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Leo Michel & Matti Pesu

Strategic deterrence redux Nuclear weapons and European security

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<p>Abstract</p> <p>One of the most notable consequences of the end of the Cold War was the diminished role of nuclear weapons in international relations. The world's primary nuclear weapon powers, the United States and the Russian Federation, made considerable reductions in their nuclear forces. The climax of the process was the New START Treaty signed in 2010.</p> <p>Now, the optimism that characterized the first decades of the post-Cold War era is rapidly evaporating. Geopolitical competition again dominates global and regional security dynamics. Nuclear powers are modernizing their forces and introducing novel systems that may affect strategic stability. At the same time, existing arms control regimes are crumbling.</p> <p>This report takes stock of recent developments in deterrence in general, and nuclear deterrence in particular. Its main ambition is to understand how deterrence has changed in light of certain post-Cold War trends, particularly in Europe.</p> <p>To this end, the report introduces the basic principles of deterrence. It also explores the nuclear-related policies and capabilities of the four nuclear weapon states most directly involved in European security affairs – Russia, the United States, France, and the United Kingdom. Importantly, the report also analyses the implications of the recent trends in strategic deterrence for Northern Europe.</p>			
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Tiivistelmä	<p>Kylmän sodan loppumisen jälkeen ydinaseiden rooli väheni kansainvälisessä politiikassa. Maailman merkittävimmät ydinasevaltiot, Yhdysvallat ja Venäjä, tekivät merkittäviä vähennyksiä ydinaseistuksiinsa. Prosessin kohokohta oli uusi START -sopimus, joka allekirjoitettiin vuonna 2010.</p> <p>Kylmän sodan lopun alkuvuosikymmeniä leimannut optimismi on kuitenkin nopeasti katoamassa. Geopoliittinen kamppailu on läsnä niin globaalissa turvallisuudessa kuin alueellisissa turvallisuuskysymyksissä. Ydinasevallat modernisoivat jälleen aseistustaan ja esittelevät uusia asejärjestelmiä, jotka voivat huojuttaa strategista vakautta. Samanaikaisesti ydinasevalvontaan liittyvä sopimusjärjestelmä on pahaenteisesti murenemassa.</p> <p>Tämä tutkimusraportti analysoi viimeaikaisia tavanomaiseen ja ydinasepelotteeseen liittyviä kehityskulkuja. Sen keskeinen tavoite on hahmottaa, miten tietyt kylmän sodan lopun jälkeiset trendit ovat vaikuttaneet pelotepolitiikkaan erityisesti Euroopassa.</p> <p>Ymmärtääkseen pelotepolitiikassa viime vuosina tapahtuneita muutoksia tutkimus esittelee pelotteen peruseriaatteen. Se paneutuu myös Euroopan turvallisuuden kannalta tärkeiden ydinasevaltojen – Yhdysvaltojen, Venäjän, Ranskan ja Iso-Britannian – pelotepolitiikkaan sekä keskeisiin suorituskykyihin. Lisäksi raportissa tarkastellaan, miten ydinasepelotteeseen liittyvät tuoreimmat trendit vaikuttavat Pohjois-Euroopan turvallisuuteen.</p>		
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Referat	<p>Till följd av kalla krigets slut minskade kärnvapnens betydelse i den internationella politiken. De två främsta kärnvapenmakterna, Förenta Staterna och Ryssland, minskade betydande på sina kärnvapenarsenaler. Processen kulminerade i det s.k. Nya START-avtalet, som slöts år 2010.</p> <p>Optimismen som kännetecknade de första decennierna efter kalla krigets slut har emellertid avtagit. Frågor som rör den globala och regionala säkerheten färgas av geopolitisk tävling. Kärnvapenmakterna moderniserar sin utrustning och presenterar nya vapensystem som kan komma att påverka den strategiska stabiliteten. Samtidigt håller den internationella regleringen kring kärnvapenkontroll på att vittra sönder.</p> <p>Denna forskningsrapport analyserar utvecklingen kring avskräckningspolitiken som baserar sig på konventionella vapen och kärnvapen. Dess centrala mål är att uppfatta hur avskräckningspolitiken har påverkats av vissa internationella trender i tiden efter kalla kriget, speciellt i Europa.</p> <p>I detta syfte introducerar rapporten avskräckningspolitikens grundläggande principer. Den granskar också avskräckningspolitiken i och kapaciteten hos kärnvapenstater som har stor betydelse för europeisk säkerhet, nämligen Förenta Staterna, Ryssland, Frankrike och Storbritannien. Rapporten undersöker också hur de senaste trenderna inom avskräckningspolitiken påverkar Nordeuropas säkerhet.</p>		
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Table of contents

Acknowledgement	9
List of abbreviations	10
1 Introduction	12
2 Deterrence – a primer	15
3 The changing nature of deterrence	21
3.1 Deterrence: from a “bipolar” to a “multipolar” security environment	22
3.1 Extended deterrence	34
3.2 Impact of technological change on deterrence	45
4 Capabilities and perspectives of the nuclear allies and Russia	53
4.1 The United States	53
4.2 France	62
4.3 The United Kingdom	66
4.4 The Russian Federation	70
5 Adaptation of the “nuclear Alliance” and prospects for a “European dimension” of nuclear deterrence	78
5.1 NATO	78
5.2 Prospects for a “European dimension” of nuclear deterrence	83
6 Risk reduction and arms control approaches	87
6.1 Risk reduction: a useful but limited role	87
6.2 Arms control at a crossroads	90
7 Challenges for Northern Europe	99
7.1 Northern European geostrategy: the big picture	100
7.2 Deterrence postures in Northern Europe	102
7.3 Nuclear weapons and regional security	105
7.4 Nuclear arms control	106
8 Conclusions	110

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The FIIA group of researchers contributing to the project included research fellow Matti Pesu and senior research fellow Katja Creutz. Senior visiting fellow Leo Michel led the project. The final report was authored by Leo Michel and Matti Pesu. Kukka-Maria Kovsky, Anu Ruokamo and Mika Langel provided valuable administrative support.

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LIST OF ABBREVIATIONS

A2AD	anti-access, area denial
ABM	Anti-Ballistic Missile
AI	artificial intelligence
ALCM	air-launched cruise missiles
ASMPA	Air-Sol Moyenne Portée Amélioré – an improved French nuclear air to surface cruise missile
ASW	anti-submarine warfare
AWS	autonomous weapons systems
C3I	command, control, communications and intelligence
C4I	command, control, communications, computer and intelligence
CPGS	conventional prompt global strike
CTBT	Comprehensive Test Ban Treaty
CTR	Cooperative Threat Reduction
DCA	dual-capable aircraft
DNI	US Director of National Intelligence
FRG	Federal Republic of Germany
GLCM	ground launched cruise missile
ICBM	<i>Intercontinental Ballistic Missile</i>
INF	Intermediate-range Nuclear Forces
IRBM	Intermediate-range Ballistic Missile
JCPOA	Joint Comprehensive Plan of Action
MAD	mutually assured destruction
MDR	Missile Defense Review
MIRV	multiple independently targetable reentry vehicles
NAC	North Atlantic Council
NATO	North Atlantic Treaty Organization
New START	New Strategic Arms Reduction Treaty
NPG	Nuclear Planning Group
NPR	Nuclear Posture Review
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSC	National Security Council
SACEUR	NATO's Supreme Allied Commander Europe
SDI	Strategic Defense Initiative
SLBM	sea-launched ballistic missile
SNP	Scottish National Party
SPD	Social Democratic Party of Germany

SSBN	ballistic missile submarine
TPNW	Treaty on the Prohibition of Nuclear Weapons
UNGA	United Nations General Assembly
WMD	weapons of mass destruction

1 Introduction

In April 2010, President Barack Obama and President Dmitri Medvedev met in Prague to sign the New Strategic Arms Reduction Treaty (New START), which mandated significant reductions in US- and Russian-deployed strategic nuclear weapons and delivery vehicles. In their public remarks, the presidents praised New START as a harbinger of deeper cuts in nuclear arsenals, further cooperation on non-proliferation and nuclear materials security, and expanded discussions on missile defence. Obama also underscored America's "unwavering commitment to the security of our European allies" and the "determination of the United States and Russia – the two nations that hold over 90 percent of the world's nuclear weapons – to pursue responsible global leadership".¹ Medvedev called the treaty a "win-win" agreement that "enhances strategic stability", while noting that each side "can use its own discretion to defend the makeup and structure of its strategic offensive potential".² North Atlantic Treaty Organization (NATO) allies and partners welcomed New START, as well.³

Nine years later, the optimism voiced by the US and Russian leaders in Prague has evaporated. In February 2014, Russia's invasion of Ukraine torpedoed the Obama administration's hope, broadly shared by Europeans, for improved cooperation. Soon thereafter, the United States and its NATO allies launched successive measures, which focused on conventional forces, to strengthen deterrence and collective defence along NATO's eastern periphery.⁴ At the same time, the United States and its allies paid renewed attention to nuclear aspects of deterrence. This was prompted by their concerns over Russia's extensive nuclear forces modernization programme, hints of new thinking in Russian military

1 White House 2010.

2 Ibid.

3 See e.g. <https://www.presidentti.fi/halonen/public/defaultcf33.html?contentid=190040&nodeid=41412&contentlan=2&culture=en-US>.

4 In April 2014, the United States dispatched some 600 paratroopers from the 173rd Airborne Brigade to Estonia, Latvia, Lithuania, and Poland to enhance ongoing military-to-military relationships and demonstrate assurance of America's commitment to its NATO Allies. For NATO's response, see NATO 2014.

circles about how those forces might be leveraged for strategic advantage in a crisis, and instances of nuclear “sabre rattling” by President Vladimir Putin and other Russian officials.

In particular, the prospects for preserving or expanding negotiated reductions of nuclear weapons look grim. In July 2014, after more than a year of senior-level diplomatic engagement with Russian officials, the Obama administration announced that Russia had violated core provisions of the 1987 Intermediate-range Nuclear Forces (INF) Treaty. A landmark accomplishment of the Cold War, the treaty banned all land-based US and Soviet (later, Russian) ballistic and cruise missiles with ranges between 500 and 5,500 kilometres. In February 2019, after additional talks with Russian officials proved fruitless, President Donald Trump declared that the United States will “suspend its obligations” under the treaty and begin the six-month process of withdrawal, “unless Russia comes back into compliance”⁵. The following month, Putin signed a decree suspending Russia’s obligations under the treaty, while accusing the US of violations. The withdrawal period ended on August 2, and the INF Treaty is no longer in force.

New START will expire on February 5, 2021, unless Washington and Moscow agree before then to extend its provisions by another five years, as permitted by the treaty. US officials have been non-committal on the treaty’s extension, claiming that Russia had rebuffed their efforts to negotiate a successor agreement on strategic arms and obtain reductions in non-strategic nuclear forces, a category where Russia enjoys a large – and apparently growing – advantage.⁶ Putin reportedly suggested to Trump that they “consider the possibility” of such an extension during their August 2018 meeting in Helsinki.⁷ In May 2019, US Secretary of State Mike Pompeo and Russian Foreign Minister Sergey Lavrov agreed, according to Pompeo, to “gather together teams that will begin to work not only on New START and its potential extension, but on a broader range of arms control issues that each of our two nations have”⁸. As of early August 2019, however, the sides have not announced a start date for formal negotiations.

Potential changes in the strategic balance that most directly affect Europe understandably preoccupy Finnish authorities and experts. Yet developments in geographically distant regions can threaten the international environment upon which Europe’s (including Finland’s) security and prosperity increasingly depend. These include: the emergence of China as a “peer” military competitor to the United States and Russia; heightened regional challenges posed by a nuclear-armed Democratic People’s Republic of Korea (North Korea) and, potentially, Iran; the growing nuclear weapon capabilities of longtime rivals India and

5 White House 2019.

6 Office of the Secretary of Defense 2018, 74.

7 Bender 2018.

8 US Embassy & Consulates in Russia 2019.

Pakistan; and persistent concern over non-state actors seeking access to nuclear weapons or radiological materials. Arguably, such developments portend additional and less predictable stressors on deterrence beyond Europe for many years to come.

Given such hard realities, this report seeks to inform and stimulate further debate on how best to deter conflicts that can directly threaten global peace and security, posing grave risks to Finland's security, sovereignty, and its most important institutions and values. To do so, our research has focused on the following questions:

- What are the basic principles of deterrence?
- How has deterrence, as understood and practised during the Cold War, changed in light of certain post-Cold War developments?
- What are the major trends in the nuclear-related policies and capabilities of the four nuclear weapon states most directly involved in European security affairs – Russia, the United States, France, and the United Kingdom?
- What are the challenges facing the specific deterrence role of NATO, an avowed “nuclear Alliance”; and the possible creation, over time, of an alternative “European” approach?
- What are the prospects for preserving existing arms control and non-proliferation regimes and/or pursuing new approaches, including efforts to eliminate nuclear weapons globally?
- In light of the above assessments, what new challenges are posed to the Nordic-Baltic region, in general, and Finland, in particular?

The report draws upon public seminars, expert workshops, and publications by the Finnish Institute of International Affairs (FIIA) under its project entitled “New Challenges for Strategic Deterrence in the 21st Century”, which is part of the implementation of the Government Plan for Analysis, Assessment, and Research. Aimed at a broad readership of government officials, parliamentarians, non-government experts, academics, media, and the public, the report does not contain detailed technical descriptions of weapons systems, their operational deployment, or potential effects. That said, any such descriptions contained in this report are based on authoritative government publications and/or research products of highly respected non-government organizations and experts.

2 Deterrence – a primer

Basic notions of deterrence took shape in ancient times. “When there is mutual fear, men think twice before they make aggressions upon one another,” observed Hermocrates of Syracuse, according to the Athenian historian Thucydides. A similar sentiment – “Si vis pacem, para bellum” (“If you want peace, prepare for war”) – was credited to the Roman general Vegetius.⁹ The advent of nuclear weaponry in 1945 and the hardening of ideological and military divisions, first in Europe and then globally, made deterrence a primary strategic goal of the world’s most powerful states and alliances. Simply put, the aim of deterrence was to prevent the Cold War from turning “hot”, and it has continued to serve this basic purpose, albeit in changed circumstances, to the present day.

Despite a large body of research on the subject, strategic affairs theorists and practitioners do not share an agreed definition of deterrence. In general, however, the term is applied where:

- one adversary declines to take action, such as military aggression, against another because the former fears unacceptable retaliation by the latter – a situation known as “deterrence by punishment”; or
- one adversary declines to take action because it fears the other can prevent that action from succeeding – a situation known as “deterrence by denial”.

These situations are not mutually exclusive. A potential aggressor might be deterred because it simultaneously fears retaliation for its actions *and* harbours doubts regarding its ability to overpower the target of aggression in the first place. For example, proponents of missile defences often emphasize the complementarity of deterrence by punishment, enabled by nuclear-armed missiles or aircraft, and deterrence by denial, made possible by

⁹ Tertrais 2018a.

modern air defences and interceptor systems that can defeat or degrade ballistic missile, cruise missile, or bomber attacks.

To be stable over the long-term, deterrence must be linked to the practice of “reassurance”. Reassurance, in this context, has two purposes. On the one hand, European, Canadian, and Asian beneficiaries of the US “nuclear umbrella” must be confident (or reassured) that such protection will be effective and unequivocal in peacetime or in a crisis. Otherwise, those allies could be tempted either to seek accommodations with their adversary or to acquire independent deterrent capabilities of their own, possibly including nuclear weapons. (See also discussion of “extended deterrence” in chapter 3 of this report.)

On the other hand, the adversary state that is the target of deterrence must be reassured that it will not suffer harm (for example, a pre-emptive strike) if, in fact, it does not pursue the aggressive action feared by the deterring state and its allies. In other words, “without credible reassurance, there is no incentive to comply with deterrent demands”.¹⁰

While the basic concept of deterrence is straightforward, understanding how it might function or fail in specific circumstances involves complex and dynamic factors. Quantitative measures – such as the size, composition, deployment, and readiness of a state’s military forces – are important but partial indicators of that state’s ability to deter or, if necessary, defend against an adversary. Qualitative factors also play a critical role. These include a nation’s history, strategic culture, confidence in its allies and/or partners, institutional arrangements (for example, its command and control mechanisms), and the skills and psychology (observed and/or assumed) of its political and military leadership. Moreover, such quantitative and qualitative assessments affect the calculations of the side exercising deterrence as well as the side that is the target of deterrence. In short, there is no fixed formula for establishing, measuring, or guaranteeing a condition of deterrence involving two or more parties because, as the eminent British strategist and negotiator, Michael Quinlan, observed: “Deterrence is a concept for operating upon the thinking of others.”¹¹

Understanding the dynamics associated with nuclear deterrence is especially challenging. As the American military theorist, Bernard Brodie, wrote in 1946: “(T)he most vital step in any American security program for the age of the atomic bombs is to take measures to guarantee to ourselves in case of attack the possibility of retaliation in kind... Thus far the chief purpose of our military establishment has been to win wars. From now on its chief

10 Long 2008.

11 Quinlan 2005.

purpose must be to avert them.”¹² Yet translating Brodie’s insight into specific measures that would “guarantee” retaliation is no easy task.

One reason for this is that empirical data on the effects of nuclear weapons in wartime is limited to the experiences of Hiroshima and Nagasaki in August 1945, when the United States used one weapon against each target, killing an estimated 300,000 people. Since then, extensive studies of bombing survivors and their descendants, data from atmospheric and underground nuclear weapons test explosions, improved performance characteristics of nuclear weapons delivery systems, and increasingly sophisticated modelling and simulation tools have greatly enhanced understanding of the physical effects of a hypothetical use of nuclear weapons against certain types of targets.¹³ Moreover, the United States acted in 1945 without fear of incurring a nuclear response. Hence, the American “theory of victory” was straightforward: the nuclear bombing would break Japan’s ability and will to resist, forcing it to accept unconditional surrender without a costly invasion.¹⁴ Yet once nuclear weapons are available to both sides in a conflict, their destructive power does more than complicate any theory of victory. It raises the question of whether “victory” is attainable in any meaningful sense.

12 Brodie 1946.

13 An estimated 2,056 nuclear test explosions have been conducted by eight nations since 1945, according to the Arms Control Association (2019a).

14 Roberts 2016. According to the author, “a theory of victory is a set of concepts for how to force termination of a war in a manner favorable to one’s objectives and to achieve an acceptable post-war balance of power”.

NUCLEAR WEAPON EFFECTS

A nuclear detonation produces an immediate hot fireball (with temperatures equivalent to the interior of the sun), extreme thermal radiation (able to cause severe burns and ignite fires at great distances), air blast and ground shock waves, prompt and residual nuclear radiation, and electromagnetic pulse (EMP) that can damage or destroy unprotected electronic components in computers, vehicles, aircraft, communications equipment, and radars. The projected effects of a specific weapon would depend on various factors, including its yield (a one kiloton, or KT, weapon produces an explosive force equivalent to 1,000 tons of TNT) and height of burst (on, above, or below the ground or water surface), the distance between the target and “ground zero” (or GZ, the point on the Earth’s surface closest to the detonation), weather conditions, and target “hardness”. (A “hard” target might be a deep underground command centre or missile silo, and a “soft” target might be an exposed military base or industrial facility.)

While estimated casualties from a nuclear conflict vary significantly depending on targets and weapons selected, various unclassified studies give an order of magnitude approximation.

For example, according to a 2016 *Nuclear Matters Handbook* produced by the US Department of Defense:

“A single, low-yield nuclear weapon employed in a major metropolitan area produces total devastation in an area large enough to produce tens of thousands, and possibly more than 300,000 fatalities... A very low-yield, 1-KT detonation produces severe damage effects approximately one quarter of a mile (0.4 km) from GZ. Within the severe damage zone, almost all buildings collapse and 99 percent of persons become fatalities quickly... A low-yield, 10-KT detonation produces severe damage effects approximately one half mile (0.8 km) from GZ. Moderate damage extends approximately one mile and light damage ranges approximately three miles. A high-yield, strategic 1-megaton (1,000 KT) detonation produces severe damage effects slightly beyond two miles (3.2 km) from GZ. Moderate damage extends out beyond four miles (6.4 km) and light damage encompasses beyond 12 miles.”¹⁵

A study published in 1979 by the US Congress’s Office of Technology Assessment (OTA) examined four hypothetical scenarios of US-Soviet nuclear warfare. These involved reciprocal attacks against one city in each country (Detroit and Leningrad, each of which had approximately 4.3 million inhabitants at the time), major oil refineries, ICBM silos, and a broader range of major military and economic targets. The study produced estimates of 220,000 American dead (and an additional 420,000 seriously injured) and 390,000 Soviet dead (and an additional 1.26 million seriously injured) in the scenario of a limited exchange (with a single 1 megaton weapon) targeting only the two cities. However, in the scenario of all-out attacks against economic and military targets using a substantial fraction of each side’s arsenal, the estimates rose to an estimated 20–165 million American and 23–100 million Soviet fatalities within 30 days. In the latter scenario, the lower estimates assumed: extensive pre-attack civil defence measures (such as evacuation of major urban areas) had occurred; Soviet fatalities would be marginally lower, given the relatively higher percentage of the population living in

15 Office of the Deputy Assistant Secretary of Defense for Nuclear Matters 2016.

rural areas; and the widely-held belief that the Soviets would employ more high-yield weapons than the United States. The study also found that “survivors would find themselves in a race to achieve viability (i.e. production at least equalling consumption plus depreciation) before stocks ran out completely. A failure to achieve viability, or even a slow recovery, would result in many additional deaths, and much additional economic, political, and social deterioration. This postwar damage could be as devastating as the damage from the actual nuclear explosions”.¹⁶

While the OTA study proved controversial at the time, it is worth noting that only three years later, a highly classified Pentagon briefing prepared for President Ronald Reagan estimated that a large-scale Soviet nuclear attack could result in 50–110 million American casualties.¹⁷

16 Johns et al. 1979.

17 Clark 1982.

Other issues arise with any means of deterrence, but are especially intractable when nuclear weapons are involved.

Deterrence may be linked to the distinctive concept of “compellence”, a form of coercion which entered the strategic lexicon in the mid-1960s. According to American strategist Thomas Schelling, whereas deterrence is “a threat intended to keep (an adversary) from starting something”, compellence is “a threat intended to make an adversary do something”.¹⁸ The two concepts are linked because an international actor (country A) determined to deter an adversary (country B) must have an idea of how to react if country B nonetheless pursues its aggressive act. But it might be very difficult for country A to convince country B that it is prepared to take an action that no one in their right mind would *deliberately* decide to take. Hence, a rational choice for country A is to avoid threats that are not credible (such as unleashing a “nuclear holocaust”) but to credibly threaten to *increase the risk* of an outcome that is unacceptable to country B. As Schelling explained, the combination of compellence and “brinkmanship” could have the effect of putting an adversary into an intolerably risky situation, thereby achieving the goal of deterrence, which is to avoid the conflict in the first place.¹⁹

18 Schelling 1966.

19 Ibid. Schelling acknowledges that while adversaries might somewhat control the level of risk, they do not control the risk itself. In other words, while neither side may choose to launch a nuclear war, during a crisis a war may unintentionally break out. According to Schelling: “(I)nternational relations often have the character of a competition in risk taking, characterized not so much by tests of force as by tests of nerve... the perils that countries face are not as straightforward as suicide, but more like Russian roulette.”

A related issue is that the mere existence of a nuclear arsenal cannot guarantee deterrence if its possessor has no feasible concept for its use, or is known or believed by others to rule out any possibility of its use, however remote. As Quinlan explained: “Firstly, it is unrealistic to suppose that a firm intention never to use (nuclear weapons), and the lack of any plans for use, could be permanently and dependably concealed from an adversary... Secondly, it cannot reasonably be supposed that the commitment of thousands of individuals – often in very demanding tasks – could be durably sustained in the known absence of planning which they could regard as seriously intended.”²⁰

The dilemma here is that any combination of these factors – lack of confidence in the reliability or effects of the weapons that comprise a state’s deterrent, fear of retaliation if the deterrent is used, and absence of feasible plans or political will to employ deterrent forces – could produce a situation of “self-deterrence”. In such a case, a reluctance to act by a threatened state becomes exploitable by a determined aggressor, who may calculate that it is better to attack sooner rather than later.

A final general point: Looking back at the nearly 75 years since the Second World War, it is remarkable that not one of the tens of thousands of nuclear weapons produced over that time – thousands of which were, or still are, operationally deployed – was detonated in an actual conflict. Many point to this as *prima facie* evidence that nuclear deterrence has “worked”. Others argue that the nuclear weapons developed in pursuit of deterrence have done more to threaten peace than preserve it.²¹

Such debates rely to some extent on counterfactual analysis – namely, comparing what *actually* happened and what *might have* happened in the absence of certain key assumptions or facts. While interesting, such debates are not central to this report. In the nuclear age, net assessments regarding the political and military requirements of deterrence, as well as judgments regarding its presumed stability or fragility in periods of heightened tension, are and will remain inherently imprecise. Given the stakes, however, such assessments cannot be avoided.

20 Op. cit., Quinlan, 11.

21 Lebow & Stein 1995.

3 The changing nature of deterrence

The collapse of the Soviet Union in December 1991 did not mark, as Francis Fukuyama wrote two years earlier, the “end of history as such: that is, the end point of mankind’s ideological evolution and the universalization of Western liberal democracy as the final form of human government”.²² Of course, there were reasons to celebrate. After all, during the 45-year span of the Cold War, hundreds of millions of men and women and scores of countries were caught up in its ideological, diplomatic, economic, and intelligence battles. The United States and the Soviet Union managed to escape a direct military clash, but they engaged in proxy warfare – and, on occasion, intervened with their own forces – in parts of Asia, the Middle East, Africa, the Caribbean region, and Central America.

For many, the end of the Cold War, above all, reduced their fears of a “nuclear Armageddon”. Those fears were understandable. At their high points, the US nuclear arsenal numbered over 31,000 weapons (in the late 1960s), while the Soviet arsenal held over 45,000 (in the mid-1980s).²³ Most of those weapons were at least several times more powerful than the bombs used against Hiroshima and Nagasaki, and a few nuclear tests produced yields more than a thousand times higher.²⁴ While nuclear arsenals of the remaining “P-5” were small in comparison with those of the superpowers, they were not insignificant. At their Cold War high points, France held some 540 weapons, the United Kingdom 500, and China 230.²⁵

Understanding how the major Western powers (particularly the United States) and the Soviet Union came to conceive of and manage deterrence during the Cold War helps to explain aspects of contemporary thinking and force structures. It also serves as a cautionary

22 Fukuyama 1989.

23 This was the historical high point for the US stockpile (International Panel on Fissile Materials 2015).

24 According to the US Department of Energy, the estimated explosive yield for the Hiroshima bomb was 15 kilotons (KT), or the equivalent of 15 thousand tons of TNT. The estimated yield for the Nagasaki bomb was 21 KT, see US Department of Energy (n/d). The largest US test, Castle Bravo, had an estimated yield of 15 megatons (MT), or the equivalent of 15 million tons of TNT, and the largest Soviet test, Tsar Bomba, had an estimated yield of 50 MT.

25 The “P-5” refers to permanent members of the UN Security Council. For the estimated French, UK, and Chinese stockpile numbers, see: <https://thebulletin.org/nuclear-notebook-multimedia/>.

tale, reminding us that past success in navigating the uncharted waters of global competition between nuclear-armed adversaries was not preordained.

The following sections examine three aspects of deterrence as they were understood and practised during the Cold War, and discusses how each of these has changed during the post-Cold War period.

3.1 Deterrence: from a “bipolar” to a “multipolar” security environment

From the earliest days of the Cold War, the United States and the Soviet Union viewed each other as implacable opponents in an essentially bipolar contest for global leadership. Although their race to develop and produce nuclear weapons and associated delivery systems became a central feature of that contest, American fears of a global Soviet offensive predated the Soviets’ first explosion of a nuclear device in August 1949. In a November 1948 National Security Council (NSC) report approved by President Harry Truman, Soviet policies were identified as the “greatest single danger to the [United States] within the foreseeable future”.²⁶ Asserting that Soviet leaders ultimately sought “domination of the world”, the report cited intelligence estimates of Soviet “capability of overrunning in about six months all of Continental Europe and the Near East as far as Cairo”.

In April 1950 – nine months *after* the Soviet nuclear test – Truman’s top advisors warned that, in the event of a general war, “it must be anticipated that atomic weapons will be used by each side in the manner it deems best suited to accomplish its objectives”. By 1954, they predicted, a Soviet surprise attack could devastate “vital centers” of Western Europe, the United States and Canada. The report cited intelligence estimates that the Soviets could possess 200 nuclear weapons by 1954, which is described as “a critical date for the United States (since) the delivery of 100 atomic bombs on targets in the United States would seriously damage this country”. At the time of the report, the US nuclear stockpile included about 369 weapons, and the US Air Force had more than 250 nuclear-capable aircraft. While US nuclear-armed aircraft could seriously damage Soviet war-making capacity, the advisors cautioned that this would not necessarily force Moscow to sue for peace or prevent Soviet forces from occupying Western Europe. In other words, US superiority in numbers of nuclear weapons and long-range bombers would not guarantee strategic success if deterrence were to fail.

