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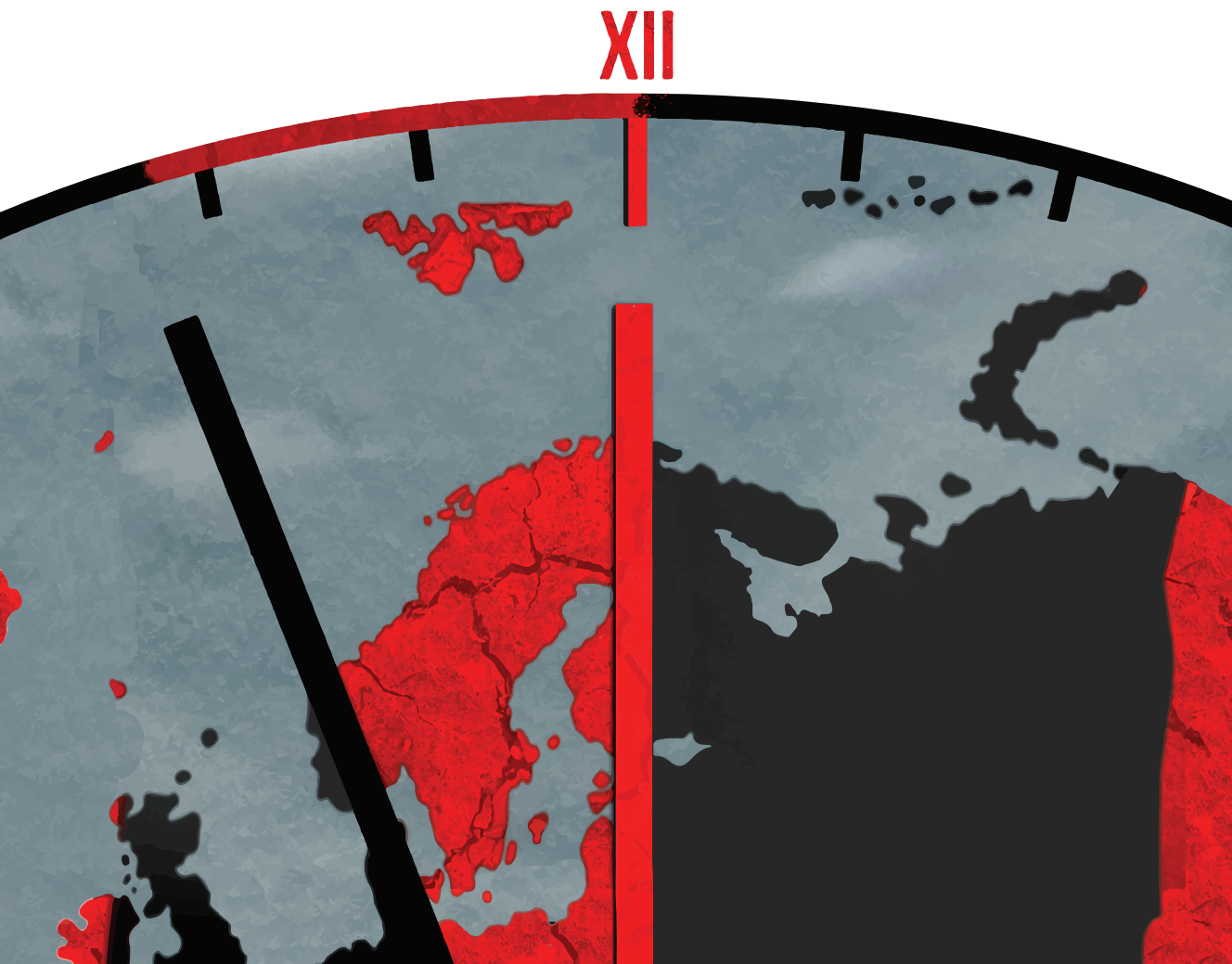
Arms Control in Europe: Regimes, Trends and Threats

Edited by Tommi Koivula and Katariina Simonen



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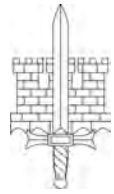

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List of Acronyms and Abbreviations

ABL
Airborne Laser

ABM
Anti Ballistic Missile System

AG
Australia Group

ALCM
Air-Launched Cruise Missile

ARF
ASEAN Regional Forum

ASEAN
Association of Southeast Asian Nations

ASMPA
French system of cruise missiles (Air-Sol Moyenne Portee Amelioree)

AWS
Autonomous Weapon Systems

A2/AD
Anti-Access Area Denial

BM
Ballistic Missile

BMDR
Ballistic Missile Defense Review

BMD(S)
Ballistic Missile Defense (System)

CBM
Confidence Building Measures

CCW
Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects

CD
Conference on Disarmament

CFE
Treaty on Conventional Forces in Europe

CM
Cruise Missile

COPUOS
Committee on Peaceful Uses of Outer Space

CSBM
Confidence- and Security- Building Measures

CTBT
Comprehensive Nuclear-Test-Ban Treaty

C2
Command and Control

C4ISR
command, control, communications, computers, intelligence, surveillance, and reconnaissance

DDPR
Deterrence and Defense Posture Review

DOD
Department of Defence

DPRK
Democratic People´s Republic of Korea

DSB
Defense Science Board

EMD
European Missile Defense

EMR
European Missile Radar

EPAA
European Phased Adaptive Approach

EPW
Earth Penetrating Warheads

EU
European Union

FBX
Forward-based radars

GAO
Government Accountability Office

GBI
Ground Based Interceptors

GGE
Group of Governmental Experts

GLCM
Ground Launched Cruise Missile

GMD
Ground-based Midcourse Defense

GPALS
Global Protection Against Limited Strikes

HTK
Hit-to-kill

HINW
humanitarian impact of nuclear weapons

IAEA
International Atomic Energy Organization

ICBM
Intercontinental Ballistic Missile

ICJ
International Court of Justice

ICoC
International Code of Conduct for Outer Space Activities

ICRAC
International Committee for Robot Arms Control

ICRC
International Committee of the Red Cross

ICTs
information and communication technologies

IHL
International Humanitarian Law

IISS
International Institute of Strategic Studies

INF
Intermediate-Range Nuclear Forces

INF Treaty
Treaty on Intermediate and Shorter Range Nuclear Forces

IO
information operations

IRBM
Intermediate-Range Ballistic Missile

ISODARCO
International School on Disarmament and Research of Conflicts

IT
information technology

ITU
International Telecommunications Union

IW
information warfare

JASSM
Joint Air-to-Surface Standoff Missile

JCG
Joint Consultative Group

JCPOA
Joint Comprehensive Plan of Action

JP
Joint Publication

KV
Kill Vehicle

LAM
Loitering Attack Munitions

LAW
Lethal autonomous weapons

LRSO
Long-range standoff weapon

MDA
Missile Defense Agency

MEADS
Medium Extended Air Defense System

MENWFZ/WMDFZ
Middle East zone free of nuclear weapons and other weapons of mass destruction

MilBal
Military Balance

MIRV
Multiple Independently Targetable Re-entry Vehicle

MLF
multilateral force

MRBM
Medium-Range Ballistic Missile

MTCR
Missile Technology Control Regime

NATO
North Atlantic Treaty Organization

NATO ALTBMD
NATO Active Layered Theatre Ballistic Missile Defence

NATO MD
NATO Mediterranean Dialogue (policy)

NIAMDS
NATO Integrated Air and Missile Defense System

NCND
'Neither Confirm, Nor Deny' policy

NFU
No First Use Policy

NGO
Non-governmental Organisation

NMD
National Missile Defense

NNWS
non-nuclear weapon state

NPT
Treaty on the Non-Proliferation of Nuclear Weapons

NSA
National Security Agency

NSG
Nuclear Suppliers Group

NTM
National Technical Means

NWS
nuclear weapons state

OAS
Organization of American States

OECD
Organization for Economic Co-operation and Development

OSCE
Organization for Security and Co-operation in Europe

OST
Outer Space Treaty

PAC
Patriot Advanced Capability

PAROS
Prevention of Arms Race in Outer Space

PGM
Precision Guided Munitions

PPD
Presidential Policy Directive

PRC
People's Republic of China

PTBT
Partial Nuclear Test Ban Treaty

PTSS
Precision Tracking and Space Surveillance

RV
Re-entry Vehicle

R&D
Research and Development

SALT
Strategic Arms Limitations Talks

SBIRS
Space-based Infrared System

SBT
Sea-based Terminal Defense

SDI
Strategic Defense Initiative

SLBM
Sea (or Submarine) Launched Ballistic Missile

SLCM
Sea (or Submarine) Launched Cruise Missile

SM
Standard Missile

SOR
Strategic Offensive Reductions Treaty

SORT
Strategic Offensive Reductions Treaty

SPX
Sea-Based Tracking Radar

SRBM
Short-range Ballistic Missile

START
Strategic Arms Reduction Treaty

STSS
Space Tracking and Surveillance System

SVC
Special Verification Commission

TCBM
Transparency and Confidence-building Measure

THAAD
Terminal High Altitude Area Defense

TMD
Tactical Missile Defense

TNT equivalent
Trinitrotoluol equivalent - measure of weight of conventional explosive equaling by destructive power to the yield of a nuclear weapon

TNW
Tactical Nuclear Weapons

UAV
Unmanned Aerial Vehicle

UCAV
Unmanned Combat Aerial Vehicle

USG
United States Government

UCS
Union of Concerned Scientists

UEWR
Upgraded Early Warning Radar

UK
United Kingdom

UN
United Nations

UNGA
United Nations General Assembly

UNIDIR
United Nations Institute for Disarmament Research

UNODA
United Nations Office for Disarmament Affairs

US
United States

VCLT
Vienna Convention of the Law of Treaties

VLS
Vertical Launch System

WMD
Weapons of mass destruction

Introduction

Tommi Koivula and Katariina Simonen

Why This Book is Important

Arms control has been a marginal theme on the European security agenda for several years. This has been the case in particular with nuclear weapons. While Russia and the United States, along with the United Kingdom and France, have maintained and constantly modernized their nuclear arsenals, the rest of Europe seems to have largely lost track of these developments and of the constant reality of nuclear weapons in the European defence policy planning. To the extent that nuclear weapons were given attention during the decades following the end of the Cold War, concerns of nuclear proliferation in the Middle East and Asia gained the upper hand at the expense of any regional focus in the European context.

In the shadow of the war against terrorism, crisis management and other initiatives, the existing arms control structures have crumbled – gradually but extensively. In fact, as of 2017, the compliance pull of the existing regimes is in jeopardy: what will happen to the US–Russia arms control initiatives, such as the Intermediate Nuclear Forces Treaty (INF) or to the regimes intended to cover the majority of states of the Northern hemisphere, such as the Conventional Forces in Europe Treaty (CFE), or for that matter, to the globally binding Treaty on the Non-Proliferation of Nuclear Weapons (NPT), one of the cornerstones of nuclear disarmament and non-proliferation?

Only after the outbreak of the Ukraine crisis have the deficiencies of the arms control and the existing Confidence and Security Building Measures (CSBM) system in Europe been discussed in public, albeit still very superficially. Likewise, with a few notable exceptions, initiatives related to arms control have not led to serious high-level discussions. What's more, deeper policy analysis of cause–effect relations of various initiatives, such as the US modernization of tactical nuclear weapons in Europe or the missile defence, is either lacking or politically motivated. Granted, differences between countries exist, and while some are very aware of the continued risks of the shortcomings of arms control to European security, others' attention has been considerably less sharp. The security policy discourse by decision-makers, the media and the academia on these matters has been conspicuously absent.

To make matters more complicated, not just public indifference, but also a number of technological innovations and the changing ways of political advocacy challenge the existing arms control regimes. Groundbreaking technological advances like artificial intelligence, unmanned and autonomous weapons systems and other innovations have come to influence our contemporary security environment. However important and far-reaching consequences they may have, we lack deeper knowledge about the implications they may bring about to regional security or global stability.

Then again, in the face of the often stagnant intergovernmental negotiations on weapons systems, the role of the civil society in arms control seems to be in a pro-

cess of rapid organization and mobilization. This activity is evidenced in recent years by the successful grass-root campaigns against anti-personnel landmines and cluster munitions, or the ongoing international *Campaign to Stop Killer Robots,* aimed against the militarization of artificial intelligence. In essence, a key characteristic to this way of campaigning is the passion to reach results more rapidly than through the more conventional ways. Also, the civil society has successfully joined forces with the majority of states not possessing nuclear weapons, contributing to the start of a diplomatic process, in March 2017, at the United Nations level on a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination. The common interest for common action lies in the frustration of both non-nuclear states and the civil society regarding the slow pace of disarmament and the embedded risks. However, questions on the effectiveness and implementation of these new ways of advocacy linger.

Thus, as of 2017, we are faced with a rapidly deteriorating and changing arms control environment in Europe and what seems to be a lacking analysis and maybe even lacking understanding of the unfolding developments. To a large extent, the reasons for inadequate analysis lie in the decline of arms control expertise and studies in several European countries. At the hour of most intense need, there are only a scarce number of people knowledgeable to serve decision-makers and to contribute to public debate on these urgent but challenging matters. In these circumstances, it is not possible to build comprehensive situational awareness, which obviously bears directly on the quality of security policy dialogue, decision-making and general awareness. It should be obvious that in the case of contemporary weaponry, decision-making and dialogue based on other than facts is highly dangerous for all those involved.

This book is written with the purpose of helping to close this knowledge gap, i.e. to improve and enhance studies and knowledge on arms control, non-proliferation and disarmament under the current circumstances. It is hopefully the first of a series of similar studies in European defence academies, research institutes and universities, serving as an introduction to a complex and evolving, albeit interesting field of study highly relevant for the European security.

About the Authors and the Structure of This Book

Arms Control in Europe: Regimes, Trends and Threats is a compilation of articles written by nine European scholars. Most of its chapters discuss nuclear weapons as a key issue in European security, covering great power nuclear doctrines, questions of missile defence, nuclear non-proliferation, as well as topical issues related to tactical and intermediate-range nuclear weapons. Then again, attention is also given to arms control from the perspective of conventional weapons and to the specific considerations on outer space as a legal framework for arms control. In addition, issues dealing with cyber security and artificial intelligence are also covered.

The writers of this volume represent diverse backgrounds. Some of us have expertise in international law, others in natural sciences, international relations, strategic studies or diplomacy. This diversity is reflected on the book's pages as different perspectives, emphasizing political, operational, ethical, legal or technical dimensions of the issues at hand.

The articles of this volume are heterogeneous in the sense that some texts seek to address primarily students by emphasizing the very basic questions and issues involved, whereas other articles address more expert readerships, such as research institutes, government, armed forces and non-governmental organizations. However, common to us all is a willingness to present the contemporary state of key arms control regimes and their impact on European security and to discuss the compelling challenges they face today.

Then again, once the reader familiarizes with the chapters of this volume, s/he will soon note that a number of intertwining issues appear and re-appear in the following pages. Many articles discuss the implications that changes in modern technology have in contemporary armaments and arms control. These changes can appear in many forms: modern technology may blur the divide between offensive and defensive weaponry or between weapons of mass destruction and conventional armaments; or it may affect the interconnection between military and non-military capabilities possessed by states. As a consequence, many writers point to an urgent need for updates in arms control regimes or for the creation of completely new ones.

