STRATEGIC ASSESSMENT 2020

Into a New Era of Great Power Competition

Edited by Thomas F. Lynch III

Institute for National Strategic Studies
National Defense University

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Contents

List of Illustrations vii

Foreword ix
Aaron L. Friedberg

Acknowledgments xiii

Major Findings on Contemporary Great Power Competition. xv

Part I. Conceptualizing the New Era of Great Power Competition

1. Introduction 1
Thomas F. Lynch III

2. Past Eras of Great Power Competition:
Historical Insights and Implications 17
Thomas F. Lynch III and Frank G. Hoffman

3a. Contemporary Great Power Geostrategic Dynamics:
Relations and Strategies 45
Thomas F. Lynch III and Phillip C. Saunders

3b. Contemporary Great Power Geostrategic Dynamics:
Competitive Elements and Tool Sets 73
Thomas F. Lynch III and Phillip C. Saunders

4. Contemporary Great Power Technological Competitive Factors in
the Fourth Industrial Revolution 105
T.X. Hammes and Diane DiEuliis

Part II. Warfighting, Innovation, and Technology in a New Era of Great Power Competition

5. Key Technologies and the Revolution of Small, Smart, and
Cheap in the Future of Warfare 121
T.X. Hammes

6. Emerging Critical Information Technology and Great Power Competition 139
Richard Andres

7. Social Media and Influence Operations Technologies:
Implications for Great Power Competition 153
Todd C. Helmus

8. Weapons of Mass Destruction, Strategic Deterrence, and
Great Power Competition 169
Paul Bernstein, Justin Anderson, Diane DiEuliis, Gerald Epstein, and Amanda Moodie

Part III. Geostrategic Interactions in a New Era of Great Power Competition

9. The Indo-Pacific Competitive Space: China's Vision and the Post–World War II American Order 185
Thomas F. Lynch III, James Przystup, and Phillip C. Saunders

10. Rogues, Disrupters, and Spoilers in an Era of Great Power Competition 219
Bryce Loidolt, Mariya Omelicheva, and James Przystup

11. Counterterrorism and the United States in a New Era of Great Power Competition 233
R. Kim Cragin, Hassan Abbas, Zachary M. Abuza, and Mariya Omelicheva

12. Whither Europe in a New Era of Great Power Competition? Resilient but Troubled 251
Steven Philip Kramer and Irene Kyriakopoulos

13. Competing Visions and Actions by China, Russia, and the United States in Latin America, the Middle East, Africa, and the Arctic 271
Bryce Loidolt, David Auerswald, Douglas Farah, Shannon Smith, and Caitlyn Yates

Part IV. Preparing to Compete

14. U.S. Strategies for Competing Against China 289
Frank G. Hoffman

15. Conclusion: Realities, Imperatives, and Principles in a New Era of Great Power Competition 309
Thomas F. Lynch III

Appendix A. Selected Bibliography 335

Appendix B. Contemporary Great Power Competition Dynamics Matrix (online only). 349

List of Contributors 351

Index 357

Chapter 8

Weapons of Mass Destruction, Strategic Deterrence, and Great Power Competition

By Paul Bernstein, Justin Anderson, Diane DiEuliis, Gerald Epstein, and Amanda Moodie

Weapons of mass destruction (WMD)—nuclear, biological, and chemical weapons and the means to deliver them—are an important feature of the global security environment and a key element of Great Power competition. For Russia and China, WMD contribute to multiple goals: conflict deterrence at the strategic and regional levels; regime survival; coercion of rival states; and, potentially, as an adjunct to conventional forces to support operations. U.S.-Russia competition in nuclear weapons has been constrained in recent decades by various arms control agreements, but the erosion of this regulatory regime in the context of deteriorating bilateral relations could create new competitive pressures. China has elevated the importance of its nuclear forces, modernized and expanded its strategic nuclear capabilities, and fielded a growing number of dual-capable theater-range missile systems whose role (whether conventional or nuclear) in a future crisis or conflict could complicate deterrence and heighten escalation risks. China and Russia may perceive chemical and biological warfare agents, including agents developed through new scientific and manufacturing techniques, as important capabilities for a range of operations against the United States and its allies. Chemical or biological attacks could be difficult to attribute and may be well suited to support Russian and Chinese objectives in operations below the threshold of open armed conflict.

Weapons of mass destruction (WMD) remain a significant concern for U.S. defense planning. Core strategy and policy documents such as the National Security Strategy, National Defense Strategy (NDS), Nuclear Posture Review, and Department of Defense Strategy for Countering Weapons of Mass Destruction highlight these weapons as an enduring feature of the security environment.[1] They are also a potentially dynamic factor in Great Power relations. Understanding the role of nuclear, biological, and chemical weapons in competition—from strategic nuclear deterrence to regional conflict (traditional, hybrid, irregular) to operations below the level of armed conflict—is essential to manage geopolitical risk, limit the possibility of surprise, prepare the joint force for future operations, and

inform the American people about the dangers associated with potential crises and conflicts. Advances in the technologies that shape WMD could make these tasks more difficult.