26 26 Souers 1948.

Two months later, the Truman administration's worst fears seemed to be realized when Communist North Korea launched its invasion of US-backed Republic of Korea (South Korea). US intelligence concluded that Moscow was behind the attack.²⁷ Fearing the aggression in Korea might be a prelude to a Soviet attack against Western Europe, Truman decided to strengthen the US military posture by dispatching non-nuclear components of nuclear weapons to certain European bases where, if required, they would be mated with fissile material components and loaded onto US bombers.²⁸ In late 1950, Truman reportedly considered the use of nuclear weapons in Korea, as requested by General Douglas MacArthur, following China's intervention in the war. Truman ultimately rejected that request, fearing an outcry from US allies, an expanded conflict with China, and the risk of direct confrontation with the Soviet Union.²⁹

In 1953, Truman's successor, Dwight Eisenhower, came close to authorizing the use of nuclear weapons before the warring sides reached an armistice in June of that year. He almost certainly would have done so if China and North Korean had broken the agreement, and he communicated that warning to their leaderships. At the same time, Eisenhower tried to convince allied counterparts of the likely need to use nuclear weapons in Korea if deterrence failed. But even some of the closest allies proved sceptical, at one point prompting a frustrated Eisenhower to dismiss as "fatuous" a British official's argument that "if we avoid the first use of the atom bomb in any war (then) the Soviets might likewise abstain".³⁰ Soviet archives again indicate that the threat of US nuclear weapons use did not substantially affect the policies of the Soviet leadership, which was more concerned about the political uncertainty caused by Stalin's death.³¹

The Korean War profoundly affected the early US approach to deterrence and the role of nuclear weapons. The war exposed the danger of committing large land forces to Asia, which sapped US strategic reserves and put heavy burdens on the national budget. (Eisenhower, like other fiscal conservatives at the time, believed nuclear weapons would be significantly less expensive than conventional forces.) The war also forced US decision-makers to consider the inherent political and military risks of employing nuclear weapons to block aggression by Chinese and North Korean forces viewed as allies of, and highly dependent upon, the Soviet Union.

27 The US assessment of Soviet responsibility for instigating the war might have exaggerated Moscow's influence over North Korean decision-making, according to Soviet archives studied by the Woodrow Wilson International Center for Scholars. See Weathersby 1993.

28 In the autumn of 1950, the Truman administration also tripled the US defence budget and stipulated that the number of US Army divisions in Europe should be increased from one to five.

29 Delpeche 2012.

30 Jackson 2005.

31 Weathersby 1999.

At the same time, the Korean War influenced broader US calculations on how best to deter direct Soviet aggression in Europe, where Soviet conventional military power was overwhelming. In December 1953, Eisenhower acknowledged in a speech to the United Nations General Assembly (UNGA) that “even a vast superiority in numbers of (atomic) weapons, and a consequent capability of devastating retaliation, is no preventive, of itself, against the fearful material damage and toll of human lives that would be inflicted by surprise aggression”.³² However, faced with assessments that the growing Soviet nuclear arsenal might diminish the credibility of the US deterrent, the Eisenhower administration felt compelled to unveil an overarching concept for the possible use of nuclear weapons.

Hence, Eisenhower’s Secretary of State, John Foster Dulles, told NATO ministers in April 1954: “In any war forced upon us by the Soviet Bloc, we and our Allies must be free to use atomic weapons against appropriate elements of the enemy’s military power where it is to our military advantage to do so.”³³ US officials believed this so-called “massive retaliation” concept, which sought to deter any Soviet attack by threatening rapid escalation to general nuclear war, would be buttressed by deploying US nuclear weapons to Europe. Initially, these forward-based and relatively low-yield “tactical” nuclear weapons were assigned to US Army units equipped with “dual capable” artillery. By deploying such units close to the inner German border, the United States signalled its willingness to use nuclear weapons early in a conflict rather than risk their capture by Soviet invaders – an approach to deterrence known as “use it or lose it”.

But the massive retaliation concept was relatively short-lived.³⁴ By 1958, alarmed by Soviet advances in nuclear weaponry and delivery systems, prominent US military leaders joined Dulles in questioning whether massive retaliation would remain a credible deterrent for much longer, especially in cases of “limited” Soviet aggression in regions where US forces were not immediately involved. Indeed, Dulles doubted “whether the massive use of nuclear weapons (by both sides) could be consistent with (US) survival”.³⁵

By 1962, the John F. Kennedy administration, convinced that massive retaliation was no longer a credible organizing principle for deterrence, began shifting to a “flexible response” strategy. Flexible response counted on a build-up of US and allied conventional forces to

32 Eisenhower 1953.

33 Michel 2017. Dulles hinted at the new “massive retaliation” concept in January 1954, stating that: “...there is no local defense which alone can contain the mighty land power of the Communist world. ... [The United States therefore has decided] to depend primarily upon a great capacity to retaliate, instantly, by means and at places of our choosing.” (Dulles 1954).

34 Miller 2011. In November 1957, NATO’s Supreme Allied Commander Europe (SACEUR), US General Lauris Norstad, in effect modified the massive retaliation concept, telling allies that the first US response to a Soviet attack would be massive use of nuclear weapons by theatre-based forces against the invading forces. Only if that failed, he suggested, would there be a massive US attack on the Soviet homeland.

35 US Arms Control and Disarmament Agency 1958.

deter or, if necessary, defeat aggression on the level at which the Soviets chose to fight.³⁶ The new strategy did not entail abandonment of the forward-based nuclear capabilities, which continued to grow under the Kennedy administration. However, it placed greater emphasis on the defence of allied territory (in effect, deterrence by denial) and raised the threshold for when the United States might be forced to employ nuclear weapons, while maintaining a calculated ambiguity regarding how and when it might decide to do so.

Flexible response raised concerns among some US allies, who argued that any use of nuclear weapons in Europe should be: “gradualist” to avoid unwanted escalation; and mainly targeted against Warsaw Pact territory to minimize damage to the Federal Republic of Germany (FRG) or other allies. The new concept was broadly welcomed, however, by those who believed that the greatest threat of escalation to the use of nuclear weapons was likely to arise from an inability or unwillingness to deter or, if necessary, defeat non-nuclear aggression by non-nuclear means.

Still, flexible response was not applicable to every theatre of US-Soviet competition. Soviet leader Nikita Khrushchev’s decision to place intermediate-range nuclear missiles and shorter-range systems in Cuba, some 90 miles from the US mainland, brought the sides to the brink of a nuclear war in October 1962.³⁷ Many historians consider the near-term result of the crisis – Khrushchev’s speedy withdrawal of the missiles and his tentative moves towards “détente” – a net victory for the United States.³⁸ However, it ultimately strengthened the position of Soviet hardliners who, after ousting Khrushchev in 1964, favoured an accelerated nuclear build-up to achieve strategic parity with the United States while reversing Khrushchev’s cutbacks in the military’s conventional capabilities.

By the late 1960s, major gaps between the size and structure of US and Soviet strategic nuclear forces had narrowed; in fact, the Soviets achieved a modest numerical superiority in land-based intercontinental ballistic missiles (ICBMs).³⁹ President Richard Nixon acknowledged, in a report to Congress in February 1970, that the once-feared situation of mutual vulnerability (or “mutually assured destruction”, popularly known as “MAD”) had finally arrived, stating: “Both the Soviet Union and the United States have acquired the ability to inflict unacceptable damage on the other, no matter which strikes first. There can be no gain and certainly no victory for the power that provokes a thermonuclear exchange.”⁴⁰

36 The flexible response concept was officially adopted by NATO in 1967.

37 *Op. cit.*, Delpech. Delpech cites several instances, in addition to Cuba, where the United States or Soviet Union considered or used implicit or explicit nuclear threats (or “signalling”) to influence the outcome of crises involving Berlin, the Taiwan Strait, Vietnam, and the Middle East.

38 Six months after the crisis, the United States removed its intermediate range Jupiter missiles from Turkey.

39 *Op. cit.*, Long, 34.

40 Nixon 1970.

This did not mean that either side had abandoned its search for strategic advantage. Nevertheless, despite adjustments to doctrines and force structures on both sides over the next decade or so, their nuclear standoff did not fundamentally change.⁴¹ In 1984 President Ronald Reagan seemed to echo Nixon when he declared: "A nuclear war cannot be won and must never be fought. The only value in our two nations possessing nuclear weapons is to make sure they will never be used."⁴² At the same time, formal guidance on nuclear weapons employment approved by Reagan in 1981 states in part that: "The most fundamental national security objective is to deter direct attack – particularly nuclear attack – on the United States and its Allies. Should nuclear attack nonetheless occur, the United States and its Allies must prevail... This requires that we be convincingly capable of responding in such a way that the Soviets or other adversary would be denied their political and military objectives. Stated otherwise, we must be prepared to wage war successfully. Our nuclear forces (both the strategic Triad and theater forces), in conjunction with general purpose forces, must hold at risk the full range of enemy military capabilities that threaten the United States and its Allies."⁴³

The statements by Nixon and Reagan underscore Washington's virtually exclusive preoccupation during the Cold War with deterring the Soviet threat. That said, American concerns over the possible proliferation of nuclear weapons beyond the Soviet Union and United Kingdom, which Eisenhower had mentioned in his UNGA speech in 1953, grew over the next few years. For example, a 1957 intelligence report estimated that three countries – France, Sweden, and Canada – could produce nuclear weapons "within the next few years", while ten or more countries could do so, either alone or with substantial foreign assistance, within a decade.⁴⁴ However, only China, which detonated its first nuclear device in 1964, posed a long-term military threat to the United States. As a former senior US official points out: "The overall size and structure of U.S. nuclear forces (during the Cold War) were a function of the requirements of deterrence of the Soviet Union and Warsaw Pact, with any other contingency deemed a lesser-included problem."⁴⁵

Moreover, US deterrence requirements were not only based on analysis of Soviet military capabilities. Other factors influencing US strategy and policy included: decades of

41 See Secretary of Defense & Director of Central Intelligence 1983. A key judgment of the assessment states: "The strategic nuclear balance is probably adequate to deter a direct nuclear attack on the United States or a major attack on Europe." The assessment also warns: "We are greatly concerned, however, about the effects of strategic nuclear imbalances on the behavior of the two sides in crises and lesser conflict situations."

42 The Reagan Vision 2019.

43 White House 1981. As Roberts points out, despite the document's emphasis on deterrence, some of its language was controversial "because it seemed to imply that nuclear wars could be won". But as one official involved in formulating the guidance later explained: "While it was difficult to foresee anyone winning such a conflict, it seemed far preferable to set a national goal of 'prevailing' rather than, say, 'losing'" (op. cit., Roberts, 13).

44 Central Intelligence Agency 1957.

45 Op. cit., Roberts, 12.

intelligence gathering and all-source analysis aimed at understanding Soviet doctrine, command and control structures, and leadership psychology; information and insights gleaned from a wide range of bilateral and multilateral contacts with Soviet political, diplomatic, and military officials through formal and informal meetings, visits, and arms control-related negotiations; the growth of a relatively large American cadre of Soviet affairs experts within and outside government; and a serious and sustained effort among generations of defence intellectuals to study and improve US deterrence theory, test it in sophisticated war-gaming, and integrate their findings in advice to policy-makers. None of this cumulative knowledge safeguarded against the risk of strategic miscalculation, miscommunication, or technical error leading to a breakdown of deterrence and the outbreak of a military conflict with direct superpower involvement.⁴⁶ Yet taken as a whole, such factors seemed to favour the *status quo* by convincing each side to act cautiously when approaching the other's core national security interests.

Today's relationship between the United States and Russia differs, in many respects, from the US-Soviet competition during the Cold War. Yet despite significant reductions in the size of their nuclear arsenals and periods of improved relations during the 1990s and early 2000s (discussed in other parts of this report), some aspects of their earlier bipolar competition are now resurfacing. The United States and Russia once again see each other primarily as geo-strategic adversaries. According to the Trump administration's National Security Strategy of December 2017, Russia has become a "revisionist power" that seeks to "restore its great power status", relying in part on new military capabilities "including nuclear systems that remain the most significant existential threat to the United States".⁴⁷ Russian leaders portray the West (in particular, the United States and NATO) as aggressively encircling their country to gain strategic dominance, while attempting to weaken Russia's regional influence and domestic cohesion through support for "colour revolutions" along its periphery.

But the United States and Russia must cope with multipolar challenges as well. In particular, China's rise as a global economic, political, and security actor has transformed it into a second "peer competitor" (alongside Russia), according to US officials.⁴⁸ Although the general thrust of US policy over the past three decades has been to encourage China to become a "responsible stakeholder" in the international system, US officials have combined this with a "hedging strategy" to deter and, if necessary, defeat any Chinese aggression. For their part, Chinese complaints about perceived US "encirclement", "hegemonic", and "containment" strategies have echoed, to some extent, those made by Russian leaders.

46 In 1983, the KGB misinterpreted a NATO command post exercise, ABLE ARCHER 83, as a prelude to a US nuclear attack. See Fischer 2007.

47 White House 2017.

48 Garamone 2018.

In fact, there is no shortage of potential flashpoints that could spark a US-Chinese military confrontation, including: China's rapid militarization of disputed territories and maritime zones in the Western Pacific; US defence ties with Taiwan; and the bilateral defence alliances with South Korea and Japan, which have been threatened, at various times, by China's ally, North Korea.

Moreover, while US concerns regarding Chinese nuclear weapons capabilities were "essentially a footnote" during the Cold War and for some years thereafter, this is no longer the case.⁴⁹ According to a recent US official assessment, China invests considerable resources to maintain a limited, survivable nuclear force that can guarantee a damaging retaliatory strike.⁵⁰ In addition to research, development, and production of new nuclear warheads, China is reportedly developing new mobile missiles armed with multiple independently targetable re-entry vehicles (MIRVs) and penetration aids, and improving its nuclear-capable strategic bomber and sea-launched ballistic missile (SLBM) capabilities. Such efforts will likely boost the overall number of Chinese warheads able to attack US and allied targets. As one expert emphasizes: "From a U.S. perspective, the move to MIRV warheads is a major concern, as it introduces significant new instability to the military balance."⁵¹ Hence, it seems more a question of when, not if, the United States will no longer be able to base its nuclear force size and posture decisions principally on Russia, with China considered a "lesser-included problem".

During the last few years, Russia and China have developed their strategic partnership. Looking to deepen its ties with Beijing, Moscow has been careful not to openly voice concerns over China's improving military capabilities, including the nuclear realm. This also may reflect Russia's confidence that it is able to deter China's potential aggression. For example, Dmitry Trenin, one of the foremost Russian national security experts, has pointed out that: "the Russians feel confident that the Chinese, who have worked so hard to grow economically, will value their well-being as much as the Russians do – which means that the threat of a nuclear strike should deter China from attacking Russia."⁵²

China's current and projected military capabilities are not the only issue for the United States and its allies. When it comes to China's approach to deterrence, nuclear doctrine,

49 Op. cit., Roberts, 147. As the author notes: "China deployed its first delivery system capable of reaching the United States in 1981 and over the next fifteen years placed only approximately twenty nuclear-armed ICBMs into silos—where they were vulnerable to preemptive attack."

50 US Defense Intelligence Agency 2019. Note that the Pentagon's Missile Defense Review 2019 states that China has deployed 75-100 ICBMs, including a new road mobile system and a new MIRVd version of its silo-based ICBMs, in addition to four advanced SSBNs each capable of carrying 12 SLBMs. "Consequently, China can now potentially threaten the United States with about 125 nuclear missiles." (Office of the Secretary of Defense 2019, III). see also Kristensen & Norris 2018a.

51 Op. cit., Roberts, 150.

52 Trenin 2012.

and crisis management, gaps in US understanding appear to be at least as great as those involving Russia. China has deflected any suggestion that it should participate in negotiated limits on nuclear forces, sometimes adding a caveat that deep cuts in US and Russian arsenals must come first. In addition, China has rebuffed repeated US efforts to hold regular, high-level, government-to-government talks on “strategic stability” issues, although since 2018, the sides have established a high-level military-to-military dialogue.⁵³ While useful informal dialogues of non-government experts (occasionally including government officials in their “private capacity”) have taken place, the paucity of government-to-government discussions on strategic stability issues limits each side’s ability to explain its most serious concerns and offer or receive reassurance from the other.⁵⁴

North Korea’s development of nuclear weapons and ballistic missiles raises somewhat different questions regarding US deterrence of regional challengers.⁵⁵ According to the North Korean government, its nuclear forces are strictly for self-defence against threats of US “aggression”. As one government statement put it: “The bloody lesson of the war in Iraq... is that only when a country has physical deterrence forces and massive military deterrence forces that are capable of overwhelmingly defeating any attack by state-of-the-art weapons, can it prevent war and defend its independence and national security.”⁵⁶

While the precise size and technical characteristics of the North Korean nuclear arsenal are subject to debate, there is no question that it is relatively small and unsophisticated compared to that of the United States (as well as Russia and China).⁵⁷ Still, US analysts assess that certain North Korean missiles are capable of striking Japan, South Korea, and US territories and forces in the Western Pacific. Indeed, North Korea has not shrunk from explicitly threatening all three countries with a nuclear attack.

There is broad agreement among Western experts that North Korea’s leadership views the country’s nuclear capabilities as a guarantee of regime survival. Yet certain actions and statements suggest that its leadership might also see nuclear brinkmanship as a means of advancing policy objectives, beginning with a politically and economically advantageous

53 Brookings 2019.

54 Op. cit., Roberts, 152–159. According to Roberts, “Washington and Beijing have shared interests in ‘keeping nuclear weapons in the background’ – that is, in not allowing new forms of competition at the strategic military level to interfere with efforts to improve the political relationship and deepen cooperation in areas of shared interest... For China, (this is done) by providing transparency about policy and strategy but not about capabilities and by resisting U.S. efforts to feature nuclear dialogue more prominently in ongoing military-to-military and political-military leadership dialogue. For the United States, nuclear weapons are best kept in the background by normalizing them in the relationship and sharing information, perspectives, and concerns...”

55 Op. cit., Office of the Secretary of Defense 2019, IV. According to the MDR, North Korea has “neared the time” when it could “credibly threaten” the US homeland with a missile attack.

56 Op. cit., Roberts, 61.

57 Estimates of the size of the North Korean arsenal range from 20 to 60 nuclear warheads.

settlement of the longstanding conflict with South Korea. More worrisome, North Korea's thinking (or theory of victory) might include scenarios where its non-nuclear capabilities (for conventional, chemical, biological, and cyber warfare) could be employed, possibly in conjunction with the threat or even limited use of nuclear weapons, in ways that could sow divisions between South Korea and its US protector, allowing the North to impose its terms for a settlement.⁵⁸

This situation poses multiple dilemmas for the United States. Notwithstanding efforts to engage North Korea in a process of denuclearization through a combination of economic sanctions and diplomatic outreach (including three summit meetings between Trump and North Korea's Kim Jong Un), US officials have apparently ruled out (for now, at least) any substantial change in the US conventional force posture in South Korea or loosening of existing international sanctions on North Korea. Such moves would likely be viewed, on both sides of the Demilitarized Zone, as weakening the American deterrent and defence commitment to South Korea. The US use of "signalling" – for example, the deployment and exercising of nuclear-capable bombers and combat aircraft in the region – might reassure some in South Korea and Japan, but others might see it as a provocative move vis-à-vis the North. Similarly, the deployment of US missile defence systems on and offshore South Korea and Japan has sparked some domestic opposition there, as well as protests from China (on the grounds that those systems pose a threat to Chinese deterrent capabilities). In addition, the nature of the North Korean regime and its very limited interactions with the United States suggest that the risk of miscalculation during a crisis would be very high.⁵⁹

A failure of deterrence on the Korean peninsula would have dramatic consequences beyond the immediate and devastating effects of a war. These could include: a sharp deterioration in US relations with China and Russia, which border North Korea; reappraisal of US alliances with South Korea and/or Japan, especially if one or both of those allies viewed Washington as partly responsible for the conflict; and the transfer of significant US military assets from Europe to meet urgent warfighting and stabilization tasks in Northeast Asia.

Unlike North Korea, Iran has stopped short of becoming a nuclear-armed state. Indeed, Iran has never acknowledged that it seeks a nuclear weapon capability, but has argued that it needs – and has the right – to develop advanced nuclear technology as an alternative energy source. However, a number of Western governments have voiced concern,

58 Op.cit., Roberts, 60–78.

59 Ibid., 78. Roberts observes that North Korean leaders "may calculate that America is in decline and no longer ready to pay a significant price to defend the interests at stake on the Korean peninsula... Conversely, the United States and its allies may calculate that the resolve in Pyongyang is weak, perhaps because of a belief that nuclear war is unwinnable and thus will not actually be fought".

since at least the late 1990s, that Iran's nuclear programmes were intended, either principally or at least in part, to develop a weapons capability. Absent an official Iranian statement, outsiders ascribed a range of motives to those Iranian leaders believed to favour a nuclear weapons option.⁶⁰

After more than a decade of international pressure on Iran, which included sanctions by the United States, European Union, and United Nations, Iran and the "P5+1" agreed in July 2015 on the Joint Comprehensive Plan of Action (JCPOA). Under the JCPOA, Iran "reaffirmed that under no circumstances will Iran ever seek, develop or acquire any nuclear weapons".⁶¹ The agreement restricts Iranian nuclear activities, establishes an intrusive verification and monitoring regime (some provisions last for up to 25 years), and contains a permanent prohibition on certain weaponization activities. In testimony to a US Senate committee in January 2019, the Director for National Intelligence stated: "We continue to assess that Iran is not currently undertaking the key nuclear weapons-development activities we judge necessary to produce a nuclear device... Iran's continued implementation of the JCPOA has extended the amount of time Iran would need to produce enough fissile material for a nuclear weapon from a few months to about one year."⁶²

Since Trump's May 2018 announcement of the US withdrawal from the JCPOA and re-imposition of sanctions against Iran, the longstanding tension between Washington and Tehran has grown progressively more volatile. In late June 2019, Trump authorized and then cancelled a US military strike against Iran in response to the downing of an American surveillance drone. He also approved new sanctions targeting Iran's supreme leader and other top officials, and threatened that "any attack by Iran on anything American will be met with great and overwhelming force".⁶³

Iran, for its part, announced at the beginning of July that it had breached the JCPOA restrictions on its stock of low-enriched uranium and surpassed the technical level for

60 Yaphé & Lutes 2005. According to the authors: "Tehran believes it needs advanced nuclear technology that could be used in weapons production for numerous reasons: weapons of mass destruction were used by Iraq against Iran in their 8-year-long war; Iraq was working on a nuclear weapons device in the 1980s and Iranians assume Baghdad will want them again; Israel, India, Pakistan, and the United States have them; Iran is strategically isolated and needs self-sufficiency to defend itself in the event of attack; and the possession of such weapons would give the regime legitimacy, respectability, and protection. All these reasons give the regime a substantial interest in pursuing the nuclear option. However, concern about possible intimidation or blackmail by the United States is probably paramount in Tehran's calculus, and the expanded U.S. military presence in the Persian Gulf and Central Asia since 2001 has likely heightened the regime's sense of vulnerability."

61 The original parties to the agreement were China, France, Germany, the Russian Federation, the United Kingdom and the United States, with the High Representative of the European Union for Foreign Affairs and Security Policy, and the Islamic Republic of Iran.

62 Coats 2019.

63 Sanger, Kirkpatrick & Kershner 2019. On July 31, the US Treasury Department announced sanctions against Iran's foreign minister "because (he) acted or purported to act for or on behalf of, directly or indirectly, the Supreme Leader of the Islamic Republic of Iran." US Department of Treasury 2019.

uranium enrichment set by the agreement. Although Iranian officials have stopped short (as of early August 2019) of announcing a full withdrawal from the JCPOA, they declared that the threatened US military strike and additional sanctions imposed by Washington meant “closing the doors of diplomacy”.⁶⁴ If the JCPOA were to collapse entirely, and if Iran restarted the full spectrum of activities previously banned or limited by the agreement, it could reduce the time needed for Iran to produce a nuclear bomb – if it chose to do so – from approximately one year to roughly two to three months.

Despite their deep disagreement with the United States over the JCPOA and re-imposition of sanctions on Iran, a number of European governments broadly share long-standing American concerns about the implications of a potentially nuclear-armed Iran. Among these are fears that, if emboldened by the possession of nuclear weapons, Iranian leaders would expand and intensify their military intervention in the region and support for ideologically sympathetic terrorist organizations. This, in turn, might convince at least a few other Middle East countries to seek to acquire nuclear weapons of their own.⁶⁵ Iran’s large inventory of ballistic missiles and its reported programmes to increase their range, accuracy, and lethality serve to compound such fears.

However, many of the potential tools (apart from the JCPOA) to deter Iran from acquiring, threatening to use, or using nuclear weapons would be hard to apply under current and foreseeable circumstances. For example, unlike the situation in Europe and the Asia-Pacific region, the United States does not have a formal defence alliance with any Middle East country except Turkey, a NATO ally. Negotiating and obtaining the consent of the US Senate for one or more such alliance(s) with Middle East partners who feel threatened by Iran, but who are often at odds with each other on different issues, would be extraordinarily difficult.⁶⁶ Absent a formal commitment seen as binding more than the incumbent US administration, it might be hard to reassure many states in the region that feel threatened by Iran that they can count on a US nuclear umbrella.

The United States could take other steps to strengthen regional deterrence against Iran. These might involve, for example, expanding its conventional force posture in and around the Gulf and taking further steps to improve its partners’ air and missile defence

64 Karimi & Gambrell 2019.

65 Israel is widely believed to possess nuclear weapons, but this has not been confirmed by official Israeli government statements. Declassified US documents strongly suggest the US government had come to believe, by 1969, that Israel “had developed nuclear weapons”. See US Department of State 1969 & Davies 1969. Among the Gulf states, Saudi Arabia is especially concerned by Iranian nuclear potential. King Abdullah reportedly told a former senior US official in 2009 that “if (the Iranians) get nuclear weapons, we will get nuclear weapons”. See Roberts 2016, 223.

66 Statements by US Presidents and various Congressional resolutions have pledged US support for the security of Israel, but neither side has seriously pursued the notion of a bilateral defence alliance comparable, for example, with US treaties with Japan, South Korea, and Australia.

capabilities. None of these would be politically easy or inexpensive to carry out. Moreover, lurking in the background is the challenge (similar, in some ways, to that posed by North Korea) of avoiding miscalculation and miscommunication with Iranian government and military authorities with whom the US government has had such difficult relations since 1979.

Developments in post-Cold War Russia, China, North Korea, and Iran are not the only examples of how deterrence has been affected by the shift from a bipolar to multipolar security environment. The US-led invasion of Iraq in 2003 and Israeli bombing of a Syrian nuclear reactor in 2007 demonstrated a willingness to take “preventive” action against perceived threats by state actors, thus dissuading potential proliferators from following the Iraqi or Syrian examples.⁶⁷ Indeed, US officials later cited the invasion of Iraq as a major reason for then Libyan leader Gaddafi’s decision, in December 2003, to dismantle Libyan weapons of mass destruction (WMD) programmes under an international inspection regime. As a result of the September 2001 al Qaeda attacks in the United States, fears that terrorist networks might acquire nuclear, radiological, chemical and biological WMD mounted precipitously. This prompted growing interest – especially in the West, but to some degree in Russia, as well – in national and international measures to prevent WMD proliferation to such networks. Prominent US strategists also explored whether deterrence concepts and tools are applicable to terrorist networks, or at least to their state sponsors.⁶⁸

Further research is necessary to understand how deterrence, as understood and practised during the Cold War, can be adapted to better fit with the 21st century security environment, but promising work is already underway. For example, American experts have advanced the idea of “tailored deterrence”, which entails “a shift from a one-size-fits-all notion of deterrence toward more adaptable approaches suitable for advanced military competitors, regional WMD states, as well as non-state terrorist networks, while assuring allies and dissuading potential competitors”.⁶⁹ The requirements of tailored deterrence would include more detailed and discriminating knowledge of the leaders that one seeks to deter, their values, objectives, and their appetite (or lack thereof) for risk-taking. The views of potential adversaries regarding Western capabilities, intentions, and credibility will also be important.

67 Bunn 2005. According to the author: “While deterrence is focused on convincing an adversary not to undertake acts of aggression, dissuasion is aimed at convincing a potential adversary not to compete with the United States or go down an undesirable path, such as acquiring, enhancing, or increasing threatening capabilities.”

