however, it is important to note that the results of it essentially sit at 100 percent effectiveness, considering the lack of nuclear attacks aside from Hiroshima and Nagasaki: the "lack of *any* nuclear weapon attacks or exchanges…seems to support a 100 percent success rate of *"the maintenance of military power"* in nuclear deterrence, regardless of the myriad factors contributing to the lack of nuclear incidents" (Boyce, 2019, p. 35). A more modern theory, in the same vein as MAD and Deterrence Theory, is what is known as "escalate to de-escalate," a strategy that is typically associated with Russia (Colby, 2018). This strategy is founded on the idea that Russia's vast and versatile nuclear arsenal, which includes naval weapons, anti-ship cruise missiles, and nuclear torpedoes and depth charges, will be enough to "settle a war on Russia's terms" by gambling that nuclear aggression will be enough to intimidate adversaries like the United States into backing down (Colby, 2018, p. 28). There is already a precedent for such a strategy, as escalating to de-escalate is similar to the tactics used

by Russia in their 2014 annexation of Crimea. Russia remains one of the largest threats to European stability, as well as stability in the Middle East (Chollet, 2018).

Russia is not the only credible nuclear threat, as China has likewise built up their nuclear arsenal over the course of recent years. In 2015, China unveiled the Dongfeng (DF) 26, an intermediate-range ballistic missile (IRBM) that is capable of reaching Guam, a U.S. territory. The DF-26 has the capabilities to be utilized as an anti-ship ballistic missile (ASBM), allegedly capable of targeting surface ships such as aircraft carriers (Missile Defense Advocacy Alliance, n.d.). China has even recently unveiled the DF-41, supposedly capable of delivering up to ten warheads, through the use of multiple independently targetable reentry vehicles (MIRV) technology, to United States territory within thirty minutes, alongside other conventional, nuclear, and allegedly hypersonic weapons (Fifield, 2019; Bodeen, 2019). Of the already capable nations, China is the next likely nuclear adversary behind Russia.

Nuclear capability is organized by four categories: First, Second, Third, and Fourth Level. China is considered a Second Level nuclear threat, whereas the United States and Russia are the sole First Level, or "Super Arsenal", threats (James, 2000). While relatively unlikely when compared to the nuclear willingness of Russia, China could potentially escalate a conventional conflict with an adversary into a nuclear standoff or even nuclear war. Talmadge (2017) writes that "…a state might engage in limited nuclear escalation to try to generate coercive leverage…," and while this quote is not directly attributed to China's potential for escalation, this article centers on escalation or nuclear strategies that could be employed, and the likelihood China may resort to such tactics in a conventional or nuclear conflict with the United States (p. 9). This escalation tactic is also extremely reminiscent of Colby's 'escalate to de-escalate' strategy, a tactic typically attributed to Russia, one of China's closest political allies.

Russia and China are not the only countries likely to employ escalatory tactics. The United States is not of clear conscious in this regard, as noted in the 2018 *Nuclear Posture Review*. Acton notes that this official government document carries a rather significant threat.

> …The United States warns potential adversaries that it would consider using nuclear weapons in the event of 'significant nonnuclear strategic attacks…on U.S. or allied nuclear forces, their command and control, or warning and attack assessment capabilities.' (Acton, 2018, p. 56)

The United States has contributed to increasing tensions with this threat of nuclear attack and escalation, although it should be noted that this threat carries with it some justification. At the beginning of the *Nuclear Posture Review,* the U.S. government notes increased aggression in space and cyberspace by Russia and China, as well as both nations' additions to the nuclear capabilities of their arsenals (U.S. Department of Defense, 2018). It has been relatively well-documented that the United States has been reducing their own nuclear capabilities with each administration after President George H. W. Bush's arsenal reduction of over 5,000 stockpiled warheads. Thus far, the United States has reduced their nuclear resources to a fraction of the Cold War era numbers (Colby, 2018). In an effort to remain prepared, many have suggested that the U.S. re-adopt deterrence theory and cease the reduction of the nation's long-range nuclear arsenal (Cimbala & McDermott, 2016; Colby, 2018).

North Korea poses a threat as a nuclear adversary in more than one way. Kim Jong-un and his regime have placed an extreme focus on achieving nuclear capability and improving their ICBM capabilities, as has been thoroughly noted in the past several years. This serves as the primary threat, as North Korea has threatened ballistic missile and nuclear strikes against the United States numerous times under Kim Jong-un. However, North Korea has a significant history of providing training, arms, and munitions to terrorist organizations from the 1960s to the present day (Ong, 2016). With increasing scrutiny on the nation concerning frequent missile

testing and the potential for nuclear development and testing, it is not outside the realm of possibility that North Korea could attempt to provide terrorist organizations with nuclear weapons or materials as an act of state-sponsored terrorism.

Consider, for a moment, the concepts of game theory and the game of 'chicken'. Game theory is both a logical system and a branch of mathematics that entered existence is 1944, and became a mainstream of tactical military affairs (Zagare, 2018) and was essentially the beginning of wargaming, as it considered both war and peace-time questions pertinent to the nuclear age in a simulation scenario (Weintraub, 2017). Also consider the question "What is the most significant consequence of nuclear arsenals after they become robust enough to survive a first strike by an adversary and still destroy that adversary in response" (Allison, 2018, p. 293)? As both Allison and Schelling noted, this scenario is no longer what is referred to as a "zero sum game" in the realm of game theory, but instead a complex and interdependent relationship, a conflict that relies on a "precarious partnership" (Schelling, 1960). Schelling (1960) considered the ideas of deterrence theory and MAD to be a high-stakes game of chicken. Consider the question above, and the Cuban Missile Crisis of October 1962. Schelling (1960) compared this nuclear faceoff to be an expertly, and carefully, maneuvered game of chicken between President John F. Kennedy and Soviet Premier Nikita Khrushchev. In terms of the earlier discussions of Deterrence Theory and MAD, Schelling realistically put it best, and most simply, by comparing these Cold War era doctrines to a potentially societal or world ending game of radioactive chicken.