Nuclear Weapons in Great Power Competition

New pressures for competition in nuclear capabilities among the Great Powers are likely to emerge in the next few years. In the U.S.-Russia relationship, a weakened arms control regime and the introduction of new technologies could catalyze a period of competition and arms-racing in both offensive and defensive systems, which could affect the nuclear balance in uncertain ways. China's continued expansion and improvement of its nuclear forces may create the basis for a more competitive stance vis-à-vis the United States, should Beijing decide this is necessary to advance its global and regional aspirations. Emerging technologies enabling improved prompt strike (for example, hypersonic vehicles) and active defense against missile attacks could be a factor, as various nuclear competitions unfold at both strategic and nonstrategic levels. Additionally, Great Power nuclear competition could have important effects on U.S. extended deterrence relationships, prospects for further nuclear proliferation, and the future of the global nonproliferation regime.

The United States and Russia

Deterrence and arms control have been central to managing nuclear competition between Washington and Moscow for decades. Both sides have adhered to a concept of mutual deterrence that has ensured neither government saw advantage in mounting a surprise nuclear attack or using nuclear weapons in a crisis. A series of arms control agreements dating back to the 1970s has sought to reinforce deterrence by first capping and then reducing or eliminating nuclear delivery systems, including those considered to have destabilizing effects. This framework of deterrence and force reduction has been successful in limiting pressures for nuclear arms-racing and in mitigating (though not fully eliminating) other dangers of the nuclear age, including crisis instability and accidental launch.

Today, stress on this framework is growing, as bilateral relations have deteriorated and the network of treaties designed to ensure nuclear stability continues to erode. To be sure, neither country has been standing still regarding strategic nuclear forces. Russia has nearly completed modernizing its entire strategic nuclear arsenal and has also introduced or stated its intent to develop several nontraditional nuclear systems (so-called exotic weapons) that are important, from Moscow's vantage, to pose a credible retaliatory threat to the United States.[2] The United States is in the early stages of executing a program to replace all three legs of its strategic nuclear triad by the 2030s.[3] These respective strategic force upgrades have long been planned; their origins predate the downturn in bilateral relations and adoption of a Great Power competition framework by the 2018 National Defense Strategy. For both Washington and Moscow, the fundamental purpose of these programs is to ensure parity in strategic forces going forward—and thereby sustain a status quo that has long delivered mutual and global security benefits.

The question today is whether either side might see the need or the opportunity in the near term to move toward a more open and unconstrained rivalry in strategic nuclear forces, in order to achieve strategic competitive advantage. A new nuclear arms race is hardly inevitable—neither is it clear that this would be in America's interest. Some have

> "I would like to tell those who have been trying to escalate the arms race for the past 15 years, to gain unilateral advantages over Russia . . . the attempt at curbing Russia has failed."
>
> —*Russian President Vladimir Putin, March 1, 2018*

argued that robust and evidently superior nuclear forces would yield meaningful geopolitical advantage for the United States and a clear edge in competitions with other nuclear-armed states.[4] Others suggest that the costs and risks of such a posture are likely to outweigh any benefits. Nothing in current U.S. strategy and policy documents states or suggests a need to pursue nuclear superiority over Russia, or that achieving the goals of the NDS requires nuclear capabilities and policies markedly different from those that define U.S. planning.

The United States is not well postured for more open nuclear competition with Russia, as compared with earlier historical periods. Although today there is in Congress a bipartisan political consensus favoring the triad replacement program, it is unlikely this consensus would survive an effort to pursue a more expansive—and expensive—nuclear development program in the name of outcompeting Russia. Many of those who support modernization also question the cost of the triad replacement program in relation to that of the other capabilities required to fulfill the main objectives of the NDS. Accordingly, as a practical matter, it makes sense for the United States to avoid inviting an unconstrained competition in nuclear capabilities with an adversary that seems willing (to a point) to bear high costs in prioritizing nuclear forces.

This possibility points to the need to maintain a focus on stability characterized by parity in strategic nuclear forces, regulated through an arms control regime.[5] The U.S. goal should be to extend and adapt the New Strategic Arms Reduction Treaty (New START) and thereby create for strategic nuclear weapons a type of "competition sanctuary" that will limit strategic risk generally and avoid diverting resources from areas of competition that are arguably more important to fully implement the NDS.[6]

If the New START, currently set to expire in February 2021, is not extended or updated, some degree of heightened nuclear competition seems likely, as either side could then act without legally binding constraints.[7] How significant a competition this would be is not entirely clear. Russia might see an advantage to rapidly building up the number of warheads it can deliver on its strategic systems or expanding its strategic nuclear capabilities in other ways. Moscow could conclude that this was a relatively easy and cost-effective way to establish a degree of benefit and impose additional risk on the United States. Russia might feel a stronger incentive to move in this direction if it was experiencing the weight of other competitive pressures in nonnuclear domains, such as global nonnuclear strike, outer space, or cyber. After all, nuclear weaponry is one of the few strategic technology areas in which Russia is capable of competing effectively with the United States. But Moscow likely will not want to trigger a strong U.S. counter-response that creates new risk and prospective high additional costs for Russia, so it can be expected to exercise caution in moving too quickly or too aggressively toward a larger deployed force.[8]

The United States might or might not respond with similar steps. The political and psychological importance of maintaining the perception and reality of numerical parity would be an important consideration that could lead Washington to reverse the reductions

taken under the New START. But as recent studies have demonstrated, the United States could remain within the treaty limits even if Russia did not—and it could do so without undermining its nuclear deterrent, as long as the resilience inherent in the U.S. nuclear triad is sustained.[9] Furthermore, neither side has the capacity to upend the strategic nuclear balance by exceeding the treaty limits if the other chooses to do so too.[10] In other words, one highly plausible outcome of renewed nuclear competition is a modified form of parity at higher levels of strategic forces.[11]