68 Ibid.

69 Ibid.

3.1 Extended deterrence

According to the concept of extended deterrence, a country is able and willing to deter aggression not only against its own territory, population, and/or vital interests, but also against that of an ally (or allies). As with bipolar deterrence, the credibility of extended deterrence depends to a high degree on the adversary's perceptions of the capabilities and intent of the country that provides the extended deterrence assurances. However, in a situation of extended deterrence, the perception of the ally (or allies) receiving the assurances is just as important. After all, by accepting extended deterrence, the ally (or allies) in question implicitly or explicitly acknowledge their inability (for example, due to technological, resource, or treaty constraints) or unwillingness (for example, due to political concerns or competing national priorities) to develop, build, and maintain the range of military capabilities, including nuclear weapons, necessary to credibly deter a potential aggressor. Before accepting *de facto* dependency as an alternative to accepting a higher risk of being attacked by, or forced to appease, their adversary, the ally (or allies) seeking protection must believe that the extended deterrence provider has a compelling mutual interest in the arrangement, since the notion of altruism is not a reliable basis for international security relationships.⁷⁰

In the United States and Europe, the concept of extended deterrence took shape during the early days of the Cold War. Although not necessarily limited to nuclear weapons, such weapons quickly became the *sine qua non* of the US commitment to European defence under the NATO Treaty due to the overwhelming size and capabilities of Soviet conventional forces, especially their heavy concentration of armoured divisions opposite the FRG. In December 1949, four months after the treaty's entry into force, Allied ministers approved their first "strategic concept", which called for "a powerful deterrent to any nation or group of nations threatening the peace".⁷¹ The first military measure listed as necessary for meeting this objective was to ensure the ability "to carry out strategic bombing by all means possible with *all types of weapons, without exception*" (emphasis added). Allies understood that US-based aircraft carrying nuclear weapons would conduct such bombing. As noted earlier in this report, by late 1954, in accordance with the massive retaliation approach, the United States began to deploy artillery-fired "tactical" nuclear weapons in the FRG. Eventually, other types of forward-based US nuclear weapons followed, including short-range rockets, aircraft-delivered bombs, and atomic demolition munitions. By the mid-1970s, several thousand tactical nuclear weapons were present on the territory of several European Allies or deployed on US Navy ships assigned to Europe.

70 Although this section focuses on extended deterrence in the European context, the concept also applies to US bilateral defence guarantees to its Asia-Pacific allies.

71 Donnelly 1949.

The existential threat posed by the Soviet Union was not, however, the only US motivation to provide extended nuclear deterrence to Europe. As previously noted, US concerns regarding the possible proliferation of nuclear weapons among certain allies and friendly (but non-aligned) states surfaced in the mid-1950s. Washington was concerned that resources and political capital spent by European states to develop independent nuclear forces would necessarily detract from needed improvements to their conventional forces and, more broadly, their post-war economic reconstruction. France was a particular and near-term concern, but US analysts also viewed Sweden and the FRG, for different reasons, as potentially interested in building or acquiring nuclear weapons.⁷² In addition, US analysts cautioned that a decision by those states to seek nuclear weapons would be domestically contentious. The resulting debate, it was feared, might mobilize disarmament sentiment and jeopardize the forward-basing of US nuclear weapons.

Some US officials believed the proliferation of European nuclear weapon states could also complicate US alliance crisis management vis-à-vis the Soviets. They considered it highly unlikely that a European ally or friendly partner might threaten to use a nuclear weapon against the Soviets (or others) in the absence of an extreme threat to its sovereignty and security. They were less confident, however, in predicting the Soviets' reaction to the prospect of confronting multiple European nuclear armed powers, especially a nuclear-armed FRG untethered from Washington's command and control.

While the broad concept of extended deterrence was well understood within the Alliance by the late 1950s, additional political and military steps were necessary to operationalize it over the following decades. Of these, four inter-related aspects stand out in particular.

First, the United States and its European and Canadian allies soon realized they needed mechanisms and procedures to reassure each other and their respective publics that extended deterrence served their mutual interests. To cite one example of why this came about, a NATO air exercise in 1955 indicated that the FRG would suffer catastrophic damage, including potentially millions of casualties, from the blast and fallout effects of some two hundred tactical nuclear weapons.⁷³ This undercut the arguments of FRG officials who had favoured threatening NATO's early use of nuclear weapons primarily as a means of avoiding any war on their territory. Through NATO and bilateral channels, US, European, and Canadian civilian and military officials established structures and protocols to conduct consultations, planning and exercises on nuclear issues. These went a long way towards reconciling their respective threat perceptions, their views on the relationship between conventional and nuclear tools of extended deterrence, and their approaches towards

72 Michel 2018.

73 Yost 1992.

the deliberate escalation and selective use of nuclear weapons, if deterrence failed, to persuade the Soviets to cease their aggression and withdraw.⁷⁴ These mechanisms also permitted the allies to work together on practical issues, ranging from nuclear weapons safety and security measures to employment doctrine and declaratory policy.

Second, the United States and the European allies came to accept that extended deterrence depended, in part, on European participation in certain nuclear operational roles within a NATO framework. This was not a foregone conclusion. In fact, from 1946 to 1958, the Truman and Eisenhower administrations accepted congressionally-mandated prohibitions on sharing nuclear-related information or materials. However, by the early 1960s, it was evident that the forward-basing of US nuclear weapons in Europe would be difficult to sustain unless a number of European allies, under mutually agreed rules and procedures, could participate in nuclear-related missions, up to and including the delivery of US nuclear weapons by European dual-capable aircraft (DCA) and ground-based weapon systems.⁷⁵

At the time, the military argument for NATO nuclear-sharing arrangements was not particularly controversial. NATO military officers generally agreed that the addition of European capabilities to deliver US forward-based weapons would complicate Soviet planning, thereby strengthening NATO deterrence and defence capabilities. However, the political arguments in favour of such arrangements proved decisive. The nuclear sharing arrangements demonstrated to three important audiences – the Soviets, Americans, and Europeans – that the United States and Europe would share the risks and responsibilities inherent in extended deterrence. To be sure, those arrangements were not popular among European publics who opposed nuclear weapons on ideological grounds and/or feared that their country's potential direct participation in NATO nuclear operations would make them a priority target for Soviet nuclear attack. But given the Cold War context and underlying consensus on the Soviet threat, European political leaders from the centre-left to centre-right were willing and able to muster the parliamentary support necessary to carry out the agreed nuclear-sharing roles despite anti-nuclear sentiment, which varied in intensity among the concerned allies.

Third, by the early 1970s the United States had overcome its initial scepticism regarding UK and French decisions to build their own nuclear deterrents, and it came to accept those independent deterrents as complementary to its own. In fact, US nuclear

74 Ibid.

75 US presidential authorization is required for release of US nuclear weapons to be delivered by an ally's "dual capable aircraft" (DCA) under so-called "dual-key" arrangements. DCA are combat aircraft specially equipped to conduct conventional or nuclear missions, and DCA pilots receive specialized training for nuclear missions.

cooperation with the British, whose scientists participated in the wartime Manhattan Project, had already progressed quite far.⁷⁶

⁷⁶ Lewis & Tertrais 2015.

US-UK NUCLEAR WEAPON COOPERATION

The US-UK “special relationship” in the area of nuclear weapons is unique: there exists no other programme where the United States has worked so intimately with another country for such an extended period of time on the gravest matters of national security. But this was not an easy accomplishment.

The two countries’ cooperation during World War II was, at times, subject to serious strains. Prime Minister Winston Churchill authorized the development of an atomic bomb in mid-1941. Apparently convinced that his country had a lead in the field, he gave a lukewarm response to President Franklin Roosevelt’s suggestion in October 1941 to coordinate their countries’ efforts. In January 1942, one month after the Japanese attack on Pearl Harbor, Roosevelt gave his tentative approval to build an atomic weapon. Later that year, the British, having encountered serious obstacles with their own programme, began to seek American assistance.

However, limited information exchanges with the British were virtually halted by the US side between late 1942 and mid-1943 due, in part, to concern that “Britain would use U.S. technological innovations for postwar industrial purposes”.⁷⁷ It was not until the Quebec Agreement, concluded in August 1943, that British scientists were effectively incorporated into the US Manhattan Project, where they made important contributions to the development of the first atomic bombs.

Once the war had ended, new bilateral complications arose as the United States sought to retain a monopoly over nuclear weapons. In 1946, Congress pushed for, and President Harry Truman approved, the Atomic Energy Act (known as the “McMahon Act” in recognition of its leading Senate proponent). The law effectively barred the sharing of atomic information with any nation, including the United Kingdom. Other frictions arose between the wartime allies over access to African uranium ore and the US desire to terminate the Quebec Agreement, which required the United States to obtain British consent prior to use of the atomic bomb.

By 1947, a combination of factors – including fear of Soviet aggression in Europe, the desire to preserve British global prestige, and perceptions of American inconstancy – led the United Kingdom (under Labour Prime Minister Clement Attlee) to resume an independent programme to develop an atomic weapon. British resolve was further strengthened when the Soviet Union conducted its first nuclear explosion in 1949.

Churchill returned to power in 1951, and after trying unsuccessfully to re-establish close nuclear collaboration with the United States, he eventually agreed that the United Kingdom should develop, manufacture, and deploy its own arsenal of nuclear weapons. However, as one expert notes: “(S)trategically, the overall objective of this British independent effort remained to secure *interdependence with the United States* (emphasis added). In British minds, collective security was the best, if not the only, viable alternative for preventing attacks on its small and

⁷⁷ Center for Strategic and International Studies 2008, 25.

vulnerable homeland.”⁷⁸ The United Kingdom exploded its first nuclear device in 1952 and deployed its first air-delivered nuclear weapons in 1955.

The following year, President Dwight Eisenhower approved measures to increase the sharing of certain atomic energy-related information. The McMahon Act was amended in 1954 and authorized the sharing of data on military characteristics of US nuclear weapons (but not their designs) with NATO Allies. After obtaining Congressional approval of the necessary legal authorities, Secretary of State John Foster Dulles and Foreign Secretary Lord Hood signed the Mutual Defence Agreement (MDA) in 1958. This watershed agreement provided for extensive bilateral information exchanges and cooperation in sensitive areas such as: defence plans; personnel training involving nuclear weapons; evaluations of nuclear capabilities of potential enemies; nuclear weapons delivery systems; transfer of a US nuclear submarine propulsion plant; and nuclear and non-nuclear weapons materials and design. The MDA specified, however, that “there will be no transfer by either Party of atomic weapons.”⁷⁹

Implementation of the MDA proceeded rapidly over the next few years but was not problem-free. Initially, the Kennedy Administration was sceptical about the value of an independent UK deterrent. Indeed, an April 1961 Policy Directive approved by President John Kennedy stated: “Over the long run, it would be desirable if the British decided to phase out of the nuclear deterrent business.”⁸⁰ The Administration’s attitude changed, however, in late 1962, when its cancellation of the Skybolt air-delivered nuclear missile programme provoked a serious rift with the British. (The British had counted on the Skybolt to extend the credibility of their airborne deterrent, whose ability to penetrate Soviet defences was increasingly in doubt.) This blow to UK confidence in the United States was solved by the 1963 Polaris Sales Agreement (PSA), under which American Polaris missile systems and related services would be provided for British-built submarines. The first of four Polaris-armed UK ballistic SSBNs entered service in 1968.

The MDA and PSA set the basic pattern for US-UK collaboration on nuclear weapons-related systems that continues today. The US and Royal navies work closely together on American SLBM and nuclear propulsion systems integrated into British-built submarines; and the US national laboratories that support the American deterrent work closely with the UK Atomic Weapons Establishment (AWE) on a range of weapons materials, design, and weapons effects issues, although the AWE is responsible for design decisions, manufacturing, maintaining, and decommissioning British warheads.⁸¹ The D-5s deployed on UK SSBNs are US-built, and undergo periodic maintenance at the US Navy’s Kings Bay Submarine Base in the state of Georgia. The United Kingdom holds title to 58 D-5s. Under pooling arrangements between

78 Ibid., 49–50.

79 US-UK Mutual Defence Agreement, 1958, accessible at: https://www.cvce.eu/content/publication/2014/6/12/a1ee4c1f-2166-48f3-a886-2711bd647111/publishable_en.pdf.

80 US Department of State 1961. One year later, Kennedy’s national security adviser, McGeorge Bundy, advised the President that “we do not really see much point in the separate British nuclear deterrent, beyond our existing Skybolt commitment; we would much rather have British efforts go into conventional weapons and have the British join with the rest of NATO in accepting a single U.S.-dominated nuclear force”.

81 Between 1962 and 1991, the British conducted 19 nuclear explosive tests at the US Nevada Test Site.

the two navies, a D-5 deployed on a US SSBN may later be deployed on a UK SSBN, and vice versa. Since the UK submarine base at Faslane, Scotland does not have facilities to load the D-5 SLBMs into their SSBNs, the loading process takes place at Kings Bay.

The United States and the United Kingdom have always maintained separate and independent command and control authority over nuclear weapons; only the US President can authorize the use of US nuclear weapons, and only the UK Prime Minister can authorize the use of UK nuclear weapons. However, in the mid-1980s, the sides acknowledged a major gap in their cooperation. As a former senior US official points out: “The fact that (the United States and the United Kingdom)... never discussed the premises of the deterrent process, or the best way to ensure effective deterrence of the Soviet leadership, or the optimum employment of a common military system (the SLBM) was simply accepted... (T)he blinding reality that we were basically ignorant of how the British government thought about nuclear deterrence – and that Britons were similarly ignorant of our approach – was unsettling.”⁸² To begin to address this situation, the sides initiated “nuclear staff talks” in 1986. Limited at first to a few senior civilian defence officials and military officers, the talks expanded over time in terms of team composition and the range and sensitivity of topics. They continue to serve as a senior-level policy channel and an operational linkage between target planners.⁸³

82 Op. cit., Center for Strategic and International Studies, 173–4.

83 Ibid., 177.

While US-French cooperation on nuclear weapons-related issues was less extensive, it expanded into some sensitive areas after President Charles de Gaulle left office in 1969.⁸⁴ NATO’s 1974 Ottawa Declaration publicly acknowledged that the United Kingdom and France “possess nuclear forces capable of playing a deterrent role of their own contributing to the overall strengthening of the deterrence of the Alliance.”⁸⁵ The declaration demonstrated solidarity among the “nuclear allies” to audiences within NATO. It also signalled to the Soviets that the United States was comfortable with having separate French and UK centres of decision-making, which served to complicate Soviet planning without undermining allied confidence in the US extended deterrence.

84 Under the 1961 US-French “Agreement for Cooperation on Mutual Defense Purposes”, the United States provided the French air force with tanker aircraft and specialized training that qualified certain French squadrons to execute NATO nuclear missions armed with US weapons based in Germany. When France withdrew from NATO’s integrated military structures in 1966, French participation in NATO’s nuclear planning as well as US training of French forces for potential nuclear missions came to an end. At their White House meeting in February 1970, Presidents Nixon and Pompidou laid the groundwork for close-hold bilateral discussions and cooperation on a range of nuclear weapon-related topics. See Burr 2011.

85 NATO 1974.

Fourth, a central issue in the extensive discussions among the allies on extended deterrence involved the linkage, or “coupling”, of US strategic forces (i.e. those intercontinental systems that, in wartime, would primarily target the Soviet homeland) and US forward-based tactical nuclear weapons (i.e. those intended primarily to repel a Soviet and Warsaw Pact attack across the inner German border). Until the late 1950s, this coupling was considered automatic. As Soviet capabilities to strike the US homeland improved, the US flexible response policy *inter alia* put more emphasis on “escalation control”, which implied a desire by Washington to avoid strategic strikes against Soviet targets. The European allies, however, insisted on coupling “on the grounds that the threat of Washington’s employment of strategic nuclear forces has a powerful effect in deterring Soviet aggression and thereby preventing war”.⁸⁶

In fact, nuclear weapon employment policy directives approved by Presidents Nixon, Carter, and Reagan confirm that deterrence of conventional or nuclear attack against US allies was considered a fundamental US objective, requiring integrated plans for the employment of strategic and theatre nuclear forces.⁸⁷ In other words, while the US presidents understandably insisted on a range of options covering possible nuclear employment, the coupling desired by Europeans was certainly not neglected, even if some European officials were not entirely satisfied with Washington’s explanations of the policy.

Indeed, the issue of coupling was at the heart of perhaps the most serious challenge to extended deterrence during the Cold War. This occurred when NATO, prompted in part by public warnings in late 1977 by FRG Chancellor Helmut Schmidt, became alarmed over Soviet deployment of the SS-20, a new road-mobile missile able to deliver, with high accuracy, three nuclear warheads to a range of some 5,000 kilometres. Schmidt’s central point was that the advent of virtual US-Soviet parity in intercontinental strategic weapons “neutralize(d)” those capabilities and “magnifie(d) the significance of disparities in nuclear tactical and conventional weapons” where the Soviets held important advantages.⁸⁸

Moscow’s motive behind the SS-20 deployments, and the military implications of those deployments for European allies and US forward presence, were hotly debated within the Alliance.⁸⁹ Allies broadly agreed, however, that the deployment of large numbers of the relatively invulnerable SS-20s (along with the Soviets’ new “Backfire” bomber) vastly

86 Yost 1992, 249.

87 The formerly Top Secret nuclear employment policy directives are accessible at: https://www.nixonlibrary.gov/sites/default/files/virtuallibrary/documents/nsdm/nsdm_242.pdf; <https://nsarchive2.gwu.edu/nukevault/ebb390/docs/7-25-80%20PD%2059.pdf>; <https://www.archives.gov/files/declassification/iscap/pdf/2013-104-doc01.pdf>.

88 Nuti et al. 2009.

89 Some Western military analysts assessed that a priority mission for the SS-20s was to attack Western European airfields, ports, and communications centres, blocking US reinforcements and imposing a *fait accompli* that would convince the United States not to engage its tactical or strategic nuclear forces against the Soviets. See Burr 2009.

exceeded any legitimate defensive needs and represented an attempt by Moscow to “decouple” US extended deterrence from the defence of Europe. NATO solidarity was further shaken by Carter’s decision in 1978 to stop production of a new type of enhanced-radiation nuclear weapon (popularly known as the “neutron bomb”) designed to counter the Soviets’ conventional advantages, especially in heavy armour, while minimizing collateral damage.

NATO’s “dual-track” decision in 1979 aimed, in effect, to avoid any perceived decoupling of the US extended deterrent by deploying 108 US intermediate-range ballistic missiles (Pershing IIs) in the FRG and 474 land-based cruise missiles in Belgium, the Netherlands, Italy, and the United Kingdom. From NATO’s perspective, the deployments track would strengthen deterrence, underscore Alliance nuclear risk and burden sharing, and reassure the allies by introducing a visible US capability to strike targets deep in Soviet territory from Western Europe. In parallel with the deployments, NATO endorsed an arms control track to negotiate the lowest possible and equal number of INF systems on both sides.

For some allies, the dual track decision was particularly difficult.⁹⁰ However, despite large protests in the basing countries, NATO’s consensus held, the Reagan administration proposed a “zero-zero” option in 1981, US INF deployments began in 1983, and the negotiations eventually produced the INF Treaty in 1987, which led to the total and verifiable elimination of the INF and shorter-range land-based missiles on both sides.⁹¹

The end of the Cold War and collapse of the Soviet Union did not convince the United States and its NATO allies to abandon extended deterrence. The emergence of a revanchist Russia or a serious nuclear (or chemical or biological) threat to European security from another source, while considered unlikely at the time, could not be excluded. Nevertheless, given the disappearance of any plausible conventional threat on its doorstep and the reduction of tensions between Europe and Russia, the United States and NATO took several measures during the 1990s and early 2000s to reduce the prominence of nuclear weapons, including the tools of extended deterrence, in their post-Cold War deterrence and collective defence strategy. These measures encompassed four areas.

First, US forward-based nuclear weapons in Europe were reduced by about 95 percent from their estimated high point of 7,300 in 1971. The lion’s share of these reductions, which were endorsed by NATO, took place in the late 1970s and early 1980s. Thousands more warheads were withdrawn beginning in late 1991, with additional withdrawals (totalling around 200) reportedly taking place as recently as 2008. Non-government sources

⁹⁰ Bell 2018.

⁹¹ The INF Treaty text and abbreviated chronology are accessible at: <https://www.state.gov/t/avc/trty/102360.htm>.

estimate that a total of approximately 150 US warheads (B-61 gravity bombs) remain at storage sites in Germany, the Netherlands, Belgium, Italy, and Turkey.⁹²

Second, NATO took internal measures to reduce the role of nuclear weapons in its planning. The readiness criteria for forces with a nuclear role were significantly relaxed, standing peacetime nuclear contingency plans were terminated, and exercises involving potential nuclear employment reportedly became less frequent and realistic.

Third, in its public statements and documents, NATO underscored its reduced reliance on nuclear weapons. Indeed, its 2010 Strategic Concept explicitly committed the Alliance, for the first time, to “create the conditions for a world without nuclear weapons in accordance with the goals of the Nuclear Non-Proliferation Treaty”.⁹³

Fourth, the Alliance sought to allay Russia’s professed concerns that new members in Central and Eastern Europe might seek, or be obliged, to base nuclear weapons on their territory. Specifically, NATO declared in the 1997 NATO-Russia Founding Act that there was “no intention, no plan and no reason to deploy nuclear weapons on the territory of new members, nor any need to change any aspect of NATO’s nuclear posture or nuclear policy – and (NATO member states) do not foresee any future need to do so. This subsumes the fact that NATO has decided that it has no intention, no plan, and no reason to establish nuclear weapon storage sites on the territory of those members, whether through the construction of new nuclear storage facilities or the adaptation of old nuclear storage facilities”.⁹⁴ In addition, NATO’s 2012 Deterrence and Defence Posture stated its readiness to consider further reductions in forward-based nuclear weapons provided Russia took reciprocal steps.⁹⁵

The steps to reduce the prominence of nuclear weapons in NATO’s internal political and military deliberations and its relations with Russia also had some unintended consequences. While not questioning the continuing need for extended deterrence, some

92 See Nuclear Threat Initiative 2019. In September 1991, President George H. W. Bush announced his unilateral “Presidential Nuclear Initiatives”, which included the removal from Europe of some 1,700 forward-based nuclear warheads, as well as the removal of all nuclear warheads from US surface ships, attack submarines, and land-based naval aircraft. As a matter of policy, NATO does not identify the basing countries or the number of US warheads present.

93 NATO 2010.

94 NATO 1997.

95 NATO 2012.

Europeans argued that US forward-based weapons were no longer essential for that purpose.⁹⁶ In 2009, at the insistence of her junior coalition partner, Chancellor Angela Merkel reluctantly agreed to consult with NATO allies on the removal of the remaining US weapons from Germany.⁹⁷ Faced with resistance (especially from France, the United Kingdom, the United States, and several Eastern and Northern European allies), Germany effectively shelved its proposal in 2010 and joined NATO's consensus on the new Strategic Concept whereby allies affirmed that "as long as there are nuclear weapons in the world, NATO will remain a nuclear Alliance"; and pledged to "ensure the broadest possible participation of Allies in collective defence planning on nuclear roles, *in peacetime basing of nuclear forces* (emphasis added), and in command, control and consultation arrangements".⁹⁸

In recent years, and especially since Russia's 2014 intervention in Ukraine, US and European thinking about extended deterrence has had to adjust to new challenges.

The "geography" of extended deterrence has changed dramatically since the end of the Cold War. The most plausible flashpoint for a military confrontation between NATO and Russia has shifted from the now erased inner German border to the Baltic allies and Poland. While NATO's overall conventional capabilities are greater than during the Cold War, the proximity, size, and improved capabilities and readiness of Russian conventional and dual-capable forces in the Baltic region have raised concerns that Russia could have an "opening attack" advantage there.⁹⁹ (See also section 7 of this report.) As previously mentioned, some allies also see Iran as a potential future nuclear threat, especially if the JCPOA were to collapse.

The types of threats that allies would like to deter have become more diverse. "Hybrid" threats – ranging from "little green men" to cyber-attacks on critical infrastructure,

96 The retention of forward-based nuclear weapons in Europe was vigorously debated within the United States as well. Some argued that absent an agreement to greatly reduce or eliminate Russia's considerable advantages in tactical nuclear systems, the forward-based US weapons were necessary to demonstrate the coupling of US strategic forces to the defence of NATO and ensure European nuclear "burden sharing" in contrast with "burden shedding". See Miller, Robertson, & Schake 2010. Advocates of a withdrawal believed extended deterrence would still be credible by relying on US strategic systems. Some also questioned the military utility and costs of relatively small numbers of air-delivered gravity bombs. See Perkovich 2010. The Obama administration's Nuclear Posture Review 2010 stated: "Although the risk of nuclear attack against NATO members is at an historic low, the presence of U.S. nuclear weapons—combined with NATO's unique nuclear sharing arrangements under which non-nuclear members participate in nuclear planning and possess specially configured aircraft capable of delivering nuclear weapons—contribute to Alliance cohesion and provide reassurance to allies and partners who feel exposed to regional threats." (US Department of Defense 2010a).

97 During the 2009 election campaign, Guido Westerwelle, leader of the small liberal FDP party who became foreign minister under the governing coalition, favoured a speedy German request to Washington to withdraw the weapons, which he termed a "relic" of the Cold War. As a candidate, Westerwelle's proposal was not predicated on prior agreement within NATO.

98 NATO 2010.

99 Binnendijk & Kramer 2018.

financial networks, and military command, control, and communications networks – could complicate national and NATO decision-making. Depending on the circumstances, these threats could trigger Article 5 (the collective defence provision) of the NATO Treaty. Nevertheless, it is difficult to imagine realistic scenarios where the classic tools of extended deterrence – US strategic and forward-based nuclear forces – would come into play at an early stage in NATO's response, except as an inherent warning to the aggressor not to escalate the situation.

Finally, while Russian military developments over the past several years, especially in nuclear weapon-related areas, have prompted responses by NATO and the “nuclear allies”, the renewed discussion of nuclear weapons has also re-energized efforts, at least in the West, to delegitimize their role in deterrence in general and, in particular, as a necessary component of extended deterrence. The Treaty on the Prohibition of Nuclear Weapons (discussed in section 6 of this report) is an example of the former, and the SPD's decision in early 2019 to re-examine Germany's role in nuclear-sharing arrangements is an example of the latter.¹⁰⁰

3.2 Impact of technological change on deterrence

The interplay between technological change and deterrence has always been complex.¹⁰¹ Technological change can improve or degrade strategic stability, depending upon factors such as the nature of the technology involved; how it relates to the broader goal of the side adopting the technology (e.g. whether to strengthen deterrence by punishment or by denial, or to improve warfighting outcomes); and effects of the technology on the structure, missions, and resourcing of other nuclear and non-nuclear military capabilities. Moreover, as is the case with other aspects of deterrence, the intent of the side developing or deploying a specific technology might differ significantly from the perceptions of its allies and adversaries. What one side might see as a necessary technological change to strengthen its deterrent or defensive posture might be seen by others as provocative or intended to augment that side's offensive potential.

For most of the Cold War, the United States and the Soviet Union focused the lion's share of their strategic programmes on technologies associated with the design and production

100 Pancevski 2019.

101 While some analysts have viewed technology as a principal engine of the nuclear “arms race”, historical experience does not support such a sweeping conclusion. See Hamlett (1990) and Office of the Secretary of Defense (1981).

of nuclear warheads and their delivery systems.¹⁰² Both countries constructed nationwide and capital-intensive networks of specialized research and development laboratories, production facilities (e.g. for fissile materials, weapon assembly, and delivery platforms), testing grounds, and deployment sites for ICBMs, ballistic missile submarines, and strategic bombers. In the late 1950s and early 1960s, US strategic programmes accounted for one-quarter of the Pentagon budget.¹⁰³

At times, the United States and the Soviet Union opted for different approaches based, in part, on the availability of preferred technologies. For example, until the late 1950s, the United States emphasized the role of strategic bombers with large nuclear payloads able to inflict massive damage on urban-industrial targets inside the Soviet Union.¹⁰⁴ During the same period, the Soviets focused more on missile and air forces primarily to support their ground operations in Europe or elsewhere along the Soviet periphery. However, at other times, each side seemed to shift its priorities in direct response to the other's actions. For example, alarmed by the Soviets' successful Sputnik launch in 1957 (which came several months after their first ICBM test), the Eisenhower administration accelerated its ICBM and SLBM programmes. For their part, the Soviets, worried by what they perceived to be the US threat to their homeland, invested heavily in air defences (and, later, missile defences) as well as ballistic missiles and aircraft especially suited to "pre-emptive operations" against US forward bases in Europe.¹⁰⁵

While the sides reached an approximate nuclear parity in offensive weapons, at least in quantitative terms, by the early 1970s, this did not produce a real convergence of their thinking on nuclear weapons and deterrence. Both saw a major role for nuclear weapons in war prevention. However, the United States, which had come to believe in the stabilizing value of MAD, placed its highest priority on nuclear forces that could survive an initial Soviet strike with enough weapons to inflict unacceptable damage on the Soviet homeland, especially by targeting those forces and functions that the Soviet leadership viewed as essential to their war plans.¹⁰⁶ This approach, which was consistent with deterrence by

102 This statement is also valid for the United Kingdom, France, and China, although the subsequent discussion focuses on the United States and Soviet Union. This section relies heavily on Western sources of information, including official archives and non-government studies, because they are more extensive and accessible than Soviet or Russian sources.