This volume is divided into nine chapters, as follows:

In Chapter 1 on *Looking for Stability: American and Russian Nuclear Doctrines and Arms Control*, Dr. LTC (Ret.) Mika Kerttunen argues that the Unites States and the Russian Federation have, despite their political statements, become rather more than less dependent on nuclear weapons during the Post-Cold War era. He argues that it is important to try to reduce the limited regional and tactical role both countries have reinstated to nuclear weapons. Without Russia and the U.S. continuing to reduce their armaments and seriously addressing their doctrinal concepts, the future of nuclear non-proliferation looks bleak. It is noteworthy that Mika Kerttunen's article contains a special section on key concepts related to nuclear deterrence, intended to support in particular those readers with not much previous knowledge on the topic.

In Chapter 2 on *US Missile Defense Systems, Europe and Russia*, Professor Götz Neuneck discusses the US Ballistic Missile Defense and its European Phased Approach. In recent years, regional missile defense in Europe, Asia and the Middle East, in response to the proliferation of theater-range ballistic missiles, has returned to the international agenda, causing much controversy about the offence/defence relationship between the nuclear weapon states and about regional stability. In the article, he especially discusses the significance of European missile defence, Aegis Ashore, and its questionable impact on arms control regimes. Having reviewed these issues, the article concludes with a discussion of proposals for future cooperation and confidence-building.

In Chapter 3 on *The Treaty on the Non-Proliferation of Nuclear Weapons – Treaty Regime on the Brink of Collapse*, Dr. Katariina Simonen discusses the NPT treaty regime, its drafting history, contradictions, the present state and its uncertain future. According to her, the NPT bargain has become empty with the unfulfilled promise of nuclear disarmament. Other ways, such as the Humanitarian Impact Initiative and the fresh diplomatic process at the UN level, may succeed in aligning the majority of states behind the complete prohibition of nuclear weapons. But is this enough to persuade the nuclear 'haves' to take any steps towards disarmament?

In Chapter 4 on *Non-Strategic Nuclear Weapons, Definitions, Arsenals, Cuts, Prospects*, Professor Alexander I. Nikitin discusses the complex and evolving field of non-strategic or tactical nuclear weapons. He points out that the current political environment does not provide strong motivation neither for the withdrawal of American tactical weapons from Europe, nor for Russian initiative in cuts or relocations, nor for cuts in non-strategic arsenals of third nuclear countries. He argues that while some prospects for dialogue nevertheless remain, any negotiations on non-strategic weapons leading to shaping a regime of arms control should take into consideration the numerous interconnections between offensive and defensive, nuclear and conventional, and strategic and non-strategic arsenals and weapons.

In Chapter 5 on *INF Treaty – the Present State and Way Forward*, Dr. Matti Vuorio reviews one of the key arms control regimes, the Intermediate-Range and Shorter-Range Nuclear Forces Treaty. He points out that the development of new technologies, in particular the unmanned combat aerial vehicles and the global proliferation of ballistic and cruise missiles have raised new problematic issues, leading to treaty breaches notified by the US and Russia during the last years. He argues that there is a need for an update of the INF paragraphs and more urgently for the parties to strengthen their discussions in the Special Verification Commission. These and other efforts could enable the INF treaty to make a contribution towards stability in the world also further on.

In Chapter 6 on *Conventional Arms Control in Europe and Its Current Challenges* Dr. Tommi Koivula provides with an overview of the existing regimes on conventional weapons (CWs) with a particular emphasis on European security. He raises some of the most pressing issues and future challenges related to conventional weapons, which are apt to affect the general arms control agenda and to bring in challenging new normative questions. Particular attention is given to some of the ongoing and emerging technological developments, such as the gradual blurring of distinctions between weapons of mass destruction and CWs and the advent of the autonomous weapons systems. Overall, these changes call for urgent updates in the respective arms control regimes.

In Chapter 7 on *The Pandora's Box of Military Artificial Intelligence* Dr. Johanna Friman inquires into the external, internal and ethical concerns arising from military artificial intelligence. While she does not foresee an impending military 'robopocalypse' with legions of killer robots dehumanising the battlefield and defying international law, she proposes that a constraining-enabling arms control regime needs to be promptly negotiated and legally implemented, striking a balance between military and non-military interests and concerns in order to govern and regulate the development of military artificial autonomy and prevent the uncontrollable proliferation of autonomous weapons.

In Chapter 8 on *Cyber: Arms Control Without Arms?* Dr. Eneken Tikk questions arms control as the optimal approach to international cyber security issues. She argues that while the core ideas of arms control are direly relevant to international peace and security in the information age, information and communications technology (ICT) hardly measure as weapons. Admitting that certain ICT related capabilities are observable and measurable, thus susceptible to arms control measures, she emphasizes that despite their role in military modernization and operations, ICTs are predominantly a technology for social and economic progress. Consequently, one

should assume a careful and constructive approach to cyber arms control and due consideration of arms control value propositions in the context of ICTs. In addition, she calls for the attention to the development of both arms control theory and contemporary conceptions of security and stability.

In Chapter 9 on *Current Challenges regarding Arms Control and the Law of Outer Space* Dr. Tamás Lattmann finally examines the legal framework applicable to weapons of mass destruction in outer space and celestial objects, outlines the most important respective organisations and explores the current and near future challenges related to arms control in outer space. He points out that step-by-step development and gradual confidence-building may be the most feasible ways to lead to global consensus and assure a weapons-free, or at least regulated space over the Earth.

Acknowledgements

A work as large as a book does not come about solely due to the efforts of its authors. It should, thus, be noted that we are deeply grateful to a number of colleagues and students, many of whom cannot be mentioned separately for providing advice, support, critique and inspiration. In particular, we would like to express our deepest thanks for Professor Götz Neuneck for his support and advice on this book, Professor Pekka Sivonen and the three peer reviewers designated by the Finnish National Defence University for constructive comments; Timo Kantola, Sannamaaria Vanamo, Ilkka Rentola and Hanna Ojanperä at the Finnish Foreign Ministry for helpful advice and consultation as well as Aki Aunala, Mert Sasioglu and Netta Lagus for valuable work in editing this volume. In addition, the authors would like to thank the Faculty of Law, University of Helsinki, and in particular Professors Jukka Kekkonen, Heikki Pihlajamäki and Lauri Hannikainen for their general support in the course of the working process. We would like to extend our acknowledgements also to Brigardier General (ret.) Pertti Laatikainen and his useful advice on funding opportunities for our research. Finally, the authors would like also to thank National Defence Foundation of Finland (Maanpuolustuksen kannatussäätiö) and Otto Malm Foundation for their support to this work.

1

Looking for Stability: American and Russian Nuclear Doctrines and Arms Control

Mika Kerttunen[1]

Abstract

Contrary to their political statements, the Unites States and the Russian Federation have become more dependent on nuclear weapons. In addition to maintaining mutual deterrence and assured capacity to retaliate, both prepare to, if needed, launch a nuclear strike in a non-nuclear situation and employ nuclear weapons alongside of and as part of military combat operations. Both have also launched mid to long-term nuclear force modernization programs. Arms control and disarmament initiatives should exploit this political and doctrinal similarity and target not only levels of armament but, most importantly, disturbing and destabilizing doctrinal principles and practices. It is of importance to try to reduce the limited, regional and tactical role both countries have reinstated for nuclear weapons. If Russia and the U.S. do not continue to reduce their armament and seriously address their doctrinal concepts, the future of non-proliferation looks bleak.

Introduction

> "[t]he United States could sustain stable deterrence with significantly fewer deployed strategic nuclear warheads, assuming parallel Russian reductions."
>
> Department of Defense, *Nuclear Posture Review Report*, 2010

Despite its peace-assuring appearance, arms control is a cold game of political manoeuvres. In liberal democracies the civil society, embodied in movements, associations and non-governmental organizations, can voice public concerns and lobby for the reduction and elimination of weapons. Yet, as an exercise of state sovereignty, government decisions to acquire or refrain from acquiring weapons, and joining or not joining arms control treaties are based on careful political, operational and economic calculations. Touching upon national survival, nuclear arms control and disarmament *sui generis* becomes and remains rather a question of bilateral sensitivities than of global common good.

When speaking of the necessity of reducing reliance on nuclear weapons, both the United States and the Russian Federation stick to practises and force postures that are familiar from the Cold War. These two countries maintain mutual deterrence as

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[1] Dr. Mika Kerttunen (LTC (ret.) Finnish Army) is adjunct professor in military strategy at the Finnish National Defence University and Director of Studies at the Cyber Policy Institute in Tartu, Estonia.

the cornerstone of their bilateral relationship but allow other security issues to interfere with their nuclear policies and doctrines. Deterring and fighting terrorist or rogue states and other uncertain actors, even with nuclear weapons, has become an important element in defining the U.S. nuclear posture. For Russia, nuclear weapon systems first came to mean a way to compensate for conventional weaknesses and then later a way to support them. Both countries speak of the possible first use of nuclear weapons and are blurring the previously clear line between nuclear and conventional non-nuclear operations.

This article is concerned with the implications of the U.S. and Russian nuclear doctrines and postures relating to arms control and disarmament. Seeking to understand the rationales that states have in acquiring nuclear weapons and maintaining nuclear military capabilities, the article opens with an analysis of three nuclear concepts: proliferation, deterrence and strategic stability; as they help to comprehend state behaviour in nuclear affairs.

After this conceptual framing, the analysis continues on to examine contemporary U.S. and Russian nuclear thinking embodied in national and operational doctrines and visible in the development and deployment of nuclear forces. Following Apunen's (1972) and Brodin's (1977) work on political doctrines, this study utilizes the notion of doctrine in two methodological manners, as a source-object and a goal-object. The American and Russian policy doctrines, i.e. political, officially accepted instruments that legitimize chosen policy options, provide administrative guidance for decision-making and inform domestic and international communities of intentions, measures and capabilities, and, witnessing their ambitions and action, these are taken at face value. Here it needs to be acknowledged that, despite the administrative practice of differentiating *policies*, *concepts*, *strategies* and *doctrines* by name, they can all be counted as doctrinal documents. Secondly, when such explicit documents have not been issued or are insufficient for providing an accurate understanding of national policy, this study outlines national policy – doctrine and strategy – as a combination of political statements on the role of nuclear weapons, descriptions on their potential use with implicit scenarios and modernization and development programs. Doctrines combine technologies into deployable and employable capabilities and are the most explicit expressions of the envisaged role and use of nuclear weapons.

Combining the conceptual-theoretic with the doctrinal-empirical, this article discusses the potential of arms control. In this setting of doctrines, technological development and politico-military action, the prerequisite for strategic stability between the major nuclear antagonists, 'Moscow' and 'Washington', is identified in order to condition arms control; this is a factor that both inhibits and promotes arms control and disarmament. This recognition is widened into a Realist's framework for analysis and action on arms control and disarmament. The framework addresses the alarming qualitative aspects of the contemporary doctrines rather than the quantities of weapon systems. Instrumentally, an aim of this political and operational analysis is to complement ethical, legal and technical analysis of the possibilities and limitations of specific arms control and disarmament initiatives.

The Rationale of Becoming and Being Nuclear

Acknowledging a government's role in nuclear weapons policy leads one to investigate the state's logic of leaning on military security in general and nuclear capabilities more specifically. Understanding the reasons for nuclear proliferation also helps to understand and approximate the possibilities of nuclear non-proliferation, arms control and disarmament.

In 1982, Väyrynen proposed a comprehensive, three-level framework to explain military capability development. Väyrynen differentiated between international, structural explanations, and national, political and technical models, seeking mainly reactively to overcome external threats and internal technological-bureaucratic factors. Sagan (1996) presents security, domestic politics and norms as the key explanatory factors for states acquiring nuclear weapons. The security claim regards nuclear weapons as the ultimate guarantee of national security against military threats and particularly the use of weapons of mass destruction and foreign invasions. Waltz (2003, pp. 6–17, 33–37) regards the anarchic international structure to be the reason for states maximizing their relative power and in particular increasing their security. Nuclear weapons are considered to be the great equalizers, providing security for states on the one hand, and on the other, giving stability to the international system; they '*induce caution in any state*'. Waltz's structural-realistic approach views proliferation permissively and claims that war among nuclear adversaries becomes less likely or more limited as no one will escalate in fear of their own intolerable losses – the key tenet in deterrence theory. Sagan's model of domestic politics notes nuclear weapons as political tools used to advance parochial domestic and bureaucratic (sectorial) interests. Military Services (Army, Navy, and Air Force) and technical communities in particular, have vested interest in possessing or developing nuclear capabilities. The normative model regards nuclear weapons as symbols of modernity and identity. More radical approaches regard nuclear weapons (but also non-proliferation) as representations of a post-colonial world order or established counterproductive masculine practises (Cohn and Ruddick, 2004). Sokov (2009, pp. 73–76) and Arbatov, Dvorkin and Oznobishchev (2010, p. 49) present instrumental objectives that different states may alternatively assign to nuclear weapons. They note the maintenance of prestige and international status, existential and extended deterrence and deterring and countering a conventional attack; all of these assignments where military-operational reasoning and purposes mix with political ones.

National security concerns are usually offered to explain both horizontal and vertical proliferation. The former describe the geographical spread of nuclear weapons and the latter the technical improvement of nuclear devices, delivery platforms, command and control systems and respective nuclear doctrines. National security concerns also lie at the core of any deterrence theory.

Deterrence seeks to dissuade an adversary from a belligerent action that they are assumed to take. It operates with a complex mind-set of psychological and cognitive factors that seek to influence the adversary's decision-making and ultimately make them behave opposite to their original intent; i.e. in a nuclear setting, to refrain from attacking the other (Buzan 1987, p. 163). Deterrence theory regards perceived costs as determinants of political behaviour. Moreover, actors assumed to be rational utili-

ty maximisers, i.e. when the cost of compliance is lower than the cost of non-compliance and the net sum of costs has essential value for them, would follow the path of lower costs.

The two major forms of deterrence, deterrence by denial and deterrence by punishment, assume different costs. On the one hand, deterrence by denial seeks to deny the attacker the anticipated objectives and gains. Efforts would either be considered futile or the use of resources too costly. Deterrence by punishment, on the other hand, is based on assured retaliation and great losses that the adversary does not wish to suffer. Although academic literature and official doctrines often focus on retaliatory capacities, deterrence is not only about punishing, but also about cost (Snyder, 1961). If an attack occurs or retaliation takes place, deterrence as the desired effect of strategy has failed (Gray, 1996, p. 31).

Successful deterrence requires that the risks and costs of behaviour have been communicated. Communication is never perfect, however. Especially in nuclear affairs, where high secrecy prevails, one cannot have full appreciation of the adversary's thinking and material capabilities. Moreover, blind reliance on the assumption that an adversary has received messages or interpreted them as they were intended to be interpreted, or that a nuclear threat and a specific arsenal are decisive factors in political and strategic decision-making is questionable at best. As a U.S. joint doctrine on nuclear weapons explains, 'Deterrence is only achieved when both capability and will are explicitly defined, demonstrated and known by all parties' (JP 3-12.1, 1996, p. I-1). Deterrence theory assumes a universal understanding and valuation of costs and benefits.

The problem of rationality is a question of life and death, and assuming such to exist is perhaps the gravest debility of deterrence theory. There is no universal rationality and seemingly irrational behaviour is ultimately rational for someone else. All assumptions and predictions are inevitably culturally conditioned, which increases the chance of miscalculation (Gray, 2003, pp. 21–23; 31–33). Moreover, the adversary is assumed to ultimately follow a rational and clear line of logic of not escalating, while one's own side is allowed to be irrational and use nuclear weapons despite the risk of escalation and the costs. Thus, it can be rational to calculate that the deterrent is only a bluff (Airaksinen, 2008, pp. 13–16).