Competitive pressures in strategic nuclear weapons could also be shaped by Russia's assessment of U.S. missile defense capabilities. Moscow has demonstrated that it will go to great lengths and bear considerable costs to ensure that its strategic nuclear forces can reliably overcome U.S. missile defenses if it needs to deliver a retaliatory strike in the event of a nuclear exchange. Russia fears that the United States will significantly expand its missile defense capabilities, and new nuclear systems being introduced by Russia, such as the Avangard nuclear-armed hypersonic glide vehicle (HGV), are intended mainly as a hedge against a U.S. breakout in missile defenses. While some analysts see the introduction of this and similar capabilities as signaling a new arms race or posing a qualitatively novel strategic threat, the number of such systems that Russia fields is likely for reasons of strategy and cost to be calibrated against U.S. missile defense deployments and the requirements for a secure second strike. That said, significant departures from current U.S. missile defense policy (for example, development of space-based interceptors) or an open effort to develop defenses tailored to HGVs could lead Russia to take more dramatic steps to ensure the survivability of its strategic nuclear forces.[12] This effort, in turn, could unleash new competitive pressures.

At the regional level, a somewhat different competitive landscape has taken shape in recent years. Russia continues to field modern land-, sea-, and air-based nonstrategic nuclear weapons (NSNW)—a category of weaponry in which it has long enjoyed uncontested advantage in relation to the United States and its Allies in the North Atlantic Treaty Organization (NATO). In the post–Cold War period, this imbalance in NSNW has been a source of concern precisely because of the fear that it could contribute to deterrence instability in Europe. Rather than compete with Russia in theater nuclear systems, the United States and NATO have sought repeatedly to extend the bilateral arms control framework to capture these capabilities. Moscow consistently has refused.

Still, during a period in which a nuclear crisis seemed a remote possibility, the United States judged the risk posed by this persistent asymmetry in NSNW to be manageable. Today, in light of Russia's conduct and its continued investment in these capabilities, this possibility is less remote and the risk therefore higher. Of particular concern is the threat that, in a regional conflict, Russia might see an advantage in escalating to the limited use of NSNW in the belief that the United States or NATO lacks the means to respond proportionately. Accordingly, mitigating this danger is now a priority for the United States. This strategy does not require matching Russia's large, diverse NSNW capabilities or its doctrine, but it does require a more tailored form of competition to narrow the imbalance in forces and convey resolve to strengthen the U.S. regional deterrence posture. To accomplish this, the United States will develop and field two nonstrategic nuclear capabilities: a low-yield option for existing submarine-launched ballistic missile warheads and a nuclear-armed sea-launched cruise missile.[13] Additionally, combatant commands and the Services have been

directed to strengthen the ability of the joint force to operate effectively in a nuclear environment following an adversary's limited use of nuclear weapons. More openly competitive measures designed to achieve parity or advantage in this category of nuclear weapons are not necessary for the United States to meet the requirements of regional deterrence.

A second issue in considering regional nuclear competition with Russia is the demise in 2019 of the Intermediate-Range Nuclear Forces (INF) Treaty. It remains to be seen what enduring effect this loss will have.[14] To date, it does not appear that Russia's deployment of previously prohibited INF systems alters the balance of power in Europe. The United States currently has no plans to develop a nuclear-capable INF system for deployment in Europe or elsewhere. The United States could choose to develop a land-based nonnuclear INF missile in support of NATO, which could help narrow the gap with Russia in such systems. In fact, Washington is much more focused on developing capabilities to close the conventional missile imbalance in East Asia that threatens to disadvantage the joint force in a future conflict with China. In the immediate period ahead, the most salient post-INF competitions will likely feature conventionally armed theater missiles.

The United States and China

Compared with the near-term dynamics that could shape U.S.-Russia nuclear competition, the prospects for U.S.-China nuclear competition need to be viewed over a longer time horizon. It is difficult to anticipate dramatic changes in the next 5 years, though trends in Chinese and U.S. capabilities should be monitored carefully; they could contribute to conditions that lead to a more competitive bilateral nuclear relationship in the future.

China has moved definitively away from its small, static strategic nuclear force of the past. As part of its broad-based modernization of its armed forces, China now fields a modern strategic dyad composed of intercontinental ballistic missiles (ICBMs) based on land and on submarines.[15] Structural reform of the People's Liberation Army has elevated the Rocket Force to coequal status with land, sea, and air forces, making more resources available for nuclear force development. Modern ICBMs (a growing number of them mobile) and submarine-launched ballistic missiles constitute an increasingly dynamic force designed to give Beijing high confidence that it possesses a survivable deterrent against U.S. nuclear forces and missile defenses—one that would allow it to resist nuclear coercion in a crisis and press its advantage in a local or regional military conflict with the United States. Clearly, China's leadership sees such a capability as a critical component of long-term competitive strategy toward the United States.

But China historically has not sought to engage in nuclear competition with the United States, choosing instead to maintain only those capabilities needed to deter and respond to nuclear threats. China's political leadership continues to have a generally conservative view of the role of nuclear weapons and has long accepted a large disparity in capabilities—a posture embodied in slogans such as "nuclear strategy of self-defense" and "lean and effective nuclear force."[16] While Beijing views a credible strategic nuclear deterrent as indispensable to a stable relationship with Washington, achieving equal status in numbers and types of nuclear weapons has not been its goal. China does not wish to be seen as an arms-racing global power.