Wargames have long been a part of history, with their origins traced back to recreational games of chess or their cultural variants across the globe. The concept would eventually evolve to be military tabletop exercises meant to simulate actual combat strategy, developed by the

Prussians and eventually adopted by major world powers at the close of the 19th century (Hershkovitz, 2019). Wargames would become an integral part of military planning, decision making, and education following World War II. The practice continues today, utilized by many military and governmental organizations as tabletop and physical exercises meant to improve operating procedures as well the original functions of education and military strategizing. With technological advancements, wargames have even become a digital simulation, both for military applications and returning to the original use of recreation. Consider the computer game DEFCON, developed by U.K. company Introversion Software. Inspired by the 1983 cult film *Wargames*, this game is a digital simulation of global scale nuclear war. The film concludes with the idea that the best way to win a thermonuclear war is "to not play at all" (Badham, 1983). The real-time strategy game, DEFCON, sees players position nuclear assets across the world, including missile silos, aircraft carriers, submarines, and defense and interception systems. The goal of the game is to incur the least number of casualties possible following the conclusion of a global nuclear war. Unlike its Hollywood inspiration, DEFCON has no option to avoid global catastrophe. No matter the strategy going into the game, it always ends in all-out nuclear war, and concludes with countless dead from nuclear missiles. No amount of Mutually Assured Destruction or deterrence will prevent such a global crisis. In DEFCON, nuclear conflict is not a matter of *if* but *when*.

It goes without saying that there has never been a truly nuclear conflict between two or more adversaries capable of inflicting complete annihilation of one another. There is no precedent for how to lead troops in such a conflict, there is nothing to consult when it comes to nuclear war aside from resources such as wargames and science fiction. No generals have performed this duty outside of thought experiments and tabletop simulations (Connely et. al,

2012). While *Wargames*, deterrence theory, and MAD suggest that the only way to win at nuclear war is not to play at all, the current state of international relations among nuclear capable powers suggests that option may already be off the board. The rising tensions among the United States, Russia, China, North Korea, and the increasing aggression of all parties, as well as Iran's recent ballistic drone strikes against Saudi Arabia, point towards the potential for just such a conflict. Most nations have stuck to the Cold War thoughts of an arsenal build-up, and while deterrence has worked so far, perhaps the United States, and realistically most nuclear capable nations, are wholly unprepared for a global scale nuclear war. As noted by Nye and Welch (2017), speaking about the British historian and philosopher Alan Toynbee, "In a world of sovereign states, where the ultimate form of defense is war and the ultimate weapons are nuclear, he [Toynbee] believed that something had to go…"

Defining Preparedness

Preparedness is typically defined as a state of readiness, or the ability to effectively respond to stimuli. In the context of nuclear conflict, this is not an entirely accurate definition. Preparedness, for the purposes of this analysis, is best defined as a combination of a variety of factors. Each of these factors contributes to a more holistic approach to preparedness. The contributing factors to this holistic concept of preparedness are nuclear capabilities, attitudes, ideology, theory, and the threat environment. Nuclear capabilities concerns those capabilities of both the United States and potential nuclear adversaries. Attitudes, ideology, and theory encompasses all aspects of how a nation views nuclear weapons and their use, as well as nuclear conflict as a whole. This also includes using nuclear weapons in alternative ways. The threat environment is a collection of what threats are or may be present, and the reasoning behind how it is a threat. Nuclear capabilities will be discussed in general in an independent section, as will

the threat environment. Attitudes, ideology, and theory will be discussed as parts of multiple sections throughout.

The best way to assess U.S. preparedness for an extended nuclear conflict comes from a recent government document; the 2018 *Nuclear Posture Review* (NPR). In this document, the Trump Administration officially recognized that the U.S. nuclear posture needs to at least partially be informed by the aggressive international policies and conduct of Russia, as well as Russia and China's intensive nuclear modernization programs (Heritage Foundation, 2018; U.S. Department of Defense, 2018). The NPR also reestablishes deterrence strategies, specifically to deter potential large-scale nuclear strikes against the United States and its allies, as the primary focus of American nuclear policy. The NPR also expresses support for the modernization of the nuclear arsenal, and even proposes two new low-yield delivery systems (Heritage Foundation, 2018; U.S. Department of Defense, 2018). On the surface, the United States looks to be primed for participation in global-scale nuclear conflict, either with or without nuclear-capable adversaries. However, there is more to consider about the state of the arsenal than merely the number of warheads attached to missiles, stored on bases, or stockpiled by the military. Multiple government reports have identified the deterioration of technical or diagnostic equipment used in testing nuclear weapons, the inability to fill needed technical positions that support this mission, and the fact that those with practical experience designing, testing, and creating nuclear weapons have retired in the time since the disarmament period began (Heritage Foundation, 2018). Updating, modernizing, or replacing the aging weapons systems currently in use is being suggested by many, as the potential threat actors or adversaries for extended, global nuclear conflict are openly and continuously working towards both improved warheads and delivery

systems. China, Russia, North Korea, and even potentially Iran or Pakistan are striving to catch up to or overtake the United States in their nuclear capabilities (Lowther & Dodge, 2017).

Nuclear Capabilities

The state of nuclear arsenals across the world are somewhat accurately documented, either in government publications or through estimates of scientists and other experts. As of 2020, it is estimated that there are approximately 13,500 nuclear warheads throughout the world, with only 9,500 of these warheads in military service (Arms Control Association, 2020). Over 90 percent of these are the arsenals possessed by the United States and Russia, with 5,800 and 6,375 warheads, respectively (Arms Control Association, 2020). China is estimated to possess anywhere from 200 to 320 warheads (Arms Control Association, 2020). North Korea is assumed to have approximately 30 to 40 warheads in their possession (Arms Control Association, 2020). It is important to note that there are four categories of nuclear weapons, at least when it comes to their position in an arsenal: deployed strategic, deployed nonstrategic, reserve or nondeployed, and military stockpiled. The primary difference to consider with these categories is where these weapons are being utilized. Strategic weapons include those stored at heavy bomber bases or incorporated into ICBMs, whereas nonstrategic are the weapons being housed on bases with short-range deliver systems. Reserve and stockpiled overlap in their definitions, but the main difference is that stockpiled also includes those that are considered inactive but are marked for potential use. A fifth category exists, but it is not necessary to list it among the other four, as it pertains to the retired nuclear warheads that await dismantling (Kristensen & Korda, 2019).