103 This does not include the large expenditures directly associated with nuclear warhead development, production, and testing, which were then the responsibility of the US Atomic Energy Commission.

104 Office of the Secretary of Defense 1981. Defence budget increases as a result of the Korean War accelerated US development of a variety of nuclear warheads, including high-yield thermonuclear devices. However, the authors concluded that in the early 1950s, US developmental work on warheads and missile delivery systems was not significantly influenced by the limited information available on Soviet programmes.

105 Ibid., 819. For Soviet documents on the early development of an ICBM designed to carry a nuclear warhead, see Malyshev et al. 1953.

106 Op. cit., Miller. The US nuclear weapons targeting process at the end of the Cold War is described in "Strategic Weapons: Nuclear Weapons Targeting Process" (US General Accounting Office 1991).

punishment, also reflected an assessment that the likelihood of nuclear war was relatively low.

In contrast, Soviet leaders did not endorse the MAD concept which, according to some Western analysts, might have been viewed by their population (and that of other Warsaw Pact members) as conceding the vulnerability of the Soviet state. Instead, Soviet strategists appeared to believe that if their forces were better prepared to fight a nuclear war and survive US retaliation – in effect, combining deterrence by punishment and by denial – the United States would not attack the Soviet homeland and, possibly, not employ its nuclear forces in defence of its allies.¹⁰⁷

These different strategic approaches were reflected in (and, perhaps, encouraged by) certain technological asymmetries between US and Soviet forces. For example, according to US assessments in the early 1980s, the Soviets' emphasis on large ICBMs (which carried nearly four-fifths of their total deployed nuclear weapons) gave them a significant advantage in "throw weight" – in other words, the ability to hold at risk a large percentage of US ICBMs and launch control centres with high-yield and increasingly accurate MIRVs. At the time, the Soviets were also believed to be more advanced in ballistic missile and air defence systems, as well as "passive defences" (such as hardened silos and deeply buried command centres), which together might blunt the effect of a US retaliatory attack.¹⁰⁸ Thus, although US officials considered a Soviet nuclear surprise attack (a "bolt from the blue") to be unlikely, the Soviet force structure appeared, from an American perspective, to be better configured to execute a successful "first strike" option.

On the other hand, by the early 1980s, the United States had placed nearly one half of its total deployed strategic warheads on SLBMs and almost one-third on long-range bombers – systems that, for a number of reasons, were considered "second strike" or retaliatory forces.¹⁰⁹ The US ballistic missile submarine fleet was considered extremely survivable, US advances in stealth technology promised to improve the ability of bombers and air-launched cruise missiles (ACLMs) to penetrate Soviet air defences, and US anti-submarine warfare (ASW) and satellite warning systems were viewed as significantly more capable than their Soviet counterparts. In addition, over time, significant new US investments were expected to improve the survivability of command, control, communications, and intelligence (C3I)

107 Office of the Secretary of Defense 1981.

108 Under the 1972 Anti-Ballistic Missile (ABM) Treaty, the United States and the Soviet Union agreed to limit strategic defensive systems to two sites in each country – one to protect an ICBM launch site, and one to protect the nation's capital. The United States opted not to construct an ABM system to defend Washington, D.C., and abandoned (in the early 1970s) efforts to deploy an ABM system to defend an ICBM site. The Soviet Union deployed, and Russia still maintains, ABM defences around Moscow, at least some of which are nuclear armed. The United States withdrew from the ABM Treaty in 2002.

109 Op. cit., Secretary of Defense & Director of Central Intelligence, 29.

capabilities, making a Soviet “first strike” less effective and therefore less attractive. Meanwhile, the combination of improved warhead designs (which enhanced their reliability, effectiveness, safety, and security) with increasingly accurate ICBMs, SLBMs, and ALCMs gave US strategic planners – and, ultimately, the president – more options for the selective employment of strategic forces that would not emphasize attacks on “urban-industrial targets” likely to cause massive civilian casualties and other undesirable collateral damage.¹¹⁰

To be sure, both sides had reason to be concerned about technological and force structure asymmetries, especially given their gaps in understanding of the many other factors that could influence their adversary’s behaviour in a crisis. Even at the height of the Cold War, however, those asymmetries were not unmanageable. Indeed, as a US assessment stated in 1983: “(T)he Soviet advantages, while significant, do not appear to be great enough for us to be concerned that we no longer have the capability to deter large-scale nuclear war. Clearly we still do. The uncertainties (involved) would make it unattractive for the Soviets to escalate to such a level of warfare; they could not expect with high confidence to prevail.”¹¹¹

In the post-Cold War period, nuclear weapons and their associated delivery systems have continued to play a central role in Russian, US, French, and UK deterrence strategies despite the reduced size of their arsenals. This is explained, at least in part, by the unique ability of their nuclear forces to deliver unmatched destructive power, with high accuracy and at great distances, against several classes of targets, ranging from hardened sites (e.g. deeply buried command structures and missile silos) to mobile missiles and critical military staging areas (e.g. airfields and naval bases). Hence, all four have undertaken steps to maintain and/or modernize their “legacy” offensive systems.

At the same time, the intersection of technological change and an increasingly multipolar threat environment has complicated previous deterrence calculations. Three broad trends since the early 1990s are of particular concern.

First, the dissemination of nuclear, missile, and related technologies – facilitated by state and non-state actors willing to circumvent international non-proliferation regimes – made it possible for additional states (Pakistan and North Korea) to join the ranks of nuclear

110 Op. cit., Secretary of Defense & Director of Central Intelligence, 8. According to the assessment, “In the past, actual targeting plans provided for considerably more emphasis on counter-force and counter-military strikes than the public debate would indicate was the case. During much of the 1960s and 1970s the criteria used for force planning and programming, as well as the US declaratory policy, emphasized retaliation against urban-industrial targets, but US targeting policy, as reflected in SIOP [nuclear war] plans, allocated most weapons to military targets (emphasis added). Present declaratory and targeting policies now more closely correspond and are intended to maximize deterrence by focusing attacks against those targets and functions that the Soviets see as most essential for carrying out their war plans”.

111 Ibid., 1.

weapon states, and their pace of development has generally exceeded expectations. For example, Pakistan has reportedly introduced short-range “battlefield” nuclear weapons, while North Korea is developing an ICBM.¹¹² While the production or acquisition of fissile material remains the most difficult and expensive barrier to building a nuclear weapon, a nuclear programme ostensibly established for energy generation purposes can be used, under certain circumstances, for a clandestine enrichment and/or reprocessing effort. (This was the root cause of Western concern leading to the JCPOA.) Plans and equipment necessary for building nuclear weapons and their delivery systems have been sold on what amounts to an international black market. In addition, the scientific, computer, and engineering skills needed to build and sustain a viable nuclear weapons programme are significantly more accessible to developing countries than during the Cold War.

Second, technological advances have facilitated the development and proliferation of non-nuclear and dual-capable weapons that can have strategic effects.¹¹³ New precision-guided intermediate and longer-range strike weapons, ranging from cruise and ballistic missiles to unmanned (but armed) submarine vehicles have increased the likelihood of standoff and remote operations (known as “anti-access, area denial” or “A2AD”) in the initial stages of an armed conflict. With an enhanced capability to deliver conventional or nuclear strikes against the defender’s air and naval units, an aggressor might hope to prevent those units from supporting and reinforcing the forward-based forces integral to the defender’s deterrence and defence strategy.¹¹⁴ Moreover, the integration of hypersonic delivery vehicles into the aggressor’s A2AD arsenal, if successful, would significantly increase their capability to quickly engage the defender’s forces – a scenario which might incentivize the latter to launch pre-emptive strikes of its own against the A2AD threat.¹¹⁵ In such a case, the dual-capable nature of certain A2AD systems might further increase the risk of escalation, since an attack to suppress those systems might be interpreted as an attack on the aggressor’s nuclear arsenal. On the other hand, new missile defence technologies are also likely to continue to mature and proliferate, improving the ability of both friendly and adversarial state actors to defeat limited ballistic and/or cruise missile attacks.

112 Pakistan has also tested a nuclear-capable submarine-launched cruise missile (SLCM). India conducted a single nuclear explosion in 1974 and a series of explosions in 1998. India is developing a “triad” of land, sea, and air-delivered nuclear weapons.

113 According to some experts, thanks to advances in conventional weapons technology, new highly precise and long-range conventional weapons may be capable, within a few years, of performing certain missions currently assigned to nuclear weapons. See Younger 2000.

114 An aggressor state could also use advanced, long-range air defence capabilities as part of its A2AD arsenal.

115 Hypersonic weapons incorporate the speed of a ballistic missile with the manoeuvring capabilities of a cruise missile. Hypersonic weapons travel at speeds many times greater than the speed of sound, are specifically designed for increased survivability against modern ballistic missile defences, and can deliver nuclear or conventional warheads at ultra-high velocities over long distances. See Smith 2019.

Third, the rapid development of offensive cyber “counter space” (including anti-satellite) and artificial intelligence (AI) capabilities pose additional challenges to deterrence. Cyber attacks mounted by state or non-state actors could disrupt and, in some cases, cause severe physical damage to critical infrastructure across the energy, financial, water, aviation, manufacturing, and government services sectors.

DETERRENCE AND THE CYBER DOMAIN

Will “mutually assured disruption” become a catchphrase for establishing deterrence in the new age of cyber operations just as “mutually assured destruction” (MAD) entered the lexicon of nuclear strategists during the Cold War? Terminology aside, the challenges involved in deterring or, if necessary, responding to the use of weaponized cyber tools are rapidly expanding, along with the number of potential “battlefields” and state and non-state actors that might be implicated in, or affected by, cyber attacks.

In 2007, Estonia was the first to experience a nationwide cyber attack, which mainly targeted its government, banking, and media websites. (Estonian officials attributed the attack to Russian government-sanctioned actors.) Since then, the proliferation of cyber threats and intrusions has led the US Director of National Intelligence (DNI), in his January 2019 report to Congress, to rank cyber at the top of his list of “global threats”. In particular, the DNI officially confirmed, for the first time, that “Russia has the ability to execute cyber attacks in the United States that generate localized, temporary disruptive effects on critical infrastructure – such as disrupting an electrical distribution network for at least a few hours – similar to those demonstrated in Ukraine in 2015 and 2016. Moscow is mapping our critical infrastructure with the long-term goal of being able to cause substantial damage”.¹¹⁶

Evidently, Russian cyber threats will not be met just by improved defences. According to a recent report by the *New York Times*, the United States, for its part, has stepped up its previous “reconnaissance probes into the control systems of the Russian electric grid” by placing “potentially crippling malware inside the Russian (electric grid) system at a depth and with an aggressiveness that had never been tried before. It is intended partly as a warning, and partly to be poised to conduct cyberstrikes if a major conflict were to break out between Washington and Moscow”.¹¹⁷

Russia is not the only US concern, however. The DNI has cited China’s “ability to launch cyber attacks that cause localized, temporary disruptive effects on critical infrastructure – such as disruption of a natural gas pipeline for days to weeks – in the United States”.¹¹⁸ Similarly, Iran, North Korea and (potentially) terrorist groups are said to have the capabilities to conduct disruptive cyber attacks.

116 Coats 2019.

117 Sanger & Perlroth 2019.

118 Coats 2019.

Estimates of the types of damage that could be caused by activating embedded malware in an adversary's digital systems that control infrastructure vary widely. Some experts point to the potentially catastrophic effects of prolonged and expansive interruptions of energy grids on hospitals, other "first responders" (police and firefighters), transportation, financial, and communications networks. More targeted cyber attacks can also wreak havoc. For example, the US "Olympic Games" operation, reportedly begun under the George W. Bush administration and accelerated under the Obama administration, was credited with temporarily disabling some 1,000 centrifuges used by Iran to enrich uranium for possible application in its weapons programme.¹¹⁹ However, such attacks can also have unintended consequences, as was apparently the case when the cyber weapon designed for "Olympic Games" was unintentionally unleashed on the internet.

In principle, the concepts of deterrence (by punishment and/or by denial) applied to nuclear weapons should be applicable to cyber operations. Indeed, in recent years, NATO has recognized cyberspace as a domain of military operations and declared cyber defence to be a core part of collective defence, meaning that a cyber attack against an ally could lead to the invocation of Article 5, the collective defence provision of the NATO Treaty. Moreover, in addition to the United States, France and the United Kingdom have acknowledged their national capabilities to conduct "offensive" cyber operations.¹²⁰

But establishing cyber deterrence also presents special challenges, including how to assess an adversary's cyber capabilities and vulnerabilities (which will likely be less susceptible to measurement or observation than nuclear or conventional forces), or its doctrine (which might not yet be developed), or its command and control structures and procedures (which might differ significantly from its nuclear-related counterparts). Moreover, depending on the nature of the cyber attack, it might be more difficult to rapidly attribute the disruption, with high confidence, to a specific adversary – an obvious prerequisite for taking punitive action that allies and partners would be willing, in most circumstances, to support.

Absent a much improved understanding of how to deal with such challenges, chances of establishing effective bilateral or multilateral regimes to lessen the risk of conflict in the cyber domain appear bleak. After all, it took nearly two decades of nuclear standoff before the United States and Soviet Union initiated serious arms limitation talks. Further, during that period, nuclear weaponry, while steadily improving, did so at a much slower pace than has been the case with cyber technologies.

Hence, "mutually assured disruption", while woefully inadequate, might well become the default approach to cyber deterrence for years to come.

119 Sanger 2012.

120 In late June, the United States reportedly conducted cyber attacks against Iranian intelligence assets believed to be involved in attacks against oil tankers in the Gulf (Barnes & Gibbons-Neff 2019).

Offensive cyber tools, in combination with technologies such as anti-satellite weapons, could degrade or destroy vital components of intelligence, warning, and nuclear command and control systems. Without such systems, the risks of misinterpretation or miscommunication among national command and control authorities, as well as between adversaries, would be significantly higher. Moreover, if a military conflict were to take place, the ability to control escalation and terminate hostilities would be dangerously degraded.

Research on the implications of autonomous weapons systems (AWS), enabled by AI technologies, is in its early stages. On balance, it seems highly unlikely that national command and control authorities would, in effect, delegate to computers decision-making that affects the employment of strategic weapons. However, by significantly reducing the reaction time for both offensive and defensive weapons, which could have a stabilizing effect in some deterrence scenarios, AWS come with inherent risks as well. As a US researcher points out: “(T)o the extent that AWS are developed and deployed because they enhance a military’s ability to deliver lethal force, it follows that a mistake by an autonomous system may have correspondingly greater consequences... (B)ecause AWS rely on decision-making processes that differ from human cognitive processes, they may act in ways that are difficult or impossible for humans to comprehend or predict. The risk of side A’s AWS making a mistake that causes a miscalculation by side B’s commanders is obvious. Less obvious is how miscalculation might arise from the interaction of two sides’ AWS.”¹²¹

121 Leys 2018. AWS could also complicate the ability to use deterrent forces – for example, placing strategic bombers on heightened alert – for purposes of “signalling” a side’s preparedness to a potential aggressor. As Ley notes: “If AWS on balance decrease America’s ability to send costly signals, this could reduce its ability to make credible threats and assurances in a crisis. This, in turn, could undermine the US alliance system. In such a situation, US allies may seek AWS themselves in much the same way that (unmanned aerial vehicle) technologies have proliferated.”

4 Capabilities and perspectives of the nuclear allies and Russia

What national forces, strategy, and policies will ensure deterrence and safeguard vital national interests in the current and foreseeable international security environment? The fact that the United States, France, the United Kingdom, and the Russian Federation address this question in different ways should not be surprising. Beyond obvious disparities in their size, location, and resources, their different approaches reflect historical factors (in particular, their experiences during the world wars and the Cold War), domestic political dynamics (including public attitudes towards nuclear weapons), and geo-strategic considerations (especially their threat perceptions and degree of confidence in allies and partners). For each of the four countries, this section describes its *current and planned* nuclear forces, and how they relate to the country's overall deterrence strategy and policies.

4.1 The United States

Nuclear force posture highlights: The US strategic nuclear deterrent relies on a “Triad” of land-based ICBMs, sea-based SLBMs (launched from ballistic missile submarines, or SSBNs), and air-launched cruise missiles (ALCMs) and gravity bombs carried by strategic bombers. In accordance with New START’s central limits, definitions, and provisions on counting weapons launchers and warheads, the United States deploys a total of 1,365 nuclear warheads on: 398 Minuteman III ICBMs in hardened silos, each missile carrying a single warhead; 209 D-5 SLBMs, armed with multiple independently-targeted re-entry vehicles

(MIRVs) on 14 Ohio-class SSBNs; and 49 nuclear-capable B-52H Stratofortress and B-2A Spirit strategic bombers, each attributed with one warhead.¹²²

The underlying US rationale for maintaining the Triad is essentially unchanged from the Cold War.

- ICBMs are the most responsive leg of the Triad. They can respond very quickly to a launch order and accurately deliver high-yield weapons against targets throughout Eurasia in 30 minutes or less. A number of factors – including the number, locations, secure command and control systems, and constant readiness of these missiles – make them highly survivable, with the possible exception of scenarios involving a massive and precisely coordinated pre-emptive attack by hundreds of high-yield and accurate warheads.¹²³
- Strategic bombers provide the most visible and flexible leg of the Triad. They can be alerted and widely dispersed (supported by air-refuelling tankers) to demonstrate US resolve and capabilities to adversaries and allies when a crisis is brewing, and they are the only strategic system that provides the president with the capability to recall a strike, if necessary. Their nuclear warheads include low-yield options, which can hold at risk a wide variety of targets, including some mobile systems, while reducing unwanted collateral damage.
- SSBNs remain the most survivable leg of the Triad, as they are mobile and deemed virtually undetectable when deployed. Only a portion of the SSBN fleet performs deterrence patrols, which

122 Under New START, the parties are not obligated to report the number of warheads deployed on each missile at all times, which gives them flexibility in the mix of forces. To comply with the New START cumulative limit of 1,550 warheads on deployed launchers and bombers for each side, the United States has opted to deploy ICBMs and SLBMs with lower numbers of warheads than they can technically carry. In the case of deployed strategic (or “heavy”) bombers, each aircraft is counted as carrying one weapon, although the B-52H and B-2A are technically capable of carrying multiple ALCMs and B-61 gravity bombs, respectively. For the latest New START figures excerpted from the US-Russian data exchange, see <https://www.state.gov/wp-content/uploads/2019/07/06-26-2019-FACT-SHEET-Public-Release-of-Dis-aggregate-Data.pdf>. Strategic bombers and a portion of the ICBM and SLBM forces can be “uploaded” – fitted with additional warheads – if necessary to respond to a strategic surprise, such as the discovery of a safety or reliability problem with a specific US warhead type or an adversary’s unexpected breakout of additional and/or more threatening weapon systems. US officials consider this “hedging capacity” as both a deterrent to potential adversaries and an additional assurance measure for allies. For additional descriptions of the US triad from both official and non-government sources, see US Department of Defense (n/d); Kristensen & Norris (2018b).

123 According to the Nuclear Posture Review of 2018: “This is an insurmountable challenge for any potential adversary today, with the exception of Russia.” But as the NPR 2018 also notes: “The (US) capability to launch ICBMs promptly means that no adversary can be confident in its ability to destroy them prior to launch. This option contributes to deterrence of a nuclear first strike attack.” (Office of the Secretary of Defense 2018).

last an average of 77 days, under normal conditions. An SSBN can carry up to 20 SLBMs with high-yield, highly accurate warheads able to reach targets across Eurasia from a wide expanse of launch areas in the Atlantic and Pacific oceans. The SSBN/SLBM combination provides an assured second strike capability.

In addition to its strategic forces, the United States maintains a non-strategic nuclear capability (known as “theatre” or “tactical” nuclear weapons during the Cold War) comprised of B61 gravity bombs carried by F-15 DCA. As discussed elsewhere in this report (see sections on extended deterrence and NATO), a portion of those non-strategic forces are forward based in Europe. If necessary, US DCA and non-strategic weapons could be deployed to other regions, such as Northeast Asia.

US officials acknowledged years before the early 2014 downturn in relations with the Russian Federation that a broad effort to recapitalize the nuclear deterrent could no longer be postponed. For example, the service life of the Minuteman III ICBMs, first deployed in 1970, cannot be extended beyond 2030; construction of the B-52 Stratofortress airframes stopped in 1962, those still in service rely in part on 1950s-era avionics and engines, and their existing ALCM weapons are 25 years past their design life; while the current Ohio-class SSBNs, which entered into service during the 1980s and 1990s, and their D-5 SLBMs must be retired by the early 2040s. Having decided, in its 2010 Nuclear Posture Review (NPR 2010), that retaining all three legs of the Triad would best maintain strategic stability at an acceptable cost, the Obama administration began funding a long-term investment programme to modernize the nuclear delivery systems, their strategic command, control, communications, computer and intelligence systems (C4I), and the associated infrastructure of nuclear research, design, and development laboratories, as well as facilities for weapons production, stockpile maintenance, and disassembly.

Following a year-long review, the Trump administration adopted a nuclear modernization programme that closely resembles its predecessor’s approach.¹²⁴ In the strategic force domain, the planned Triad replacement systems will include: at least 12 Columbia-class SSBNs (the first of which is expected to enter service in 2031) armed with a new SLBM to replace the D-5; 400 new type ICBMs (Ground Based Strategic Deterrent) to replace the Minuteman IIIs beginning in 2029; and, beginning in the mid-2020s, a new B-21 bomber (the Raider) armed, when assigned to nuclear missions, with the new Long Range Stand-Off cruise missile or a modernized version of the B61 gravity bomb with low-yield options.¹²⁵

124 Op. cit., Bell.

125 Air Force Technology (n/d).

In the non-strategic force domain, the current administration is continuing its predecessor's policy of upgrading US capabilities by deploying the F-35 dual-capable (and "stealthy") combat aircraft, which can carry the modernized B-61 bomb. However, the Trump administration has unveiled additional initiatives intended to respond to Russia's deployment of a nuclear-capable GLCM that violates the INF Treaty.¹²⁶ The United States has begun production of a low-yield variant for a small number of nuclear warheads of the type currently used with the D-5 SLBM – a programme likely to be completed by 2021. In addition, it has taken initial steps to develop a new nuclear-capable sea-launched cruise missile (SLCM), a type of weapons system removed from US ships and attack submarines in 1992. Moreover, it has begun research and development of a new, intermediate-range and conventionally-armed ground-based ballistic missile and cruise missile, systems for which testing or deployment would have been prohibited by the INF Treaty.

Lastly, the Trump administration is continuing, and in some cases expanding, pre-existing programmes to modernize the nuclear command and control systems – parts of which have not been updated for nearly three decades – and the nuclear weapons infrastructure.¹²⁷ As of January 2019, the estimated cost of the administration's plans for sustaining and modernizing the nuclear deterrent is \$494 billion over the period 2019–2028.¹²⁸

Deterrence strategy and policies: As Robert Bell has observed, there is "a perhaps surprisingly high degree of continuity" among official statements on the national security strategy and nuclear policy by the Trump administration and its predecessor administrations.¹²⁹ This is particularly true with respect to US strategic goals and the role of nuclear weapons. For example:

- As stated in the NPR 2018: "The highest U.S. nuclear policy and strategy priority is to deter potential adversaries from nuclear attack of any scale. However, deterring nuclear attack is not the sole purpose of nuclear weapons... They contribute to the: deterrence of nuclear and non-nuclear attack; assurance of allies and partners; achievement of U.S. objectives if deterrence fails; and capacity to hedge against an uncertain future."

126 Op. cit., Bell.

127 Nuclear command and control includes warning satellites and radars; communications satellites, aircraft, and ground stations; fixed and mobile command posts; and the control centres for nuclear systems.

128 See US Congressional Budget Office 2019. The estimate, conducted by the Congressional Budget Office, represents a 23 percent increase over the previous 10-year estimate published in 2017 and includes spending by the Department of Defense (which has primary responsibility for weapon systems and command and control) and the Department of Energy (which has primary responsibility for weapons laboratories, warhead production, and support facilities).

129 Op. cit., Bell.

- The same document articulates US policy regarding the potential employment of nuclear weapons as follows: *“The United States would only consider the employment of nuclear weapons in extreme circumstances to defend the vital interests of the United States, its allies, and partners. Extreme circumstances could include significant non-nuclear strategic attacks... on the U.S., allied, or partner civilian population or infrastructure, and attacks on U.S. or allied nuclear forces, their command and control, or warning and attack assessment capabilities. The United States will not use or threaten to use nuclear weapons against non-nuclear weapons states that are party to the NPT and in compliance with their nuclear non-proliferation obligations.”*¹³⁰

Both statements closely resemble those made by the Obama, Bush, and Bill Clinton administrations.¹³¹ The NPR 2018 also reaffirmed the longstanding US policy of “ambiguity” regarding the precise circumstances that might lead to a nuclear response, while rejecting (as have previous administrations) a “no first use” pledge and proposals to “de-alert” ICBMs.¹³²

Nevertheless, the NPR 2018’s description of the strategic environment differs in important respects from the NPR 2010. Gone is the latter’s hopeful language on further steps to “reduce the salience of nuclear weapons in international affairs and moving step-by-step toward eliminating them”; on Russia (“Russia is not an enemy, and is increasingly a partner in confronting proliferation and other emerging threats”); and on China (“The United States and China are increasingly interdependent and their shared responsibility for addressing global threats, such as WMD proliferation and terrorism, is growing.”).¹³³ The NPR 2018, in contrast, underscores Russia’s strategic nuclear force modernization programmes, retention of large numbers of non-strategic nuclear weapons, and “adoption of military strategies and capabilities that rely on nuclear escalation for their success” as elements of

130 Office of the Secretary of Defense 2018, 21.

131 Indeed, the highlighted passages are identical to the language of the Obama administration’s 2010 NPR (US Department of Defense 2010). This is particularly noteworthy in the case of the second passage, wherein the Obama administration strengthened the previous US “negative security assurance” language.

132 Two controversial options to change longstanding US nuclear policy – by declaring a “no first use” policy and that “the sole purpose of nuclear weapons would be to deter others from launching a nuclear attack” – were hotly debated within the Obama administration, but were ultimately not adopted. Many US and allied officials have viewed such declarations as fundamentally incompatible with extended deterrence. The NPR 2018 arguments against “de-alerting” – i.e. that it could weaken deterrence by making the ICBM force more vulnerable to a potential first strike and compel the US to “re-alert” in a crisis, giving an adversary greater incentive to strike first – are consistent with the views of previous administrations.

133 US Department of Defense 2010a.

“Moscow’s decided return to Great Power competition”,¹³⁴ China’s nuclear modernization programmes and challenges to US military superiority in the Western Pacific are highlighted as well.

This shift in tone and emphasis, however, appears to reflect a broad bipartisan consensus. As a result, criticism of the Trump administration’s approach to nuclear force structure and policy issues has been relatively mild and has not fallen neatly along partisan lines – at least so far. For example, some American experts, including prominent national security figures from the Clinton and Reagan administrations, have voiced concern that introducing a low-yield warhead option on a small number of SLBMs might have the effect of lowering the nuclear threshold and raise the spectre of “nuclear war-fighting”. But others, including former senior officials in the Obama administration, have supported the low-yield SLBM warhead, arguing that it would reinforce deterrence against regional aggression by ensuring that potential adversaries, such as Russia and North Korea, would see no realistic advantage to be gained by attempting a “limited” nuclear escalation.

Partisan differences are more apparent in ongoing congressional debates on funding the nuclear programme. Yet it is far from certain that outspoken Democratic critics of the programme’s price tag will rally support from a majority of their party colleagues. Moreover, while competition for the Democratic Party’s presidential nomination in 2020 is in its early stages, it seems unlikely – absent a major international crisis – that any of the top contenders would elevate nuclear issues to the top tier of their eventual presidential campaign platform.

Non-nuclear capabilities: Non-nuclear systems are poised to assume greater prominence in US deterrent strategy and policies. For the purposes of this report, two categories of such systems are particularly noteworthy: missile defences and conventional prompt global strike (CPGS) weapons.