> "While China's declaratory policy and doctrine have not changed, its lack of transparency regarding the scope and scale of its modernization program raises questions regarding its future intent."
>
> — Nuclear Posture Review, *DOD (2018)*

As the strategic environment changes and as the technological impediments to fielding larger and more advanced forces continue to fall, it is reasonable to ask whether and under what conditions China could adopt a more competitive approach to its nuclear forces. One possibility is that leadership will decide that parity (or something close to it) in strategic nuclear weapons is necessary to enhance China's status as a coequal global power and a dominant force in East Asia. Especially if U.S. force levels remain relatively static, this goal may become increasingly attractive; it likely would be even more attractive should the United States decide in 2020 or beyond to reduce current levels of operationally deployed forces, either unilaterally or through a renewed commitment to arms control with Russia. Should U.S. (and Russian) forces fall to, say, two-thirds of New START limits, Beijing's task in moving toward parity would be much more manageable—assuming it continues to rebuff U.S. entreaties to join the process of making negotiated reductions. If China were to achieve parity or equivalence in deployed or deliverable warheads, it might then be expected to explore ways to translate this status into political and military advantage.

Another possibility is that, as with Russia, competitive pressures for China could be driven by changes to U.S. missile defense and defeat capabilities. Should the United States expand its regional missile defense network, move toward a larger or more sophisticated homeland defense capability (for example, boost-phase kill, space-based interceptors), and field advanced theater-range missiles capable of precision strike against Chinese nuclear sites (fixed and mobile), concerns about the survivability of its nuclear forces could lead China to consider any number of steps to ensure the credibility of its deterrent. These types of offense-defense dynamics might have little to do with a decision by China to pursue nuclear parity as an explicit policy goal, but they nonetheless point to the possibility that, under certain circumstances, Beijing could feel compelled to undertake a significant expansion of its strategic nuclear forces.

The United States must also consider the possibility of nuclear competition with China at the regional level. Beijing historically has eschewed theater or tactical nuclear weapons that would support more expansive deterrence concepts and more operational scenarios that envision the limited use of nuclear weapons. But there are indications that this stance is changing as China considers how to strengthen its options for coercing and deterring the United States (and its allies) at different stages of conflict in an increasingly complex operating environment. Should China move decisively in the direction of limited nuclear options, it will need to consider how the United States might respond.[17] The United States does not station land-based or air-delivered nuclear weapons in the Far East and has no current plans to do so. If China's theater nuclear footprint expands, then U.S. allies in the region could press Washington to take countervailing steps. This potential competitive dynamic bears watching.

The converse could happen as well. The United States currently extends nuclear deterrence to regional allies through over-the-horizon nuclear capabilities; however, if the

nuclear crisis with North Korea is not resolved and indeed worsens, Washington could face pressures from the Republic of Korea and Japan to provide a more visible nuclear presence in the theater. This could lead the United States to deploy nuclear weapons to the region as a means to deepen extended deterrence relationships with these allies and perhaps other regional security partners. Should the U.S. nuclear presence in the region grow significantly and in a visible way—even for the purpose of countering a North Korean threat—Beijing might see the need to respond in kind by building up its own theater nuclear presence.

Finally, other regional developments could shape Chinese thinking about nuclear forces. Notably, China is closely watching India's efforts to develop a nuclear triad. While China was an important factor in India's decision to acquire nuclear weapons, India's nuclear force is not optimized for use against China or any other state; rather, India's nuclear deterrent historically has been more existential in nature, with the goal of maintaining India's strategic independence and keeping it free from intimidation or coercion by other nuclear powers. For its part, Beijing is reticent to acknowledge that India's nuclear arsenal could impact China's security. Still, the two nations have divergent and potentially competing interests and ambitions in South Asia and the Indian Ocean. As Beijing assesses future nuclear risks in the region, it cannot ignore India's progress in developing new and improved nuclear-capable delivery systems or India's efforts to build missile defense capabilities.

The Impact of Competition in Hypersonic Systems

The introduction of hypersonic vehicles by the Great Powers is not likely to have a major impact on the global balance of nuclear power in the next few years. To date, only Russia, as noted, is fielding a nuclear-armed hypersonic missile as part of its strategic forces. This capability will not in itself alter the U.S.-Russia nuclear balance in a significant way. Over time, if the Great Powers deploy intercontinental-range hypersonic missiles in growing numbers, it will be necessary to consider the strategic implications regardless of whether these systems are nuclear or conventionally armed. Could the conventional hypersonic systems of one Great Power pose a credible threat to the strategic nuclear deterrent of another? How would strategic stability be affected if the United States fielded a new generation of missile defenses capable of defeating Russian and Chinese hypersonic platforms?

Such questions will become more important in the period ahead, but strategists and defense planners must also closely examine the potential impact of hypersonic weapons on nuclear stability at the theater level. One concern is whether the widespread use of hypersonic missiles in a regional conflict would undermine stability by creating pressures for early nuclear use. If, as might be anticipated, theater-range hypersonic weapons give both sides to a conflict the capability to inflict more decisive nonnuclear damage (for example, against power projection forces, air defenses, or missile arsenals) at an earlier stage, then these reciprocal vulnerabilities could not only reinforce deterrence and restraint but also generate pressures to consider limited use of nuclear weapons to avoid or redress major operational setbacks.[18] How much more dangerous would such a scenario be if each side faced uncertainty about the payload of hypersonic missiles that were, in fact, dual capable?