Alternate Methods of Nuclear Conflict

Conventional nuclear strikes are not the only way for a nation to utilize their nuclear arsenal. One of the most compelling alternative methods of nuclear conflict is the use of a

nuclear detonation to cause an electromagnetic pulse (EMP) attack. Typically referred to as a nuclear high-altitude electromagnetic pulse (HEMP), this is the concept that nuclear warheads detonated at certain heights above a target are capable of disabling or destroying electronics and equipment within a certain radius, based on the height of the detonation. This is due to the after-effects of a nuclear explosion; the effects being largely attributed to the radiation from the blast interacting with the atmosphere. In an executive order regarding resilience to EMPs, the White House defines nuclear HEMP as "a type of human-made EMP that occurs when a nuclear device is detonated at approximately 40 kilometers or more above the surface of Earth" (2019).

Nuclear HEMP relies on the detonation of a nuclear warhead anywhere from 30 to over 400 kilometers (18-50 miles) above the surface of the earth (AFCEC, 2020). The higher the altitude of the detonation, the more atmosphere below it that the radiation can influence. Essentially, the higher the detonation, the greater range the associated EMP will have. The general consensus regarding a nuclear HEMP strike against the U.S. is that a nuclear detonation at approximately 500 kilometers above the United States would generate a significant enough EMP to disable, disrupt, or destroy "electrical and electronic systems that operate the critical infrastructure of the United States, as well as portions of Canada and Mexico" (Riddle, 2004). This is the major threat associated with nuclear HEMP attacks, as it can entirely disable command, control, and communications (C3) infrastructure. This would also disable aspects of critical infrastructure, severely crippling major assets used in the day to day functioning of the United States. The broad range of frequencies effected by such an attack cover both commercial and military infrastructure. This means that a nuclear HEMP strike at any significant altitude, over 30 kilometers, would disable communications, damage electrical infrastructure, and disrupt command and control operations.

As a means of conflict, nuclear HEMP attacks could be significant in a variety of ways if vulnerable infrastructure is not properly protected against these effects. This use of nuclear weapons could stand as an attack on its own, as crippling U.S. infrastructure in this manner would bring the nation to a standstill. Successfully disabling the critical infrastructure of the United States, or even just a portion of the nation, would impede operations regarding identifying the attacker. Such an attack would also force the United States to focus on response, recovery, relief, and rebuilding efforts: protecting lives, mitigating cascading effects of the EMP, and reestablishing capabilities lost to the attack. This would include recalling some troops stationed outside of the United States. The more alarming possibility is the use of a nuclear HEMP strike as a precursor to another attack, either nuclear or conventional. Such a strike could disable detection and communication capabilities, allowing an adversary to essentially undertake a surprise invasion of the United States. Both are extremely low probability, high impact scenarios. While either use of a nuclear HEMP strike could theoretically disable the electronic infrastructure, and would likely cost a significant amount of lives, the second scenario would be significantly more devastating.

Attitudes towards Use

Much like the conventional use of nuclear weapons, it is important to consider the attitudes of potential adversarial nations towards the use of nuclear weapons in this way. This information typically comes from documents regarding a nation's attitude towards EMPs in general, not specifically the use of nuclear weapons. There is an important distinction to be made regarding nuclear HEMP, as to what a nation considers EMPs and this method of utilizing a nuclear arsenal. It is also important to note that this topic, at least at a general level, has become a relatively mainstream; entering the lexicon of several major nations, including several nuclear

powers. In the last decade, terminology such as “non-nuclear radio frequency (FR) weapons”, “information warfare” and “nuclear EMP attack” have appeared in the literatures of: Britain, France, Germany, Israel, Egypt, Taiwan, Sweden, India, Pakistan, Cuba, North Korea, Iran, Iraq, China, and Russia (Pry, 2017).

One of the most important factors to consider is what a nation considers an EMP attack, especially a nuclear HEMP. There are two perspectives to consider regarding what an EMP is categorized as: information/electronic or nuclear warfare. Both perspectives are relatively well-represented on the global stage among nuclear powers, as well as among significant allies to the United States. Many nations also see using nuclear weapons in this way as ‘legitimate use’, as it targets technology and not human lives. Additionally, it is important to note is that the analysts of some nations consider the United States to be a potential aggressor willing to use their extensive nuclear arsenal in a first strike (Pry, 2017). This assessment is relatively accurate, as the 2018 *Nuclear Posture Review* presented this exact sentiment, as the United States expressed a willingness to utilize their nuclear arsenal in defense of itself and its allies (Acton, 2018; U.S. Department of Defense, 2018).

Several nations consider nuclear EMPs as a subsect of information warfare, not as a dimension of nuclear warfare. Among these nations are Russia and China, and it can be relatively safe to assume that North Korea and Iran share these views (Pry, 2017). These nations also share the belief that the United States is a potential aggressor, with the potential to escalate matters into a nuclear conflict. One of the major aspects of a nuclear HEMP strike is the ability to cripple the communications, command, and control (C3) capabilities of a target. China and Russia, per relevant military writings, both heavily view C3 disruption as a key to victory in future wars (Pry, 2017). Viewing nuclear EMP attacks as information warfare acts as an

indicator that such a nation may be more likely to utilize a nuclear HEMP strike as part of a potential conflict with an adversarial nation, whether or not the target is nuclear capable. Another dimension to consider regarding nuclear HEMP is that some analysts, as well as the nations they represent, consider EMP attacks as legitimate use of nuclear weapons (Pry, 2017). This notion stems from the idea that an EMP would inflict "no or few casualties" (Pry, 2017), as well as the belief that targeting technology is acceptable as opposed to using nuclear weapons to target human lives, whether or not they are civilian or military.