The question of rationality expands to a wider political and ethical dilemma when nuclear deterrence is extended to one's military allies: is it worth it to risk, say, New York because Narva has been attacked, especially if Narva has been labelled a suburb of St. Petersburg (Gingrich, 2016; Thompson, 2016)? Similar doubts concerning credibility arise with the doctrine of flexible response and the increased reliance on advanced conventional weapons systems. Treaties and political statements announce firm commitment and provide assurance, but only provisional guidance on the parameters of attacks, or threats of attacks, that would justify and actually trigger the use of nuclear weapons. Limited transparency on intentions, the red lines and capabilities, however, is regarded not only sufficient but most importantly necessary for creating a deterring effect (Hagerty, 1995, pp. 87–91; JP 3–12, 2005, viii). Precisely because the logic of deterrence emphasises deterrence as a structural condition and an absolute value, empirical and political considerations of actual capacities, conditions of use and determination start to undermine the very thought. The line between belief and disbelief cannot and, following the very logic of deterrence, should

not be defined, making the risk of escalation a key factor of credible deterrence for the advocates of deterrence (Ogilvie-White, 2011, pp. 45–47). Accordingly, any unilateral political move, operational/doctrinal change and technological development can be regarded as destabilising.

In the 1950s, the vertical proliferation of atomic bombs and their delivery platforms created a fear of a devastating surprise attack, leading to two international conferences on 'measures to safeguard against surprise attack' in 1958. One was held in Washington, D.C. and attended by the five leading Western nations and another in Geneva that also included five socialist/communist countries. Accordingly, and in the aftermath of the strategic shock that the *Sputnik* caused, the 1958 U.S. Interagency Working Group on Surprise Attack aligned strategic stability with freedom from surprise attack that depended 'not only on an inspection of one's potential enemy and limitations on his forces, but also very heavily on the vulnerability of one's own retaliatory forces'. In these unavoidable circumstances, it became essential to reduce the vulnerability of such forces 'to acceptable levels in order to safeguard their effectiveness as retaliatory forces' (Interagency Working Group on Surprise Attack (1958) in Gerson, 2013, p. 30).

In a very twisted way, the instability, especially when accepting the risk of escalation, came to be to warrant security and vulnerabilities and mutual retaliatory capabilities as assurances of stability. Schelling (1966) turned this necessity into a virtue. One party's vulnerability would ensure the other of its capacity to retaliate. Such an assurance would help to prevent nuclear war, and thus increase the stability of deterrence and the nuclear equation. The survivability of command and control and weapons systems denied ultimate victory and the vulnerability to an attack ensured the likelihood of retaliation. Gerson (2013, p. 35) credits Schelling not just with making stability an essential metric for evaluating nuclear forces, but with ensuring that the concept of stability became the new – and lasting – rationale for U.S.-Soviet nuclear arms control considerations. Simultaneously, arms control was distanced from idealist disarmament and became a realist's tool. It started to focus on risk-reduction by enacting restrictions on both sides' nuclear arsenals in order to minimize the fear of a surprise attack and by ensuring that both sides possessed retaliatory capabilities.

The demise of the Soviet Union and the dissolution of the Warsaw Pact did not change how strategic stability was understood in international politics. The political, economic and military rise of the People's Republic of China has only solidified the nuclear and strategic weapon system-centric setting. The U.S. – Russia, and U.S. – China relationships and the attitude of arms control continue to function as the main conditioning framework for both the established nuclear and the emerging security stability questions.

In the 'Soviet-U.S. Joint Statement on the Treaty on Strategic Offensive Arms' of June 1990, which was issued when one signatory was already crumbling, the parties agreed upon their mutual responsibility to enhance strategic stability. In particular, the reductions in several nuclear weapons systems designed to make a first strike less plausible were said to result in 'greater stability and a lower risk of war' (The White House, 1990). Similarly, the 'U.S.-Russia Joint Statement: Cooperation on Strategic Stability' of July 2000 underscored 'that continued strengthening of global stability and international security is one of the most important tasks today', estab-

lishing a basis for (further) reduction of nuclear weapons arsenals and the preservation and strengthening of the Anti-Ballistic Missile Treaty (ABM). The ABM Treaty fully embodies the logic of strategic stability: only limited measures to secure vital command and retaliatory capabilities were accepted. Furthermore, the Statement noted the need to confront 'new challenges to international security' and called upon other nations to unite with Russo-American efforts to strengthen strategic stability (The White House, 2000).

Strategic stability, functioning as a pattern of thought fundamental to the theory and policy of deterrence, has become a cornerstone in superpower relations. The concept is dualistic, dynamic and contextual, and to its critics it is arbitrary, malleable and politically charged. It operates with the desire of survival and the knowledge of vulnerability as well as change and continuity. It directs actors to take into account their own capacity and also that of their adversary. It recognizes the need to look at technical details and objective facts, but also acknowledges that these will change. The U.S. *Nuclear Posture Review* (NPR 2010) lists the maintenance of strategic deterrence and stability at reduced nuclear force levels as one of its goals. The NPR notes that bilateral dialogues with Russia and China on missile defence, space-related issues, conventional precision-strike-capabilities and nuclear weapons issues promote more stable and transparent strategic relationships (Rose, 2014). Primakov et.al. (2010) emphasize equal security, mutual trust and international stability as the way to nuclear disarmament, and the 2015 Russian *National Security Strategy* (#100 and 102) speaks of the need to support strategic stability also to ensure the development of the Russian Federation. In 2016, President Putin justified the suspension of an agreement with the U.S. concerning the disposal of plutonium from decommissioned warheads by referring to U.S. 'hostile actions' and 'inability to deliver on the obligation'. This constituted a radical change in the environment and a threat to strategic stability – a stand echoing the sentiment of becoming vulnerable (RT, 2016). Podvig (2012) criticises the notion of strategic stability and its [political] use. He regards the key elements and assumptions of the concept as poorly defined, leaving us without useful meaning and 'virtually no practical value'. In fact, its pursuit is the single most serious obstacle to disarmament.

To Deter and to Fight: U.S. and Russian Nuclear Postures

Brodie pointed out already in 1946 that the atomic bomb was unique by nature and that it had revolutionized warfare. It was not feasible to wage war with these weapons but, nevertheless, they were not useless. They could avert wars rather than win them (Brodie, 1946, pp. 76; 88–91; Freedman, 1989, pp. 43–44). Technical development since the mid-1950s made it possible to build smaller nuclear devices and more precise counterforce weapons systems. Nuclear weapons, including ultimately nuclear land mines and the so-called neutron bombs, were designed to destroy enemy offensive formations that had broken through one's own defensive lines, or alternatively major enemy reserve formations still waiting to do so. Tactical nuclear weapons became additional stock in the arsenal. The very thought of nuclear warfare, let alone of a winnable war, turned Brodies's absolute premise upside-down. Particularly Kahn believed that controlled, rational behaviour could continue even when and after nuclear weapons had been used (Freedman, 1989, pp. 134, 216–217).

War-fighting theories introduced the concepts and strategies of countercity and counterforce. Countercity, a.k.a. counter-value strategy, targets cities, i.e. the population and the industry in the fashion outlined by the Douhetian theory of air power of the 1920s and used against German cities in 1943–45. As these targets are large, even rudimentary precision is sufficient to inflict destruction considered painful or decisive. Cities and populations have still remained on the target list despite the development of missile technology that turned counterforce strategy from promise into reality. Neither have made demands stemming from and grounded on the international humanitarian law that would stop the threatening of cities, civilians and critical infrastructure. Counterforce strategy targets the adversary's military or otherwise critical objects. This requires accurate intelligence, penetration through defences and far better accuracy than the counter-value strategy. On the other hand, submarine-launched ballistic missiles, which were originally meant as a retaliatory second-strike capacity (Brodie, 1959), have with their improved accuracy become capable of pre-emptive or offensive strikes (Kristensen, Norris and Oelrich, 2009, p. 20).

The dualistic nuclear debate between the absolute weapon that deters and the ultimate weapon that destroys has continued. The debate that centred on (the possibility of) limited U.S.-Soviet nuclear war has transited to considerations on compensating insufficient explosive power or conventional forces with nuclear weapons.

The United States

American declaratory nuclear policy has gone through several distinct phases, but the operational policy has remained relatively consistent throughout and arguably after the Cold War. The distinct and partially parallel doctrines include the massive retaliation of the 1950s, the flexible response in the early 1960s, the mutually assured destruction in the 1960s, the limited nuclear war in the 1970s and the focus on counter-proliferation in the 1990s (NTI 2015US). These changes in declaratory policies, and to an extent in operational doctrines, reflect the political and military technological changes in potential adversary countries. As the Soviet nuclear capacity grew, the American policy and doctrine became more cautious and nuanced but also more integrated and target-sensitive. Similarly, as China and the so-called rogue states became politically more important to the U.S., these states returned or emerged, respectively, in the American nuclear scenarios and plans.

The U.S.'s new millennium nuclear theory and posture is best described in the 2005 *Doctrine for Joint Nuclear Operations* (JP 3–12). Building on the 2001 *Nuclear Posture Review* (*NPR*) and preluding the 2010 *Nuclear Posture Review*, the Doctrine explains the purpose of U.S. nuclear weapons, discusses nuclear operations and elaborates on theatre-level nuclear operations. It explicitly acknowledges deterrence beyond the diametric Cold War setting, recognizes the enhanced war-fighting role of nuclear weapons and combines the employment of nuclear and conventional weapons.

The 2005 Doctrine (JP 3–12 2005, p. I–5) explains how the 2001 *Nuclear Posture Review* 'in a major break from Cold War thinking' had reflected 'the capabilities required of nuclear forces in the new strategic environment'. The major change that the Review had set in motion was the shift in planning from a threat-based Cold War approach to a capability-based one (*NPR,* 2001). The Review had underscored the need for a new cooperative approach with Russia, but instead of relying on pro-

tracted arms control negotiations, the U.S. was to take the lead and, for her own purposes, develop nuclear policy and capabilities. For example, the *NPR,* issued by the Bush administration, renounced the Anti-Ballistic Missile Treaty and called for developing missile defence capability against 'terrorist or rogue states' (*NPR,* 2001) and, although adhering to the nuclear testing moratorium, did not seek the ratification and the entry into force of the Comprehensive Test Ban Treaty (CTBT) (NTI, 2002). In the aftermath of the 9/11 terrorist attacks, the neo-conservatives in Washington in particular read and interpreted the operating environment differently. It was considered that the U.S. needed to flexibility respond – even with nuclear weapons.

The U.S. nuclear policy and nuclear forces were to assure friends and allies of the continued U.S. determination to defend them, to dissuade potential adversaries by being numerous, advanced and reliable, to deter potential adversaries by providing the means to respond appropriately to an attack on the U.S., its friends or allies, including the capability to destroy the adversary's valuable and necessary critical war-making and war-supporting assets and capabilities, and to defeat by applying overwhelming force to a broad range of targets in a chosen time and manner (JP 3-12, 2005, pp. I-1–I-2, I-10–I11).

The Doctrine outlined (JP 3-12, 2005, pp. I-3–I-5) the new triad of nuclear and non-nuclear capabilities that the 2001 *NPR* had introduced. Instead of portraying the known trinity of land, sea and air-based or airborne weapon systems, the new policy broadened nuclear policy and planning to cover both nuclear and non-nuclear strike capabilities, incorporate active and passive defences and acknowledge the importance of robust research, development and industrial infrastructure to develop, build and maintain offensive forces and defensive systems. In addition, the enhanced functions of command and control, intelligence and adaptive planning were to support the new triad of Washington's nuclear policy.

The 2001 *NPR* and the 2005 Doctrine regarded deterrence as important but, assigned nuclear weapons a regional and war-fighting role nonetheless. The Doctrine (JP 3-12, 2005, pp. III-1–III-2) exemplified conditions for geographic commanders requesting the President's approval for the use of nuclear weapons, as follows:

- An adversary using or intending to use WMD against the U.S., multinational, or alliance forces or civilian populations;
- Imminent attack from adversary biological weapons that only effects from nuclear weapons can safely destroy;
- Attacks on adversary installations including WMD, deep, hardened bunkers containing chemical or biological weapons or the command and control infrastructure required for the adversary to execute a WMD attack against the United States or its friends and allies;
- To counter potentially overwhelming adversary conventional forces, including mobile and area targets (troop concentration);
- For rapid and favourable war termination on U.S. terms;
- To ensure success of U.S. and multinational operations;
- To demonstrate U.S. intent and capability to use nuclear weapons to deter adversary use of WMD; and
- To respond to adversary-supplied WMD use by surrogates against U.S. and multinational forces or civilian populations.

Even though the Doctrine and its examples do not dictate or limit the use of nuclear weapons, the geographical role assigned to nuclear weapons clearly speaks of pre-emptive strikes and strikes against non-nuclear entities or targets. For Kristensen (2005, pp. 1,4), the 2005 Doctrine signified a change in the role of nuclear weapons in American strategic and operational thinking: nuclear weapons might be used in less intense crises than previously envisioned and also in a pre-emptive manner. However, the 1996 *Doctrine for Joint Theater Nuclear Operations* (JP 3-12.1, p. I-2) had outlined the potential use and desired results of the use of nuclear weapons in a manner that spoke for the instrumental use – especially that 'units capable of delivering nuclear weapons should be integrated with other forces in a combined arms, joint approach'**:**

- Decisively change the perception of enemy leaders about their ability to win;
- Demonstrate to enemy leaders that, should the conflict continue or escalate, the certain loss outweighs the potential gain;
- Promptly resolve the conflict on terms favourable to the United States and our allies;
- Preclude the enemy from achieving its objectives;
- Ensure the success of the effort by U.S. and/or multinational forces; and
- Counter enemy weapons of mass destruction.

Moreover, the arsenal available for regional nuclear operations included gravity bombs, air-launched cruise missiles (ALCM) as well as submarine-launched (SLBM) and intercontinental ballistic missiles (ICBM). This was essentially the full spectrum of the U.S. triad.

The 2005 Doctrine continued (JP 3–12, 2005, pp. II-8–II-9) to explain how for many contingencies, existing and emerging conventional capabilities would meet anticipated requirements, but that for some, the use of nuclear weapons may be the most appropriate response. The integration of conventional and nuclear planning and attacks was regarded essential to ensure the efficient use of force and provide a broader range of strike options. Such integration was said to ensure optimal targeting, minimal collateral damage and to reduce the probability of escalation.

Despite the early promises of the 'peace and security of a world without nuclear weapons' (Obama, 2009), President Obama's presidency from 2008–2016 did not change much. Like its predecessor, the 2010 *Nuclear Posture Review* (*NPR,* 2010*,* pp. 15–17) speaks of the reduced role of nuclear weapons as well as of making the deterrence of nuclear attacks the sole purpose of U.S. nuclear weapons. The *NPR,* however, states (p. 16) that because of other countries either possessing nuclear weapons or not complying with their nuclear non-proliferation obligations, the United States is 'not prepared, at the present time, to adopt a universal policy that deterring nuclear attack is the sole purpose of nuclear weapons'. The NTI (NTI 2015US) explicitly comments on how 'the Obama administration declined to specify that the sole purpose of the U.S. nuclear arsenal is to deter or respond to a nuclear attack'.