Extended Deterrence and Proliferation Implications of Great Power Nuclear Competition

More open nuclear competition among the Great Powers likely would reverberate in the security environment in several ways. The impact on U.S. allies and security partners is one area of concern. The prospect of nuclear arms racing and heightened nuclear tension would make many partners anxious. This anxiety could lead some to demand a return to arms control and risk-reduction measures, while others are likely to demand stronger nuclear security guarantees from the United States. Either way, Washington would face new challenges in alliance management.

Indeed, the United States cannot dismiss the possibility that one or more of its allies, in the face of Great Power nuclear competition and a weakened arms control regime, could decide to pursue an independent nuclear weapons capability; other, less friendly states could make the same calculation as nuclear dangers rise. This is one way that Great Power nuclear competition could fuel proliferation. Additionally, sharper nuclear competition among the Great Powers is certain to be viewed by many nonnuclear states party to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as additional evidence that the "nuclear haves" remain unprepared to make progress toward nuclear disarmament. This would add to growing questions about the utility of the NPT in the 21st century and to pressures facing allies under the U.S. nuclear umbrella and others to embrace the Treaty on the Prohibition of Nuclear Weapons (Nuclear Weapon Ban Treaty) as an alternative to the NPT—a development that could undermine the legitimacy of nuclear deterrence as a security strategy.

Biological Weapons in Great Power Competition

There has been a broad consensus for decades that biological weapons are not useful as instruments of warfare because their effects are too difficult to control and too dependent on conditions such as weather, which cannot be predicted long in advance. Even in a strategic role beyond the battlefield, use of a contagious biological agent on a large scale could threaten to spread back to the attacker. Although the Soviet Union was not deterred by such considerations, or by the Biological Weapons Convention (BWC), from pursuing an extensive offensive biological weapons program, that threat receded with the end of the Cold War and the exposure and dismantling of many Soviet biological weapons facilities. Thereafter the biological weapons threat came to be seen by the United States as tied principally to terrorists rather than to nation-states, especially after 9/11 and the anthrax attacks that followed.

The BWC, which entered into force in 1975, embodies this global consensus on the lack of military utility of biological weapons and the importance of establishing a norm prohibiting their use.[19] The question today is whether, 45 years later, advances in technology and the revival of Great Power competition could challenge these assumptions. For example, progress in the life sciences could lead to the emergence of disease agents that are more easily controlled than their natural counterparts. Certain manipulations, such as conferring antibiotic resistance or hardening agents to environmental conditions, are likely to be within the capacity of scientists working for national defense establishments. Should U.S. competitors become interested in a new generation of biological weapons, defense planners would have to anticipate a threat of greater sophistication than in the past—one that could be employed in a set of contingencies that extends well beyond those associated with terrorists or violent extremist groups.[20]

Table 8.1. Biological Weapons and Gray Zone Operations	
Ambiguity	Pathogens naturally present in the affected area could be selected to disguise the deliberate origins of an attack.
Nonlethality	Pathogens could be disseminated to cause nonlethal rather than fatal diseases.
Delay	Effects from the release of a biological weapon would be delayed from the time of release, with the length of the delay depending on the dose received and the health of the victim.
Psychological Amplification	The invisible, time-delayed, and potentially lethal consequences of exposure to disease agents—whether deliberate or natural—could cause great anxiety among civilian or military personnel in the vicinity of any disease outbreak, greatly amplifying the disruptive effects.
Behavioral Consequences	Advanced biological agents might be developed that could influence the mood and behavior of those infected, rather than causing illness or death, with uncertain consequences.

Thus, an important task is to understand how the "new biology" could help determined competitors such as Russia and China overcome the traditional obstacles to effective battlefield or even strategic employment of disease agents—and to what potential effect. Should Russia or China be willing to violate its BWC commitments, either country could seek to develop more effective capabilities designed to target specific U.S. military activities and facilities important to the prosecution of a regional conflict. Examples could include attacks on U.S. power projection or logistical supply activities critical to flowing U.S. forces and equipment, such as operations at ports of embarkation or debarkation. Such attacks, if successful, would interrupt key supply chains by disabling or killing unprotected civilian port workers. Military personnel could also be affected by a no-notice attack that infects them before physical or medical protections could be put into place. Panic in the general populace could further complicate military activities.

Aside from the question of effects on military activities is the challenge of attribution. It is already difficult to determine whether a disease outbreak is natural or deliberate and to identify with high confidence the source of an intentional attack. A new generation of biological agents could make it even more challenging and thus encourage other powers to consider militarizing such agents as a tool of asymmetric warfare for various nontraditional battlefields. Here, the Department of Defense needs to look beyond the possibility of major war. In the types of irregular or hybrid operations exemplified by recent Russian activities, or even in so-called gray zone operations, innovations in the life sciences could allow peer competitors to exploit the ambiguity associated with biological agents; these actors could pursue important goals while avoiding accountability. Table 8.1 notes the attributes of biological weapons that could make them attractive in such an effort.