US efforts to defend its homeland and its allies from missile attack have a long and chequered pedigree. After a string of abandoned prototype programmes dating back to the 1940s, a nuclear-armed ballistic missile defence system (Safeguard), designed to protect an ICBM base in North Dakota (as permitted by the 1972 ABM Treaty), became fully operational in late 1975, only to be deactivated less than six months later.¹³⁵ In 1983, Reagan announced a Strategic Defense Initiative (SDI), the stated aim of which was to “intercept and

134 Office of the Secretary of Defense 2018, 1.

135 The deactivation decision was a result of the high cost of the system as well as questions about its operational effectiveness. For a history of US missile defence efforts, see <https://www.mda.mil/global/documents/pdf/first70.pdf>.

destroy strategic ballistic missiles before they reached our own soil or that of our allies".¹³⁶ By 1987, the Pentagon developed a national missile defence concept, including space and ground-based sensors and non-nuclear kinetic ("hit to kill") interceptors, intended to degrade a massive Soviet attack. Research, development, and testing of potential SDI components showed some positive results. Nevertheless, the overall effort was plagued by controversy over its cost, incompatibility with the ABM Treaty, and scepticism regarding its ability to outpace the Soviets' large offensive capabilities, which could be expanded, if necessary, to overwhelm virtually any plausible defence architecture.

With the end of the Cold War, successive US administrations reoriented missile defence efforts away from large-scale threats – specifically from Russia and, to a lesser degree, China – towards more modest programmes designed to: protect the US homeland against a "limited" ICBM attack involving some two dozen incoming warheads; and protect US allies, and US and allied deployed forces against various intermediate- to shorter-range missile threats. While the scope and cost of specific missile defence programmes, as well as the Bush administration's withdrawal from the ABM Treaty, were subject to heated Congressional debates in the early 2000s, a broad consensus favouring missile defence has emerged since then, mainly in reaction to North Korean and Iranian missile developments.

Today, missile defences are generally accepted as a means of strengthening deterrence by denial in several ways: by dissuading potential adversaries from building ballistic missiles in the first place (in effect, short-circuiting their potentially destabilizing missile capability); by deterring those with such missiles from using them (since the aggressor could not have high confidence that missile attacks would be successful); by reassuring allies and partners that US forces would not be intimidated by regional missile threats, and hesitate to meet US defence commitments; by giving the US president options to respond to a limited attack other than by ordering a retaliatory nuclear strike; and by limiting US, allied, and partner losses if deterrence fails. Supported by a global network of land-, sea-, air- and space-based C4I systems, US missile defences currently include: 44 Ground Based Interceptors deployed in Alaska and California for homeland defence against North Korean (and, potentially, Iranian) ICBMs; 38 multi-role naval combatants armed with SM-3 and SM-6 guided missile interceptors; a missile defence site in Romania armed with a land-based version of the SM-3 for defence of NATO allies against Iran and other potential Middle East threats (a second site is under construction in Poland for the same purpose); and land-based interceptors (THAAD and Patriot) for the defence of US allies (e.g. South Korea) and US and/or allied deployed forces against medium- and short-range threats.

136 Reagan 1983.

Although there are areas of continuity between the Trump administration's Missile Defense Review (MDR), published in January 2019, and a similar review by the Obama administration nine years earlier, there are notable differences and ambiguities, as well.¹³⁷ For example, according to the MDR 2019, the United States will expand the existing homeland missile defence deployments to deter and defend against growing North Korean and, potentially, Iranian threats, while "(relying) on nuclear deterrence to address the large and more sophisticated Russian and Chinese (ICBM) capabilities".¹³⁸ Those approaches are broadly consistent with the previous administration's policy. However, the MDR 2019 also hints at a new initiative to defend the homeland against Russian and Chinese cruise missiles and hypersonic glide vehicles, as well as improve capabilities for early warning of any such attacks. Similarly, the MDR maintains (and, in some areas, accelerates) the previous administration's cooperation with European and Asia-Pacific allies and partners on regional missile defences. It also takes a new step by suggesting future testing of an advanced version of the SM-3 against an ICBM target. Moreover, while the previous administration clearly oriented its regional missile defence efforts against "rogue states" (notably North Korea and Iran) and Chinese short- and intermediate-range missiles, the MDR suggests a US effort to strengthen regional defences against Russian A2AD ballistic and cruise missile threats.

If funded by Congress and implemented by the Trump administration, those arguably new directions for US missile defence policy will almost certainly be denounced by Russia and China. Both have alleged for many years that the underlying objective of US missile defence efforts is to degrade their respective strategic deterrent capabilities. Trump's public statement (upon announcing the MDR 2019's completion) that "(o)ur goal is simple: to ensure that we can detect and destroy any missile launched against the United States – anywhere, anytime, anyplace" is a sweeping formulation that does not appear in the review itself, but will doubtless serve to fuel Russian and Chinese suspicions on that score. His words could also revive past European worries about potential US decoupling of its defence systems – and, ultimately, its strategic deterrent – from that of its allies and partners.

CPGS weapons are intended to strengthen US capabilities to deter and defeat potential adversaries without resorting to nuclear weapons. The CPGS concept, which emerged in the early 2000s, envisions a US capability to strike targets virtually anywhere in the world, in approximately one hour, with high-precision conventional weapons. These weapons

137 Missile Defense Review of 2019 accessible at: https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf. Ballistic Missile Defense Review of 2010 accessible at: https://archive.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630_for%20web.pdf.

See also Bunn 2019.

138 Ibid., Office of the Secretary of Defense 2019.

could include SLBMs or ICBMs modified to carry conventional warheads, or conventionally-armed and manoeuvrable hypersonic cruise missiles.

The strategic rationale for CPGS, as explained by prominent US defence experts in 2011, is straightforward: “The United States has global security commitments to deter and respond to a diverse spectrum of threats, ranging from terrorist organizations to near-peer competitors. (It) might need to strike a time-sensitive target protected by formidable air defenses or located deep inside enemy territory. Small, high-value targets might pop up without warning in remote or sensitive areas... A long-range nuclear-armed ballistic missile has the speed and global reach to overcome these obstacles. But a President would probably prefer a conventional strike option as an alternative to nuclear weapons in most contingencies... Additionally, in many potential crises, a nuclear threat might lack credibility in the eyes of U.S. allies and adversaries regardless of a U.S. President’s willingness to employ nuclear force.”¹³⁹ As these and other analysts have pointed out, CPGS weapons would not rely on forward basing or overflight permissions, adding flexibility and autonomy to the US response in a range of contingencies.

To date, US efforts in the field of CPGS have not produced a specific weapons system ready for deployment. A new SLCM incorporating hypersonic technologies currently appears to be the favoured approach, and recent Pentagon budgets have included increased – but still relatively modest – funding for research, development, and testing purposes.

If the CPGS concept proves technically feasible and affordable, it may nevertheless raise new and complex issues for strategic deterrence and stability. Many US strategists do not see CPGS as a direct substitute for nuclear weapons, due in part to inherent limitations of conventional explosives against certain types of targets. Yet “even without direct substitution... CPGS still might reduce U.S. reliance on nuclear weapons, because with more conventional options, a President might be less likely to authorize the use of a nuclear weapon to attack a critical target”.¹⁴⁰ While some allies and partners might view this in a positive light, others might be concerned that it raises the nuclear use threshold too high, thereby weakening deterrence against a broad spectrum of possible threats.

Other issues arise from the possible risk of misinterpretation of the nature of an attack. Critics of the CPGS concept argue, for example, that under certain scenarios, Russia could misinterpret a CPGS strike (for example, against A2AD systems based on Russian territory) as a nuclear attack. Others point out that even if the target of the US hypersonic weapons did not believe them to be nuclear armed, the shortened timelines involved could be

139 Bunn & Manzo 2011.

140 Congressional Research Service 2019.

destabilizing. “Because the weapons could be launched and reach their targets quickly, they would shorten the amount of time available to an adversary both for detecting and responding to an attack. But pressure to respond promptly, possibly in response to ambiguous information and before countervailing capabilities were destroyed in an attack, could lead to inadvertent or unnecessary escalation during a crisis.”¹⁴¹ Of course, Russian or Chinese use of hypersonic weapons could pose the same dilemma for US commanders.

4.2 France

Nuclear force posture highlights: France’s strategic nuclear deterrent rests on two components.¹⁴² The sea-based component includes four Triomphant-class SSBNs, each carrying up to 16 M51-type SLBMs armed with MIRVs and able to reach targets at intercontinental range approximately 30 minutes after launch. Under longstanding French policy, at least one SSBN is operationally deployed at all times (normally for some 70 days), with a second SSBN available, if necessary, for simultaneous deployment. The air component includes two squadrons (totalling approximately 40 aircraft) of land-based Rafale DCA operated by the Strategic Air Forces. Upon presidential order, an additional force of approximately 10 maritime-version Rafale DCA, operated by the Naval Nuclear Aviation Force, can be deployed on the Charles de Gaulle aircraft carrier. Each Rafale can carry a single nuclear-armed air-to-surface missile (ASMPA). The total inventory of French SLBM and ASMPA warheads is less than 300.¹⁴³

According to French officials, all their nuclear weapons are considered strategic, but the two components have somewhat different attributes. French SLBMs represent a highly survivable and reliable second strike capability against a “major power” (Russia or China), but they could also be employed in a limited strike against a less capable regional adversary. The air component allows greater flexibility for the president to signal French intentions at various crisis stages – for example, by raising the DCA aircraft alert status in a way that is visible to the adversary; by de-alerting the aircraft, or recalling them after launch, if the crisis subsides; or by delivering a “final warning”, that is, a “single, non-renewable limited strike” intended to demonstrate French preparedness to engage its larger nuclear forces if the adversary does not cease its aggression.¹⁴⁴ Depending on the specific contin-

141 Ibid., 35.

142 In 1996, President Jacques Chirac ordered the closing of France’s single intermediate-range ballistic missile (IRBM) base at Plateau d’Albion in southeastern France. The last of the 18 IRBMs, which carried MIRVs, was eliminated in 1999.

143 Tertrais 2018b, Tertrais 2019, Kristensen & Korda 2019a.

144 Ibid., Tertrais 2018b.

gency, the air component's more accurate and relatively lower-yield weapons might also be more appropriate than SLBMs for selective use against a regional adversary, especially one that does not have highly capable air defence systems.

Under current plans, France will replace the existing SSBNs, on a one-for-one basis, in the mid-2030s, thereby preserving the capability to maintain at least one SSBN on operational deployment at all times. The new SSBNs will also carry 16 M51-type SLBMs armed with MIRVs. Meanwhile, studies are underway to allow a presidential decision by 2021 on options to replace the ASMPA (possibly incorporating hypersonic and stealth technologies) in the 2030–2035 timeframe and the Rafale DCA in the 2040 timeframe.¹⁴⁵ Over the next six years, the estimated cost of maintaining and modernizing the nuclear deterrent will increase from €4.5 to €6.2 billion annually, which would represent more than 20 percent of projected defence spending for equipment (or around 12 percent of total defence spending) over the same period.¹⁴⁶ Despite occasional calls by critics of the nuclear programme to reduce the future SSBN fleet to three boats and/or eliminate the air component – principally as cost-saving measures – the Emmanuel Macron government firmly supports their retention, as do many opposition politicians, so neither action is likely to occur.

Deterrence strategy and policies: French ambitions to build an independent nuclear deterrent date back to the early post-Second World War period. In some respects, French motivations for doing so – in particular, fear of Soviet aggression and perceptions of American unreliability – were similar to those of the British. France's searing experience of defeat by Germany in 1940 and concerns (broadly shared within the political class and elements of the military) regarding its international stature in the early 1950s no doubt played an important role as well. In retrospect, the 1956 Suez crisis probably helped to seal the political consensus that was already taking root. Unlike the British, who evidently concluded after the crisis that they should not put at risk their "special relationship" with the United States by deploying hard power without at least tacit American support, the overwhelming French reaction was to question Washington's (and, to some extent, London's) dependability when it came to protecting French strategic interests.¹⁴⁷

Soon after his return to power in 1958, de Gaulle accelerated the expensive and technologically demanding programme (begun, in fact, by his predecessors) to build a credible nuclear deterrent, resulting in France's first nuclear test in 1960. By 1970, its Strategic Air

145 Assemblée Nationale 2018.

146 Ministère des Armées 2018.

147 Moreover, the Soviet threat that France could be attacked "by more powerful states possessing all types of modern weapons of destruction" if it did not withdraw from Suez was seen by Paris as "nuclear blackmail". Evidence of French concern over the Soviet threat can be seen in a message from Prime Minister Guy Mollet to Eisenhower (US Department of State 1956).

Forces were theoretically capable of inflicting in the order of 15 to 20 million deaths in an attack on the Soviet Union –a level of potential destruction that continued to grow with the addition of thermonuclear weapons, SSBNs, and MIRVs to the French arsenal over the following two decades. According to Bruno Tertrais, “during the Cold War, French strategy focused on counter-cities strikes targeting both the economy and the population” of the Soviet Union, an extension of the concept of “deterrence from the weak to the strong”.¹⁴⁸ At the same time, consistent with their emphasis on strategic autonomy, especially in nuclear affairs, de Gaulle and his successors opted not to participate in NATO’s formal body, the Nuclear Planning Group, which serves as the Alliance’s senior body on a range of nuclear policy issues.¹⁴⁹

During the two decades or so following the end of the Cold War, France took several steps that, viewed in their totality, amounted to a reduced role for nuclear weapons in its national security strategy. It unilaterally reduced the nuclear force structure by dismantling tactical nuclear systems, cutting the SSBN fleet from six to four, deactivating one of three DCA squadrons, and downsizing the warhead stockpile by approximately one-third. In related areas, it ratified the NPT and Comprehensive Test Ban Treaty (CTBT) and stopped plutonium and highly enriched uranium production.

The articulation of the French deterrence strategy and nuclear-related policies has also evolved.

As Tertrais points out, France still considers its deterrent force as an “indispensable tool for its freedom of action and its strategic autonomy. For Paris, this freedom must exist in relation to a potential adversary: nuclear weapons make it possible to ensure that it will not be subjected to blackmail intended to prevent it from acting militarily or politically... (to fulfill) its international commitments (international mandate, Article 5 of the Washington treaty, defence agreement, etc.) or to ensure the protection of its strategic interests (protection of territory, security of supplies, freedom of navigation, etc.).”¹⁵⁰ Descriptions of French doctrine emphasize that the use of nuclear weapons would be considered only in “extreme circumstances of legitimate defence” and not for any offensive purpose. Hence,

148 Tertrais 2019. As Tertrais points out, while France had a theoretical capability in 1980 to destroy about 20 percent of the Soviet population and up to 50 percent of Soviet industry, “in practice, Soviet anti-aircraft and anti-ballistic defences would certainly not have enabled France to achieve this objective”. The “deterrence from the weak to the strong” concept posited that to deter aggression by a larger power, a smaller power need not match the aggressor’s military capabilities. Instead, the smaller power needed to ensure it could cause enough damage to the aggressor to convince it not to put the smaller power’s existence at risk. An anti-cities targeting strategy was a logical outcome of the “deterrence from the weak to the strong” concept, at least until missile accuracy could be substantially improved.

149 However, this did not prevent discussions on sensitive nuclear issues between France and the other nuclear allies in other formats. Ullman 1989; Tertrais 2019.

150 Ibid., Tertrais 2019.

the size of the French deterrent is limited “to the minimum deemed necessary, i.e., to the sole capacity to exert unacceptable damage in all circumstances”.¹⁵¹

At the same time, recent French presidents have been careful not to limit the possible use of nuclear weapons to retaliate against nuclear attack, thus leaving open the option of their use in response to conventional, chemical, biological, or even cyber attack on a scale that threatens French “vital interests”. It is noteworthy in this regard that “vital interests” have never been precisely defined, and the responsibility for doing so ultimately rests with the French president, who has the sole authority to order nuclear use.

While it is widely understood that Russia and China currently possess the nuclear capability to pose an existential threat to France, French officials, as a rule, are more circumspect than US counterparts regarding the public identification of specific “major powers” or “potential adversaries” who are the object of their respective deterrence policies and capabilities. That said, in recent years, Russian and, to a lesser extent, Chinese military developments in general, and their nuclear programmes in particular, appear to be attracting increased attention in various official statements.¹⁵²

For example, the Macron government’s 2017 strategic review notes that increased Russian flights of strategic bombers and submarine deployments in the North Atlantic are a “major concern”, since “(t)hese areas are vital for NATO’s collective defence, the economic interests of Europe, and the *freedom of action of French forces, including for nuclear deterrence*” (emphasis added).¹⁵³ Moreover, in testimony to French parliamentarians in early 2019, a senior foreign ministry official expressed concern over Russia’s violation of the INF Treaty and lack of transparency on the “volume, number, and deployment zones” of the Russian cruise missiles in question. The official added that “one of the essential elements of the military and nuclear strategy of the Russian Federation is to play the card of strategic ambiguity as a form of intimidation and certainly (a means of) weakening European actors and sowing divisions among them and between (Europeans) and the Americans”.¹⁵⁴

151 Ibid., 31. As Tertrais explains, since the end of the Cold War, French officials have moderated their public language dealing with the level of destruction to be imposed on an adversary. For example, previous references to “anti-cities” targeting or inflicting “appalling destruction” or damage “out of proportion with the objective of an aggression” have been replaced by more neutral formulations, such as targeting the aggressor’s “centres of power, i.e., its political, economic, and military nerve centres”.

152 Ibid., 33. Tertrais notes that in 1999, Prime Minister Lionel Jospin “stressed that French deterrence could equally well concern a ‘distant’ threat – codeword for China”. The French White Book published in 2013 noted that: “Alongside its allies, in case of an open crisis, France would bring an appropriate political and military contribution.” (Ministère des Armées 2013). French security and defence interests in the Indo-Pacific region are discussed in a recent report by the Ministry for Armed Forces, “France and Security in the Indo-Pacific” (Ministère des Armées 2019). France, like the United States and the United Kingdom, conducts “freedom of navigation” operations through international waters in the South China Sea, which China considers part of its maritime territory.

153 République Française 2017.

154 Assemblée Nationale 2019.

However, in the post-Cold War era, the potential adversary is no longer necessarily a major power. Chirac, for example, implied in a 2006 speech that a state-sponsored terrorist attack against French interests could prompt a nuclear response against that state.¹⁵⁵ Further, the Macron government's 2017 strategic review voices concern over North Korea, noting that the regime's "stated priority, which is to have an operational nuclear force of global reach, may soon become a reality, thus directly threatening the United States, as well as European territory" (emphasis added).¹⁵⁶

4.3 The United Kingdom

Nuclear force posture highlights: The United Kingdom's nuclear deterrent consists of four Vanguard-class SSBNs, each of which is technically capable of carrying up to 16 D-5 SLBMs armed with up to 12 MIRVs.¹⁵⁷ After a reassessment of British "minimum necessary requirements for credible deterrence", the Conservative-led government of Prime Minister David Cameron decided in 2010 to reduce the number of operational missiles on each submarine to "no more than eight", and to reduce the total number of warheads carried by an individual SSBN from 48 to 40.¹⁵⁸ As a matter of longstanding policy, at least one SSBN is on operational patrol at all times, and it can respond very quickly to a launch order and accurately deliver high-yield weapons against targets at intercontinental range in 30 minutes or less. The UK nuclear stockpile totals "no more than 180" warheads, of which "no more than 120" are operationally available.

After more than a decade of intense study and debate, in July 2016 the House of Commons approved the government's decision to replace the SSBN fleet, on a one-for-one basis, with new Dreadnought-class SSBNs, the first of which is under construction and expected to enter service in the early 2030s. The missile compartment (containing the SLBM launch tubes) for the new SSBNs is under development in conjunction with the United States, since the compartment will house the existing D-5 missile.¹⁵⁹ The estimated cost of design and manufacture of the four new SSBNs (not including the D-5s) is £31 billion over the expected 35-year life of the programme, with annual in-service costs (once the new SSBNs are operating) representing approximately six percent of the total defence

155 Chirac appeared to be thinking of Iran, see Bernard 2006.

156 Ministère des Armées 2013.

157 Mills 2016.

158 Government of the United Kingdom 2010.

159 The United Kingdom is participating in the US programme to extend the service life of the D-5, which will potentially keep the D-5 in service until the early 2060s. The new SSBNs are expected to carry no more than eight SLBMs (Mills 2019).

budget.¹⁶⁰ Brexit is expected to have an impact on the SSBN programme, since elements of the programme's supply chain are based elsewhere in the EU. However, the extent of the impact in terms of cost and schedule will depend on how Brexit is finally decided and implemented in practice.

Deterrence strategy and policies: In broad terms, the strategic rationale for the UK deterrent during the Cold War was two-fold: to provide a "second centre of decision" within NATO, thereby complicating Soviet planning of any potential aggression against the Alliance; and to retain a capability to act independently if British "supreme national interests" were threatened. In fact, the United Kingdom willingly committed, as part of the agreement to purchase the US Polaris system, to assign its SSBNs to NATO and target them according to NATO plans, "except where the UK government may decide that supreme national interests are at stake".¹⁶¹

In this way, the United Kingdom could demonstrate its *bona fides* as a reliable ally while reducing the risk, during a crisis, of Soviet miscalculation. As a UK defence ministry official explained in 1980: "We need to convince Soviet leaders that even if they thought that at some critical point as a conflict developed the US would hold back, the British force could still inflict a blow so destructive that the penalty for aggression would have proved too high."¹⁶² Or as Quinlan framed it, the US deterrent was a "massive insurance policy", and the UK's "supplementary capability based on a 'second-centre' rationale (served) as an insurance policy against the failure of the first insurance policy".¹⁶³

During the last two decades of the Cold War, the UK nuclear deterrent had strategic, non-strategic, and tactical components. Upon their entering service in 1968, the principal function of the UK SSBNs was strategic – specifically, to hold at risk military forces, industry, and population centres in the Soviet Union. According to one study, "by the time Polaris (SSBNs) began to be deployed in the North Atlantic in 1968, the target set (included) 7–10 Soviet cities... These included Moscow and Leningrad... with a minimum level of destruction of 50 percent (and) the remainder had to have populations exceeding 300,000".¹⁶⁴ The Royal Air Force, which had primarily targeted Soviet cities and high-value military targets before the SSBN deployments, carried gravity bombs intended for limited strikes against individual targets on Warsaw Pact territory. Lower-yield US warheads were available to the UK forces in Europe under "dual-key" arrangements for employment with heavy artillery

160 Ibid.

161 WEU Secretariat General 1962.

162 Ministry of Defence of the United Kingdom 1980.

163 Op. cit., Quinlan.

164 Stoddart 2008. The author argues that the "Moscow Criterion" – the ability to strike Moscow with relative certainty – became the dominant British "touchstone" for its independent nuclear deterrent for nearly 30 years.

and short-range surface-to-surface missiles. And as a demonstration of solidarity with the United States and other NATO allies, the British government, despite large public protests, agreed to the basing of US GLCMs at Greenham Common in 1982.

With the end of the Cold War, the United Kingdom took several steps to adapt its deterrence strategy and posture to what it anticipated would be a less menacing international environment. By the early 1990s, its tactical systems were dismantled (most of the US warheads having been withdrawn as part of President George H. W. Bush's nuclear initiative in 1992), and in 1993, the Conservative-led government decided not to renew the aging bomber component. In 1995, it issued a "negative security assurance", stating that the United Kingdom "will not use, or threaten to use, nuclear weapons" against any non-nuclear weapons state that is party to the NPT and in compliance with its obligations.

In 1998, the Labour government under Prime Minister Tony Blair cut the warhead stockpile by one-third (which, combined with reductions by its Conservative predecessors, reduced its aggregate yield by more than 70 percent). It relaxed the patrol cycle and readiness of SSBNs (although keeping the minimum of one SSBN on patrol at all times), reduced the number of deployed SLBM warheads by one half, and cancelled a pending order for additional D-5s. In addition, the United Kingdom ratified the CTBT and (slightly) downsized its fissile material stocks.¹⁶⁵

In its most recent comprehensive strategy review, the UK government (once again under Conservative leadership) recommitted to "maintaining the minimum amount of destructive power needed to deter any aggressor" and to "ensure that our deterrent is not vulnerable to pre-emptive action by potential adversaries". The meaning of "minimum" was never precisely defined, presumably because the level of damage that the UK nuclear force must be capable of delivering in order to be credible is not absolute. (It would depend on various assumptions, such as whether the United Kingdom needed to be prepared to act alone or would only do so in concert with its allies.) Still, UK declaratory policy emphasized that the use of nuclear weapons would occur "only in extreme circumstances of self-defence, including the defence of our NATO Allies". Moreover, echoing US and French doctrine, the review stated that "we will remain deliberately ambiguous about precisely when, how and at what scale we would contemplate their use, in order not to simplify the calculations of any potential aggressor".¹⁶⁶ In other words, like its nuclear allies, the United Kingdom viewed its nuclear forces as a deterrent against possible non-nuclear threats as well.

165 Dodd 1998.

166 Government of the United Kingdom 2015.

As Tom Plant observes, of the three nuclear allies, the United Kingdom faces the greatest uncertainty in terms of domestic support for its nuclear status.¹⁶⁷ Except for the Conservative party, all of its major political parties have advocated, at some point, for steep reductions to, or complete elimination of, the UK nuclear deterrent. Indeed, several senior government ministers who defended nuclear policies while in office later voiced discomfort with those very policies. Even former PM Blair revealed after leaving 10 Downing Street that “I could see clearly the force of the common sense and practical argument against (the UK’s SSBN deterrent), yet in the final analysis I thought giving it up too big a downgrading of our status as a nation, and in an uncertain world, too big a risk for our defence.”¹⁶⁸ And while the Labour party’s 2017 manifesto included supported renewal of the SSBN fleet, its current leader, Jeremy Corbin, a long-standing opponent of the deterrent, has also insisted that his party would pursue “multilateral disarmament” through the NPT.¹⁶⁹

On balance, it seems highly unlikely that any British government would reverse course entirely and abandon the deterrent renewal programme. Such a move would jolt the UK role in NATO and bilateral ties with the United States and France in unpredictable ways.¹⁷⁰ As an independent experts commission (including prominent figures linked to the Conservative, Liberal Democrat, and Labour parties) argued in 2014, when it concluded unanimously that Britain should retain and deploy a nuclear arsenal: “We cannot expect the United States to shoulder indefinitely the awesome responsibilities that lie in providing extended nuclear deterrence to Europe, particularly if the United Kingdom were to abandon its own nuclear force.”¹⁷¹ Moreover, all of the major political parties, including Labour, would be concerned about a backlash from voters tied, directly or indirectly, to investments and employment in the affected defence industries.

Nevertheless, two future scenarios merit consideration. First, a change from a Conservative-led to a Labour-led government and/or serious economic downturn (tied to Brexit or

167 Tom Plant is Director, Proliferation and Nuclear Policy, Royal United Services Institute for Defence and Security Studies, and an expert contributor to this project.

168 Ibid.

169 BBC 2017. At a February 2016 rally organized by the Campaign for Nuclear Disarmament (CND), Corbin stated that “I don’t want us to replace Trident (the UK SSBN fleet), everybody knows that... I believe in a nuclear-free Britain and a nuclear-free future” (Campaign for Nuclear Disarmament n/d). Corbin voted against the deterrent renewal during the House of Commons debate that summer.

170 Under the 2010 Lancaster House treaty, the United Kingdom and France share two laboratories related to nuclear weapons safety and reliability. Beyond the cost savings of such arrangements, the French have a strategic stake in keeping Britain in the nuclear weapons business. As retired General Henri Bentégeat, a former French chief of defence, told French parliamentarians in April 2014: “By helping the British... we are also protecting our own nuclear deterrent. Imagine the intense pressures that France would confront if (the British) were forced to abandon their deterrent.” (Assemblée Nationale 2014).

171 Trident Commission 2014. Ironically, the commission had been assembled by BASIC, a British-American think-tank whose stated goal is a nuclear weapon-free world.

some other external shock) could reopen debate on the SSBN replacement costs and, in particular, the programme's one-for-one approach. Although the Conservative government studied alternative approaches, including the possibility of ordering only three new SSBNs, those were ultimately dismissed for a variety of reasons.¹⁷² In particular, the study found that only the four SSBN option is "capable of sustaining a continuous deterrence posture for the 25-30 year life of the system", and no alternative posture would offer the same degree of resilience or "guarantee a prompt response in all circumstances". A successor government, however, might weigh the cost, capability, and credibility factors differently.