The Government Accountability Office (GAO, 2012, pp. 3–5) analysis on the U.S. nuclear weapons' targeting process notices how, despite the changes in the structure of the nuclear war plan and in the categories and number of targets, the fundamental objectives of U.S. nuclear deterrence policy have remained largely consistent

since 1991 and that the process for developing nuclear targeting and employment guidance has remained consistent. Quite obviously, there is no significant change in basic target categories since the mid-1970s. According to Kristensen (2010), the 2009 OPLAN basic target categories include military forces, weapons of mass destruction infrastructure, military and national leadership and war-supporting infrastructure, indicating the continuity of nuclear war theories. In fact, Arbatov, Dvorkin and Oznobishchev (2010, p. 47) point out how the 2010 *NPR* maintains the concept of first strike, despite the fact that the U.S.'s superior conventional military power should eradicate such serious incentives. It should be noted here, that nuclear doctrines are not country-specific in the way operational and contingency plans are. The former speak of general principles and guidelines of intended use; the latter plans include, among other things, identified targets, defined effects and employable units and weapons systems.

The following table shows the number of U.S. strategic nuclear platforms, i.e. long-range missiles and heavy bombers capable of carrying nuclear warheads, by category. The U.S. has reduced the size of its nuclear stockpile from 21,392 operational warheads in 1990 to 4,571 today. In addition, it is reported that the U.S. has 500 B61 gravity bombs, categorized as non-strategic, 'tactical' weapons, of which 180–200 are stored in European bases (NTI 2015US). An account of the Russian nuclear arsenal is presented in the following section on Russia.

Category	**Amount**
Deployed ICBMs	449: LGM-30G *Minuteman* III (capacity 1-3 MIRV Mk12/Mk12A per missile)
Non-deployed ICBMs	246
Deployed and non-deployed launchers of ICBMs	454
Deployed SLBMs	248: 14 *Ohio* SSBN with up to 24 UGM-133A *Trident* D-5, 4 single 533mm TT with Mk48 *Sea Arrow* HWT
Non-deployed SLBMs	160
Deployed and non-deployed launchers of SLBMs	336
Deployed Heavy Bombers	88: 12 B-2A *Spirit*, 76 B-52H *Stratofortress* with AGM-86B; AGM-129A 8 B-2A,
Non-deployed Heavy Bombers	12 B-52H

Table 1. U.S. Strategic Nuclear Platforms. Data declared effective as of March 1, 2015. (U.S. Department of Defense, Bureau of Arms Control, Verification and Compliance. 2015. 'New START Treaty Aggregate Numbers of Strategic Offensive Arms. United States of America Data'; International Institute for Strategic Studies. 2014-2016. *The Military Balance.* London)

The modernization plans helping the U.S. to maintain the new triad that the Bush administration had outlined, and the safe, secure and effective arsenal that the Obama administration (*NPR,* 2010, pp. 37-42; Reif, 2016) had promised, include among other things:

- Delivery systems: modernization and replacement of Minuteman III intercontinental ballistic missiles (projected length of deployment to the 2080s), modernization of Trident II submarine-launched ballistic missile (2040s), development of long range standoff cruise missile (2080s), deployment of twelve Columbia-class submarines (2031-2080s), modernization of B-2 (2050s) and B-52 (2040s), development of B-21 (2080s) strategic bombers;
- Replacement and life extension of warheads, especially W87, W88, W76-1 and B61;
- Modernized production complex: uranium processing facility (Oak Ridge), and chemistry and metallurgy research.
- Command, control communication and early-warning system upgrades and development;
- Nuclear force and workforce improvement.

In addition, both mobile and stationary ballistic missile defence capacity is being developed. Systems have already been deployed to Czech Republic, Romania, South Korea and on-board the U.S. *Ticonderoga* class cruisers and *Arleigh Burke* class destroyers, which in turn has triggered strong opposition from Russia and China.

The 2010 *NPR* continues to merge nuclear and non-nuclear capabilities. While thinking of the early 2000s incorporated advanced conventional weapon systems into nuclear-strategic planning, the thinking of the 2010s (*NPR,* 2010, p. 20) wants to deploy conventionally armed ballistic missiles as possible additions of 'non-nuclear prompt-global strike capabilities'. Despite remarks by Presidents Bush and Obama, the U.S. has also decided to maintain the current alert posture of its strategic forces: the heavy bombers are off full-time alert, but nearly all ICBMs together with a 'significant number of SSBNs at sea at any given time' are on alert (*NPR,* 2010, pp. 25, 27).

The United States has signed but not ratified the Comprehensive Test Ban Treaty, thus being one of the few countries effectively stopping the CTBT from coming into force. There are no doctrinal hindrances for ratification, only domestic political ones. On the contrary, the *Nuclear Posture Review* recommended pursuing ratification. Modernization of the triad and the suggested life-extension programs of nuclear devices do not require testing either, as the U.S. is not developing new warheads (*NPR,* 2010, pp. 38–39). Nuclear devices can, in fact, be tested in adherence to the letter of the CTBT through simulations, sub-critical explosions and component trials.

The Russian Federation

The Russian nuclear doctrine portrays a combination of established Cold War thinking and reactions to American advances in military technology and the changes in nuclear doctrine. In particular, the U.S. dominance over the Soviet-equipped Iraqi forces in 1991, the use of air power against Serbia in 1999, former Soviet states and Eastern bloc countries joining NATO, the interventions in Afghanistan and Iraq as

well as 'colour revolutions' both in the Middle East and in Russia's periphery have shaped the Russian world view and threat perceptions. Russian nuclear doctrine has developed in three distinct phases from the post-Soviet vagueness of the 1990s through the reactionary 2000s to the more consolidated doctrine of the 2010s.

The first military doctrine of the Russian Federation in 1993 gave nuclear weapons a primordial role in a large-scale global conflict, that is, a major war between the U.S. with its allies and Russia. The doctrine abandoned the declaratory policy of no-first-use that the Soviet Union had maintained, most likely for propagandistic purposes. Throughout the decade, Russian conventional forces were in decay, whereas at the same time, American forces were undergoing a successful transformation to rather easily deployable, effective and easily available modern information and communication technologies, which contributed to a debate in Russia on expanding the role of nuclear weapons to secure the military security and the continuity of the state (Sokov, 2009, pp. 76–78).

Sokov (1999; 2009, p. 78) dates the origin of the new nuclear policy to a Russian Security Council meeting in April 1999. Although all the positions adopted were not announced, Security Council Secretary Putin's account and 'other sources' indicate an enhancement of the role of nuclear weapons by the development of new nuclear weapons, adjustments to the strategic posture, and most likely, continued reliance on tactical nuclear weapons. The January 2000 *Russian National Security Concept* (*NSC,* 2000, Ch. I) detected two mutually exclusive trends in world politics: multilateral management, which Russia supports; and unilateral solutions, which the developed Western countries are claimed to seek. The Concept examined the interests of the individual, society and the state in economic, domestic political, social, international, informational, military, border and environmental spheres where the 'national interests of Russia in the military sphere boil down to the protection of its independence, sovereignty, state and territorial integrity, the prevention of military aggression against Russia and its allies, and in ensuring the conditions for peaceful and democratic development of the state' (*NSC,* 2000, Ch. II). Accordingly, the Russian foreign policy was inter alia 'ensuring progress in the sphere of nuclear arms control and maintaining strategic stability in the world'. Moreover, exercising deterrence to prevent aggressions was considered a vital task, and the Russian Federation was to possess nuclear forces capable of guaranteeing the infliction of the desired extent of damage against any aggressor state or coalition of states under any conditions and circumstances, including the use of nuclear weapons in repulsing armed aggression (*NCS,* 2000, Ch. IV). Thus the Russian National Security Concept of 2000 expanded the use of nuclear weapons from deterring a large-scale attack to include deterring wars that do not necessarily threaten Russia's existence and, logically, to limited use of nuclear weapons - also in regional wars (NTI, 2004; 2015RU). For Sokov (2016), Russian engagement in Chechnya and the U.S.'s actions in the Kosovo war triggered this doctrinal change. As it had become obvious that Russian conventional forces and Soviet-origin military technology could not have matched the American ones, a more permissive nuclear doctrine was considered necessary to prevent Western intervention in Russian zones of influence and to signal the boundaries of acceptable behaviour to the west.

The post-2000 Russian national and military doctrines have maintained the overall direction of the 2000 *Security Concept*. The 2014 *Military Doctrine* (*RMD,* 2014, #12d) and the 2015 *Russian National Security Strategy*, officially referred to as an edict (*NSS,* 2015, #15), regard that the deployment of the U.S. missile defence systems and non-nuclear strategic precision weapon systems, together with the American global strike concept and the ideas of deploying weapon systems to outer space, diminish opportunities to maintain global and regional stability. To ensure strategic deterrence and the prevention of nuclear and conventional conflicts from major to regional wars, Russian nuclear deterrence capacity is to be maintained at a sufficient level (*RMD,* 2014, #16,20,21,27,32; *NSS,* 2015, #36).

However, compared to the 2000 *Security Concept,* the 2014 *Military Doctrine* seems to take an important step back. Although it factually permits the first use of nuclear weapons, it (*RMD, 2014*, #27) narrows down the possible use of nuclear weapons to retaliatory response and to situations that threaten Russian statehood:

> "The Russian Federation retains the right to use nuclear weapons in response to the use of nuclear weapons or other weapons of mass destruction against itself or its allies and also in case of an aggression against the Russian Federation by means of conventional weapons when this threatens the very existence of statehood."

Sokov (2009) and Arbatov, Dvorkin and Oznobishchev (2010, pp. 25, 42–43) point out that already the military doctrine of 2010 had, referring to the existence of the state instead of to national security, raised the threshold for using nuclear weapons, especially in non-nuclear scenarios. Maintaining a permissive but politically unnecessary and operationally obscure role of nuclear weapons in the doctrine would have kept undermining Russian political and normative arguments against the widened American nuclear policy. Such a move may also signify increased confidence in Russian conventional capacity. This interpretation undermines the often-presented and still-maintained claim of compensation. The question no longer is of compensating conventional incapacities but of complementing conventional capabilities. These doctrines, accompanied by national sensitivities and perceived regional vulnerability, encourage planning for the first use of nuclear weapons. Accordingly, Russian political and military references to nuclear weapons and the deployment of ballistic missile systems to the Kaliningrad Oblast can be seen as declaratory measures with the purpose of underlining Russian interests in the Baltic Sea region, but they can also be seen as signifying the operational role that nuclear weapons have, also in a non-nuclear setting.

Sokov's 2016 analysis of major Russian military exercises involving nuclear scenarios hints of the operational and limited use of nuclear weapons. He detects the following exercise targets for heavy and medium range bombers that include European and Baltic sites [although the deployment of a carrier group to the Baltic Sea is operationally unnecessary and not likely ever to happen (in contrast to e.g. the Norwegian Sea)]:

- Airbases, command, communications and support centres (in European NATO countries, especially Eastern Europe and the Baltic States, and, in at least one case, in Japan).

- Undisclosed targets in the continental U.S. (most likely B-2 airbases, and command and control centres.
- Naval targets (aircraft carrier groups in the Pacific Ocean and the Baltic Sea; and one in the Indian Ocean and one in the Black Sea-Mediterranean.)
- In 2003, heavy bombers simulated strikes against U.S. overseas bases (Diego Garcia and in 2007 against Guam).

The generic 'target list' should not surprise anyone as it follows the logic and practice of counter-force strategy established five decades ago; an American version would contain similar categories of targets. However, one should not draw linear lines between doctrines, deployments and exercises and willingness, let alone intent to attack. Actual decision-making on peace or war is – luckily – based on other factors and considerations than on the capacity to wage war.

Sokov (2016) explains the Russian concept and task of deterring 'regional conflicts' as a way to create a de-escalatory effect that builds on the perceived asymmetry of the opponents. For the U.S. (and its allies and partners), such a conflict especially in the Russian near abroad would be of secondary importance, relating to democracy and other values, but not relating to national security, sovereignty and survival to the same extent as it would be relative for Russia. Russia inflicting tailored damage even with nuclear weapons (*sic*) would de-escalate the conflict – a thought that returns to the glory days of limited nuclear war theories and undermines the risk of escalation to a full-fledged nuclear war. To paraphrase Marxist-Leninist thinking, the objective realities of the particular conditions of use would, thus, not cause threats to use and even the first use of nuclear weapons to escalate. However, following the pure logic of nuclear deterrence, splitting deterrence into geographical parts or contingent conditions, reduces the risk of escalation - the very cornerstone of deterrence. Here both the American tendency of blurring the line between strategic and tactical and nuclear and non-nuclear weapon systems, and Russian regional doctrine are guilty-as-charged of departing from systemic risk aversion to contingent considerations to use nuclear weapons.

The following table accounts for the number of deployed Russian strategic nuclear platforms, long-range missiles and heavy bombers capable of carrying nuclear warheads. In addition, it is reported that Russia has up to 2,000 warheads categorized as non-strategic, 'tactical' weapons. These include gravity and depth bombs and devices mounted on cruise missiles, anti-air missiles and torpedoes as well as short-range ballistic missiles. Here it should also be noted that compared to land-based, strategic rocket forces, navy and sea-based deterrent has had a marginal role in the Soviet Union and later in the Russia Federation (NTI 2015RU).

Category	Amount
Deployed ICBMs *- with multiple warheads* *- with single warhead*	*356:* *54 RS-20 (SS-18 Satan)* *24 RS-24 Yars (SS- 27M2)* *40 RS-18 (SS-19 Stileto)* *160 RS-12M (SS-25 Sickle)* *60 RS-12M2 Topol-M (SS-27M1)* *18 RS-12M2 Topol-M (SS- 27M1)*
Deployed SLBMs	11: 3 *Kalmar* (*Delta* III) with 16 R-29R *Volna* (SS-N-18 *Stingray*) 6 *Delfin* (*Delta* IV) with 16 R-29RMU *Sineva* (SS-N-23 *Ski*) 1 *Akula* (*Typhoon*) 1 *Borey* with capacity for 16 *Bulava* (SS-N-X-32)
Deployed Heavy Bombers	78: 16 Tu-160 *Blackjack* each with up to 12 Kh-55 SM (AS-15A/B *Kent*) 31 Tu-95MS6 (*Bear* H-6) each with up to 6 Kh-55/SM (AS-15A/B *Kent*) 31 Tu-95MS16 (*Bear* H-16) each with up to 16 Kh-55 (AS-15A *Kent*)

Table 2. Russian Strategic Nuclear Platforms (International Institute for Strategic Studies. 2014-2016. *The Military Balance.* London)

Russian plans to modernize their nuclear arsenal are not explicitly publicized. What has been announced and estimated indicates an encompassing modernization program covering all three legs of the nuclear triad; missiles and platforms and command and control system. By 2024, all Soviet-era ICBMs, especially RS-20 (SS-18 *Satan*) and RS-18 (SS-19 *Stileto*), are estimated to have been replaced, partly due to ageing and partly to improve the missiles' and warheads' capacity to penetrate missile defence. The new ICBM package would include the road-mobile RS-24 *Yars* and the RS-26 *Rubezh*; the *Sarmat,* a silo-based heavy ICBM, and the train-mobile *Barguzin*. The Navy should be receiving additional *Borey*-class submarines, expanding its *Bulava*-30 SLBM-equipped fleet to eight submarines, most likely by the mid-2020s. A new strategic bomber 'PAK-DA' is planned to be designed to replace the Tu-95 and Tu-160 fleet. (Arbatov, Dvorkin and Oznobishchev, 2010, p. 26; NTI 2015RU) Russia has been suspected of testing a ground-launched cruise missile as well as expanding the range of the short-range *Iskander* (SS-21 *Stone*) ballistic missile above 500 kilometres, which, if correct, violates the 1987 Intermediate-Range Nuclear Forces Treaty.