Emerging biological applications have the potential to shape Great Power competition more broadly. Bioinspired innovations—such as advanced materials, "living" sensors, engineered medicines, and new forms of energy production—could confer advantage on those militaries best able to develop, field, and exploit them. State competitors could also invest in biotechnology to directly enhance warfighter capabilities—for example, through machine interfaces or more direct physical enhancements or protections. These kinds of military applications may be legitimate in the sense that they do not violate international

legal prohibitions against the use of biological weapons, but they could also mask illicit programs to develop such weapons.

Additionally, technological advances in the life sciences could lead to the exploitation of genetic vulnerabilities and the genetic targeting of populations. Knowledge of the genetic makeup of key individuals might indicate health conditions to which they are especially vulnerable; more speculatively, in the event that relationships may be gleaned between genetic traits and behavior, this knowledge could indicate propensities to act in certain ways. Advances in genetics and biotechnology raise related questions about the possibility that genetic weapons might be developed that selectively target individuals or groups based on specific genetic signatures. A 2018 report from the National Academies of Sciences, Engineering, and Medicine finds that developing such a weapon confronts a number of technical challenges; however, the rate of technical progress in relevant fields suggests that this issue should continue to be monitored.[21] To the extent that these possibilities exist, genetic databases containing information on a nation's population or leaders assume national security sensitivity.

Looking ahead, the United States will need to develop intelligence capabilities that can anticipate, monitor, and assess the range of advanced agents that modern biotechnologies may make possible and adversary efforts to militarize these agents. This is a formidable challenge, not least because of the dual-use nature of work in the life sciences. The potential for adversary use of biological weapons with deliberate ambiguity requires the United States to develop techniques and practices that can reliably identify disease outbreaks and differentiate natural from deliberate attacks, attribute the source of a possible attack, and accelerate the execution of medical management strategies. Given the importance of allies and coalitions to U.S. defense strategy and the prosecution of any regional conflict, the United States must work with partners to ensure an adequate level of preparedness for plausible biological weapons attacks. The United States cannot anticipate all possible weapons applications of the life sciences and biotechnology, but it must be postured to respond effectively to biological warfare threats so as to deny any meaningful advantage to adversaries seeking to exploit these technologies for military gain.[22]

The coronavirus pandemic underscores this point. Although the novel coronavirus is clearly not a biological weapon (despite persistent efforts by those hostile to U.S. interests to assert otherwise), the pandemic nonetheless could hold lessons for adversaries inclined to see utility in asymmetric or unconventional means of conflict—and who have invested in modern biology. Future threat assessments will need to consider how potential adversaries view the economic and social disruption caused by the virus in the United States and for some of its partners, the challenges in mounting an effective response, and possible effects on the readiness of the joint force.

Chemical Weapons in Great Power Competition

As with biology, advances in chemical science and technology could result in novel military threats, new proliferation risks, and further challenges to the Chemical Weapons Convention (CWC). For example, the convergence of chemistry and biology—an important aspect of what has been called the fourth industrial revolution (as described in chapter 4)—has led some analysts to ask whether bad actors could use processes such as peptide

synthesis or metabolic engineering to create toxins or other chemical agents in order to exploit loopholes in the CWC or avoid detection through its routine verification measures.[23] Likewise, the convergence of chemistry and information technology means that many chemical production processes could become automated or capable of being performed remotely, which would make it more difficult to detect the existence of a covert or illicit chemical weapons program.[24]

Another potential challenge is the interest of several countries, including Russia and China, in developing incapacitating chemical agents or central nervous system (CNS)–acting chemicals for domestic law enforcement purposes.[25] The CWC permits member states to use chemical agents for this purpose and does not rule out the use of incapacitants or CNS-acting chemicals under this exemption. Although the treaty prohibits the use of such agents as weapons, it is possible that Russia or China would consider this prohibition a useful tactic in military operations below the level of open armed conflict, while claiming that the use was both legal and acceptable under a broad interpretation of the law enforcement provision of the CWC.

Russia has already demonstrated its willingness to use chemical agents in operations other than war. In 2002, Russian security forces employed a fentanyl derivative to incapacitate Chechen separatists in a Moscow theater, leading to the death of 117 hostages. In 2018, a failed assassination attempt against a former Russian intelligence agent using a new variant of nerve agent developed by the Soviet Union in the 1970s resulted in the accidental death of a British citizen.[26] Similar incidents, such as the 2017 assassination of the half-brother of North Korean leader Kim Jong-un using the nerve agent VX, suggest that chemical agents may be an attractive option for governments seeking plausibly deniable means to conduct tailored operations short of war.[27]

Far more troubling is the use of chemical agents to support major military operations. The government of Bashar al-Asad has repeatedly employed chemical weapons in the Syrian civil war, ranging from a massive attack using sarin gas in August 2013[28] to numerous smaller scale chlorine attacks in the following years,[29] even after Syria acceded to the CWC in September 2013. The apparent effectiveness of these attacks and the lack of a forceful, sustained international response in their aftermath could lead other autocratic governments to conclude that chemical weapons have utility in ensuring internal security and regime survival. Russia's shielding of the Syrian government's attacks further suggests that Moscow itself does not view the longstanding taboo against chemical weapons—or the international censure that might result from their use—as a constraint on its behavior, especially in the gray zone and when not confronting the United States directly.