A less probable but still plausible scenario cannot be excluded. In 2014, the Scottish National Party (SNP), campaigning for a "yes" vote in the referendum on independence, pledged to terminate arrangements, dating from the 1960s, for basing UK SSBNs and their warheads at Faslane and Coulport on Scotland's west coast. While the referendum failed that year, the SNP is strongly opposed to Brexit, and First Minister (and SNP leader) Nicola Sturgeon declared, in April 2019, that Scotland should hold a new referendum on independence by 2021 if Brexit takes place.¹⁷³ Official and non-government studies conducted in 2014 concluded that hypothetical options for moving the deterrent out of Scotland could be prohibitively expensive, with former senior British officials warning that it would effectively mean the "unilateral nuclear disarming" of the remaining parts of the United Kingdom.

4.4 The Russian Federation

Nuclear force posture highlights: Russia's strategic nuclear forces rest on the triad of ICBMs, SLBMs and heavy bombers. Russia has the largest nuclear weapons stockpile in the world, although it has been greatly reduced from the Soviet high-water mark of some 45,000 warheads during the Cold War. The total inventory is estimated to exceed 6,490 warheads, of which 4,490 are assigned to long-range strategic launchers and shorter-range tactical nuclear forces.¹⁷⁴ According to New START data as of March 2019, Russia deploys a total of 1,461 warheads on 524 ICBMs, SLBMs, and heavy bombers.¹⁷⁵ The stockpile of non-strategic nuclear weapons is considerable, about 1,820 warheads, although

172 These are described in detail in the government's 2013 Trident Alternatives Review. See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/212745/20130716_Trident_Alternatives_Study.pdf.

173 Meyer 2019.

174 Kristensen & Korda 2019b, 73.

175 US Department of State 2019.

estimates vary widely. The rest of the warheads are either in storage or awaiting dismantlement.

Russia's ICBM inventory comprises silo-based, rail-based and mobile systems. Russia is estimated to have around 318 ICBMs, which are able to carry roughly 1,165 warheads. Furthermore, it has 10 SSBNs, able to carry up to 720 warheads. (Since several SSBNs are normally in overhaul, only a fraction of those warheads are operationally deployed.) Lastly, Russia operates two different types of heavy bombers, armed with ALCMs and gravity bombs. In addition to the considerable arsenal of offensive strategic weapons, Russia possesses the largest inventory of non-strategic nuclear weapons in the world, which many analysts believe is intended to offset Moscow's perception of its own conventional inferiority. The largest holder of tactical nuclear weapons is the Russian Navy, followed by the Air Force and air and missile defence forces.¹⁷⁶

Russia has an ongoing nuclear modernization programme, which has met approximately 80 percent of its planned goals.¹⁷⁷ Some aspects of the programme are not surprising, since older systems needed replacement. The scope of the modernization programme, however, has raised concerns in the West about its underlying objectives.

Russia is modernizing every component of the strategic triad. This involves upgrading road-mobile ICBM systems, including the Topol-M and the RS-Yar (a MIRVed version of the Topol-M), and the silo-based (and MIRVed) Sarmat. Three new SSBNs entered service in 2013–2016, and five additional submarines are under construction.¹⁷⁸ A new, next-generation strategic bomber is planned to enter serial production in the late 2020s. Moreover, old Tupolev-160s have been modernized.¹⁷⁹

One aim of the programme is to sustain approximate numerical parity with the US strategic forces and to maintain a retaliatory capability against a potential aggressor. As Eldridge Colby points out, "Moscow is seeking to build and deploy a strategic nuclear force that is able to demonstrate clearly to Washington that such a [U.S.] first-strike capability is out of reach and that U.S. attempts to use force to disarm Russia of its strategic deterrent would result in devastating retaliation".¹⁸⁰

A notable driver of the Russian modernization efforts has been the US withdrawal (in 2002) from the ABM treaty, which limited development and deployment of missile

176 Kristensen & Korda 2019b. See also Woolf 2019.

177 Statement by Russian defence minister in December 2018, as reported in Kristensen & Korda 2019b.

178 Podgvig 2018.

179 Gady 2019.

180 Colby 2016.

defence systems.¹⁸¹ Although it is very unlikely that existing or planned US systems (see previous discussion of US non-nuclear capabilities) could undermine Russia's strategic deterrence, persistent Russian concern about potential technological breakthroughs by the US anti-missile defence programmes has influenced the modernization process in terms of decision-making, budget allocation and acquisition process. Russia's new systems, such as the Sarmat ICBM and the Avangard boost-glide hypersonic vehicle, are designed to circumvent or counter US missile defence.¹⁸²

Unlike the United States, the Soviet Union built, and Russia still maintains, a silo-based missile defence system around its capital, consisting of approximately 68 nuclear-armed A-135 interceptor missiles. A new interceptor missile was recently tested at a Russian-controlled site in Kazakhstan.¹⁸³ In addition, Russia has deployed various types of short-range, mobile missile defence systems (such as the S-300 and S-400) in parts of its territory, and is reportedly developing an S-500 system able to track and destroy up to ten missile warheads, including hypersonic targets, according to Russian media.¹⁸⁴

Deterrence strategy and policies: Russia's approach to deterrence is holistic. In other words, in Russian strategic thinking the line between conventional and nuclear deterrence on the one hand and between defensive and offensive actions on the other is blurred. Kristin ven Bruusgaard has called Russia's approach "strategic deterrence". According to her, strategic deterrence "is conceived much more broadly than the traditional Western concept of deterrence. It is not entirely defensive: it contains offensive and defensive, nuclear, non-nuclear and non-military deterrent tools".¹⁸⁵ This view is also echoed by other scholars. Dmitry Adamsky, for example, speaks of cross-domain coercion, which refers to "the host of Russian efforts to deter (preserve the status quo) and to compel (change the status quo) by orchestrating soft and hard forms of influence across the nuclear, conventional and informational (cyber) domains through all stages of strategic interaction (peace, crisis and war)".¹⁸⁶

Importantly, ven Bruusgaard notes that Russia's nuclear weapons are the cornerstone of the strategic deterrence approach. Russia's deterrence strategy can be divided into

181 Upon US withdrawal from the ABM Treaty, Russia withdrew from the START II Treaty, which had been approved for ratification by the US Senate in 1996 and the Russian Duma in 2000. A major accomplishment of the START II Treaty – the elimination of MIRVed ICBMs – was therefore never implemented. As previously noted, the United States has opted against MIRVed ICBMs under New START, while Russia retains and is modernizing its MIRVed ICBMs.

182 Podvid 2018, 259–260.

183 Moscow Times 2019. See also Rozin 2018.

184 Sputnik News 2018.

185 Ven Bruusgaard 2016, 7.

186 Adamsky 2018, 36.

two dimensions. First, there is global nuclear deterrence, which simply aims at deterring nuclear aggression. Secondly, there is regional nuclear deterrence, aimed at deterring a large-scale conventional war.¹⁸⁷ Russia's concrete warfighting plans, strategies and doctrines remain secret, which is the case with other nuclear weapons states as well. However, for deterrence purposes, Russia selectively reveals some elements in its military strategy.¹⁸⁸

Russia's unclassified nuclear doctrine has evolved in the post-Cold War years. The first military doctrine from 1993 was deterrence-oriented, but it did withdraw from the Soviet no-first use policy. Reflecting conventional inferiority to the West, Putin expanded the role of nuclear weapons in the doctrine revealed in 2000, which stated that Russia could use nuclear weapons not only as a response to nuclear attack but also in situations critical to its national security. In the subsequent doctrines from 2010 and 2014, the role of nuclear weapons was restricted. In the most recent 2014 doctrine, the formulation is as follows: "The Russian Federation reserves the right to use nuclear weapons in response to the use of nuclear and other types of weapons of mass destruction against it and/or its allies, and also in the event of aggression against the Russian Federation involving the use of conventional weapons when the very existence of the state is under threat."¹⁸⁹

This more restricted formulation of nuclear weapons use indicates that Russia's confidence in its conventional capabilities has grown since the chaotic 1990s.

Russia's doctrine regarding its non-strategic nuclear weapons is much less clear. David Yost has provided perhaps the most detailed description of the strategic rationale behind Russia's tactical nuclear weapons stockpile. More precisely he has listed nine functions for the weapons:

1. To deter external aggression;
2. to serve as an 'equalizer' or 'counterbalance' to the conventional force superiority of potential adversaries;
3. to help maintain the 'combat stability' of forces engaged in an operation;
4. to make possible the 'de-escalation' of conventional conflicts;
5. to make it possible for Russia to conduct limited nuclear strikes in a regional (or theatre) war while avoiding an escalation to intercontinental nuclear operations or any other geographical extension of the conflict;

187 Adamsky 2014, 91–92.

188 Johnson 2016, 22.

189 For a useful comparison of Russia's military doctrines see: <https://www.offiziere.ch/wp-content/uploads-001/2015/08/Comparison-of-the-Russian-Military-Doctrine-1993-2000-2010-and-2014.pdf>.

6. to inhibit the intervention of outside powers (such as the United States or NATO) in regional conflicts involving Russia;
7. for non-strategic nuclear forces to substitute for advanced long-range non-nuclear precision strike systems;
8. to enable the high command to change the correlation of forces in specific theatres or sectors of military operations;
9. to compensate for reductions in Russia's strategic nuclear forces.¹⁹⁰

Based on an extensive analysis of Russian strategic debate, Adamsky in turn argues that Russia has no articulated mission nor deterrence framework for its non-strategic nuclear weapons. He claims that “nuclear reality in Russia is a constellation of contradictory trends and narratives unlinked by either unifying logic or official policy”.¹⁹¹ Some authors argue that ambiguity at the official level may be deliberate, and aimed at complicating Western thinking and planning.¹⁹²

Interestingly, the ambiguity concerning Russia's tactical nuclear weapons doctrine has led to an exchange of arguments among strategic affairs experts within and outside government. In particular, the existence of an “escalate to de-escalate doctrine” has become a subject of debate. For some, the de-escalation doctrine refers to the “idea that, if Russia were faced with a large-scale conventional attack that exceeded its capacity for defence, it might respond with a limited nuclear strike”.¹⁹³ For others, a pre-emptive use of nuclear weapons by Russia could be part of an offensive strategy, whereby a Russian seizure of territory by conventional forces would be coupled with the limited use of tactical nuclear weapons as a part of “standoff” operations to block rescue or reinforcement efforts on behalf of the invaded country.¹⁹⁴

While the expression “escalate to de-escalate” does not appear *verbatim* in Russia's official military doctrine, many analysts believe it is strongly implied by the language in the 2000,

190 Yost 2001, 534–537.

191 Adamsky 2014, 92.

192 Terrais 2018c.

193 Sokov 2014.

194 Savelyev 2010; Carlsson, Norberg, and Westerlund 2013. These references are cited by Roberts. As Roberts points out, Russia's possible pre-emptive use of nuclear weapons “(p)resumably follows from the calculus of Russian leadership that their employment of nuclear weapons against NATO forces would signal their resolve and alert Western decision makers to the asymmetry of stake, as Russian leaders perceive it, while being sufficiently limited not to risk a strategic response. In this (Russian) assessment, the asymmetry of stake favors Russia because any conflict between NATO and Russia would jeopardize vital Russian interests whereas it would involve important but not vital NATO or U.S. interests” (emphasis added), Roberts 2016, 134.

2010, and 2014 versions of the doctrine.¹⁹⁵ Those experts who argue for the existence of the doctrine point out that some of the more recent Russian strategic documents, such as the 2012 and 2017 naval doctrines, included references to a line of thinking that bears a resemblance to the escalate to de-escalate approach.¹⁹⁶ Moreover, some commentators have also paid attention to Russia's recent exercises, dual-use capabilities and provocative rhetoric coming from Moscow and seen them as indicators of the escalate to de-escalate strategy.¹⁹⁷

It is noteworthy, in this context, that statements by top US defence and military officials from both the Obama and Trump administrations indicate that they take the escalate to de-escalate doctrine very seriously. In June 2015, for example, the US Deputy Secretary of Defence, Robert Work, and Vice Chairman of the Joint Chiefs of Staff, Admiral James Winnefeld, stated that "Russian military includes what some have called an 'escalate to de-escalate' strategy (that) purportedly seeks to de-escalate a conventional conflict through coercive threats, including limited nuclear use" – a strategy that they described as "playing with fire".¹⁹⁸ Moreover, the NPR 2018 states that "Moscow threatens and exercises limited nuclear first use, suggesting a mistaken expectation that coercive nuclear threats or limited first use could paralyze the United States and NATO and thereby end a conflict on terms favorable to Russia".¹⁹⁹

On the other hand, there are also respected scholars who seriously question the existence of such a doctrine. Olga Oliker and Andrey Baklitskiy have argued that exercises, capabilities and rhetoric are not definitive proof that Russia's threshold for the use of nuclear weapons is low. More specifically, they claim that Russian exercises do not fit the model of a small-scale nuclear strike early in a conflict. Moreover, other countries – like the United States – have dual-use capabilities (albeit in much smaller numbers), and they have not been subject to accusation. Finally, they posit that President Putin's rhetoric and his occasional references to nuclear weapons are meant to underline that Russia is a nuclear weapon state. Thus, the purpose is to consolidate Russia's nuclear deterrence and not to signal that Russia's nuclear threshold has suddenly been lowered.²⁰⁰

195 According to the 2010 version: "The Russian Federation reserves the right to use nuclear weapons in response to the use of nuclear and other types of weapons of mass destruction against it and (or) its allies, as well as in response to large-scale aggression utilizing conventional weapons in situations critical to the national security of the Russian Federation and its allies. See also Sokov 2000.

196 Zysk 2018.

197 Oliker & Baklitskiy 2018.

198 Work & Winnefeld 2015.

199 Office of the Secretary of Defense 2018, 39.

200 Ibid.

Tertrais is also of the opinion that Russia has no definite escalate to de-escalate doctrine. He concludes that “Russia is not building new dedicated theatre-nuclear systems, and there is little evidence of new ‘low-yield’ warheads; it does not have an ‘escalate to de-escalate’ doctrine; and it is not practising the use of nuclear weapons in large-scale military exercises. The Russian nuclear problem is real and serious – but it is political more than it is military”.²⁰¹ Interestingly, Tertrais suggests that the alleged de-escalate doctrine resembles the idea of the limited use of nuclear weapons for conflict termination – an approach that Western nuclear powers have traditionally shared.²⁰² This is in fact a view that some of the proponents of the explicit escalate to de-escalate doctrine seem to hold.²⁰³

According to Tertrais, the real problem regarding Russia’s nuclear weapons policy is its political dimension – namely, the use of the nuclear card for political coercion. One can also speak of nuclear sabre-rattling.

There are numerous examples of Russia’s provocative behaviour involving a nuclear weapons dimension. In 2013, Russia launched a mock attack against Sweden with a strategic bomber. Moreover, as pointed out, Putin has continuously reminded the West that Russia is a nuclear weapons state. Such comments have often been associated with the situation in Ukraine.²⁰⁴ Indeed, Putin mentioned his disagreement with the United States over missile defences when publicly justifying his intervention in Crimea.²⁰⁵ However, the most provocative statements have come from below the Kremlin, which is crucial to understand. Dmitry Kiselyov – a television presenter loyal to Putin – has said that Russia is capable of turning the US into radioactive ash.²⁰⁶ The Russian ambassador to Denmark threatened that Denmark can become a target of Russia’s nuclear missiles if it joins the NATO missile defence shield.²⁰⁷ Further, in 2016 a member of the Federation Council Committee on Defence and Security threatened Norway with being added to “the list of targets of our strategic weapons” because of the rotational presence of a few hundred US Marines.²⁰⁸

201 Tertrais 2018c, 35. Some observers contest the assertion that Russia is not practising the use of nuclear weapons in large-scale exercises. A NATO staff member has pointed out, for example, that Russia’s large-scale ZAPAD exercise in 2017 not only included dual-capable systems, including the ISKANDER missile system, but also concurrent test launches of ICBMs and a simulated SLBM attack against a “simulated enemy” (presumably Western) force. See Johnson 2017. A 2013 assessment by the Swedish Defence Research Agency (FOI) also notes that “exercises involving sub-strategic nuclear strikes seem to be continuing” (Carlsson, Norberg & Westerlund 2013).

202 Tertrais 2018c, 41.

203 See e.g. Kroenig 2018, 5. However, there is arguably an important distinction between the threat or use of nuclear weapons to terminate an aggression (e.g. a Russian seizure of NATO territory) and such a threat or use to consolidate the gains of such aggression.

204 Freeman 2014; BBC 2015.

205 Op. cit., Roberts, 120.

206 Kelly 2014.

207 Withnall 2015.

208 Local 2016.

Russia's nuclear sabre-rattling fits well with its active and coercive deterrence policy. As one commentator has pointed out: "The nuclear sabre-rattling [...] indicates that Russia's nuclear arsenal has become an integral element in its approach to political messaging and conflict, an approach that skilfully merges non-military and military, conventional and asymmetrical instruments."²⁰⁹

Thus, in summary, Putin's frequent reminders about Russia's status as a nuclear power and the more reckless comments by the Kremlin's subordinates are meant both to deter a potential aggressor and also to change their behaviour, intentions and policy goals.²¹⁰

209 Durkalec 2016.

210 Olikier & Baklitskyi 2018.

5 Adaptation of the “nuclear Alliance” and prospects for a “European dimension” of nuclear deterrence

As discussed in other FIIA publications, for more than two decades following the end of the Cold War, NATO pursued steps to reduce the role of nuclear weapons in its deterrence and collective defence strategy, and to allay stated Russian concerns that enlargement of the Alliance would lead to changes in NATO’s nuclear posture that would threaten Russian security.²¹¹ Since the Russian military intervention in Ukraine in 2014, NATO has focused renewed attention on nuclear issues as part of its broader efforts to accomplish its deterrence and collective defence objectives. However, as NATO proceeds to adapt its approach in the nuclear domain, new complications – and, potentially, a new “European deterrent” concept – need to be explored.

5.1 NATO

By way of background, a few essential facts on NATO’s nuclear posture and how it manages nuclear policy are summarized below.

- NATO, as an organization, does not “own” nuclear weapons. Instead, it relies on multi-layered relationships among its three nuclear-weapon states – the United States, France, and the United Kingdom (the “nuclear allies”) – and its non-nuclear members. The nuclear allies have both overlapping and distinctive roles. The “strategic forces of the Alliance, particularly those of the United States, are the supreme guarantee of the security of the

211 The background summary draws largely on these papers: Michel (2017a), Bell (2018), Michel (2017b).

Alliance”, while the “independent strategic nuclear forces of the United Kingdom and France have a deterrent role of their own and contribute significantly to the overall security of the Alliance”.²¹² Only the US President, French President, and UK Prime Minister can authorize the employment of his/her nation’s strategic nuclear weapons, and NATO cannot direct them to do so.

- Over the years, NATO has established policies and procedures (known as “nuclear sharing arrangements”) under which US non-strategic nuclear weapons based in Europe could be released – only upon US presidential authorization – to NATO allies with DCA capabilities who are prepared to conduct nuclear missions under NATO command and control. As a matter of policy, NATO does not publicly identify the DCA-capable allies or the locations and numbers of US non-strategic nuclear weapons based in Europe. Various non-government sources estimate that a total of some 150 US B-61 nuclear gravity bombs may be deployed in five NATO members: Germany, Belgium, the Netherlands, Italy, and Turkey.²¹³ Those countries –plus Greece – are also understood to have DCA capabilities (at various stages of readiness), and some US DCA are forward-based in Europe as well.
- As Bell points out in his FIIA Working Paper, allies can make valuable contributions to NATO’s deterrence operations in areas other than conducting nuclear strike missions, including: aerial refuelling to extend the range of DCA; combat fighters to protect the DCA; and precision strike aircraft to suppress enemy air defences. No ally is required to provide such assets, although many do so.
- The North Atlantic Council (NAC) is the Alliance’s principal decision-making body and includes all 29 allies. Since the role of nuclear weapons in NATO deterrence and defence strategy affects all allies, the subject is discussed and decided in the NAC. The Nuclear Planning Group (NPG) has comparable authority to the NAC for more specific policy and technical matters involving nuclear weapons, including the aforementioned nuclear-sharing arrangements, but France has opted not to join this body.

212 NATO 2018.

213 Kristensen & Norris 2018b.

- Faced with Russia’s approach – specifically its evolving doctrine, nuclear modernization programmes, exercises and deployments, and instances of nuclear sabre-rattling – NATO has taken important steps in response. These steps have included strengthening the Alliance’s conventional defence capabilities, especially in the Baltic Sea region, and declaratory language intended to disabuse Russian leaders of any notion that they could employ nuclear weapons as part of an “escalate to de-escalate” strategy to terminate a conflict (sparked by their own aggression) on advantageous terms.
- At the same time, it remains highly unlikely that NATO will refashion its approach to nuclear weapons in ways that mirror Russian concepts and/or exercise practices. For example, NATO does not target Russia for nuclear strikes and does not conduct simulated nuclear strikes near Russian territory; indeed, its nuclear exercises are conducted without reference to Russia or Russian territory. Similarly, long-standing NATO policies intended to reduce tensions and risks of miscalculation are highly unlikely to change.

However, looking ahead, it seems likely that NATO will face additional challenges related to nuclear aspects of deterrence in the not-too-distant future. For the purposes of this report, two related issues merit particular attention: repercussions for the Alliance of the termination of the INF Treaty; and long-term sustainment of nuclear-sharing arrangements.

INF: Although NATO was not a party to the INF Treaty, its security and solidarity were clearly at stake in the US-Soviet negotiations and parallel deployments of US INF systems that produced the historic agreement. With the treaty’s recent demise, NATO needs to manage the military and political fallout in a way that preserves those core interests – and the US extended deterrence that underpins them. This will not be easy.

The US administration’s clumsy announcement, in October 2018, of its plan to withdraw from the treaty roiled the allies and initially diverted attention away from the Russian violation. Some of the diplomatic damage has been repaired by formal NATO statements supporting the US action and public acknowledgement by European officials (for example, in the Netherlands and France) that their governments had independently confirmed the violation.

NATO now faces the more difficult task of reaching a solid consensus on the military implications of the Russian deployments which, according to some experts, will improve Moscow’s ability to strike theatre-level targets in Europe and Asia with mobile, land-based

cruise missiles that are less vulnerable than weapons carried by aircraft (which can be shot down or destroyed on runways) or ships (which can be sunk.) Norway, the three Baltic states, and Poland— which are particularly concerned that the Russian A2AD strategy could deny the United States and NATO access to key ports, airfields, and command and control centres during a conflict – may feel more exposed than some allies in central and southern Europe, even if the latter also fall within the range of the Russian INF-range GLCMs.

Assuming that NATO Military Authorities, who will perform the military implications assessment, reach a consensus, even thornier questions will arise regarding the Alliance's response. In principle, options range from imposing further economic sanctions on Russia (an area where the EU, not NATO, commands the requisite tools), to upgrading the readiness of NATO DCA assets, to increasing defence systems with anti-GLCM capability, to augmenting US offshore capabilities (for example, air-delivered weapons and/or new SLCMs), to development and deployment of new US GLCMs or ground-based ballistic missiles of the previously prohibited INF range, or some combination of such measures.

But all of those would raise concerns in various parts of the Alliance. In particular, the former US INF basing countries are presumably anxious to accept new US systems on their territory and risk a replay of the domestic protests of the 1980s, despite recent assurances by US and NATO officials that any such systems would be armed with conventional, not nuclear warheads.²¹⁴ Deploying new ground-based systems of INF range on the territory of NATO allies in eastern and northern Europe would raise many political-military questions, including but not limited to their vulnerability to pre-emption and “provocative” nature (from the Russian perspective.). That said, any discussion of new military deployments would quickly raise the question of who pays for them, opening a potential Pandora's Box with a Trump administration critical of European defence spending levels and anxious to increase sales of US military systems.

Sustaining nuclear sharing arrangements: Prior to the 2014 Russian intervention in Ukraine, the role and importance of NATO's nuclear sharing arrangements were subject to periodic – and sometimes contentious – debate.²¹⁵ Since then, NATO's declarations on the subject have become more categorical. Moreover, at their last summit, NATO heads of state and government left no doubt about their view, stating: “NATO's nuclear deterrence posture also relies on United States' nuclear weapons forward-deployed in Europe and the capabilities and infrastructure provided by Allies concerned. *National contributions of*

214 In late June, the Acting US Secretary of Defence stated that US research and development on INF-range missiles is limited to “conventional missiles – not nuclear”; and NATO's Secretary General reiterated that “we do not intend to deploy new land-based nuclear missiles in Europe.” (Esper 2019)

215 See, for example, the earlier reference (section on extended deterrence) to Germany's proposal in 2009–2010.

dual-capable aircraft to NATO's nuclear deterrence mission remain central to this effort" (emphasis added).²¹⁶ But how these commitments will be sustained is not so clear-cut.

One looming problem concerns the aircraft. Except for Germany and Italy (which fly European-built Tornado combat aircraft), NATO's European DCA contributors currently rely on US-built F-16s, which entered into service decades ago, for potential nuclear missions. Several allies, including the Netherlands, Italy, and Belgium, are purchasing the "stealthy" US F-35, one version of which can be configured to carry the B-61 bomb. For its DCA requirements, Germany relies on a portion of its aging Tornado fleet, which reportedly must be replaced beginning around 2025. However, according to a German defence ministry announcement in January 2019, it has ruled out purchasing the F-35, leaving the replacement aircraft competition to the European-built Typhoon (which has not been certified to carry US nuclear weapons) and the US-built F-18 Super Hornet (which, to date, has not been certified for that purpose either).

A second (and related) potential problem concerns the US weapons. According to press reports, in early 2019 Germany's Social Democratic Party (SPD) appointed a commission to re-evaluate its positions on foreign and security policy, including "nuclear-sharing".²¹⁷ SPD figures have already threatened to block any F-18 purchase, and it seems implausible that the new commission would not examine the basing of US weapons as well. As the SPD is the junior partner in the governing coalition, it is unclear whether a recommendation by the new commission to seek the removal of the weapons would force a change in the Merkel government's policy.²¹⁸ But anti-nuclear sentiment appears to be widespread in Germany, especially among younger voters, so renewed public debate on its nuclear-sharing role could have unpredictable results.

A variety of outcomes could be envisioned. Germany might try to preserve the status quo by procuring a small number of F-18s (and obtaining the nuclear certification, which might involve additional cost) and tamping down the debate on the weapons themselves. The least plausible outcomes would be to retain a DCA capability while terminating the weapons-basing arrangements; or to retain the weapons, but not the DCA capability.

In past years, there has been widespread concern among allied officials and non-government experts that if the Germans were to break ranks on the nuclear sharing arrangements, other DCA countries would follow their example, sooner or later. This should not be a foregone conclusion, given NATO's more recent and repeated reaffirmations that it is

216 NATO 2018.

217 Pancevski 2019.

218 Ibid. According to the article, a Merkel spokesman said the government saw "no reason to debate this aspect of NATO deterrence. We continue to fully support the defensive nuclear strategy of NATO".

a “nuclear Alliance”, and persistent concerns among many allies (including Germany’s close partner, France) about “decoupling” the US extended deterrent. Nevertheless, reopening the nuclear-sharing question would risk another fractious intra-European and transatlantic debate most allies would prefer to avoid.

5.2 Prospects for a “European dimension” of nuclear deterrence

If the existing architecture of deterrence in Europe – based on NATO and, in particular, US extended deterrence guarantees – appears to be under strain, for different reasons, from Russia and the United States, is there another option? What might a “European dimension” of nuclear deterrence look like? As part of his contribution to this project, Tertrais examines the possibilities of a significant evolution of the European nuclear deterrence landscape and sets the stage for future research and reflection on the topic.²¹⁹

As Tertrais points out, France and the United Kingdom – Western Europe’s only nuclear weapon states, and likely to remain so – have much in common when it comes to nuclear affairs.

- Their main rationale for maintaining nuclear deterrents is to protect their security, not their “prestige”.
- They have similar threat perceptions (Russia, followed by China and North Korea, and potentially Iran).
- Their doctrines are largely convergent; both would restrict nuclear use to “extreme circumstances of self-defence” if “vital interests” were at stake. (The British do not, however, share the French concept of a “final warning”.)
- They have similar criteria for sizing their deterrents: an ability to inflict “unacceptable damage” on an aggressor, even after an enemy first strike.
- Both governments have concluded that to guarantee an effective sea-based deterrent force, each of their respective navies require four SSBNs to maintain at least one SSBN on operational patrol at all times.

219 Tertrais 2018b. This section largely draws upon Tertrais’ paper.

In addition, their views on non-proliferation (and the importance of the JCPOA with Iran), keeping their “minimum” nuclear deterrents outside US-Russian arms control regimes, and opposition to the proposed Treaty on the Prohibition of Nuclear Weapons (TPNW) are generally in close alignment. Furthermore, over the past two decades, and especially since the 2010 Lancaster House agreements, UK-French technical cooperation has expanded without diminishing their respective bilateral nuclear ties with the United States.