An Arms Control Association report (Philipp and Davenport, 2016, pp. 24–25) assesses that Russia maintains 75 and up to 96 [*sic*] per cent of its nuclear weapons on a high-alert status. This assessment is mainly based on a 2009 statement of Colonel General Solovtsov, the commander of Russia's ICBM force, but also on Russian political behaviour. Namely, Russia has either voted against (in 2012 and in 2014) a resolution on reducing the readiness of nuclear forces or abstained from voting (2010). Russia has explained her vote by saying that the resolution did not look at the 'specifics of national arsenals' when calling for reductions in alert levels (Russian Federation, 2012 cited in Philipp and Davenport, 2016, p. 25.) As background information, it may be stated here that the United States, together with France and the United Kingdom, voted against a 2007 draft resolution calling for further practical

steps to decrease the operational readiness of nuclear weapons systems, with a view to ensuring that all nuclear weapons were removed from high alert status; Russia abstained from this vote (UNGA, 2007).

Conclusion: The Limits and Potential of Arms Control and Disarmament

Firstly, U.S. and Russian nuclear thinking subscribe to the possession and potential use of nuclear weapons. Both countries believe that nuclear weapons help to deter at least major wars from breaking out. They also reserve the right to use nuclear weapons first: the U.S. would use them against a rogue actor in a pre-emptive manner, whereas Russia would use them if conventional aggression jeopardizes its statehood.

Despite an early promise of nuclear disarmament, the Obama administration maintained the elementary role that nuclear weapons have in U.S. national security. The Putin administration follows suit. Although the notion of national security is widely and loosely associated with almost any security or military threat, in the context of nuclear weapons it firmly refers to vital interest, existential threats and the survival of statehood and the population. This role has not changed and is not changing in the U.S. or in Russia. As President Obama also said in Prague: 'Make no mistake: As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies'. In this millennium, both countries have re-assigned nuclear weapons with regional and battlefield tasks, broadening their role from deterrence and the hard core of national security.

The shift from the Soviet and early 1990s Russian doctrine of deterrence, i.e. massive response and caution to Russian new millennium doctrines of deterrence, i.e. massive response albeit limited and first use also in regional conflicts, is striking but not surprising. Regardless of how much weight one puts on the compensation claim discussed earlier, Russia has emerged from a position of weakness and uncertainty to a position of power and parity. Despite its rogue state-specific agenda, the U.S. cannot spring ahead of Russia in widening the role of nuclear weapons. Accordingly, U.S. steps to establish arguably limited, target-specific ballistic missile defence cannot in principle be accepted by Russia.

Despite their adherence to nuclear weapons and their on-going disputes over issues such as missile defence, Ukraine, Syria and cyber activities, Russia and the United States have respected the strategic arms control treaties. Since the Treaty on *Measures for the Further Reduction and Limitation of Strategic Offensive Arms*, the so-called New START, entered into force in 2011, the two have reduced their strategic arsenals. As of September 2016, the Treaty provisions allow the U.S. to deploy 1,367, and Russia 1,796 strategic warheads. According to the 2016 exchange of data, the Russian Federation and the United States possessed the following amounts of strategic nuclear weapons:

Category	The Russian Federation	The United States
Deployed ICBMs, SLBMs and heavy bombers	508	681
Warheads on deployed ballistic missiles and nuclear warheads counted for deployed heavy bombers	1796	1367
Deployed and non-deployed launchers (ballistic missiles and heavy bombers)	847	848

Table 3. Biannual exchange of data required by the Strategic Arms Reduction Treaty. Data declared current as of September 1, 2016. (U.S. Department of Defence, Bureau of Arms Control, Verification and Compliance. 'New START Treaty Aggregate Numbers of Strategic Offensive Arms').

The New START treaty obliges both countries to reduce the number of deployed and non-deployed launchers to 800 by February 2018. However, the Treaty does not mention multiple warheads (per missile), thus taking a considerable step back from the 1993 START II agreement, which, had it entered into force, would have banned multiple independently targetable re-entry vehicles (MIRV). START II was signed and ratified, but the U.S. withdrawal from the ABM Treaty in 2002 caused Russia to stop its efforts to bring START II into force. The New START does not address the amount of the overall nuclear stockpiles either. Obviously, nuclear weapons declared non-strategic, but still yielding similar physical and radiological effects, continue to be excluded also from this treaty and, in fact, from any serious negotiations.

The implicit but clear adoption of pre-emption, the development of missile defence systems and the dilution of the thin but clear line between nuclear and conventional weapons in U.S. strategic and nuclear documents of the early 2000s fundamentally undermine strategic stability that is based on mutual vulnerabilities and assured retaliation. First strike policy and the doctrinal intention of using nuclear weapons in conventional conflicts indicate that other countries' nuclear posture and, most importantly, their use of nuclear weapons, are no longer decisive planning prerequisites for U.S. and Russian nuclear elites and engagement. Schmitt's (2003, p. 513–518) analysis of the 2002 U.S. *National Security Strategy* stresses how pre-emptive approach was regarded as a remedy to the shortfalls of containment and deterrence in a new threat environment of transnational terrorism and proliferation of weapons of mass destruction. Schmitt also lists criticism against the doctrine of pre-emption, in that it would actually encourage adversaries to use weapons of mass destruction, lest they be lost during a first strike, that it might legitimize pre-emption by other states, and that it would threaten the Westphalian world order and its fundamental principles, sovereignty and territorial inviolability. Subscription to potential first, limited and regional use of nuclear weapons underlines also the merged political and military-operational rationale of nuclear weapons and being nuclear. Regional and limited tasks and tactical employment of nuclear weapons increase the practical and political utility of nuclear weapons and inhibit nuclear disarmament and pragmatic arms control measures.

The policy of no first use (NFU) would not necessarily reduce the risk of unintentional use or the likelihood of intentional use. On the contrary, no first use can, at best, be regarded as political lip service and, at worst, as destabilizing. Though widely supported within the disarmament community, deterrence advocates consider the no first use policy harmful, as following the need to maintain the risk of escalation, refraining from first use is considered to undermine deterrence. Moreover, NFU can encourage activities under assumed nuclear red-lines and umbrellas. The U.S. has systematically refrained from NFU and, as mentioned, although the Soviet Union declared it would not use nuclear weapons first, the Russian Federation abandoned this stance in 1993, leaving China as the only nuclear weapon state to subscribe to this policy.

Secondly, contrary to Cold War nuclear doctrines of continuity, contemporary U.S. and Russian nuclear doctrines are reactions to change: the American reactions aim to control the changes in the world order, whereas the Russian reactions focus on resisting (further) changes in her self-defined sphere of interest, including Russia herself. Moreover, references to threats such as biological weapons, terrorists, North Korea or NATO, as well as the development of new ballistic missiles, submarines and aircraft make both Russia and the U.S. great again. They revitalize the status of being nuclear. By defining and re-defining the enemy, they not only provide guidance to and legitimize technical and doctrinal measures, but also draw the boundaries of the nation (Schmitt, 2007).

Adherence to deterrence and stability and the habit of considering unilateral moves to be destabilizing decelerates arms control and disarmament. In particular, by maintaining and qualitatively improving their nuclear arsenals, Russia and the U.S. undermine the spirit and the letter of the Treaty on the Non-proliferation of Nuclear Weapons (NPT). They do not progress towards disarmament, but rather expect states without nuclear weapons not to obtain them. In fact, the NPT has become 'the cornerstone of the nuclear non-proliferation regime' (Obama, 2015), but not a building block of disarmament. Reductions in nuclear arsenals stem from operational-technical considerations, financial calculations and mutual political agreements, not from the obligation to disarm under Article VI of the NPT.

The U.S. and Russian doctrines do not, however, prevent arms control. In fact, both countries express the readiness to reduce their arsenals. The main conditions for doing so are mutual obligations and the maintenance of strategic stability. Strategic stability, as a model of thinking, conditions, limits and sets needs for arms control. Washington and Moscow keep to their arsenals as a means of maintaining stability but are wary of any adversary technological or doctrinal advancement that could shake that stability.

Reading of the U.S. and Russian nuclear policies and doctrines identifies how the notion of strategic stability is used to legitimize the existence of nuclear armaments in general, and how strategic stability can be exploited to reduce specifically their gravity and quantity. As deterrence is more of an abstraction than a well-defined or pre-defined level of arsenals, there is no a priori obstacle for joint arms control endeavours that at the same time maintain strategic stability, or the stability of deterrence. Parity and balance of forces and capabilities can be maintained regardless of their level. Accordingly, a bilateral nuclear arms race is illogical and unnecessary at best and counterproductive at worst, because moves to improve security needs tend

to lead others to perceive increased insecurity and to acquire balancing capabilities, as the well-known concept of the security dilemma explains (Herz, 1951).

The dual policy of maintaining strategic stability and taking decisive and concerted action in nuclear and missile non-proliferation can foster arms control that secures mutual deterrence, alleviates military security threats, and respects the concerns of non-nuclear nations. As the Russian 2015 *National Security Strategy* (#104) states: to preserve strategic stability, the Russian Federation is inter alia 'prepared for further discussion of a reduction of nuclear potentials based on bilateral accords and in multilateral formats and also contributes to the creation of fitting conditions permitting a reduction in nuclear arms without detriment to international security and strategic stability'. Washington should take this statement at face value, even if only to test Moscow's readiness to live up to its promise. Moscow could do the same with the U.S. 2010 *Nuclear Posture Review's* conditional commitment to reductions.

Taking deterrence-stability as a point of departure is rather a piecemeal, apologetic turn than a utopian objective [to follow Popper (1994, p. xlii), and Koskenniemi (2005)], but neither nuclear weapons nor the doctrine of deterrence can be wished away. This pragmatic approach builds on the following key assumptions and conclusions of this analysis:

- No major nuclear or non-nuclear arms control move is possible without respecting the doctrine of stability;
- No arms control agreement that does not respect the necessity of mutual stability can enter into force;
- Stability without explicit and frequent attention to arms control cannot be maintained over an extended period of time; and
- Technology, weapon systems and doctrines constantly look for openings to create favourable conditions, which other states can interpret as threatening and destabilizing.

Thirdly, nuclear weapons are here to stay for the foreseeable future. It is also very likely that any arms control and disarmament steps taken will be modest rather than ambitious. For a realist, the instrumental value of arms control is that it helps to maintain stability in technological, doctrinal and political developments and moves that can challenge the obtained stability. An idealist needs to dive deeper, and a careful reading of doctrines and other political statements can be of use. Despite the dire doctrines, arms control and disarmament are not destined to fail. On the contrary, as doctrines are but characteristic products of their contingent time, arms control and disarmament can and must revisit the key nuclear beliefs, assumptions and principles, and, time and again, reinvent the approaches. What worked yesterday may not work today or in the future.

Stemming from a realistic reading of the contemporary Russian and American nuclear thinking, the following framework for analysis and action seeks to identify the rationality, methods and tangible objectives of the politics of arms control and disarmament. The first question an analyst or an activist needs to ask concerns the fundamental approach and purpose of a policy or an initiative: limitation, reduction, conditioning or banning and of what, the use, quality or amounts of particular weapons systems. Especially, as in the 2000s, both the U.S. and Russia have announced more permissive nuclear doctrines and diluted the previously clear distinc-

tion between nuclear and non-nuclear weapons arms control, efforts should not be limited to weapon systems and their deployment, but should address questionable policies and destabilizing doctrines. We may also ask about the stakeholders' interest: what particular national interests affect the policies or processes; is it to preserve or change stability or balance; and is the real interest promoting or preventing the processes, the latter preserving an utility that nationally is considered essential? We also need to determine whether it is more beneficial to focus on existing technologies and ways of employment or on developing technologies and anticipated, harmful, ways of their employment. Finally, we should ask about the desired product of any arms control or disarmament policy or process: are we satisfied with voluntary norms, statements or measures, or are we to seek legally binding, explicitly verifiable and even universal agreements and treaties?

Furthermore, reading the American and Russian nuclear doctrines identifies permissive operational practices that are more alarming than the existence or levels of their nuclear weapons. Although a nuclear-free world is considered an ideal, the threat of nuclear escalation involving and between the super powers needs most urgent attention. In the case of nuclear weapons, even a relatively small number of weapons can create absolute destruction. Moreover, while the U.S. and Russia and other states with nuclear weapons have learned to manage and live with vast arsenals, even theoretical considerations on the limited and regional use of nuclear weapons and the combined nuclear/non-nuclear arsenals are dangerous new terrain. Thus, the following arms control measures would help in reducing the likelihood of intended use of nuclear weapons and the risk of intended or unintended nuclear escalation of conflicts:

- Abandonment of regional and limited nuclear doctrines, where nuclear weapons are regarded as and thought to be used as any other weapon;
- Taking nuclear weapons off high-alert levels and onto lower levels of alert and readiness;
- Banning multiple warheads in line with START II Treaty provisions;
- Clearly separating nuclear and non-nuclear weapons systems;
- Creating a treaty-based reduction of non-strategic, so-called tactical nuclear weapons; and
- Taking nuclear non-proliferation seriously also politically and not only as a technical measure to prevent the illegal spread of technologies, material and competence.

The hyper-realist domestic politics prevailing in both Moscow and Washington do not rule out mutually beneficial deals in arms control. Still, it is likely that it is not the current, but rather the next generation U.S. and Russian leaders that will have the chance to earn peace prizes:

> [Russia needs to] "enhance the combat capability of strategic nuclear forces, primarily by strengthening missile complexes that will be guaranteed to penetrate existing and future missile defence systems."
>
> Vladimir Putin, 22 December 2016.

"The United States must greatly strengthen and expand its nuclear capability until such time as the world comes to its senses regarding nukes."

Donald J. Trump, 22 December 2016.

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Concepts and Abbreviations

Sources: Arms Control Association; Federation of American Scientists; Treaty Texts; U.S. Department of Defence; U.S. Department of State.

First strike

A decisive, surprise nuclear strike launched with an intention to destroy the target or defeat the enemy.

Second strike

A retaliatory nuclear strike launched in response to a first strike.

Launch-on-warning

A doctrine/strategy to launch a retaliatory strike on warning of an incoming nuclear strike, that is before that strike hits their targets and potentially eliminates the capacity retaliate.

Counter-city/counter-value

A doctrine/strategy and force to target enemy population and society.

Counter-force

A doctrine/strategy and force to target enemy military objects, especially nuclear and other high-value units and formations, command and control centres, air and naval bases and military-industrial infrastructure.

Ballistic missile

A missile launched to and flying most of the time on a ballistic flight path (suborbital trajectory). Ballistic trajectory is the straight line between the site of launch and the target but its vertical curve and height of it is determined by the launch speed (thrust and impulse) of the missile. Ballistic missiles travel to outer space and closer to the target the missiles or their multiple warheads return at high velocity to atmosphere.

Cruise missile

A missile travelling through atmosphere to its target on a guided, chosen flight path. Because of their guidance and navigation systems cruise missiles have high precision and probability to hit even a small target.

Tactical nuclear weapons

Nuclear weapons intended to be used in battlefield or against single, usually, but not exclusively a militarily valuable target.

Strategic nuclear weapons

Nuclear weapons intended to be used against larger and high political or military value targets as a part of strategic plan, i.e. not of immediate battlefield utility.

Short-range

Ballistic missile range less than 500 kilometres; the U.S. Department of Defence *Dictionary of Military and Associated Terms* (JP 1-02) defines short range as ballistic missile range between up to 600 nautical miles (1100 km).

Intermediate range

Following the scope of the INF Treaty ballistic missile range between 500 to 5500 kilometres; the U.S. Department of Defence *Dictionary of Military and Associated Terms* (JP 1-02) defines *medium range* as ballistic missile range between 600 to 1500 nautical miles (1100–2800 km).