The United States has been investing for decades in protection for deployed forces that might be exposed to chemical weapons. Whether the Department of Defense in a new era of Great Power competition now needs to consider additional threat possibilities is a reasonable question. Russia might not contemplate the use of chemical weapons in a major conflict with NATO, but such employment cannot be ruled out. Facing significant operational challenges or setbacks from a NATO counterattack, Moscow might well consider asymmetric responses to regain the initiative, including chemical attacks against NATO ground formations, air bases, and forward logistics sites. It is possible that such operations' effectiveness would be limited if Russia were to choose to constrain its

preparations (material and nonmaterial) for fear of signaling its intent to violate the CWC. Nonetheless, the possibility of such attacks and their impact on Alliance operations should be incorporated into future plans and exercises, in order to strengthen deterrence and battlefield preparations.

While China also engages in a wide range of gray zone activities in an attempt to assert and defend controversial maritime and land border claims and shape the political environment, it has not yet violated the norm against the use of chemical weapons and does not appear prepared to do so.[30] In the past 3 years, the Department of State's annual arms control report addressing CWC compliance has made no mention of China.[31] Chinese military leaders may not perceive a need for chemical weapons on current or future battlefields; this may dovetail with a broader political strategy under which China seeks to counter the negative effects of its regional policies by maintaining a cooperative posture with the United States on other issues, including WMD proliferation.

The world may have entered an era in which the norm against chemical warfare continues to weaken while the incentives to resort to unconventional weapons could grow. Ongoing technology developments could further undermine traditional constraints against the use of chemical weapons—while enhancing their appeal as a tool to achieve specific political or operational goals.[32] Varied uses of chemical agents could become a more common occurrence across the spectrum of competition and conflict. This possibility is an important feature of the new era of Great Power competition and should inform U.S. strategic thinking and defense planning.

Notes

[1] *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Department of Defense [DOD], January 2018), 2–3; *2018 Nuclear Posture Review* (Washington, DC: DOD, February 2018), V–VI, available at <https://media.defense.gov/2018/feb/02/2001872886/-1/-1/1/2018-nuclear-posture-review-final-report.pdf>; *Department of Defense Strategy for Countering Weapons of Mass Destruction* (Washington, DC: DOD, June 2014), 3.

[2] See Matthew Kroenig, Mark Massa, and Christian Trotti, *Russia's Exotic Nuclear Weapons and Implications for the United States and NATO* (Washington, DC: Atlantic Council, March 2020), available at <www.atlanticcouncil.org/in-depth-research-reports/issue-brief/russias-exotic-nuclear-weapons-and-implications-for-the-united-states-and-nato/>.

[3] Land-based intercontinental ballistic missiles (ICBM), *Columbia* class nuclear submarines carrying submarine-launched ballistic missiles (SLBM), and long-range bombers carrying air-launched cruise missiles and gravity bombs.

[4] See, for instance, Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Strategic Superiority Matters* (New York: Oxford University Press, 2018).

[5] See Rose Gottemoeller, "Don't Let the New START Treaty Lapse," *New York Times*, November 8, 2019.

[6] The New Strategic Arms Reduction Treaty (New START) aggregate limits are 700 deployed ICBM, SLBM, and nuclear-equipped heavy bombers equipped for nuclear armament, and 1,550 operationally deployed strategic nuclear warheads associated with these systems. See Department of State, "New START Treaty," available at <www.state.gov/new-start/>.

[7] With the U.S. withdrawal from the Intermediate-Range Nuclear Forces (INF) Treaty in August 2019, following years of Russia violating the accord, New START is the only nuclear arms control treaty currently in force between the two countries. New START can be extended for up to 5 years, if both the United States and Russia agree to an extension.

[8] Vince Manzo, *Nuclear Arms Control Without a Treaty? Risks and Options After New START* (Arlington, VA: CNA, March 2019), 59. The author notes, "Russia has prioritized funding for nuclear forces, but it probably does not have the economic wherewithal for a massive arms buildup."

[9] Ibid., 59–60.

[10] Ibid., 2.

[11] An additional consideration is the ability of the Department of Energy to produce warheads in numbers beyond those required for the triad replacement program of record. Constraints on the department's production capacity could be a limiting factor.

[12] The *2019 Missile Defense Review* discusses the potential benefits of space-based interceptors and states that DOD will examine concepts and technologies to support such a capability. See *2019 Missile Defense Review* (Washington, DC: DOD, 2019), 36–37, available at <https://media.defense.gov/2019/Jan/17/2002080666/-1/-1/1/2019-MISSILE-DEFENSE-REVIEW.PDF>.

[13] The *2018 Nuclear Posture Review* fully explains the strategic logic behind the decision to field limited new nonstrategic nuclear capabilities. See *2018 Nuclear Posture Review*, 52–55.

[14] For an overview of the INF Treaty, see Bureau of Arms Control, Verification and Compliance, Department of State,

"The Intermediate-Range Nuclear Forces Treaty," available at <www.state.gov/inf>. For the U.S. statement withdrawing from the treaty, see Michael R. Pompeo, "U.S. Withdrawal from the INF Treaty on August 2, 2019," Press Statement, Department of State, available at <www.state.gov/u-s-withdrawal-from-the-inf-treaty-on-august-2-2019/>. For a discussion of implications of the treaty's demise, see Amy Woolf, *U.S. Withdrawal from the INF Treaty: What's Next*, IF11051 (Washington, DC: Congressional Research Service, updated January 2, 2020), available at <https://crsreports.congress.gov/product/pdf/IF/IF11051>.