Another dimension to this discussion that further complicates the threat environment is the idea of "super-EMP" weapons (Pry, 2017). Some analysts in Russia and China claim that the United States is developing, or already has developed, "EMP 'super' nuclear weapons", using this as justification for their own development of such weapons (Pry, 2017). Such an enhanced radiation weapon would, in theory, resemble a neutron bomb: minimized physical or explosive power with maximized radiation effects, meaning increased levels of neutrons and gamma radiation (Pry, 2017). The detonation of a conventionally designed nuclear weapon can produce EMP field strengths of "tens of kilovolts per meter" (Pry, 2017), whereas the same effect from an enhanced-EMP weapon would be drastically different. This same effect, if produced by a 'super-EMP' weapon, would be capable of producing field strengths of "several hundred kilovolts per meter" (Pry, 2017). This is important, as analysts assume the counter-EMP hardening of the United States to be at or around fifty kilovolts per meter (Pry, 2017). If this is an accurate estimation of the EMP hardening of the United States, this would mean that the nation is extremely vulnerable to such attacks. This vulnerability not only encompasses the C3 capabilities of the United States but would likely also impact the critical infrastructure of the nation, thereby impacting the lives of civilians and businesses. A significant aspect of this to consider is that

both China and Russia have already manufactured neutron bombs, as well as being capable of manufacturing the type of advanced EMP warheads being discussed (Pry, 2017). It is not outside of the realm of possibility that one, if not both, of these nations have in fact already produced such warheads. This provides another implication, the potential proliferation to other nations. Specifically, the rogue states assumed to be allied with Russia and China, North Korea, and Iran.

Analytic Considerations

In terms of what a nuclear HEMP strike targeting the United States means, there are several important takeaways for any analysis incorporating a nuclear EMP as a dimension of potential nuclear conflict. The primary implication regarding nuclear HEMP is the immediate impacts such a detonation could have on the infrastructure of the United States, depending on the type of weapon detonated. A significant indicator for this analysis is that the militaries of both Russia and China consider information warfare, specifically the disruption of C3 capabilities, as important aspects of future military conflicts. With both recognizing nuclear EMPs a dimension of information warfare, there is a strong likelihood that any future, major conflict with the United States could result in the use of nuclear weapons in this manner. This consideration plays into another aspect of Russian military strategy: escalating to de-escalate. Russia could incorporate nuclear HEMP into what is essentially a modern, deterrence-centric Blitzkrieg.

A significant factor to consider is the historical hesitance regarding the use of nuclear weapons, at least since the bombings of Hiroshima and Nagasaki. Throughout the latter half of the 20th Century, both the United States and the Soviet Union refrained from escalating conflict into a nuclear war. Even though both had manufactured miniaturized nuclear weapons (i.e. ‘low-yield’) and continued to do so during the course of the Cold War, neither implemented these weapons that would have caused damage comparable to that of conventional weapons (Nye &

Welch, 2017). This is important, has both the United States and the Soviet Union refrained from using their arsenals, including low-yield nuclear weapons, out of fear that "using any nuclear weapon, no matter how small, would open the window to using other nuclear weapons" (Nye & Welch, 2017). This fear could, and should, reasonably extend to include using such weapons as an EMP. With the United States' current stance on use, per the 2018 *Nuclear Posture Review*, it can be reasonable to assume that this stance, and deterrence in general, is still the dominant stance of major nuclear powers.

Threat Environment

One of the primary contributing factors to preparedness is an awareness regarding the threat environment. Being able to identify potential threats to the United States is one of the first procedures necessary for a comprehensive, holistic approach to preparedness. A threat environment is a term that refers to the collection of possible near and long-term threats towards an entity. Typically, a threat environment incorporates a multitude of threats across a variety of categories, including natural disasters, military threats, terrorist organizations or activities, etc. For the purposes of this analysis, the threat environment will only consist of threats coming from nuclear capable states that could potentially enter conflict with the United States. The three nations that this threat environment consists of are Russia, China, and North Korea. Each nation will be examined individually, with discussions centered on how and why they pose a threat to the United States in the context of a potential nuclear conflict.

Russia

Russia is, realistically, the most likely nuclear adversary for the United States. While a full-blown nuclear conflict is an extremely low probability, high risk scenario, it is not entirely outside the realm of possibility. Any future conflict between the U.S. and Russia is likely to have

a risk of escalating into a nuclear conflict, at the very least a stand-off similar to those in the past. Russia poses a threat to the United States for a variety of reasons, chief among them their commitment to nuclear capabilities and nuclear deterrence, as well as the nuclear forces the nation can field. Russia has been building a modern, versatile nuclear arsenal designed to attack specific military targets; anti-ship cruise missiles, nuclear torpedoes, and nuclear depth charges (Colby, 2018). Russia possesses increasingly accurate, low-yield nuclear weapons (Colby, 2018). Russia has fully embraced nuclear weapons and deterrence as a part of their military strategies, incorporating both as a major component in their most recent military doctrine: "Nuclear weapons will remain an important factor in preventing the outbreak of nuclear military conflicts and conventional military conflicts (large-scale war or regional war)" (Military Doctrine of the Russian Federation, 2014). While deterrence is a major facet of modern Russian military strategy, it is not necessarily an act of altruism or due to concern for the ramifications of nuclear conflict.

Russia has, essentially, weaponized deterrence. The nuclear strategy employed by Russia is based on 'defensive' deterrence, through which Moscow provides "security umbrella under which the state seeks to conduct operations while reminding other powers of its nuclear capabilities" (Colby, 2018). One such example of this weaponized deterrence is the Russian strategy known "escalate to de-escalate" (Colby, 2018). This strategy is founded on the idea that Russia's vast, versatile nuclear arsenal will be enough to "settle a war on Russia's terms" by gambling that nuclear aggression will be enough to intimidate adversaries like the United States into backing down (Colby, 2018). Russia has shown a significant commitment to this strategy, deterrence, and nuclear capabilities as a whole through a vast military and nuclear modernization program.