Long-range

Ballistic missile range over 5500 kilometres

Intercontinental Ballistic Missile (ICBM)

Silo or mobile ground platform launched long-range missile with single or multiple warheads, nuclear or non-nuclear.

Submarine Launched Ballistic Missile (SLBM)

Long-range ballistic missile launched from a submarine with single or multiple warheads, nuclear or non-nuclear.

Submarine-Launched Cruise Missile (SLCM)

Cruise missile with nuclear or non-nuclear warhead launched from a submarine.

Air-Launched Cruise Missile (ALCM)

Cruise missile with nuclear or non-nuclear warhead launched from an airplane.

Multiple Independently Targeted Re-Entry Vehicle (MIRV)

Ballistic missile payload (section) containing multiple warheads and possible decoys that are released in outer space and return to atmosphere on a descending trajectory before hitting the multiple targets on the ground or at sea.

Surface-to-Surface Missile (SS/SSM)

Ballistic missiles fired on ground (SS) or at sea (SSN) against targets on ground or at sea as opposite to Surface-to-Air (SA/SAM) anti-air(craft) and Air-to-Surface/Air-to-Ground (ASM/AGM /ATGM) missiles.

Ballistic Missile Defence/Anti Ballistic Missile Defence (BMD/ABM Defence)

Defence system comprising radar stations, command and control centres, satellite and other secure connections and surface-to-air interceptors (missiles) that are able to detect and destroy ballistic missiles in various stages of the trajectory.

Anti-Ballistic Missile Treaty (ABM Treaty)

The *Treaty Between The United States of America and The Union of Soviet Socialist Republics on The Limitation of Anti-Ballistic Missile Systems* was signed in May 1972. The Treaty permitted each may have only two ABM deployment areas, one to protect its capital and another to protect an ICBM launch area. This agreed restriction prevented the build-up of a nationwide ABM defense or become the basis for developing one, which left each country vulnerable to the others retaliatory missile forces. The U.S. and the Soviet Union also signed to limit qualitative improvement of their ABM technology, in particular not to develop, test, or deploy ABM launchers capable of launching more than one interceptor missile at a time or modify existing launchers to give them this capability. In December 2001, the United States indicated its intent to withdraw from the ABM Treaty, and its withdrawal became effective 6 months later. President George W. Bush stated in his remarks that that at the time of signing in 1972 the world was vastly different and that the ABM Treaty had come to hinder "our government's ability to develop ways to protect our people from future terrorist or rogue-state missile attacks".

Comprehensive Nuclear Test Ban Treaty

(CTBT) bans all nuclear explosions on Earth whether for military or for peaceful purposes. The basic obligations as stipulated in Article I are "1. Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control" and "2. Each State Party undertakes, furthermore, to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion." The CTBT was opened for signature in 1996. Currently 183 countries are members of which 166 have ratified the Treaty. Of the 44 specified country ratifications needed the Treaty to enter force eight are still needed, namely China, North Korea, Egypt, India, Iran, Israel, Pakistan, and the United States.

Nuclear Non-Proliferation Treaty (NPT)

Signed in July 1968 the NPT entered force in March 1970. The Treaty has three main pillars: non-proliferation, disarmament and peaceful use of nuclear energy. The designated *nuclear-weapon state* parties to the Treaty, China, France, Russia, the United Kingdom, and the United States, undertook "not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices" (Article I).

On the other hand, each *non-nuclear-weapon state* party to the Treaty undertook "not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices" (Article II).

The NPT does not limit states to "develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with articles I and II of this Treaty." Moreover, all the Parties to the Treaty undertook "to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy" (Article IV).

Each of the Parties to the Treaty undertook "to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a Treaty on general and complete disarmament under strict and effective international control" (Article VI).

Strategic Arms Limitation Talks (SALT)

The Strategic Arms Limitations Talks were initiated in 1967 as a combined objective to limit ballistic missile and anti-ballistic missile defence build-up. The formal negotiations commenced in 1969 and the *Interim Agreement on the Limitation of Strategic Offensive Arms* (SALT I) and the *ABM Treaty* were signed in May 1972. SALT I limited the number of strategic ballistic missile launchers at existing levels. It also limited land-based ICBMs that were in range from the northeastern border of the continental United States to the northwestern border of the continental USSR and the number of SLBM capable submarines that NATO and the United States could operate to 50 with a maximum of 800 SLBM launchers between them. It also required both parties to limit their ABM system to two as agreed in the *ABM Treaty*. SALT II was in principle agreed in 1974 but was never ratified. It suggested strategic nuclear delivery vehicles (ICBMs, SLBMs, and heavy bombers) to 2400 for each side; a limit of 1320 limit on MIRV systems; a ban on new land-based ICBM launchers; and limits on deployment of new types of strategic offensive arms.

Intermediate Range Nuclear Forces (INF) Treaty

The *Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles*, signed in 1987, eliminated all Soviet and American longer-range intermediate nuclear force missiles with ranges between 1,000 and 5,500 kilometers, as well as shorter-range intermediate nuclear force missiles with ranges between 500 and 1,000 kilometers.

Strategic Arms Reduction Treaty (START)

The *Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms* was signed on in July 1991. START reduced and limited each party's number of deployable launchers to 1600 and deployable warheads to 6000. After the collapse of the Soviet Union it was agreed in 1992 that Russia, Belarus, Kazakhstan and Ukraine became parties to the START I Treaty as legal successors to the Soviet Union, the three latter later joining the NPT as non-nuclear states and abandoning their nuclear weapons.

START II

The *Treaty Between the United States of America and the Russian Federation on the Further Reduction and Limitation of Strategic Offensive Arms* was signed in January 1993 and ratified by the U.S. Senate in 1996 and by the Russian Duma in April 2000. START II reduced the number of deployable nuclear weapons initially by two-thirds and finally to 3000–3500 warheads. The START II also banned heavy intercontinental ballistic missiles and multiple-warhead ICBMs. Since the U.S. withdrew from the ABM Treaty in 2002 Russia ended its efforts to bring the signed and ratified START II into force.

START III

The Treaty would have established by the end of 2007 a ceiling of 2,000-2,500 strategic nuclear weapons for each of the parties. The treaty negotiations were never concluded.

Strategic Offensive Reductions Treaty (SORT)

The *Treaty Between the United States of America and the Russian Federation On Strategic Offensive Reductions* ("The Moscow Treaty") was signed in May 2002 and entered force in June 2003. The Treaty reduced and limited strategic nuclear warheads by the end of 2012 to the maximum of 1700-2200 for each Party. In addition the U.S. and Russia agreed that START I remains in force in accordance with its terms. SORT does not address strategic nuclear warhead destruction or tactical nuclear weapons limits, which were suggested for inclusion in START III.

New START

The treaty on *Measures for the Further Reduction and Limitation of Strategic Offensive Arms* was signed in April 2010 and entered force in February 2011. New START replaced the Treaty of Moscow (SORT) expiring in December 2012. The New START limits the number of deployed strategic nuclear warheads to 1550. It will also limit the number of deployed and non-deployed inter-continental ballistic missile launchers, submarine-launched ballistic missile launchers, and heavy bombers equipped for nuclear armaments to 800. The number of deployed ICBMs, SLBMs, and heavy bombers equipped for nuclear armaments is limited to 700.

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The US Missile Defense Systems, Europe and Russia

Götz Neuneck[2]

Abstract

Efforts to erect a workable defense against attacking long-range ballistic missiles were pursued from the beginning of the missile age in the 1950s. During the Cold War, the US and the Soviet Union developed and partially fielded strategic anti-ballistic missile systems (ABM), but these deployments were intentionally limited in 1974 by the ABM Treaty. The U.S. withdrew from the Treaty in 2002 which made the development of national ballistic missile defense (BMD) and its proliferation and regional deployment possible. Under US President Obama, particularly, regional missile defense in Europe, Asia and the Middle East, in response to the proliferation of theater-range ballistic missiles, has returned to the international agenda, causing much controversy about the offense/defense relationship between the nuclear weapon states and about regional stability. In particular, the planned European Phased Adaptive Approach (EPAA), which, according to NATO, is directed against an Iranian missile threat, caused much Russian opposition. The criticism is that the US wants to build a global missile defense, which undermines 'strategic stability' in relation to survivability, crisis stability and arms race stability, causing thereby a new arms race. The US effort to develop different BMD programs is accompanied by an ongoing debate about their technical effectiveness, their scope, their deterrent effects and their impact on arms control and regional stability. The first section gives a short historical introduction to the development of various BMD programs and their potential implications. The second section outlines the current status of the global and regional missile programs from a European point of view and the Russian objections to them. The third section analyses the EPAA and its consequences for European Security and Arms Control. The article concludes with a discussion of proposals for future cooperation and confidence-building.

Introduction: A Short History of BMD - From Global Aspirations to Regional Reality

The US and Russia have pursued efforts to build defenses against long-range ballistic missiles, especially those equipped with nuclear warheads, since the 1950s (Neuneck, 2010). To shoot down a missile in flight with a very high speed 'anti-missile' is

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an enormous technical challenge. BMD was first born out of the monstrous threat of nuclear weapons first delivered by airplanes (air defense), then against attacking ballistic missiles. As ballistic missiles are able – within minutes – to deliver payloads of mass destruction over considerable distances, they represent an enormous strategic threat, especially if equipped with nuclear warheads. During the Cold War, the US and the Soviet Union developed and partially fielded strategic anti-ballistic missile (ABM) interceptors (Sentinel, Galosh) armed with nuclear warheads but, due to technical problems and the overwhelming number of nuclear warheads, these deployments were limited to one interceptor site per country with 100 interceptors by the time the 1972 and 1974 Protocol ABM Treaty was signed. Additional prohibitions against the location of radar sites except at territorial peripheries, the introduction of new interception technologies (i.e. lasers in space) and the demarcation between strategic and tactical BMD systems were also fixed. All of these years, the feasibility of BMD and its impact on strategic stability were called into question by critics. Given the huge arsenals, an effective BMD system was neither feasible nor useful during the 1970s and 1980s. The bilateral ABM Treaty also prohibited the deployment and testing of comprehensive ABM systems (sea-based, air-based and space-based) for the entire territory of the USA and the Soviet Union/Russia, but placed no restrictions on tactical BMDs against shorter range ballistic missiles.

In 1983, President Reagan revitalized the debate with his 'Strategic Defense Initiative' (SDI) proposal which put the utopian idea of an astrodome of exotic weapons, such as high-energy lasers, on the international agenda and challenged, by its very nature, the idea of nuclear deterrence. But within five years, many exotic elements of this ambitious program, such as 'Directed Energy Weapons' (i.e. lasers) or the x-ray laser were cancelled and the funding was scaled back, especially when the Cold War ended in the early 1990s. Under George H. W. Bush's presidency, SDI was transformed into GPALS, the 'Global Protection against Limited Strikes'. With the end of the Cold War and the collapse of the Soviet Union, the risk of a deliberate nuclear attack by Russia was drastically reduced. The focus of the BMD debate shifted from the Russian threat to 'rogue' or 'irrational' states using more conventional technologies as a BMD technology. This involves hitting an enemy missile or warhead with a 'kill vehicle' to destroy the attacking system with a collision or an explosion in close proximity to the attacking warhead. In 1994, the Republican Party, in particular, called (in 'Contract with America') for deploying a 'cost-effective, operational anti-ballistic missile defense system' as early as possible. Nevertheless, technical feasibility, considering costs at the margin and the implications for arms control have always been decisive criteria for not deploying strategic BMD programs.

President Bill Clinton and the Democrats dropped their opposition to strategic BMD in exchange for maintaining the arms control agenda. In 1996, the Clinton administration introduced 'National Missile Defense' (NMD) to protect US territory – an issue of their policy – and set the course for deployment using more conventional technologies. In January 1999, the administration announced that the deployment decision would be based on four criteria: the ballistic missile threat, the costs, the readiness of interception technology and the arms control implications. NMD's purpose was to defend all 50 US States, i.e. including Hawaii and Alaska, against a limited ICBM strike. Under intense pressure from Republicans in Congress

in 1999 President Clinton signed the National Missile Defense Act (Public Law 106-38) which says:

> "It is the policy of the United States to deploy, as soon as is technologically possible, an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate)."

After that, an analysis of NMD testing produced mixed results and on September 1, 2000 President Clinton concluded that he would leave the deployment decision of NMD to his successor. Until that time, 'national' and 'theater' BMD systems were separate programs, but in 2002 the new George W. Bush administration saw the different elements as part of a global 'Ballistic Missile Defense System' (BMDS). This caused much concern in Russia and China. At the center of BMDS is the Ground-based Midcourse Defense (GMD) system to defend the US homeland against an attack from countries, such as North Korea or Iran. The US pullback from the ABM Treaty in 2002 made the development of the national Ballistic Missile Defense (BMD) and its regional deployment possible. Also in 2002, the Missile Defense Agency (MDA) was renamed 'to develop, test and field an integrated, layered, ballistic missile defense system (BMDS) to defend the United States, its deployed forces, allies and friends against all ranges of enemy ballistic missiles in all phases of flight' (MDA Homepage, Mission 2017). Especially after 9/11, the nationally oriented GMD system became the centerpiece of the Bush administration's policy to protect the United States against long-range missiles.

Currently, both Russia and the United States maintain strategic missile defenses. The Russian Federation still appears to have deployed 68 'Gazelle' interceptors close to Moscow in their ABM-3 system to protect the capital. The last version of the A-135 system became operational in 1995. (Sputnik International, 2012) It is unclear whether the ABM-3 system is operational and equipped with nuclear or conventional tipped warheads.

The Obama administration inherited four main BMD programs based on ballistic missile interceptors: The Ground-Based Midcourse Defense (GMD) consists of 30 ground-based interceptors (GBIs), deployed in Alaska (26) and in California (4), the naval Aegis BMD ships, the land-based Theater High Altitude Area Defense (THAAD) and the Patriot PAC-3 tactical BMD system.

According to MDA figures, the US has spent over $180 billion on BMD programs since the mid-1980s, but there is neither a functional territorial defense program in the US nor can the very limited number of strategic interceptors match a real world threat. By contrast, some countries, such as North Korea, are accelerating their offensive missile programs. In addition, some other nuclear armed states, such as Russia, China and India, are working to develop their own strategic interceptors for future development. The evolving BM programs of North Korea and Iran are the main justification for the various BMD efforts in the US. Despite all of these programs and approaches, the US has no effective BMD system against long-range ballistic missiles, which would be operational against a realistic threat today. As made

clear by many independent studies, missile defense is obviously much more politically motivated than based on sound technical analysis. (Sessler et. al. 2000, Neuneck et al. 2015, Kelleher et al. 2015, UCS 2016)

The 'Evolving' Missile Threat

Beyond the five traditional nuclear weapons states, which have developed and deployed missiles with long-ranges (ICBMs, SLBMs), *de facto* nuclear-armed states, such as Pakistan, India and Israel, are working on BMs with intermediate ranges (3,000-5,500 km). Officially, the main focus of the US BMD efforts is the evolving missile threat from North Korea and Iran. These two countries still rely heavily on imported missile technology and foreign missile expertise. The Democratic People's Republic of Korea (DPRK) has an active nuclear weapons program and conducted nuclear explosive devices tests in 2006, 2009, 2013, twice in 2016, and one in 2017. The DPRK deploys short- and medium-range ballistic missiles and successfully launched long-range rockets in 2012, 2016 and 2017. North Korea is also believed to be working on an ICBM that could reach US territory in several years. Iran has an ambitious BM program and can produce Medium-range Ballistic Missiles (MRBM), such as Shahab-3 and Sejjil-2 (1,000-2,000 km). After more than 10 years of extensive diplomatic efforts, it was possible to negotiate an agreement with Iran to stop further nuclear weapon-relevant developments: The Joint Comprehensive Plan of Action (JCPOA) between Iran and the P5+1 from July 2015 created an effective mechanism to block Tehran from building nuclear weapons for 10 years. Iran has the biggest variety of deployed Short-range Ballistic Missiles (SRBM) in the Middle East and is conducting MRBM tests of several variants of the imported Shahab/No-Dong type. It is also working on its space capabilities, which could also be exploited for military purposes. According to experts, Iran is a decade or more away from developing and testing an ICBM. Iran's BM program is not part of the JCPOA, but under UN Resolution 2231 (2015) 'Iran is called upon not to undertake any activity related to BMs designed to be capable of delivering nuclear weapons'. Nevertheless, in 1998, the Rumsfeld Commission stated that 'the newer ballistic missile-equipped nations would be able to inflict major destruction on the US within about five years of a decision to acquire such a capability (10 years in the case of Iraq)'. It is noteworthy that this direct threat to the US has never materialized, nearly two decades later, demonstrating that it is much harder for Third World countries to build ICBMs.