[15] China may be moving toward a nuclear triad through the fielding of upgraded aircraft that can carry a nuclear-armed air-launched ballistic missile. See *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2019* (Washington, DC: Office of the Secretary of Defense, May 2019), 67, available at <https://media.defense.gov/2019/May/02/2002127082/-1/-1/1/2019%20CHINA%20MILITARY%20POWER%20REPORT%20(1).PDF>.

[16] *China's National Defense in the New Era,* 2019 Defense White Paper (Beijing: State Council Information Office of the People's Republic of China, July 2019); *China's National Defense in 2006,* 2006 Defense White Paper (Beijing: State Council Information Office of the People's Republic of China, December 2006).

[17] *2018 Nuclear Posture Review*, 32.

[18] See Paul Bernstein and Harrison Menke, "Russia's Hypersonic Weapons," *Georgetown Journal of International Affairs*, December 12, 2019, available at <https://gjia.georgetown.edu/2019/12/12/russias-hypersonic-weapons/>.

[19] The Biological Weapons Convention prohibits signing parties from developing, producing, stockpiling, or otherwise acquiring or retaining biological agents or toxins "of types and in quantities that have no justification for prophylactic, protective, or other peaceful purpose." These prohibitions also include "weapons, equipment, or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict." See "Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction," Article I, available at <http://disarmament.un.org/treaties/t/bwc/text>.

[20] See Gerald L. Epstein, "Biodefense and Great Power Competition," *Nonproliferation Review*, Spring/Summer 2020 (forthcoming).

[21] See *Biodefense in the Age of Synthetic Biology* (Washington, DC: National Academies Press, 2018), 71–84, available at <http://nap.edu/24890>.

[22] Kim Riley, "Blue Ribbon Study Panel on Biodefense Focuses on DOD Role in Protecting U.S. Against Bio Attacks," *Homeland Preparedness News*, February 6, 2019, available at <https://homelandprepnews.com/countermeasures/32417-blue-ribbon-study-panel-on-biodefense-focuses-on-dod-role-in-protecting-u-s-against-bio-attacks/>.

[23] Jonathan B. Tucker, "The Future of Chemical Weapons," *The New Atlantis*, no. 26 (Fall 2009/Winter 2010), 3–29.

[24] *Spiez Convergence: Report on the Third Workshop 11–14 September 2018* (Zurich: Spiez Laboratory, November 2018), available at <www.labor-spiez.ch/pdf/en/rue/Spiez_CONVERGENCE_Report_on_the_3rd_workshop_2018.pdf>.

[25] Michael Crowley and Malcolm Dando, "The Use of Incapacitating Chemical Agent Weapons in Law Enforcement," *The International Journal of Human Rights* 19, no. 4 (2015), 465–487.

[26] Government of the United Kingdom, "Novichok Nerve Agent Use in Salisbury: UK Government Response, March to April 2018," April 18, 2018, available at <www.gov.uk/government/news/novichok-nerve-agent-use-in-salisbury-uk-government-response>.

[27] Oliver Holmes and Tom Phillips, "Kim Jong-nam Killed by VX Nerve Agent, Say Malaysian Police," *The Guardian*, February 24, 2017, available at <www.theguardian.com/world/2017/feb/24/kim-jong-nam-north-korea-killed-chemical-weapon-nerve-agent-mass-destruction-malaysian-police>.

[28] United Nations General Assembly Security Council, *Report of the United Nations Mission to Investigate Allegations of the Use of Chemical Weapons in the Syrian Arab Republic on the Alleged Use of Chemical Weapons in the Ghouta Area of Damascus on 21 August 2013*, A/67/997-S/2013/553, September 16, 2013, available at <https://digitallibrary.un.org/record/756814/files/A_67_997%26S_2013_553-EN.pdf>.

[29] *Third Report of the Organization for the Prohibition of Chemical Weapons–United Nations Joint Investigative Mechanism*, S/2016/738, August 24, 2016, available at <https://undocs.org/S/2016/738>.

[30] John A. Stevenson, Belinda Bragg, and Sabrina Pagano, *Violating Normal: How International Norms Transgressions Magnify Gray Zone Challenges*, NSI Concept Paper (Arlington, VA: NSI, February 2017), available at <https://nsiteam.com/how-international-norms-transgressions-magnify-gray-zone-challenges-2/>.

[31] *Compliance with the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction*, Condition, (10)(c) Report (Washington, DC: Department of State, April 15, 2019), available at <www.state.gov/wp-content/uploads/2019/05/AVC-Condition-10c-2019.pdf>. See also 2018 and 2017 reports, both available at <www.state.gov/adherence-to-and-compliance-with-arms-control-nonproliferation-and-disarmament-agreements-and-commitments-compliance-report/>.

[32] Peter Beaumont, "The Taboo on Chemical Weapons Has Lasted a Century—It Must Be Preserved," *The Guardian*, April 18, 2018, available at <www.theguardian.com/commentisfree/2018/apr/18/chemical-weapons-taboo-syria>; Filippa Lentzos, "Strengthen the Taboo Against Biological and Chemical Weapons," *Bulletin of the Atomic Scientists*, July 26, 2018, available at <https://thebulletin.org/2018/07/strengthen-the-taboo-against-biological-and-chemical-weapons/>.