Shortly after the New START Treaty (short for New Strategic Arms Reduction Treaty, formally known as the Measures for the Further Reduction and Limitation of Strategic Offensive Arms) entered into force in February of 2011 (U.S. Department of State, n.d.), Russia committed to an ambitious military modernization program. Russia committed 19.3 trillion rubles (Approximately $303 billion) to rearming their armed forces to 70 percent new or modern, prioritizing the modernization of their nuclear arsenal (Cimbala & McDermott, 2016). This program includes new hardware and weapons systems for: Aerospace Forces, Navy, & Ground Forces (Cimbala & McDermott, 2016). A modern Russian nuclear force should be concerning for multiple reasons. One of the major reasons for concern is that one aspect of Russia's nuclear policy has not changed: "…Moscow has not changed its nuclear policy, which includes first use as a 'demonstration strike' to induce an enemy power to negotiate" (Cimballa & McDermott, 2016). This is important, as Cimballa and McDermott note that this essentially means the operational use of a nuclear arsenal to "de-escalate a conflict" (Cimballa & McDermott, 2016). This borders extremely closely to the strategy of escalate to de-escalate, which should be extremely concerning, as that was the strategy implemented by Russia in its 2014 annexation of Crimea.

China

While China does present some level of a nuclear threat to the United States, it is less than that posed by Russia. The nation holds a strict 'no first-use' doctrine when it comes to nuclear conflict. This doctrine would suggest that China is less likely to escalate conflicts than other powers, such as Russia or North Korea, but could turn to their nuclear forces if there is perceived escalation from an adversary, such as the United States. It is important to note that China views the United States as a potential aggressor willing to utilize their nuclear arsenal in

first strike scenarios (Pry, 2017). China has been developing modern, nuclear capable forces usable in regional conflicts; focusing on increasingly accurate, flexible nuclear forces capable of hitting U.S. bases in the western Pacific (Colby, 2018). China possesses perhaps the most diverse missile arsenal and development program of any of the nuclear powers, and in general; with rapidly modernizing ICBMs, multiple independently targetable reentry vehicles (MIRV) capabilities, and even hypersonic glide vehicles (Missile Defense Project, 2020). This is important, as China presents some likelihood to engage in regional conflicts, with risk of escalation if the nation perceives outside threats from those it considers to be potential nuclear aggressors. While unlikely when compared to the relatively nuclear willingness of Russia, China could potentially escalate a conventional conflict with an adversary into a nuclear standoff or even nuclear war (Talmadge, 2017). Another aspect of the threat China presents is nuclear HEMP. China, like Russia, considers nuclear HEMP and EMPs in general as a facet of information warfare, not nuclear warfare (Pry, 2017). Information warfare is a major component of China's strategies, and the nation considers the disruption of communications, command, and control (C3) capabilities as a key to victory in future wars (Pry, 2017). Given that China view the United States as a potential aggressor willing to utilize their nuclear weapons in first-strike scenarios, the nation may be more likely to employ this facet of information warfare in a preemptive strike to prevent further perceived aggression.

North Korea

Of the most likely nuclear adversaries of the United States, North Korea is somewhat unpredictable. The Democratic People's Republic of Korea is somewhat of a wildcard in this, as the clandestine nature of the communist nation's programs make it difficult to obtain reliable information. North Korea views the United States as an "aggressive capitalist power willing and

able to use nuclear weapons with decisive strategic effects against its enemies" (Pry, 2017). This attitude originally developed under Kim Il-sung and his fellow Stalinist elites, persisting through the reign of Kim Jong-il and typifying Kim Jong-un's reign thus far. The current regime, under Kim Jong-un, has aggressively pursued developments for both nuclear and missile capabilities. Current estimates place the arsenal of the DPRK between 30 to 40 warheads (Arms Control Association, 2020).

An important factor to consider here is the history of North Korea when it comes to the United States and nuclear weapons. Pyongyang has long viewed its defeat in the Korean War as a direct result of the atomic diplomacy of the United States, with fear of U.S. nuclear escalation greatly contributing to the signing of the armistice in 1953 (Pry, 2017). This fear of U.S. escalation, and intervention in general, has led to the development of a "nuclear inferiority complex" in North Korea (Pry, 2017). For the most part, the military strategy of North Korea is largely formed around avoiding U.S. intervention, either on behalf of South Korea or for other reasons. Placed in the context of current North Korean activities, the wildcard status of the nation is relatively significant. The Kim Jong-un regime has placed a significant focus on establishing itself as a major nuclear power, with ballistic missile capabilities to warrant more influence in the region. With several threats aimed at the United States, largely during the years of the Obama Administration, North Korea warrants some attention as a potential nuclear adversary.

Nuclear Modernization

Modernization has become a primary focus of several nuclear powers, including Russia and China. China continues to develop and field new weapons delivery systems (Missile Defense Project, 2020). Russia is nearing completion of the most ambitious military modernization program in their history (Cimbala & McDermott, 2016). North Korea appears to be continuously,

and aggressively, pursuing nuclear and missile developments and capabilities. Until recently, the United States had only been maintaining the state of the arsenal, primarily through the Stockpile Stewardship Program (Dodge, 2017).

The Stockpile Stewardship Program is the National Nuclear Security Administration (NNSA) effort to assess the reliability of nuclear weapons and certify the stockpile without nuclear explosive testing (NNSA, n.d.). This program marks a post-Cold War shift in nuclear weapons modernization, from constructing warheads with an approximately 10-year service life into efforts to extend the operational service life of nuclear weapons well beyond 10 years (Dodge, 2017). This extension of operational service life is a primary focus of the Stockpile Stewardship Program, both for existing nuclear weapons and the weapons delivery systems in service (NNSA, n.d.). While this has maintained a relatively effective arsenal, and continued to be effective at encouraging deterrence, it has led to an aging nuclear triad. Bombers date back to the Kennedy administration, nuclear submarines are nearing the end of their designed lifespans, and the warheads in the arsenal are on average three decades old (Dodge, 2017; NNSA, n.d.). The majority of U.S. warheads were developed during the 1950s and 1960s (National Nuclear Security Administration, n.d.), with the bulk of the current stockpile developed in the 1980s, based on weapons system designs from the 1970s (Dodge, 2017). There is an obvious need for the United States to address an aging nuclear security enterprise, a need that has been highlighted repeatedly over the years.