A trajectory of a BM can be described in three phases. During the boost phase, the missile is highly visible and is powered by its rocket motors. The midcourse phase is the longest phase, during which the remaining stage and the warhead are drifting through space. In the terminal phase, the warhead is re-entering the atmosphere and finally reaches its target. Consequently, a BMD system has to deal with different requirements and is very time-critical in the different phases.

Type		Range [km]	Flight Time [min]	Burnout Velocity [km/s]	Stages	Countries
Long-range Missiles	ICBM	5,500 – 14,000	~ 24 - 40	~ 6,9	2-3	USA, Russia, China, (DPRK), (India)
	IRBM	3,000 – 5,500	~ 14 - 24	~ 5,0	1-3	China, India
	MRBM	1,000 – 3,000	~ 8 - 14	~ 2,8	1-2	Israel, India, China Pakistan, Saudi-Arabia, Iran, DPRK
SRBM		< 1,000	~ 5 - 8	~ 1,5	1	31 countries
SLBM		300 – 12,000	~ 5 - 40	~ 1,5 – 6,9	1-3	USA, Russia, China, UK, France, (DPRK), (India)

Table 1: Categorization of ballistic missiles and their characteristics after the INF Treaty (...): Missiles in Development

The Current BMD Programs and Rationales: A Closer Look

The current U.S. GMD BMD program consists of different key components: forward-based radars (FBX), satellite-based, infrared sensors for early-warning, continental ground-based interceptors (GBI), which will release a kill vehicle against an incoming warhead, a ground-based Command and Control System and a sea-based Tracking Radar (SBX). In 2002, the Bush-II Administration decided to deploy 54 silo-based interceptors (GBI) at three locations, 30 (expanding to 44) in the US (Vandenberg, California and Fort Greely, Alaska), and 10 interceptors under the 'European Missile Defense' (EMD) in Europe. The administration fielded the first GBIs in the US in 2004, without robust testing results ('fly-before-you-buy'-policy), and maintains that, since then, it has had an 'operational capability' or 'a rudimentary protection' of the continental United States, causing much debate about the reliability of GMD.

The Bush-II-Administration rushed rapidly into the deployment of the GBIs for political reasons and did not follow the Pentagon's standard acquisition rules. Of the 17 pre-deployment and the integrated flight tests only 8 were successful (Grego, Lewis & Wright, 2016, p. 3). Different Government Accountability Office (GAO) reports repeatedly criticized a lack of transparency by the MDA, cost overruns and high-risk acquisition practices (GAO, 2016). In 2016, the GAO's assessment was that MDA has not 'demonstrated through flight testing that it can defend the U.S. homeland against the current missile defense threat'. (GAO, 2016a, p. 6) In addition, some BMD components, such as the 'Precision Tracking and Space Surveillance' (PTSS) and the 'Multiple Kill Vehicle Program' (MKV) were cancelled. The MKV program was meant to be an answer to the 'countermeasure problem' (Sessler et al., 2000): An attacker can try to multiply the missile payload during flight by using light decoys, balloons and debris or warhead mockups, besides the real warhead,

to confuse the defense. Distinguishing objects in a 'threat cloud' is a key task of sensors for tracking missiles and their warheads. The tracking radar has the task of discriminating between the 'fake warhead' and the real one to guide the kill vehicle to the nuclear warhead. The current GMD testing program uses limited testing conditions (i.e. sun lighting, smooth weather etc.) and has not yet test against an ICBM-range target. The current testing also does not include sophisticated countermeasures. An UCS study from 2016 concluded that 'the Pentagon's own testing officials have said the system has not demonstrated an operational capability to defend the US public from a missile attack' (UCS, 2016, p. 2). The 2012 National Academy of Sciences' study (NRC, 2012) called the GMD system 'deficient' with respect to some principles for cost-effective missile defense and recommended a complete overhaul of the GBIs, sensors and the concept of operations. (UCS, 2016, p. 11) Today, the MDA has deployed 30 GBIs in Alaska (24) and at California's Vandenberg Air Force Base (6) and is preparing to field 14 more. The Obama Administration did not improve the oversight problem, but in March 2013, then-Secretary of Defense, Chuck Hagel, announced that 14 additional interceptors would be fielded by the end of 2017 in response to the North Korean ballistic missile program. 15 years after announcing the GMD system, the aggregated costs are $40 billion without demonstrating that GMD has 'a real world defense capability' against more sophisticated threats. The 2016 UCS study concluded that 'inadequate congressional oversight, presidential administrations that push for a rushed deployment and few impediments to starting poorly vetted projects have led to the GMD program's current state of disarray' (UCS, 2016, p. 18).

Despite the sobering test results, advocates in the US Congress for an expansion of the national GMD are now pushing to build a 'third NMD site' on the East Coast of the US. In May 2016, the Pentagon said that it had completed a draft study of three possible locations on the Eastern US coast for a new BMD interceptor site, but that it still had no plans to actually build such a site. The estimated costs for such a new site might be $3-4 billion. Other proponents in the US Congress are proposing old ideas, such as the deployment of GBIs in Eastern Europe or the return of space-based interceptors (Reif, 2016). The version of the FY 2017 National Defense Authorization Act passed by the House of Representatives requires the Pentagon to begin design, research and development and testing for a space-based missile defense system. The version of the bill passed by the Senate says the department 'may' commence work on such a system but does not require it. The Obama administration argued that there are no requirements for a space-based intercept system and cited concerns about the technical feasibility and long-term affordability of BMD interceptors in space. (Reif, 2016)

In addition, the efforts–predominantly by Republicans in the US Senate and the House of Representatives–to revise the 1999 National Missile Defense Act were successful. They succeeded in removing the word 'limited' in the act and in introducing the phrase 'an effective, robust layered missile defense'. So, Congress rewrote the long-standing US BMD policy by stating it is now 'the policy of the United States to maintain and improve an effective, robust layered missile defense system capable of defending the territory of the United States and its allies against the developing and increasingly complex ballistic missile threat' (Reif, 2017). Despite objections from the Pentagon, analysts and civil society, President Obama signed

that law on December 23, 2016. This language opens the door for the accelerated expansion of different BMD systems against countries beyond Iran and North Korea (Reif, 2017). Such a statement sends a signal to Russia and China that the US is not committed to finding any solution for balanced strategic stability, thus undermining any future disarmament steps.

Midcourse Defense				
Name	**Task**	**Technology**	**Components**	**Status**
Ground-base Midcourse Defense (GMD)	Protection of the U.S. homeland against limited attacks	Hit-to-Kill Technology to intercept strategic ballistic missiles IRBM, ICBM	Ground-based interceptors GBI	Initially deployed since 2004
Aegis BMD		Hit-to-Kill Technology to intercept short- and medium range ballistic missiles SRBM, MRBM, IRBM	Aegis BMD ships; aegis Ashore	Deployed, Testing
Terminal Phase Defense				
Name	**Targets**	**Technology**	**Contractor**	**Status**
THAAD	SRBM, MRBM (IRBM)	Hit-to-Kill, mobile ground-based interceptors	Lockheed Martin u.a.	Testing and deployment in Guam (2013); Deployment planned in South-Korea
Patriot PAC-3	Aircraft, Cruise Missiles, SRBM	Hit-to-Kill + warhead, mobile ground-based interceptors	Raytheon, Lockheed Martin	Deployed
Aegis Terminal Defense	SRBM	Warhead with proximity fuse, sea-based Interceptors	Lockheed Martin, Raytheon, ATK, Boeing, among others	Deployed, testing

Table 2: The U.S. BMD programs and their key characteristics

Current US Lower- and Upper-tier BMD Systems

Only two current US BMD systems have been envisioned specifically to address the medium-range ballistic missiles threat: the US naval system Aegis- BMD system and the US ground-based interceptor system THAAD (Theater High Altitude Area Defense). Both BMD-systems are dedicated to area and regional protection against sophisticated aerial threats up to intermediate-range missiles.

The *Aegis BMD system* is the naval component of the BMDS, which consists of Aegis ships equipped with Standard Missile (SM) interceptors and onboard tracking radars (O'Rourke, 2016). The US Navy sees BMD as a core mission. In addition to that, the land-based 'Aegis Ashore' locations in Europe are adapting the ship-based

Aegis system to land locations, especially as part of the EPAA concept. The Aegis Weapon System (AWS) is geared toward defending against SRBMs, MRBMs and intermediate-range missiles above the atmosphere. Several SM interceptors are already deployed or are in development. The SM-2 Block IV and SM-6 Dual I/II interceptor can intercept SRBMs in the atmosphere, whereas the SM-3 Block IA, IB and the forthcoming Block IIA can defeat targets above the atmosphere. The SM-3 has a three-stage booster with a homing kill-vehicle on top. The MDA is also running another BMD program, the *Sea-Based Terminal Defense* (SBT) Program, which creates a low-altitude second layer of BMD for Navy ships and nearby areas. SBT interceptors, such as the SM-6, operate within the atmosphere and defeat the target with high-explosive fragmentation warheads. Intercepting SRBMs, such as Scud missiles, which do not leave the atmosphere, is planned. The SM-6 is an air defense interceptor which can also have a surface attack capability. 1,800 missiles will be procured by 2024 (Lewis, 2016c).

Japan and the US are co-developing the SM-3 Block IIA interceptor variant to defeat longer-range BMs. This faster version (~ 4.5 km/s) can cover much larger areas and is operationally more flexible than the SM-3 IB. The deployment is scheduled for 2018. The MDA claims that Aegis BMD ships can detect and track BMs of all ranges, including ICBMs if early warning and tracking data is available from space- or ground based sensors (MDA, 2016). An Aegis cruiser or destroyer is equipped with a SPY-1 radar and vertical launch tubes (VLS) for a maximum carrying capacity of 90-122 weapons, which can host different offensive and defensive missiles. The first Aegis deployment was in 2004. Japan has purchased four Kongo class destroyers with upgraded BMD capabilities. As of July 2016, 33 US Aegis BMD ships (five cruisers and 28 destroyers) were in service.

Flight tests are conducted at the Pacific Test Range in Hawaii. MDA says that it has conducted 40 SM-3 intercept tests with 33 successful intercepts. The MDA states that of 40 flight tests, 37 were successful. The number of interceptors and BMD ships will increase over time. Today, the US Navy has only four ships with 'advanced' BMD capability, which can perform air and missile defense at the same time. The MDA projects that there will be 39 BMD capable ships by 2020 and 80 Aegis BMD ships with 7.000+ VLS tubes by 2040 (Lewis, 2015).

The land-based *Theater High Altitude Area Defense System* (THAAD) is a globally transportable missile defense system designed to defend against incoming threats, such as SRBMs and MRBMs at the end of their midcourse and their terminal stage inside and outside of the atmosphere. A THAAD battery consists of a launcher with eight interceptors, an X-band radar (AN/TPY-2) and a fire control system. A battery consists of a maximum of nine launchers which are air-deliverable. THAAD has been 'successfully' tested 13 times since 2006, including 11 intercepts of SRBM targets. The first test against an IRBM is planned for 2017. The THAAD system provides the upper tier of a 'layered defense' to protect 'high value strategic or tactical sites', such as airfields or populations centers. The production of interceptors began in 2011 and, up until 2015, several hundred interceptors had been delivered. Five of the seven planned THAAD batteries have been delivered to the US Army. The first two batteries were deployed in Fort Bliss, Texas. One THAAD battery was

deployed to Guam in 2013 to defend against a North Korean threat. In July 2016, the US and South Korea decided to deploy another THAAD battery to protect parts of the South Korean peninsula against the North Korean threat. This decision caused much controversy in South Korea. China articulated strong objections, especially against the THAAD radar, which can, in a specific mode, monitor Chinese ICBM launches.

The operational 'lower tier' *Patriot Advanced Capability-3* (PAC-3) is designed to defend against S/MRBMs in the terminal stage at low altitudes with a blast fragmentation interceptor. It is not necessarily part of EPAA and is or will be deployed in several field missions and can protect point targets, such as troop accumulations. Earlier Patriot versions but also PAC-3 were purchased by other countries and have been deployed to different regions. PAC-3 destroyed 2 Iraqi SRBMs, but also shot down a US fighter jet in 2013.

Summary

Many questions about the feasibility of the current technology and the potential effectiveness of strategic ballistic missile defenses remain open, but the Obama Administration still invested around $10 billion annually for BMD, much of which was for strategic defense. Advocates and critics of missile defenses agree that neither the Russian nor the US BMD system currently deployed would provide an effective and reliable defense against a sophisticated nuclear ballistic missile attack. There is also a consensus among many analysts that the existing US strategic defense system does not provide a reliable defense against even a simple ICBM attack from an emerging nuclear weapons state. The remaining three US BMD programs are non-strategic, designed to defend against S/MRBM/IRBMs: the sea-based Aegis BMD system; the Army's THAAD program; and the Patriot PAC-3 program. These tactical and theater BMD systems, as well as the Russian S-300/400/500 series program, will not substantially affect the strategic military balance between Russia and the United States due to their limited capabilities. During the debates on the ABM Treaty, both sides especially valued the contribution of missile defenses against tactical and theater BM systems, leaving such defenses outside the limits of the treaty and negotiating a demarcation protocol to distinguish tactical and strategic BMD in 1997. This valuation has only risen as the S/MRBMs arsenals of independent third-party states has expanded. The need to reassure allies and partner states in the face of new ballistic missile threats was an important driver for the United States' missile defense policy, even as the Obama administration cut the rate of growth in missile defense spending. The Airborne laser (ABL) and the Precision Tracking Space System (PTSS, previously SBIRS-Low) were cancelled in April 2013.