For Tertrais, the British and French deterrents “were never designed to exclusively cover strictly national vital interests and always had at least a *de facto* European dimension”. The fact that UK SSBNs have been “assigned” to NATO since the 1960s is well-known, but Tertrais’ research demonstrates that the French, too, “have always seen a European dimension to their nuclear deterrent”. The creation of the EU provided additional impetus for French leaders to consider a “European dimension of deterrence”. Indeed, by 1992, President François Mitterrand “signaled his acceptance of the need for the member states of the newly-born Union to tackle the nuclear issue together when the time came”.

More recently, changes in the political and strategic context – here, Tertrais points, in particular, to Russia’s “new assertiveness and territorial aggression” and “doubts about the reliability of the US guarantee to Europe” aggravated by various Trump statements – have renewed interest in “thinking about Europe’s nuclear role in securing the continent”, especially in Germany and France. Indeed, the Treaty of Aachen signed by Macron and Merkel in January 2019 states that their countries “shall afford one another any means of assistance or aid within their power, including military force, in the event of an armed attack on their territories”.²²⁰ Moreover, when he was subsequently asked if “all means” would include the French nuclear deterrent, Macron confirmed that it would – a public pledge that appears to go further than his predecessors.²²¹

Tertrais rules out several “non-starters”, which are summarized below:

- “There will be no ‘joint nuclear force’ controlled by the European Union...
- Another unrealistic proposal is that European partners could partly fund the French force in return for a say in French national policy.”
- “(Another) arrangement that will almost certainly not take place is a pooling of UK and French assets... If Brexit happens, Britain

220 Franco-German Treaty of Aachen accessible at: <https://www.diplomatie.gouv.fr/en/country-files/germany/france-and-germany/franco-german-treaty-of-aachen/>.

221 Drozdiak 2019.

will want to cling to its strategic assets – which include an independent nuclear force.”

- “Paris is unlikely to join the NPG or assign part of the airborne component to the Atlantic Alliance... French absence from the NPG and NATO nuclear arrangements is part of the country’s ‘strategic DNA’, mostly for political and symbolic reasons.”
- “Furthermore, it is unlikely that any serious nuclear discussion will happen in the context of the European Union institutions.”

This does leave various “realistic” scenarios open, according to Tertrais, with the key variable being the continued existence of the current NATO nuclear arrangements.

In essence, Tertrais argues that if those arrangements hold, Paris can provide “complementary insurance for European NATO members and nuclear reassurance for non-NATO EU members”. For example, France could “state more clearly that the French force protects Europe as a whole... Another way of putting it would be to make it clear that Article 42.7 of the Lisbon Treaty – the mutual defence clause of the EU – could be exercised by any means, thus including nuclear weapons”. A practical demonstration of this could be “rotations of Rafale fighter-bombers (without their nuclear missiles)... to allied bases, including on the territory of the most eastern countries of the Alliance in order to demonstrate its solidarity”.

On the other hand, if dramatic changes were to occur with NATO – such as the falling apart of its nuclear-sharing arrangements – “it is likely that France would be ready to consider playing a stronger, visible role in ensuring that Europe feels protected by nuclear deterrence. Options would include both ‘sharing’ and ‘basing’. France could base part of its airborne arsenal (say, in the order of ten missiles) in Germany or in Poland (basing) and/or agree that they could be carried by European fighter-bombers (sharing).”

As for the British role under such circumstances, Tertrais seems cautiously optimistic. “In the context of Brexit,” he observes, “London is eager to bolster its European security credentials. If we are correct in predicting that the European deterrence question will not be treated within formal EU circles, it is conceivable that the United Kingdom could be part of such arrangements one way or another. It would be an irony of history to see London take a greater part in the security of Finland and Sweden – or Ireland for that matter – after having left the Union.”

Anticipating counterarguments to his ideas – for example, that a French and/or UK-based deterrent “would not have the necessary credibility” – Tertrais responds: “This is a debatable question. A smaller arsenal can deter a major power provided it has the ability to inflict damage seen as unacceptable by the other party. This has always been the premise of

'deterrence of the strong by the weak,' and is not connected to the size of the other party's nuclear arsenal as long as no counterforce strategy is sought. Most importantly, again, deterrence exercised by a European power might be seen as more credible than when it is exercised by a distant protector." To his credit, Tertrais does not suggest that his contribution represents a comprehensive examination of all the potential opportunities and obstacles (political, military, diplomatic, and economic) inherent in either broadening or transforming the "European dimension" of deterrence. But his challenge to more orthodox thinking about deterrence opens a valuable debate.

6 Risk reduction and arms control approaches

Over the past 56 years, several types of US-Soviet and, later, US-Russian formal agreements, coordinated actions, and other activities have demonstrated that “hostile states almost always have important interests of military policy in common”.²²² Those agreements and activities have also shown that a risk reduction approach (efforts to improve crisis-prevention and crisis-management communications, avoid incidents, facilitate compliance with formal arms control commitments, and promote dialogue) and an arms control approach (formal agreements or coordinated actions intended to directly limit weapons or technologies) are not necessarily antithetical to deterrence. Rather, like deterrence, both approaches can contribute to strategic stability and reduce the risk of war through misunderstanding or miscalculation.

However, with the collapse of the INF Treaty, doubts over the future of New START, and China’s emergence as a major nuclear weapons power, the already fraught US-Russian relationship involving formal arms control might become even more precarious. Hence, at least in the near term, renewed emphasis on a risk reduction approach might be the best available option to improve strategic stability and maintain deterrence in the near term.²²³

6.1 Risk reduction: a useful but limited role

US-Soviet and, later, US-Russian risk reduction efforts have included a range of formal agreements. For example:

222 Jervis 1993.

223 “The international legal framework: The divide between non-proliferation and abolition” included in the chapter is authored by Katja Creutz, senior research fellow at Finnish Institute of International Affairs.

- *Communications links.* The first of these – the June 1963 agreement establishing a Direct Communications Link (or “hotline”) – resulted from the October 1962 Cuban missile crisis, which convinced both sides of the need for a prompt, direct means of communication at the head of government level. The hotline was reportedly used during two Middle East wars (1967 and 1973) and the 1971 India-Pakistan war. (Subsequent instances of its use have not been made public.) The 1963 agreement was superseded by a 2008 agreement establishing a “direct secure” communications system for “emergency and non-emergency communications between the highest leadership of the two countries”.²²⁴ A separate communications link (Nuclear Risk Reduction Centers) was established in 1987 to send bilateral notifications (such as ballistic missile test launches and on-site inspection requests) and periodic data exchanges required under arms control and confidence-building measure agreements.²²⁵
- *Confidence-building measures.* Following several incidents between US and Soviet naval forces, in May 1972 the two governments concluded an “Incidents at Sea” agreement on steps to avoid collisions, simulated attacks, and other potentially dangerous manoeuvres on and over the high seas. (The Russian Federation later assumed all rights and responsibilities of the former Soviet Union under the agreement.) Under the agreement, the US and Russian navies have established procedures to discuss alleged violations, which have proved useful over the years to defuse confrontation. That said, worrisome incidents can still occur. In fact, US and Russian nuclear submarines collided in the Barents Sea in February 1992, and other similar (but unreported) collisions are said to have taken place.²²⁶ In at least two incidents in 2018, Russian combat aircraft performed “unsafe” manoeuvres close to US patrol aircraft in international air space above the Black Sea, according to US Navy spokespersons.²²⁷ Added to this, the US Navy accused a Russian naval ship of “unsafe and unprofessional” conduct following a near collision in the Philippine Sea in June 2019.

224 US Department of State 2008.

225 US Department of State (n/d). The US Center’s role was subsequently expanded to include information exchanges required by several multilateral, non-nuclear arms control agreements.

226 Cushman 1992.

227 Woody 2019.

- *Cooperative Threat Reduction.* In autumn 1991, the United States launched an initiative to provide technical and material assistance to the Soviet Union to improve the security, and facilitate the dismantlement, of weapons of mass destruction and associated infrastructure. With the collapse of the Soviet Union, US assistance – later known as the Cooperative Threat Reduction (CTR) programme – focused on four states: the Russian Federation, Ukraine, Belarus, and Kazakhstan. In Russia, CTR-financed programmes facilitated the dismantlement of ballistic missiles, missile launchers (land- and submarine-based), and bomber aircraft, security upgrades to nuclear material storage sites, and chemical weapons elimination. Russia opted not to renew the CTR agreement when it expired in 2013, reportedly to halt US contractors' access to their military facilities. Over the life of the programme, the value of the US technical and material assistance reached an estimated \$5–6 billion.²²⁸ While the CTR agreement did not place limits on Russian weapons, it unquestionably helped Russia comply with treaty-mandated reduction and elimination obligations more expeditiously and safely, and at reduced economic cost to the Russian government.

In addition to formal agreements, since the end of the Cold War, US and Russian officials have held government-to-government and military-to-military talks, under various formats, aimed at improving their mutual understanding on thorny issues. During the Clinton administration, for example, meetings between Secretary of Defense William Perry and Russian Minister of Defense Pavel Grachev ultimately produced an agreement in November 1995 to permit Russian peacekeeping battalions to serve in Bosnia under the commander of US forces in Europe. As Secretary of Defense in both the Bush and Obama administrations, Robert Gates met periodically with his Russian counterpart, and in 2010, the sides established a defence relations working group “to foster ties across major policy issues, not just military relations”.²²⁹

The frequency and scope of US-Russian discussions touching on broad strategic issues appear to have slowed in recent years, with diplomatic engagement focused mainly on the INF dispute and military-to-military contacts placing highest priority on mitigating the

228 Woolf 2012. Total CTR authorizations for the period 1992–2010 were \$8.7 billion. Russia received the lion's share of the assistance. Most CTR funding was drawn from the budgets of the US Department of Defense and Department of Energy.

229 Shanker & Schwirtz 2010.

risk of miscalculation in operational theatres, especially Syria.²³⁰ Top US military officers have voiced concern about the current level of dialogue with Russian counterparts. According to General Curtis Scaparrotti, the former SACEUR and Combat Commander, US Forces in Europe: “During the Cold War, we understood each other’s signals. We talked. I’m concerned that we don’t know them as well today. I personally think communication is a very important part of deterrence.”²³¹ As a former senior US diplomat notes: “(Strategic stability) talks are useful, particularly when new developments, such as those in the cyber and space domains, emerge and when Russian nuclear doctrine has provoked concern in Washington and led to changes in the U.S. nuclear posture. Even if strategic stability talks do not spin off specific negotiations, they provide a venue for the sides to exchange views and better understand the concerns of the other.”²³² Under the Trump administration, such talks have been sporadic; the latest US-Russia “strategic security dialogue” took place in Geneva on July 17, 2019.

6.2 Arms control at a crossroads

The first agreement to impose legally-binding constraints affecting nuclear weapons development was the Limited Test Ban Treaty, signed by the United States, United Kingdom, and Soviet Union in August 1963, which banned nuclear explosive testing in outer space, in the atmosphere, and underwater.²³³ Since then, the United States and the Soviet Union – and, later, Russia – have signed seven bilateral agreements to place legally binding limits on nuclear weapons and ballistic missile defence systems. Of those seven, only one remains in force: New START, which will expire in February 2021, unless the sides agree to extend it for another five years.²³⁴

230 Brookings 2019.

231 Burns 2019.

232 Pifer 2019.

233 Previous negotiations on a comprehensive test ban had collapsed, ostensibly over verification issues, but in fact the parties had concluded that their nuclear requirements could be met by underground testing, which posed fewer health risks and provoked much less public opposition than the atmospheric blasts. A subsequent US-Soviet treaty, signed in 1974, limited the size of underground nuclear explosions to 150 KT, which – at least for the United States, but presumably for the Soviet Union as well – permitted significant improvements to warhead safety, reliability, and effectiveness. The last US nuclear test was conducted in 1992. In 1996, under the Clinton administration, the United States signed the Comprehensive Test Ban Treaty (CTBT), but the US Senate has not given its “advice and consent” to the Treaty, which is required for ratification. The NPR 2018 stated that the Trump administration “will not seek Senate ratification” of the CTBT and “will not resume nuclear explosive testing unless necessary to ensure the safety and effectiveness of the U.S. nuclear arsenal”. The last Soviet nuclear test took place in 1990. Russia signed the CTBT in 1996 and ratified it in 2000.

234 For a convenient summary description of these agreements, with links to treaty texts and additional narratives, see Arms Control Association 2019b.

The benefits of those agreements have been substantial. From the 1972 Interim Agreement on Offensive Arms (also known as SALT I) to the full implementation in 2018 of the New START ceilings, the permitted number of deployed ICBMs and SLBMs for each side was cut by more than one half. During the same period, the permitted number of deployed strategic warheads was reduced to 1,550 for each side – their lowest level since the 1950s. The progress on verification methods has been remarkable as well. The early agreements relied exclusively on “national technical means”, such as satellites, to monitor compliance. The INF Treaty, followed by the 1991 START agreement, introduced various on-site inspection and monitoring provisions. The New START verification regime drew upon valuable lessons from INF and START, and included unprecedented provisions for the actual counting of warheads on deployed missiles and bombers in the course of on-site inspections. As recently as May 2019, a top Pentagon official stated that “we assess Russia to be in compliance with the central limits of New START”.²³⁵

In sum, from SALT I through New START, the sides have progressively increased transparency (the ability of each side to count and track the other’s weapons systems with high confidence) and predictability (the ability to understand the other’s force structure and anticipate changes), while promoting greater strategic stability (by reducing each side’s incentives and capabilities to risk a “first strike” on the other’s strategic weapons). At the same time, neither side sacrificed its ability to deter the other, nor its ability (within the overall ceilings) to modernize its forces. However, the expectation – at least during the Obama administration – that New START would pave the way for further deep reductions proved short-lived. As mutual recriminations mounted in the wake of Russia’s intervention in Ukraine and Syria, and became exacerbated by the demise of the INF Treaty, longstanding arms control issues that were left unresolved by past agreements have resurfaced, and new issues have arisen.

On the US side, officials emphasize three areas of concern when explaining why the Trump administration has yet to decide on a potential extension of New START or a proposal to launch negotiations on a strategic arms treaty to replace New START:

- Neither the 2002 Strategic Offensive Reductions Treaty nor New START addressed Russia’s active stockpile of approximately 2,000 non-strategic nuclear weapons that can be deployed on ships, bombers, tactical aircraft, Moscow’s anti-ballistic missile system, and with ground forces.²³⁶ (The INF Treaty covered INF-range launchers but not their warheads.) According to US

235 Trachtenberg 2019.

236 As previously noted, the US has approximately 150 nuclear bombs forward-based in Europe under NATO nuclear-sharing arrangements.

officials, these Russian capabilities are being modernized and expanded “to facilitate a doctrine that envisions the potential use of nuclear weapons”.²³⁷ However, Russian officials have reportedly spurned or ignored US and NATO offers – first made during the Obama administration – to open a dialogue on transparency measures for those systems, which could lead to eventual talks on their reduction or elimination.

- Russian nuclear force modernization programmes permitted under New START are a growing worry; even permitted systems – such as new versions of road-mobile and silo-based ICBMs – can change perceptions of the strategic balance over time. Moreover, in a March 2018 speech, Putin announced the development of five new nuclear armed systems, some of which might be fielded before the treaty’s expiration date. According to US officials, at least two of them (a new “heavy” ICBM and the “Avangard” hypersonic system) should be subject to New START counting rules, while the others (a nuclear-armed submarine drone and nuclear-powered cruise missile) would constitute a “new kind of strategic offensive arms” and, therefore, must be discussed in the bilateral commission set up by the treaty to deal with compliance issues.²³⁸ But according to US officials, as of February 2019 the Russians were dragging their heels on discussing these issues.²³⁹
- As previously mentioned, China’s expanding military capabilities – especially its strategic nuclear weapons able to strike the US homeland, as well as US territory (Guam) and forces in the Indo-Pacific region – mean that US planners can no longer afford to consider those capabilities a “lesser-included problem”. As Chinese nuclear forces grow and become more sophisticated, US officials and experts worry that China, like Russia, might miscalculate that those weapons provide it with a means of coercion or leverage in a crisis. However, according to a US official, China “has rebuffed multiple US attempts to engage in a meaningful bilateral dialogue on nuclear posture and risk reduction issues”.²⁴⁰ Indeed, in May 2019, a Chinese foreign ministry spokesman categorically dismissed the idea (which Trump

237 Hyten 2019.

238 Ibid.

239 Ibid.

240 Trachtenberg 2019.

said he had discussed with Putin) of any trilateral negotiations on “nuclear disarmament” with Russia and the United States.

While Russian officials have declared their readiness for holding talks on extending New START, their stated concerns about US capabilities and intentions would be very difficult, if not impossible, to reconcile with current or foreseeable US positions.

Russia’s longstanding objections to US missile defence developmental programmes and deployments have intensified in recent years and constitute the major obstacle to a follow-on agreement to New START. Put simply, Moscow sees those programmes as precursors for systems intended to negate its deterrent and not, as the US has long maintained, intended to defend NATO allies and the US homeland from a limited attack by an aggressor such as North Korea or Iran. (The Obama administration intensified efforts to address Russian concerns and find areas of cooperation soon after signing New START, but the talks essentially collapsed by 2012.) The Russian president has been especially vocal on the subject, going as far as to declare in April 2014 that his intervention in Ukraine was “partially prompted” by his concern that US missile defences had “offensive potential” against Russia.²⁴¹ However, Moscow’s apparent position that any future talks on strategic offensive arms must include limits on US missile defences would almost certainly be a non-starter with Washington.

In fact, it is likely that US missile defences are not the only stumbling block to a new accord. If Moscow believes that its non-strategic nuclear weapons, reinforced by its new INF systems, are necessary to deter or defend against a perceived NATO threat to the Russian heartland, there is little reason to believe it will place them on the negotiating table. At the same time, Russian experts reportedly want to negotiate a wide-ranging arms control agreement that, in addition to limits on missile defences, would place tight constraints on US non-nuclear strike capabilities and space-related technologies, such as space-based interceptors and directed energy systems.²⁴² Moreover, Russian officials have previously suggested that further reductions in strategic offensive arms should include limits on the independent French and British deterrents as well – a step that Paris and London (with support from Washington) have consistently rejected, given the relatively modest size of their respective nuclear forces. On the other hand, Moscow may feel disinclined to put at risk its recently improved relations with China by trying to convince it to join trilateral arms control negotiations with the United States.

241 Op. cit, Roberts, 55.

242 Miller & Rose 2018; Younger 2000.

Given this tableau of complex issues, it would appear very unlikely that the United States and Russia – which have yet to agree, in principle, on holding negotiations – could complete a new arms control agreement by the current New START deadline.²⁴³ Chances are slightly better that the sides might agree before February 2021 on a five-year extension for the treaty, judging that the status quo is, on balance, preferable to a renewed strategic competition with no agreed constraints. But it is hard to predict how decision-makers will ultimately balance the political costs and benefits of such an agreement.

The political cross-currents in Washington are especially challenging. In 2017, Trump disparaged New START as “one sided”, and “just another bad deal that the country made” under Obama.²⁴⁴ His current National Security Advisor, John Bolton, a longstanding critic of arms control, reportedly criticized New START for perpetuating US-Russian numerical parity in key treaty limits. Moreover, it remains an open question whether they appreciate, as Bell points out, that NATO allies expect to see a “robust” arms control posture by Washington as a quid pro quo for their closing ranks behind enhancements to NATO’s nuclear posture required to respond to Russia’s threatening behaviour.²⁴⁵ On the other hand, if the Trump administration is perceived as indifferent or openly hostile to extending New START, it will risk losing the necessary approval of the Democratic-controlled House of Representatives to fund the nuclear modernization and missile defence programmes.

To avoid an arms control impasse, some former US officials favour a pragmatic solution: the United States, in their view, should agree to a five-year extension for New START, thereby preserving its transparency, predictability, and stability benefits, while initiating high-level “strategic stability” talks in various formats – bilaterally with Russia, trilaterally (to include China), and multilaterally (to include France, the United Kingdom and potentially others). The purpose of these talks would not be to negotiate a new arms control treaty, but to have an in-depth discussion of each side’s strategic concerns and to identify practical measures to reduce the risk of war – which is, after all, the shared objective of deterrence and arms control.²⁴⁶ In their recent article urging the resumption of a productive dialogue with Moscow, a former senior Obama administration official and retired US senator widely respected for their expertise on strategic affairs summed up the situation as follows: “For decades, strategic stability between the United States and Russia included a mutual recognition of vital interests, redlines, and the means to reduce the risks of accidents or miscalculations leading to conflict, and especially the use of nuclear weapons. Today,

243 A US National Security Council staff member stated in late May 2019 that a presidential decision on whether to extend New START would be made “next year” (Reuters 2019).

244 Landay & Rohde 2017.

245 Op. cit., Bell.

246 Keynote speech by the Honourable Frank Rose, former US Assistant Secretary of State for Arms Control, Verification and Compliance (2014–17), at FIIA public seminar in Helsinki, March 2019.

however, clashing national interests, insufficient dialogue, eroding arms control structures, advanced missile systems, and new cyberweapons have destabilized the old equilibrium. Political polarization in Washington has only made matters worse, undoing any remnants of a domestic consensus about US foreign policy toward Russia. Unless Washington and Moscow confront these problems now, a major international conflict or nuclear escalation is disturbingly plausible—perhaps even likely.”²⁴⁷

247 Moniz & Nunn 2019.

THE INTERNATIONAL LEGAL FRAMEWORK: THE DIVIDE BETWEEN NON-PROLIFERATION AND ABOLITION (KATJA CREUTZ)

The multilateral regulatory framework on nuclear weapons has so far focused on preventing the proliferation of nuclear weapons with the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT). A number of international conventions also exist establishing nuclear-weapon-free zones, in addition to which there are different international initiatives on export control.²⁴⁸ However, there is currently no general prohibition in place for the use of nuclear weapons, unlike other weapons of mass destruction. Besides arms control treaties, there are several branches of international law regulating issues that are relevant for the legality of threat or use of nuclear weapons. These include primarily the law on the use of force and international humanitarian law, but also international environmental law and international human rights law.

The main regulatory regime on nuclear weapons, namely the NPT, builds upon the three pillars of non-proliferation, disarmament and peaceful uses of nuclear energy. While seeking to stop the spread of nuclear weapons to new states and the expansion of existing arsenals (Arts. I and II), it promotes nuclear and general disarmament (Art. VI), while recognizing the rights of states to nuclear energy for peaceful purposes (Art. IV). The nearly universal treaty enjoys broad political backing with five nuclear weapon states and 186 non-nuclear weapon states as state parties to the convention. The NPT regime has generally been considered more effective in terms of non-proliferation than disarmament, which may in part explain why much international attention has in the recent years been paid to humanitarian and environmental aspects of nuclear weapons. Yet, it is worth mentioning that some of the states now possessing nuclear weapons have never joined the NPT to begin with, such as India and Pakistan, in addition to which North Korea withdrew from the NPT in 2003.

Parallel to the non-proliferation regime, there is a long-term, ongoing process seeking to prohibit or abolish nuclear weapons. Since 1946, the UN General Assembly has pursued the elimination agenda at the initiative of non-aligned states, and it has on several occasions adopted resolutions describing the threat or use of nuclear weapons as violations of the UN Charter's Art. 2(4) and as a crime against humanity.²⁴⁹ One milestone in the battle to abolish nuclear weapons was reached in 1994, when the UN General Assembly decided to ask the International Court of Justice (ICJ), the world organization's main judicial organ, for an advisory opinion on the legality of the threat or use of nuclear weapons. In the Court's opinion,²⁵⁰ nothing in international law authorizes or prohibits the threat or use of nuclear weapons as such. However, the legality of threat or use depends upon how pertinent international legal obligations are followed: all situations must abide by international humanitarian law and the UN Charter obligations, especially Art. 51 of the UN Charter. However, according to the ICJ: "The Court cannot conclude definitely whether the threat or use of nuclear weapons would be

248 An example of the former category is the 1967 Treaty on Tlatelolco, which prohibits nuclear weapons in Latin America and the Caribbean, and of the latter category, the Nuclear Supplier Group's (NSG) Guidelines of 1978.

249 For example UNGA res. 46/37D, 6 December 1991.

250 *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, ICJ Reports 1996, 226.*

lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of the State would be at stake.”²⁵¹ Thus, the Court effectively delivered a *non liquet*.²⁵²

Another major step for the abolition movement seeking to ban nuclear weapons was taken on 7 July 2017, when the UN adopted the Treaty on the Prohibition of Nuclear Weapons (TPNW) with 122 signatory states.²⁵³ The TPNW was motivated by ethical and humanitarian concerns as the state parties note “the catastrophic humanitarian consequences that would result from any use of nuclear weapons.”²⁵⁴ Other drivers were the slow pace of nuclear disarmament, and the continued reliance on nuclear weapons in military and security policies and doctrines. While the Treaty prohibits state parties from the threat or use of nuclear weapons, its prohibitions extend also, *inter alia*, to developing, testing or possessing nuclear weapons, as well as allowing nuclear weapons in the territory of state parties. The Treaty also contains novel regulation on victim assistance and environmental remediation.

The Treaty was adopted after a remarkably short period of negotiations, but it will enter into force only 90 days after 50 ratifications. At the time of writing, twenty states have ratified the TPNW, most of which are from Latin America, the Caribbean or Asia. None of the nuclear powers have ratified the treaty, and the United States, United Kingdom and France have declared that they will never sign up to the TPNW as it is incompatible with deterrence policy. US allies are also generally reluctant to embrace the new Treaty. Accordingly, the future of the TPNW remains uncertain. The high number of signatory states does not automatically indicate that the Treaty will enter into force. There is no correspondence between support for a treaty at the time of its adoption and subsequent rates of ratifications, which is a completely independent procedure.²⁵⁵ Yet signatory states are already under an obligation not to undermine the purpose of the treaty even before ratification.²⁵⁶

The quick adoption process of the Treaty nevertheless reveals deep disappointment among a large number of non-nuclear weapon states with the review process of the NPT, another round of which will take place again in 2020. The TPNW also aims to fulfil an expressive function, namely to signal which states are for a nuclear weapons-free world and which are not. Such divisive aims have nevertheless been criticized in today’s world where the trust deficit increasingly undermines the cooperative dialogue.²⁵⁷ It has also been claimed that the most fundamental objection against the TPNW is that it makes the policy of deterrence unlawful.

Indeed, the policy of deterrence is central to both regulatory approaches to nuclear weapons. When it comes to the non-proliferation regime, deterrence is essential as it allows allied countries to stay nuclear weapons-free while benefiting from deterrence. For example, the

251 *Ibid.*, para 105E.

252 Koskenniemi 1997, 140.

253 Treaty on the Prohibition of Nuclear Weapons, UN Doc. A/CONF.229/2017/8, 7 July 2017.

254 *Ibid.*, preamble, para. 2.

255 Paddeu 2018, 96 (citing Simma 1986).

256 Vienna Convention on the Law of Treaties, Vienna 1969, in force 1980, 1155 United Nations Treaty Series 331, art. 18.

257 Ford 2018.

NATO nuclear arrangements are taken to form an accepted part of the NPT regime,²⁵⁸ and a concrete way in which the spread of nuclear weapons is hindered. However, the NPT also imposes an obligation upon nuclear weapon states to eventually disarm, which would affect deterrence policies as well. Nonetheless, this would take place only through a step-by-step process, in stark contrast to the TPNW, which explicitly prohibits the threat to use nuclear weapons (Art. 1d). Moreover, the TPNW also outlaws seeking or receiving assistance “from anyone to engage in any activity prohibited to a State party” (Art. 1e). Accordingly, the policy of deterrence seems incompatible with the TPNW.

It is noteworthy that there are other legal developments that signal support for the prohibition of the threat or use of nuclear weapons, for instance, within international human rights law. One recent example is to be found in the work of the UN Human Rights Committee, which in 2018 issued General Comment 36 on the International Covenant on Civil and Political Rights’ (ICCPR) Article 6 on the Right to Life. This General Comment seeks to instruct state parties, inter alia, on the right to life and the use of nuclear weapons. The Committee observes that nuclear weapons are irreconcilable with respect for the right to life and may amount to a crime under international law due to the indiscriminate character of the weapons, as well as the disastrous scope of destruction of human life.²⁵⁹ The General Comment fails, however, to urge contracting states to sign up to any treaty, such as the TPNW. It is also noteworthy that the legal relevance of such comments is disputed.