In 2016, the then-administrator of the NNSA, General Frank G. Klotz, testified before the Senate Armed Services Committee that “the age and condition of NNSA’s infrastructure will, if not addressed, put the mission, the safety of our workers, the public, and the environment at risk” (Woolf & Werner, 2020). In 2015, then-Secretary of Energy, Ernest Moniz, expressed significant

concerns about the infrastructure of NNSA facilities and systems, as well noting that "a majority of NNSA's facilities and systems are well beyond end-of-life" (Woolf & Werner, 2020). The need for modernization has been noted in each *Nuclear Posture Review* since the end of the Cold War, recognizing the need to maintain modern nuclear weapons infrastructure (Woolf & Werner, 2020). Most recently in the 2018 *Nuclear Posture Review*, which noted: "Over the past several decades, the U.S. nuclear weapons infrastructure has suffered the effects of aging and underfunding. Over half of NNSA's infrastructure is over 40 years old, and a quarter dates back to the Manhattan Project era." (Department of Defense, 2018). Modernization is a need that has been recognized numerous times, without significant results. However, some level of commitment to modernization has materialized: 2019 and early 2020 saw the development and fielding of a new, low-yield submarine launched ballistic missile, the W76-2 (Rood, 2020). This comes in pursuit of Department of Defense recommendations made in the 2018 *Nuclear Posture Review*, which called for the development of new low-yield weapons. Although it is not the significant modernization undertaking required, it is a step in the right direction. Estimates suggest that the modernization of U.S. nuclear forces would cost approximately 7 percent of the Department of Defense budget (Dodge, 2017). The Congressional Budget Office estimates that the nuclear forces of the United States will cost approximately $400 billion over the next ten years. For reference, the Department of Defense budget for 2020 was approximately $665 billion (Korb, 2020). With an assumed potential for most major future conflicts to risk escalation, a more modern U.S. nuclear force will be significant in deterring escalation for both the United States and potential adversaries.

Strategic Analytic Techniques

Strategic Analytic Techniques, or SATs, are designed to facilitate and improve analysis while mitigating any potential cognitive biases (Heuer & Pherson, 2015). There are a wide variety of such techniques that are used throughout the U.S. Intelligence Community in the completion of analytic products. These techniques are designed to facilitate or improve specific parts of an intelligence product, such as the hypothesis, the analysis of evidence, or even to identify potential deception by an adversary. SATs reduce biases in analysis by enabling analysts to identify cognitive bias or assumptions, thereby improving the validity and accuracy of an analysis. SATs have a variety of purposes that each contribute to improving an analytic product, but these purposes are achieved through a variety of individual products: idea generation, hypothesis generation and testing, scenarios, indicators, cause and effect assessments, etc. (Heuer & Pherson, 2015). Morphological Analysis is a technique used for complex situations, as it systematically structures and examines possible relationships in "multidimensional, highly complex, usually nonquantifiable" scenarios (Heuer & Pherson, 2015). Morphological Analysis is best used to address problems with limited available information with high chances for surprise. In *Structured Analytic Techniques for Intelligence Analysis*, the authors provide a list of examples for how the method can be used, including: "identify possible variations of a threat…ways a crisis might occur…ways a set of driving forces might interact, or the full range of potential outcomes in any ambiguous situation" (Heuer & Pherson, 2015). This technique, typically used as a way of 'looking ahead', enables analysts to identify and select potential outcomes that are the most credible.

Morphological Analysis: How Nuclear Conflict Could Occur

Figure 1.

Dimensions			
Adversarial Nation	Russia	China	North Korea
Attack Method	Nuclear HEMP	Mixed Tactics	Conventional
Target	Infrastructure	Military	Multiple
Impact (Why)	Destabilize	Expand Influence	Mixed

The component pieces of a scenario are the various ways in which whatever problem being considered, in this case a potential nuclear conflict against the United States, could unfold. Turning to the journalistic questions, the dimensions that need to be considered are who, what, how, and why. When and where are largely unimportant in this analysis, as these aspects can be assumed, with reasonable confidence and accuracy, to be a near-constant: occurring in the future, either within the United States or its territories. The alternate dimensions, and the possible combinations between them, generate a list of possible scenarios that answer the question at hand. Morphological Analysis produces a number of results, n, based on the number of possible outcomes in each dimension, or parameters (P). Therefore, the number of potential scenarios is equal to all of the total (t) outcomes for each parameter multiplied with each other, or: n = P1.t X P2.t… etc. until all parameters are accounted for. For the analysis featured in **Figure 1**, this would be represented as n = 3 X 3 X 3 X 3. There are 81 total, unique combinations that provide alternatives for addressing the concern of how nuclear conflict might occur. Instead of listing all possible permutations that result from the Morphological Analysis matrix, additional SATs will be used to explore alternatives offered by the Morphological Analysis matrix: Multiple Hypothesis Generator and Classic Quadrant Crunching.

Multiple Hypothesis Generator

The Multiple Hypothesis Generator is typically used when there is a reigning or 'lead' hypothesis. Like the previously discussed techniques, this technique separates that hypothesis into component parts, the key assumptions based around the journalistic questions. Those assumptions are examined, contrary assumptions are applied, and a number of contrary dimensions are listed. These contrary dimensions are what provide alternative hypothesis, which are then assessed on credibility and ranked accordingly. This provides a succinct list of priority hypotheses for decision makers to consider. For the purposes of this analysis, the lead hypothesis will be that Russia utilizes a nuclear high altitude electromagnetic pulse (HEMP) strike to cripple the critical infrastructure and communication, command, and control (C3) capabilities of the United States; forcing the withdrawal of forces acting as a forward presence, thereby destabilizing key regions of interest. As previously discussed, this matrix results in a total of 81 total combinations. Therefore, for brevity, further analysis through SATs will limit the alternative hypotheses featured, focusing on significant hypotheses supported by evidence provided in previous sections.

Figure 2.1: Multiple Hypothesis Generator

Lead Hypothesis: *Russian HEMP strike to cripple U.S. infrastructure and C3 capabilities, to destabilize key regions*

Components	**Lead Hypothesis**	**Alternatives Brainstormed**	
Adversarial Nation (Who)	Russia	China	North Korea
Attack Method (How)	Nuclear HEMP	Conventional Strike	Mixed Tactics
Target (What)	Infrastructure	Military	Multiple
Impact (Why)	Destabilize	Expand Influence	Mixed Goals

Figure 2.2: Generated Hypotheses	
Alternative Hypothesis:	**Credibility:**
Russia uses a nuclear HEMP strike to cripple U.S. infrastructure, to destabilize the U.S. and their interests abroad	5
China utilizes a nuclear HEMP strike, targeting U.S. infrastructure, to destabilize the United States	5
China utilizes a nuclear HEMP strike, attacking multiple critical infrastructure and military assets, to expand their influence in regions of interest	4
North Korea utilizes a conventional nuclear strike, targeting military assets, to expand their influence	4
Russia employs multiple attack methods, targeting infrastructure and military assets, to expand their influence	3
China employs multiple attack methods, targeting infrastructure and military assets, to destabilize the United States	3
North Korea utilizes a nuclear HEMP strike, targeting military assets, to destabilize the United States	3
Russia uses a nuclear HEMP strike to disable military targets in pursuit of multiple goals	3
North Korea utilizes multiple attack methods to target U.S. military assets, destabilizing their foreign interests	3
Russia utilizes a variety of attack methods, targeting multiple critical infrastructure and military assets, in pursuit of multiple national goals	2
China employs multiple attack methods to strike U.S. military targets in pursuit of multiple goals	2
North Korea employs conventional nuclear strikes, targeting U.S. infrastructure assets, to expand their influence	2
North Korea utilizes multiple attack methods, to strike a variety of U.S. infrastructure and military assets, in an effort to expand their influence	2
Russia enacts a conventional nuclear strike, targeting U.S. military assets, to expand their influence	1
China utilizes conventional nuclear strikes to cripple U.S. infrastructure, in pursuit of multiple goals	1

Figure 2.3: Accepted Hypotheses
Russia uses a nuclear HEMP strike to cripple U.S. infrastructure, to destabilize the U.S. and their interests abroad
China utilizes a nuclear HEMP strike, targeting U.S. infrastructure, to destabilize the United States
China utilizes a nuclear HEMP strike, attacking multiple critical infrastructure and military assets, to expand their influence in regions of interest
North Korea utilizes a conventional nuclear strike, targeting military assets, to expand their influence

The main hypotheses identified through the Multiple Hypothesis Generator are listed in **Figure 2.3**. All of the potential hypotheses generated through the analytic technique were graded and ranked by credibility, as shown in **Figure 2.2.** This credibility comes from a variety of evidence, largely that stemming from the Threat Environments section. The attitudes towards use, as well as the capabilities of each potential adversarial nation, are largely what informed the analysis and subsequent ranking of each alternative hypothesis. The four accepted hypotheses (**Figure 2.3**) will be examined and displayed individually.

Hypothesis One: Russia

The primary hypothesis, identified through the two previous Strategic Analytic Techniques and used as the lead hypothesis, concerns Russia and the use of nuclear HEMP strikes. This hypothesis suggests that Russia would detonate a nuclear weapon, or an "EMP super weapon," in the atmosphere above a selected target, likely the United States itself. Doing so would cripple the critical infrastructure of the United States, as well the C3 capabilities of the nation. This would likely force the U.S. to withdraw forces stationed abroad to focus on response and rebuilding efforts. Essentially eliminating any significant forward presence across the globe, this would destabilize key regions, enabling Russia to pursue its interests with relatively limited interference while the U.S. is otherwise occupied. By utilizing a nuclear HEMP strike in this way, Russia eliminates the possibility of U.S. intervention, at least for the duration of the recovery efforts.

This hypothesis is supported by several significant facts regarding Russia's attitudes towards the use of nuclear weapons, military strategies, and perceptions towards other nations. One major factor contributing to the credibility of this hypothesis is Russia's general military strategy. The nation has long considered nuclear weapons as a major aspect of their military

capabilities, incorporating deterrence as a major facet of their military doctrine (Military Doctrine of the Russian Federation, 2014). Featuring nuclear deterrence as a key aspect of their military strategies would detract from this hypothesis, however Russia is one of several nations that do not consider nuclear HEMP, as well as EMPs in general, to be a facet of nuclear warfare (Pry, 2017). This hypothesis also fits under the Russian strategy referred to as "escalate to de-escalate" (Colby, 2018), as disabling the United States in this manner would certainly escalate tensions across the world, but the vast and versatile Russian arsenal would likely intimidate any other potential adversaries from initially interfering in the post-detonation activities of Russia. Perhaps the most important indicator regarding this hypothesis is that Russia considers the United States to be a potential aggressor willing to use their arsenal in a first strike (Pry, 2017). This concern is reinforced by the United States itself, in the 2018 *Nuclear Posture Review*, where it was stated that the nation would be willing to utilize its arsenal in defense of itself or its allies (U.S. Department of Defense, 2018).

Hypotheses Two & Three: China

These two hypotheses concern how China might utilize a nuclear HEMP strike to target the United States. The second hypothesis is relatively the same as the one concerning Russia: China detonates a nuclear weapon, either a conventional one or one designed to maximize EMP effects, above the United States to cripple infrastructure assets, thereby destabilizing the United States and any forward presence in key regions of interest to China. The third hypothesis is similar; however, it incorporates the targeting of military assets to increase Chinese influence in regions of interest. This hypothesis largely concerns the targeting of mainland U.S. infrastructure and the simultaneous targeting of military assets in key regions, such as the southern or south eastern China, as well as the South and East China Seas. Both hypotheses are supported by the

same evidence, it is just a matter of how China might utilize the arsenal at their disposal to pursue their interests or destabilize their adversary.