All in all, international law has since the *Lotus* case followed the principle that what is not explicitly prohibited under international law, is permitted.²⁶⁰ The humanitarian movement has nonetheless persistently and effectively voiced its concern about the acceptance and use of nuclear weapons due to the enormous and irreversible effects on humankind, without managing conclusively thus far to swing the pendulum towards comprehensive abolition. The new TPNW is not insignificant, however, as it will force the NPT regime to prove itself. It has also highlighted for public debate both the lawfulness of the use of nuclear weapons and the policy of nuclear deterrence. Its adoption ends the twenty-year-long period of stagnation in multilateral nuclear arms control, and it will most certainly put pressure on nuclear weapons states and their allies. But as long as the nuclear powers reject abolition policies, international law will be uncertain about the threat or use of nuclear weapons, as political agreement is needed to settle the matter.

258 NATO 2017.

259 General Comment No. 36 (2018) on Article 6 of the International Covenant on Civil and Political Rights, on the Right to Life, UN Doc. CCPR/C/GC/36, 30 October 2018, para. 66.

260 PCIJ, Series A, No 10, 18–19.

7 Challenges for Northern Europe

This chapter scrutinizes the challenges that the re-emergence of nuclear weapons and strategic deterrence as prominent factors in world politics pose for Northern Europe. The main thrust is that after two or three decades of expeditionary operations, territorial defence concerns have resurfaced and, consequently, Nordic-Baltic states have increasingly engaged in deterrence efforts during the recent half a decade. National deterrence postures notwithstanding, extended deterrence provided by NATO (and the United States) plays a crucial role not only for the regional NATO members but increasingly for militarily non-aligned countries, namely Finland and Sweden. Nuclear weapons are part of the game. Russia has the full nuclear triad in the region, and NATO's regional deterrence is ultimately based on the possibility to use nuclear weapons against a potential aggressor. So far, the deterrence-related concerns have overshadowed arms control activities, which is evident, for example, in Nordic-Baltic governments' reactions to the TPNW.

One of the most crucial recent trajectories for Northern Europe's security has been intensified strategic competition between major powers, which has accentuated the geostrategic importance of the region. Northern Europe consists of two distinct areas, both having high strategic significance. First, the High North – home to the Russian Northern Fleet, including SSBN and SSN bases on the Kola Peninsula – is once again attracting the attention of Western defence planners. Second, there is the Baltic Sea region, where, as a reaction to Russia's military posture and increased activities in the region (large-scale "snap" exercises, provocative intrusions into national airspace and territorial waters), NATO has taken concrete measures to enhance deterrence and reassure its members.

Understanding the geostrategic realities of Northern Europe is crucial not only for regional policy-makers but also for decision-makers in the Euro-Atlantic community. The region is tightly connected to global security dynamics, particularly to West-Russia relations, and cannot be isolated from growing strategic competition. Conventional and nuclear deterrence will be part of the respective toolboxes of the regional players in the new

competitive era.²⁶¹ In other words, regional players, allied and non-allied, must view their national efforts in the larger context. This applies to Finland, which has increasingly integrated itself into the Western defence and deterrence system.

7.1 Northern European geostrategy: the big picture

There is both continuity and change in the post-Second World War geostrategy of Northern Europe. The High North started to gain increasing strategic importance in the latter half of the 1960s. Although the planned flight routes of US strategic bombers had underscored Northern Europe's significance in the early post-war years, NATO's flexible response strategy further elevated the importance of the Alliance's flanks, including the northern one. Moreover, the Alliance responded to the Soviet naval build-up and woke up to the threat of ballistic missile submarines that the Soviet Union introduced at the end of the 1960s. The region became a strategic theatre in its own right.²⁶²

The end of the Cold War changed the lenses through which policy-makers perceived the Arctic region. Compared to its predecessor, post-Soviet Russia was a much weaker power, with limited means to achieve its geopolitical ambitions. As a result, West-Russia relations entered a new era, characterized by efforts to build partnership, not antagonism. Suddenly, the Arctic region and the North Atlantic lost much of the importance it had gained during the Cold War. In fact, the High North emerged as a zone of cooperation and low tensions. This was exemplified by the 1996 launch of the Arctic Council, for example, which remains a forum addressing various Arctic issues in a cooperative spirit.

The transformation brought about by Russia's assertiveness, especially after its intervention in Ukraine in 2014, and NATO's subsequent increased emphasis on collective defence have once again thrust the region to the forefront of strategic thinking. Again, the High North has profound geostrategic importance for both NATO and Russia akin to the Cold War era. In short, the Russian strategic nuclear triad is present in the region, and ballistic missile submarines are of utmost importance for the country since they constitute the most potent second strike capability Russia has in the highly unlikely event of a nuclear war. Moreover, the Arctic Ocean provides Russia with the only uncontested access to the Atlantic Ocean, further underscoring the importance of the Arctic for Russia's great-power

261 Bowers 2018.

262 See e.g. Dyndal 2011.

ambitions and security. Hence, it is no surprise that Russia has strengthened its military presence in the region during recent years.²⁶³

From NATO's vantage point, the Arctic has gradually increased its significance, since control of the North Atlantic (including the so-called GIUK gap) is crucial for NATO in terms of potential US crisis-time reinforcements to Europe. Consequently, NATO has established a new Joint Force Command, which focuses on the improvement of NATO's deterrence capabilities in the North Atlantic region. Moreover, in addition to pre-positioning military equipment in Norway, the United States has deployed a rotational force in the country consisting of 700 marines.²⁶⁴

The regional security constellation of the Baltic Sea region – the other Northern theatre – changed dramatically after the end of the Cold War. First, Estonia, Latvia, and Lithuania regained their independence and established strong democratic systems. The collapse of the Soviet Union resulted in Russia's withdrawal to the eastern corner of the Baltic Sea. Second, NATO's foothold eventually grew stronger in the region. In 1999, Poland joined the Alliance, to be followed in 2004 by the three Baltic states. The enlargement process – which was not accompanied by any deployment of NATO forces (or infrastructure) – did not immediately change the strategic reality of the region. Russia's response was rather mild, and it had not yet started the ambitious modernization project of its armed forces. NATO took charge of the Baltic states' air-policing requirement, but the Alliance did not seriously address contingency planning for the defence of its new members until the early 2010s. Indeed, the first NATO exercise (Steadfast Jazz) involving defence of Poland and the Baltic states took place in 2013.

Russian aggression against Ukraine strongly reverberated across the Baltic Sea region, convincing NATO to step up efforts to establish credible deterrence and reassure its members there. NATO has relied solely on conventional forces for this purpose, including the relatively modest deployment of rotational "trip-wire" NATO multinational battalions.²⁶⁵

Along with the Western powers, Russia has significant interests in the region. Russia's main interests in the Baltic Sea region are connected to protecting its second largest city, Saint Petersburg, and the exclave of Kaliningrad. Moreover, the bulk of Russia's exports are transported through the Baltic Sea, and hence the region is highly important for Russia's economy. Compared to Russia's capabilities in the High North, its nuclear assets in the region are perhaps less considerable. However, in recent years, Russia has deployed various

263 Mikkola 2019.

264 Mikkola 2019; Flanagan 2018.

265 For a summary of NATO's actions, see https://www.nato.int/cps/en/natohq/topics_136388.htm.

modern weapon systems – often referred to as A2/AD capabilities – to the area. At the moment, the systems are conventional, but some of them – like the 9K720 Iskander – are also capable of carrying nuclear warheads. From Moscow’s perspective, a key purpose of the A2/AD resources is undoubtedly to protect Russia’s territory from a Western incursion. The second purpose is to erect a potential “shield” against NATO efforts to reinforce defences in the Nordic-Baltic region in case Russia decides to attack some of the countries in its vicinity. In addition to these aims, Moscow has also used the deployment and (occasionally dangerous) manoeuvring of these systems to convey a strategic message about its military prowess.²⁶⁶ The region has duly become an arena for Russian sabre-rattling. Moreover, during the last decade, Russia has beefed up the size and power of its Western military district and enjoys a considerable advantage in the regional force correlation.²⁶⁷ New missile systems deployed to the region have increased Russian firepower, which has been demonstrated in increasingly sophisticated military exercises.

7.2 Deterrence postures in Northern Europe

The Nordic-Baltic states’ chief response to Russia’s aggression has been the enhancement of conventional deterrence. The countries in the region pursue considerably different deterrence strategies, and it is useful to present a brief overview of the diversity of national approaches because the strategies effectively constitute the broader regional deterrence framework. The Northern European deterrence system is thus a *mélange* of national efforts, buttressed by extended deterrence provided by NATO and, effectively, the United States.²⁶⁸

The Baltic states have pursued rather similar defence strategies, with some notable differences regarding the emphasis and tempo of their respective policies. After the re-independence of the trio in 1991, the Baltic countries planned to pursue strategies inspired by a total defence concept. Their successful bids to join NATO, however, shifted their emphasis onto expeditionary operations, such as the NATO operation in Afghanistan, as the states wanted to express their *bona fides* as trustworthy allies. Estonia in particular took an active role in developing its defence capabilities, whereas Latvian and Lithuanian ambitions were somewhat lower. When Russia’s resurgence started becoming evident, the Baltic states swiftly reverted to territorial defence. Estonia, Latvia and Lithuania have increased their defence budgets and they now reach the NATO 2 percent of GDP target

266 Dalsjö et al. 2019.

267 Boston et al. 2018.

268 For a recent assessment on how the Baltic states might employ emerging technology to defend against Russia, see Hammes 2019.

for defence spending.²⁶⁹ However, and importantly, given their small economies and the glaring asymmetry between them and Russia, it is practically impossible for the Balts to establish a credible independent deterrence posture. Rather, their respective armed forces follow a “porcupine strategy” aimed at winning time before NATO reinforcements reach the theatre.²⁷⁰

As to extended deterrence in the Baltic Sea area, NATO and US presence in the region complements the respective deterrence and defence efforts of Estonia, Latvia and Lithuania. The Readiness Action Plan begun in 2014 was the Alliance’s first considerable step back to the direction of collective defence. Furthermore, at the 2016 Warsaw Summit, NATO decided to establish a multinational battalion-sized Enhanced Forward Presence operation in the Baltic states and Poland. The main objective is to create a “trip-wire” effect against a potential aggressor. In other words, the presence of NATO troops from various allies is meant to convince Russia and to reassure the Baltic states that an aggression against any of the states would launch a NATO response to defend allied territory. Consequently, NATO deterrence in the region is based on both principles of deterrence – denial and punishment.²⁷¹ Importantly, what often remains unsaid in everyday political parlance is the fact that the supreme guarantee is provided by the Alliance’s strategic nuclear forces, which makes a military aggression against the regional NATO allies incredibly risky and thus highly unlikely. It is also noteworthy that both European nuclear weapon powers, the United Kingdom and France, are present in the region. Thus, a Russian attack on the Baltic states would quickly encounter forces from two nuclear weapon states – thereby raising the risk to Russia of unleashing a confrontation that it could not necessarily control.

Of the actors in Northern Europe, Norway’s focus is primarily on the High North, not on the Baltic Sea region. It has also refocused on territorial defence questions during recent years, after making significant cuts particularly to its land forces by reducing the number of brigades from 13 to one. As said, the deteriorated security environment has brought the Arctic back into the geopolitical game, and it is the High North and North Atlantic where Norwegian threat perceptions reside. Moreover, Norway has made important procurements lately, which further underscore its defence policy reappraisal. As early as 2008, it decided to purchase F-35s, and the first fighters were delivered in 2017. In addition to F-35s, it has decided to buy new submarines from Germany and P3 maritime patrol planes, both indicators of traditional defence concerns.²⁷² It is important to note that Norway’s deterrence relies largely on NATO, and from the Alliance’s vantage point, the territory and adjacent waters of Norway are crucial for collective defence operations.

269 Hedberg & Kasekamp 2018.

270 Clark et al. 2016.

271 See e.g. Kofmann 2016; Milevski 2018; Shea 2018.

272 Friis 2019.

As the potential frontline retreated further to the east, Denmark made a notable shift in its defence policy. In other words, Copenhagen became a highly active actor in high-intensity crisis management, and is still taking an active part in multiple expeditionary operations, including in Afghanistan. However, in terms of force structure, it has intentionally not maintained a full-spectrum defence force. Although the general Western focus has now changed, Denmark has not taken significant steps to reintroduce territorial defence capabilities.²⁷³ Some adaptation is nonetheless underway, and the importance of the Baltic Sea region has also grown in Copenhagen's eyes. The latest defence agreement from 2018 sets the goal of having the capability to deploy a heavy brigade, for example, to assist the Baltic states from 2024.²⁷⁴

In order to form a complete picture of Western deterrence efforts in Northern Europe, one should not omit militarily non-aligned Finland and Sweden.

Finland has long been an exceptional actor in post-Cold War Europe in terms of its deterrence posture. Regardless of all of the positive developments in European and global security, it decided to adhere to conscription and a territorial defence system, when other countries discontinued obligatory military service and geared their defence policy towards expeditionary operations. The Finnish system has long relied on the idea of deterrence by denial, which is the case in the current security environment as well. However, after the shocks of 2014, Finland has intensified defence cooperation with the United States, NATO, and Sweden, for example, with the stated aim of improving deterrence. Finland will, however, remain as a country not belonging to a military alliance, and the form of extended deterrence that Finland might expect from the Alliance is ambiguous in nature.²⁷⁵ Suffice it to say that Finland, as a close Partner of NATO but not a member of the Alliance, does not benefit from the same treaty commitment, under NATO's Article 5, that serves to reassure NATO's 29 allies and to deter possible aggression. Moreover, while Finland (like Sweden) has intensified its interactions with NATO as a result of its status as an "Enhanced Opportunity Partner", those interactions do not include – and almost certainly will not be extended to – participation in NATO's Nuclear Planning Group.²⁷⁶

Sweden was among those European nations that greatly reduced their territorial defence capabilities following the collapse of the Soviet Union. Sweden's decision can be seen as exceptionally drastic, since its Cold War total defence system was strong and impressive. Subsequently, Sweden has decided to revert to territorial defence as the primary objective of its defence policy, and Stockholm has shifted its focus back to defending its own

273 Petersson 2018.

274 Szymański 2018.

275 Salonijs-Pasternak 2019.

276 See e.g. Michel 2016.

territory. It has reintroduced conscription, increased its defence budget and deployed troops to the island of Gotland. On the procurement side, Sweden has also decided to buy the Patriot air defence system. These developments notwithstanding, the country allegedly suffers from a “deterrence deficit”,²⁷⁷ and despite its military non-alignment, its defence essentially relies on foreign assistance. Sweden’s national security strategy, for example, explicitly states that Swedish defence forces will defend Sweden with others.²⁷⁸

To conclude, territorial defence concerns have made a comeback in Northern Europe. The regional actors have limited capabilities to establish an independent deterrence posture partly due to the defence policies they pursued in the first decades of the post-Cold War era. More importantly, the potential aggressor that the states in the region face – Russia – is still a military great power, which makes force asymmetry between the West and Russia a noteworthy challenge. The regional NATO members explicitly rely on extended deterrence provided by the Alliance. Moreover, the Northern European allies have either a NATO or a US presence on their respective soils. Lastly, NATO’s defence strategy in the region is primarily based on deterrence by punishment.

7.3 Nuclear weapons and regional security

As previously stated, nuclear weapons are part of deterrence in Northern Europe, which has implications for all of the regional players. The only deployed nuclear weapons in the region are those possessed by Russia, as NATO has no nuclear weapons in the region. Norway and Denmark have pursued a consistent policy, refusing to station nuclear weapons on their soil in peacetime. Moreover, as previously noted, according to the NATO-Russia Founding Act, the Alliance has no intention or plans to establish nuclear weapon storage sites on the territory of new member states such as Poland and the Baltic states.²⁷⁹

Given that Northern Europe is a contact zone for two actors armed with nuclear weapons, a regional military conflict between NATO and Russia is highly prone to nuclear escalation.²⁸⁰ For example, in their article arguing for NATO to adopt a deterrence-by-denial approach in the Baltic Sea region, Jüri Luik and Tomas Jermalavičius envisage a scenario where, after seizing the Baltic states, Russia seeks to dissuade NATO from fulfilling its collective defence obligations. They claim that “Moscow might even order the actual

277 Dalsjö 2019.

278 Government offices of Sweden, Prime Minister’s office 2017.

279 NATO 1997.

280 Kofman 2016.

detonation of a nuclear weapon in some non-populated yet strategically important area (e.g. above the high seas in the Greenland-Iceland-UK gap) to reinforce the message and underline the credibility of the threat". Such a move would force NATO to decide whether it would respond in kind or even take a further step on the escalation ladder.²⁸¹

7.4 Nuclear arms control

Deterrence-related concerns have clearly dominated Nordic-Baltic agendas in the last half decade. Owing to this emphasis, arms control policies have been somewhat eclipsed. Currently, there is no new activity in sight, but the situation might be changing, as the reverberations of a changing world order become stronger in Northern Europe. A rules-based international order is particularly crucial for small states such as the Nordic-Baltic countries. From the perspective of lesser states, effective and stabilizing arms control regimes are part and parcel of such an order, since they can easily be the first victims of unravelling great-power stability. Therefore, the recent developments, such as the collapse of the INF Treaty, have been a cause for concern among Northern Europeans to a varying degree.

Nuclear arms control has been a traditional item on the foreign policy agendas of the Nordic countries.²⁸² However, every state has had its own distinctive "national nuclear style", which has again affected its respective policies in the field of arms control. After giving up its own nuclear weapons programme in the mid-1960s, Sweden has been a vocal proponent of nuclear arms control. In the post-Cold War era, Sweden has for example criticized nuclear weapon states and their lack of progress in nuclear disarmament. Moreover, it has also voiced its concern over the non-strategic nuclear weapons deployed in Europe. In 2010, for example, the foreign ministers of Sweden and Poland called on the US and Russia to reduce the stockpile of their tactical nuclear weapons in Europe.²⁸³

More recently, Sweden – unlike Finland, Norway and Denmark – participated in the TPNW negotiations. Sweden has not proceeded to ratification, however. The TPNW question duly became a political bone of contention in the country, particularly between the foreign and defence ministries, both led by prominent Social Democrats. To resolve – or to bury – the question, the government decided to commission an independent study, which was conducted by former diplomat Lars-Erik Lundin. The report suggested that Sweden should not join the treaty in its current form. In July 2019, the Swedish Government announced

281 Luik & Jermalavičius 2017, 235–236.

282 See e.g. van Dassen & Wetter 2006.

283 Bild & Sikorski 2010.

that it “will refrain from signing or pursuing ratification of the TPNW at the present time.” At the same time, according to the government statement, the government parties “are continuing to work for a ban on nuclear weapons through Sweden’s participation as an observer (to the UN TPNW)”, and the government will establish a Swedish “knowledge centre on nuclear disarmament” aimed at ensuring that Swedish knowledge in related areas is “strengthened and updated...on a broad front, among diplomats and politicians, but also students, civil society and the media.”²⁸⁴

In the Cold War, Finnish nuclear non-proliferation activities were focused on its immediate security environment.²⁸⁵ The most notable Finnish initiative was the proposal to create a nuclear weapons-free zone in Northern Europe. In the last few decades, Finland’s activity in nuclear arms control has been less visible. Compared to Sweden, for example, the Finnish approach can be described as pragmatic.²⁸⁶ Finland sees the NPT as the cornerstone of global nuclear arms-control efforts, and the NPT-based approach was also the main argument for not being part of the TPNW process.²⁸⁷ Public interest towards nuclear weapons is nevertheless low, which partly explains why there was little bottom-up pressure for the Finnish government to study the possibility of ratifying the TPNW.²⁸⁸ More recently, Finland has played an active role in the Global Initiative to Combat Nuclear Terrorism.

Norway and Denmark have traditionally been balancing between their Alliance commitments and anti-nuclear sentiments within some political parties and in the broader civil society. Whereas in Denmark nuclear weapons do not feature prominently in the public debate and the country has no strong nuclear arms control agenda, in Norway nuclear weapons attract public attention. The TPNW is a case in point. Norway did not participate in the negotiations but, due to public pressure, parliament pushed the government to study the issue. The report concluded that Norway could not ratify the treaty without compromising its obligations as a NATO member.²⁸⁹ However, Norway has traditionally retained nuclear arms control on its agenda. In 2013 for example, it hosted the first conference on the humanitarian impact of nuclear weapons. It also plays an active role in the nuclear verification regime.

The Baltic states have signed the key treaty on the prevention of nuclear proliferation, namely the NPT, but are not known for strong advocacy of a nuclear-free world. The

284 Swedish Ministry for Foreign Affairs 2019; Regeringskansliet, Utrikesdepartementet 2019.

285 Vesa 1987.

286 Juntunen 2018.

287 Patokallio 2017.

288 Finland has not categorically ruled out the possibility joining the TPNW in the future, but the ratification of the treaty remains unlikely.

289 Norwegian Ministry of Foreign Affairs 2018.

extended deterrence provided by NATO is extremely important for them, and sacrificing the ultimate guarantee is not in their interests. In line with this policy and their critical approach to Russia, the Balts were not particularly shocked by the collapse of the INF treaty. The Baltic states might potentially be interested in regional arms control. Russia's stockpile of non-strategic nuclear weapons and the new dually capable long-range systems pose a concrete threat to the Baltic states. Thus far, Russia has shown zero interest in negotiating the reduction or elimination of its tactical nuclear weapons.

Since the Nordic-Baltic countries have diverse approaches to their respective foreign, security and defence policies, and their 'nuclear styles' duly differ, it is doubtful that they could pursue a joint arms control agenda.²⁹⁰ The Nordic countries, particularly Sweden, Finland and perhaps Norway, could find some common ground. In his FIIA Working Paper, Tapio Juntunen suggests that the Nordics could call for "the Europeanization of the INF Treaty". In other words, they should advocate limiting the INF's geographical scope to Europe. Given Russia's dual use and non-strategic capabilities, Northern European countries might also have a strategic interest to promote such an initiative. Juntunen argues that "the Nordic countries could also use the proposal as a platform to assert the specific sub-regional security concerns together with their allies".²⁹¹ The Europeanization of the INF might face difficulties, however, owing to the potentially one-sided nature of such a treaty. Russia could easily redeploy its weapon systems west of the Urals, whereas US systems (if it were to build new INF ground systems) would have been banned from Europe.

There are also additional, low-key measures to ensure regional stability, which do not directly touch upon nuclear weapons but are nonetheless indirectly linked to managing escalation between nuclear powers. For instance, Ulrich Kühn has suggested three broad risk reduction measures to strengthen regional stability in the Baltic Sea region. These include the introduction of military-to-military crisis communication channels between NATO and Russia. Moreover, Brussels and Moscow could talk about how best to avoid accidental escalation in the region. Here, the Finnish initiative to improve air safety in the Baltic Sea region is one useful example. Finally, resuming NATO-Russia talks about military and nuclear weapons matters might help to mitigate misperceptions and reduce the risk of inadvertent escalation.²⁹² Wolfgang Richter has made similar suggestions. His proposals include, for example, the intensification of Open Skies flights, greater transparency of military exercises and the establishment of an Incident Prevention and Response Mechanism in order to avoid miscalculations and escalation.²⁹³

290 See e.g. Iso-Markku et al. 2018, 30.

291 Juntunen 2019.

292 Kühn 2018, 63–64.

293 Richter 2016.

Any joint activity on nuclear arms control promotion must start from a common understanding of the security environment. Thus, the Nordic-Baltic countries should endeavour to enhance understanding on both (nuclear) deterrence and arms control matters. These issues could be addressed in elite-level formats such as Nordefco and the Nordic-Baltic Eight. Furthermore, regional epistemic communities should also strive to enhance their understanding of the elements of strategic stability, which could eventually translate into solid official policies.

8 Conclusions

In the last few years, nuclear deterrence has made a comeback to the forefront of international politics. The return is associated with great-power politics, regional security dynamics and technological advances. At the same time, the strategic environment is becoming increasingly complex, which has implications not only for the great powers but also for small states such as Finland.

In terms of the nature of strategic deterrence, the new adversarial era differs from the Cold War in one crucial respect. The primary nuclear weapon powers, the United States and Russia, must now cope not only with themselves but also with multipolar challenges. As China is slowly taking on the mantle of a superpower, its nuclear capabilities can no longer be treated as a mere footnote. China invests considerable resources in maintaining a limited, survivable nuclear force that can guarantee a damaging retaliatory strike, and it is also developing new capabilities such as new mobile missiles armed with MIRVs. The key conclusion is that the United States (and its European nuclear allies) must increasingly take China into account in their nuclear planning.

In addition to the changing balance of power, there are new regional players and concerns related to nuclear weapons. North Korea's leadership views the country's nuclear capabilities as a guarantee of regime survival, and Pyongyang uses nuclear brinkmanship as a means of advancing policy objectives. Unlike North Korea, Iran has stopped short of becoming a nuclear-armed state. However, owing in part to the Trump administration's withdrawal from the JCPOA, the regional situation has become volatile. Despite their disagreement over the JCPOA, a number of European and Middle East governments broadly share long-standing American concerns about the implications of a potentially nuclear-armed Iran.

The security landscape in Europe has also changed, and European thinking about extended deterrence has had to adjust to new factors. First, the "geography" of extended deterrence has dramatically changed since the end of the Cold War, as former Soviet Republics and satellites joined NATO. Secondly, the types of threats that allies would like to deter have become more diverse. "Hybrid" threats –ranging from "little green men" to

cyber-attacks on critical infrastructure, financial networks, and military command, control, and communications networks – could complicate national and NATO decision-making. Finally, the renewed discussion on nuclear weapons has also re-energized efforts, at least in the West, to delegitimize their role in deterrence in general and, in particular, as a necessary component of extended deterrence.

Additionally, since the Russian military intervention in Ukraine in 2014, NATO has focused new attention on nuclear issues as part of its broader efforts to accomplish its deterrence and collective defence objectives. The key questions vis-à-vis adjustments will concern the sustainability of existing nuclear-sharing agreements and the prospects for a more independent European nuclear deterrent.

The intersection of technological change and an increasingly multipolar threat environment has further complicated previous deterrence calculations. Three broad trends since the early 1990s are of particular concern. First, the dissemination of nuclear, missile, and related technologies made it possible for additional states (Pakistan and North Korea) to join the ranks of nuclear weapon states, and their pace of development has generally exceeded expectations. Secondly, technological advances have facilitated the development and proliferation of non-nuclear and dual-capable weapons that can have strategic effects. Thirdly, the rapid development of offensive cyber, “counterspace”, and AI capabilities pose additional challenges to deterrence.

Furthermore, and importantly, the three nuclear allies and Russia are all modernizing the core elements of their existing nuclear forces, which further highlights the persistence of nuclear deterrence. Both the United States and Russia will maintain and develop their respective nuclear triads in the future. In particular, Russia’s ambitions to introduce hypersonic systems have attracted considerable interest. Furthermore, France will modernize its existing sea- and airborne capabilities, and nuclear deterrence will remain the bedrock of its strategic independence. In the United Kingdom, political support behind the country’s nuclear deterrent is shakier than in France. This fact notwithstanding, its modernization programme, aimed at replacing the current SSBN fleet with new vessels, is currently underway, and without dramatic changes in its domestic environment the UK will remain a nuclear weapon power.

Nuclear arms control has been the other element of strategic stability for decades, but now the existing regimes between the United States and Russia are at a crossroads. The INF has collapsed, and the future of the New START Treaty, expiring in 2021, looks bleak, as mutual political will seems to be lacking and obstacles and different interests appear insurmountable, although treaties from SALT I through New START have been beneficial. Washington and Moscow have progressively increased transparency, while promoting

greater strategic stability. At the same time, neither side has sacrificed its ability to deter the other, nor its ability to modernize its forces.

Growing great-power competition and the associated return of nuclear deterrence have profound implications for Northern Europe in general and the Nordic-Baltic countries in particular. The changed security landscape has already emphasized the importance of the High North. Control of the strategic locations of the Arctic region is crucial for both NATO's and Russia's defence. Furthermore, as a response to Russian aggression in Europe, NATO has considerably consolidated its extended deterrence efforts in the Baltic Sea region. Extended deterrence provided by NATO, and the independent deterrence efforts of the allied countries and Finland and Sweden, form the general deterrence framework of the region.

Nuclear weapons are part of the regional reality in Northern Europe. Russia's nuclear triad is present in the region, and it has increasingly deployed dual-capable conventional systems in the areas proximate to NATO. Moreover, NATO's deterrence ultimately rests on nuclear weapons, and all three nuclear allies have troops either in one of the Baltic states or in Poland as part of NATO's Enhanced Forward Presence.

The erosion of arms control regimes primarily poses a foreign policy challenge for the countries in Northern Europe. However, the Nordic-Baltic states do not share a similar approach to nuclear arms control, and forging joint policy is difficult even between like-minded countries such as Finland, Sweden and Norway. The most realistic option going forward would be to advocate additional risk-reduction measures that would mitigate the risk of a potentially disastrous military escalation. Moreover, the Nordic-Baltic countries should improve both bureaucratic and societal expertise on nuclear deterrence in order to be effective agents in a global world arena in which the nuclear dimension is ever more notably present.

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