China, like Russia, considers nuclear HEMP and EMPs in general as a facet of information warfare, not nuclear warfare (Pry, 2017). China also views the United States as a potential aggressor that is willing to utilize their nuclear arsenal in first strike scenarios (Pry, 2017). China has been developing modern, nuclear capable forces usable in regional conflicts; focusing on increasingly accurate, flexible nuclear forces capable of hitting U.S. bases in the western Pacific (Colby, 2018). The attitudes towards use harbored by China are somewhat unknown, due to the clandestine nature of several key nuclear programs. However, the continued expansion of China's nuclear capabilities, both regarding delivery systems and the size of the nuclear stockpile (Masterson & Bugos, 2020), suggests a commitment to deterrence, which is affirmed by the nation's stated "no first-use" doctrine. This suggests that China is less likely to escalate conflicts than other powers but could turn to nuclear forces if perceived escalation from an adversary, such as the United States. Given China's "no first-use" doctrine, it is unlikely that the nation would use a conventional nuclear strike to attack an adversary, unless otherwise provoked. Such provocation could come in the form of first-use by another nation, such as the United States, in defense of itself or its allies over perceived threats or aggression. However, given that China views nuclear HEMP as a legitimate use of nuclear weapons as an aspect of information warfare, there is potential for the nation to employ this strategy as a pre-emptive strike to limit U.S. intervention or aggression.

Hypothesis Four: North Korea

The fourth accepted hypothesis is that North Korea employs a conventional nuclear strike to attack U.S. military assets in order to strengthen or expand their influence. This hypothesis is

largely supported by the fact that this nation has been aggressively pursuing nuclear capabilities since the U.S. become involved in Korea. Under Supreme Leader Kim Jong-un, the Democratic People's Republic of Korea has been aggressively pursuing the development and improvement of ballistic missile capabilities. North Korea has also been working towards establishing itself as a nuclear power, to uproot the status-quo present in Asia. Largely, the entire military and nuclear strategy of the DPRK stems from the Korean War, often focused around avoiding foreign intervention, particularly that of the United States. This is largely due to the fact that Pyongyang views their defeat in the Korean War as a direct result of U.S. atomic diplomacy; leading to a sort of "nuclear inferiority complex" that has defined their programs since 1953 (Pry, 2017). With a recent history of threatening military action against the United States, specifically during the years of the Obama Administration, it is not outside the realm of possibility that North Korea would use a conventional nuclear strike to attack U.S. military targets. Doing so would demonstrate that North Korea has solidified its status as a nuclear power, with sufficient ballistic missile capabilities to engage in regional conflicts. A successful strike would increase North Korea's influence in the region, as well some level of influence on the global stage given that they would then be considered a confirmed nuclear power.

Conclusions and Implications

Preparedness, when it comes to something as drastic a topic as this, is a difficult concept to grasp. There are seemingly infinite factors at play that contribute to or detract from a state of preparedness. In terms of being prepared for modern nuclear conflict preparedness has multiple aspects to consider, including ideology, offensive capabilities, defensive capabilities, global political climate, and the threat environment. The prevalent ideology has remained the same since the Cold War, as deterrence theory is still the dominant nuclear ideology across the globe.

As for the capabilities of the United States, even after a drastic disarmament following the end of the Cold War, the United States still maintains one of the largest nuclear weapons stockpiles in the world, as the United States and Russia account for over 90 percent of all nuclear weapons (Kristensen & Korda, 2019). Defensive capabilities are present, with detection and interception capabilities monitoring for potential incoming missiles targeting the homeland, but the exact nature of these capabilities is often a tightly held state secret. The global climate and threat environment are closely intertwined, as the social and political attitudes across the globe will potentially impact the threat environment, and vice versa. The current threat environment is an interesting aspect to look at, as Russia and North Korea have become increasingly aggressive in their nuclear developments, with China close behind in the advancements of their weapons delivery systems. Multiple potential threat actors have been working towards proliferation for some time, such as North Korea and Iran, and these contributes significantly towards rising tensions across the world that if not handled appropriately, could escalate into extended conventional conflict and even nuclear conflict.

Achieving a more complete preparedness for potential nuclear conflict will require multiple changes by the United States. Continuing to work towards modernization of the nuclear arsenal will be important but focusing solely on offensive capabilities is insufficient. Deterrence theory has worked thus far, but it is not foolproof. Maintaining a healthy balance of offensive and defensive approaches to nuclear ideology will be critical to establishing preparedness for nuclear conflict, as having competent defenses and convincing offensive capabilities will present potential adversaries with significant consequences should they attempt nuclear strikes against the nation. Improving both the quality of the nuclear arsenal, as well as the detection and

interception capabilities of the nation, coupled with a necessary shift in focus and ideology is the recommended course of action moving towards preparedness.

Implications for the Future

There are several significant implications regarding potential nuclear conflict. Potential nuclear adversaries, specifically Russia and China, have designed military forces that are ideally suited for fighting and defeating the United States in a future conflict. These military forces feature modern, mobile nuclear forces as a key part of their strategies. Meanwhile, the United States has largely prioritized the maintenance of an aging arsenal and nuclear triad through the Stockpile Stewardship Program. The most important implication for the future, however, is the impending expiration of the New START Treaty. This is the only remaining nuclear agreement between the United States and Russia, set to expire in February of 2021. As of now, any talks to extend the treaty, or negotiate a new one, are ceased. Moscow has expressed interest in extending the treaty, as the existing agreement allows for an extension of up to five years is the leaders of both nations agree. Talks between Russia and the United States fell through largely because the United States wanted to incorporate new conditions, whereas Russia wanted an unconditional extension. One of the conditions the Trump Administration sought was the inclusion of China in a trilateral agreement, which China refused to enter unless the United States reduced the size of their arsenal to equivalent of their own: approximately 200 to 320 warheads. The stalled nuclear talks between the United States and Russia, expiring in early 2021, present a major uncertainty regarding how events may unfold if the New START Treaty is not extended. Now more than ever, the nuclear security of the United States should be an area of concern.

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