The EPAA and the Implications for European Security

Especially after 9/11, a 'Global Missile Defense' became the centerpiece of the Bush administration's policy to protect the United States, but also its allies, US forces and friendly countries against long-range missiles. For Europe, the original idea was to place an interceptor site with 10 two stage GBIs in Poland and a fixed, potent, 'European Midcourse Radar' in the Czech Republic. This configuration was mainly designed to intercept Iranian missiles heading to the US, but under some

conditions these interceptors could also shoot down Russian ICBMs. Some parts of Southern Europe would also not be covered by the GBI footprint. President Putin criticized these plans at the Munich Security conference in 2007, arguing that this would lead to 'an inevitable arms race'. On September 17, 2009, the newly elected President Obama announced the cancellation of the Bush deployment plan in Europe, replacing it with a more mobile and flexible BMD architecture, which protects the whole of Europe, especially against Iranian ballistic missiles. This 'European Phased Adaptive Approach' (EPAA) plan calls for deploying the US Navy's SM-3 interceptors on board Aegis ships and, later, on two land-based 'Aegis Ashore' EPAA sites in Romania and Poland. This regional BMD architecture includes a land-based radar in Turkey and an evolving Command and Control (C2) network, also known as NATO's ALTBMD system. Then-Prime Minister V. Putin and Russian President Medvedev welcomed President Obama's decision. NATO Secretary, Anders Fogh Rasmussen, stated in his first speech as new Secretary General that the Alliance would 'explore the potential of linking US, NATO and Russian missile defense systems at an appropriate time'. But the US decision increasingly caused frustration to the Polish and Czech governments. At the end of 2009, the BMD subject was still blocking the START follow-up talks.

In February 2010, the Pentagon released the Ballistic Missile Defense Review (BMDR) Report. This first-ever comprehensive BMD review mandated by the US Congress (DoD, 2010) outlines the official US BMD strategy, policy and future program planning. In his foreword, the then-Secretary of Defense, Robert Gates, underlined the two main missions of the US missile defense policy under President Obama. The top priority was (1) to defend 'against near-term regional threats' and (2) 'to defend the homeland against attack by a small number of long-range ballistic missiles' (DoD. 2010, p. i). Concerning the long-range threat, the report names North Korea and Iran (DoD. 2010, p. ii). The main focus of the BMDR-Report was clearly on the growing regional threats 'from short-range, medium-range, and intermediate-range ballistic missiles (SRBMs, MRBMs, and IRBMs) in regions where the United States deploys forces and maintains security relationships' (DoD. 2010, p.iii).

The Basis of the EPAA: American or European?

The European Phased Adaptive Approach (EPAA) originally consisted of *four phases*, sequenced to provide increasing protection against a BM threat (O`Rourke, 2016, p.6). The *first* EPAA phase started with the deployment of a tactical Patriot BMD system and four Aegis BMD ships in the Mediterranean by the end of 2011. *Phase two* involved the construction of an 'Aegis Ashore' site in Deveselu Air Base, Romania, with SM-3 IB interceptors in 2015. The site was operationally activated on May 12, 2016. In *Phase three,* the building of another Aegis Ashore site in Redzikowo, Poland in the 2018 mainframe, with new SM-3 Block IIA interceptors is planned. The faster SM-3 Block IIA interceptor has a higher seeker sensitivity and a better divert capability compared with the slower SM-3 IB interceptor. Its initial deployment is planned by the end of 2018 (Lewis, 2016d).

If Aegis BMD ships are deployed near the Eastern US coast, they could have significant defense capabilities against Russian ICBMs (Butt & Postol, 2011). Such a relocation of Aegis ships needs a few days but could not be achieved clandestinely,

given Russia's additional warnings. The *fourth phase*, originally planned for 2020, would have deployed faster SM-3 Block IIB interceptors with an anti-ICBM mission to defend the US against Iranian ICBMs, but was cancelled in 2013 due to technical problems and a slower evolution of the Iranian threat. A GAO study from 2013 has already stated that 'the original impetus came from comparing policy alternatives, not from technical analysis' (Grego, Lewis & Wright, 2016, p. 17). This would have created an extra layer to defend the US homeland.

Phase	Date	Systems	Deployment Area (Aegis)	Targeted Threat
I	2011	Patriot, four Aegis Cruisers based in Rota/Spain Aegis SM-3 Block IA	Mediterranean Sea	SRBM / MRBM
II	2015	+ Aegis SM-3 Block IB	Land-based in Poland , Mediterranean Sea	SRBM / MRBM
III	2018	+ Aegis SM-3 Block IIA	Land-based in Romania, Poland	SRBM / MRBM / IRBM /
IV*	2020	+ Aegis SM-3 Block IIB	Possibly only two Aegis Ashore site in Poland and Romania	SRBM / MRBM / IRBM / ICBM

Table 4: Planned deployment phases for the future NATO BMD (Neuneck et al, 2015, p. 178)

*** Phase IV was cancelled in March 201**3.

Some European NATO member states contributed key elements to the EPAA architecture. Four countries are hosting EPAA bases: since 2011, Turkey has been hosting the US AN/TPY-1A radar in Kürecik near Diyarbakir. Romania (2015) and Poland (2018) are each hosting a land-based SM-3 BMD interceptor site. Spain runs the Rota harbor, which is the base for the four multi-mission US Aegis destroyers. In Ramstein, Germany hosts the EPAA C2 center and holds available Patriot missiles to defend the asset. In September 2011, the Netherlands announced an upgrade to four air-defense frigates with extended long-range BMD early warning radar. The UK announced it was investing in a land-based BMD radar to enhance NATO's BMD capability. France, Italy and the UK are developing the SAMP-T/Aster family of short-range BMD interceptors. These BMD systems as well as Patriot PAC-3 and the canceled MEADS program are only capable of covering limited areas (point defense). So far, however, the design of the European BMD system architecture and its key components remain largely a US project based on US technology and funding. In his article, G. Lindstrom notes that EPAA 'increasingly serves as an expression of NATO's pursuit of collective defense' (Lindstrom, 2015, p. 114). To become a fully operational BMD system, additional key functions have to be elaborated within the Alliance: given the short time period of intercept planning, monitoring and tracking and, consequently, the management, including kill assessment, and the whole interception process is crucial and time-critical. The Aegis SPY-1 radar alone is ineffective for this purpose as has been pointed out by the Pentagon's Defense Board and the US National Academy of Science studies (DSB. 2011; NSC, 2012). NATO's ballistic missile defense (BMD) activities, although in

their infancy, also play an important part in the NATO Integrated Air and Missile Defense System (NIAMDS), which protects the Alliance territory, population and armed forces against air and missile threats. From a purely military point of view, Russia sees this as an emerging military threat.

Date	Key decisions
19.-20. November 2010	The NATO Summit in Lisbon decided that ballistic missile defense is a European project and approved EPAA.
21. May 2012	At the NATO Summit in Chicago, NATO Secretary General announced that the first elements of NATO BMD are operational ('Interim Capability')
22. December 2013	The new Aegis Ashore Test Facility at the Pacific Missile Test Range is declared operational
31. January 2014	The first of four Aegis destroyers, the USS Donald Cook, leaves Norfolk for the Spanish Harbor Rota
14. March 2014	The Aegis destroyer, the USS Donald Cook, leaves Rota for its first mission
12. May 2016	The first EPAA Aegis Ashore at the Deveselu Air Base, Romania, with SM-3 IB interceptors, was declared as operational.

Table 5: The development of NATO's Ballistic Missile Defense plans (Neuneck 2015, 178)

The Unsuccessful Strive for NATO-Russia Cooperation

At the Lisbon Summit in November 2010, NATO decided officially 'to develop a missile defense capability to protect all NATO European populations, territory and forces,' adding a new core mission for the Alliance. Russia was invited to participate in BMD within the NATO-Russia Council framework, but NATO worked continuously to build-up its BMD infrastructure. Different proposals for a joint BMD architecture were made. Russia proposed shared defense responsibilities for different geographical sectors. The so-called sectoral approach means that each party (NATO or Russia) would have been responsible for providing BMD to a specific area. Under this plan, Russia would also have been responsible for the Baltic States (Makarov. 2012, pp. 11-23). The key issues here are that Early Warning cannot be divided into different sectors and that both sides would be dependent on each other without having a clearly defined threat assessment. NATO also proposed establishing a joint Missile Defense Data Fusion Centre and a Planning Operations Centre. The independent EASI project, in which Russian and American experts, sponsored by the Nuclear Threat Initiative, were involved, worked out a compromise of two separate, but coordinated BMD systems (Dvorkin, 2015, p. 132). Two elements were proposed: Independent ship-based interceptors from NATO/Russia and two BMD centers for Early Warning and Coordination. A Satellite and Radar Data Integration Center and a BMD Planning and Operational Center, staffed by both Russian and NATO officers, would have been responsible for the coordination of both the early warning and the defense. The patrol area was geographically restricted: Russian ships would have been deployed in the Baltic Sea, the Barents Sea, the Black Sea and in the Norwegian Sea (EASI, 2012). On the level of tactical missile defense (TMD), NATO and Russia held several joint computer-assisted exercises

between 2003 and 2008 to develop a common understanding and practices for a future Joint BMD Centre. Despite great efforts from science, military experts and civil society, a common understanding for robust cooperation did not materialize. The obstacles to an enduring BMD cooperation were based on the inability to agree on the missile threat, different views on the geographical and operational responsibilities to defend specific zones and mistrust over the future development of the European BM defense, in combination with NATO being unwilling to give legally binding guarantees that the EPAA would not be directed in the future against Russia's Strategic Forces (Dvorkin, 2015, p. 121). With the annexation of Crimea and the unresolved conflict over the Eastern Ukraine, any talks on joint BMD efforts came to a halt.

On November 23, 2011, as a possible military reaction against NATO's BMD deployment, Russian President Medvedev announced a set of countermeasures, such as activating an early-warning radar in Kaliningrad or deploying offensive capabilities (Iskander SRBMs) or withdrawing from the N-START Treaty.

NATO's Inflexibility

At the Chicago NATO summit in May 2012, the Alliance declared an 'interim missile defense capability' and NATO´s defense ministers approved an action plan for the next steps towards an Alliance-wide BMD capability. The May 2012 NATO Deterrence and Defense Posture Review (DDPR) also emphasized that 'Missile defense can complement the role of nuclear weapons in deterrence; it cannot substitute for them.' No details or any operational rationale were worked out. In early May 2012, during an international BMD conference in Moscow, senior Russian officials specified their concerns. At the conference, Russian officials claimed that interceptor speeds higher than 5.5 km/sec and sea-based interceptors higher than 4.5 km/sec would be able to intercept Russian strategic missiles (Zadra, 2014, p. 53). First, the Russian military sees an inextricable link between strategic defenses and offenses. The new NATO BMD structure was perceived by the Kremlin as the basis of a strategic defense system, which would undermine Russia's strategic nuclear deterrent. For a long time, strategists have argued that the deployment of defenses by one side would reduce the effectiveness of the other side's second-strike weapons. This perception directly touches the debate on a follow-on New Strategic Arms Reduction Treaty. The Russian military sees the US BMD architecture as 'global'. Furthermore, Russia claims that other emerging US capabilities, such as conventional, precision-guided strategic missiles (Prompt Global Strike) and space dominance, are able to undermine Russia's strategic deterrent.

In September 2014, at the NATO summit in Wales, the Alliance repeated in its statement that 'Missile defence can complement the role of nuclear weapons in deterrence; it cannot substitute for them', without explaining the operational relationship of both concepts by specifying what 'appropriate' means (NATO, 2014, Nr. 49 & 52). The 28 leaders also commented: 'Should international efforts reduce the threats posed by BM proliferation, NATO missile defence can and will adapt accordingly' (NATO, 2014, Nr. 55). In May 2016, NATO Secretary General Jens Stoltenberg reiterated that 'our missile defense programme represents a long-term investment against a long-term threat. Our goal is to achieve full coverage and protec-

tion for NATO's European Allies against ballistic missile attacks from outside the Euro-Atlantic area'. He described the system as 'defensive' and emphasized that 'nor does the system represent any threat to Russia's strategic nuclear deterrent 'based on 'physics and geography' (Stoltenberg, 2016). Although, this is correct under the current configuration, the architecture can change significantly in the future by adding new platforms and faster interceptors.

At the NATO Summit in Warsaw, the 28 leaders declared the 'Initial Operational Capability' of NATO's BMD, which means that the four Aegis ships based in Spain, the radar in Turkey and the interceptor site in Romania can work together under NATO Command and Control (C^2). (NATO, 2016, Nr. 56-58).

When President Obama announced the EPAA in September 2009, a principle goal was to enable NATO to defend against the emerging long-term ballistic missile threat from Iran. In his Prague speech in 2009, President Obama stated that 'if the Iranian threat is eliminated, we will have a stronger basis for security, and the driving force for missile defense will be removed'. With the successful conclusion of the Joint Comprehensive Plan of Action in July 2015, the prospects of a nuclear-armed Iran declined rapidly. Also, Iranian ICBM flight tests, predicted by 2015, never materialized. For example, a report of the US-Russian-German Deep Cuts Commission from 2015 called for the postponement of the EPAA phase deployment in Poland (Deep Cuts Commission, 2016, p. 29), but nothing happened at the Warsaw summit. NATO has continued with its EPAA implementation, which Washington has repeatedly declared is not directed against Russia. NATO's inflexible stance is unnecessarily exacerbating tensions with Moscow, creating additional anti-Western momentum in Russia. A study on regional missile defense states that 'there has been remarkably little public debate on the critical issues raised by the renewed and reimagined emphasis on missile defense in the United States and across the globe' (Kelleher, 2015, p. 13). Among the public, BMD is seen as a protective tool of security policy.

Future Possible Aegis Deployments

Three key parameters are decisive for reaching strategic missiles heading to the US: speed, the number of interceptors which can reach Russian missiles heading to the US, and the effectiveness of the kill vehicle. A simulation model developed in Hamburg, which includes real missile data as well as location, gravitation, earth rotation and drag forces, calculates the trajectories of attacking missiles and interceptor to determine the reachability of attacking missiles. The calculations showed that an 'early intercept' of Russian ICBMs by EPAA assets would only be possible with interceptors faster than 5 km/sec. (Neuneck, 2015, X). It follows that the current and planned number of SM-3 interceptors would not undermine the Russian deterrent. Simulations also show that five ships with SM-3 Block IB interceptors or two Aegis Ashore sites can cover the NATO area against MRBMs from the South. It should also be clear that if the interceptors become faster, this would also increase the defended area. If new and faster interceptors are introduced, a cooperation agreement with Russia should be on the agenda. This must include the locations and the operational areas of the BMD capable ships, the speed and number of the interceptors, as well as the capabilities of the deployed radars.

As of the end of 2016, the US Navy currently had 33 BMD-capable Aegis ships (5 cruisers and 28 destroyers). 16 are assigned to the US Navy Atlantic fleet. The MDA and the US Navy are working to increase the 33 ships to 39 by the end of 2020. BMD-capable ships are operating in the Western Pacific and the Persian Gulf to provide regional missile defense, mainly against North Korea and Iran (O´Rourke, 2016, p. i). Of the 33 BMD-capable Aegis ships, only four have 'advanced BMD capability', which can perform against aircraft and ballistic missiles simultaneously. The Navy's requirement is to have 40 ships available for 2026: four for EPAA, nine to be based in Japan and 27 for carrier battle groups (O´Rourke, 2016, pp. 14-15).

The Aegis sea-based BMD system, deployed on Ticonderoga-class cruisers and the guided missile destroyers enjoy broad political support in Washington. Currently, the US Navy has in service three types of 'Standard Missile' interceptors: 75 SM-2 Block IV (to defend against aircraft and cruise missiles), which will be replaced by SM-3s; 200 SM-3 Block 1 A/B (to defend against ballistic missiles). In principle, each destroyer can carry 90-96 Vertical Launch System (VLS) tubes (Mk 41 launch containers) and each cruiser 122 VLS. Under the plans of the Obama administration, the number of Block IIA interceptors would increase rapidly in the 2020s (Lewis, 2016d). For the four EPAA Aegis destroyers, there are no concrete numbers available, but it is believed that 182 SM-3 Block IIA interceptors will be purchased for EPAA (Lewis, 2016d). According to an analysis by G. Lewis, starting with 2017, the number of advanced Aegis BMD ships will increase rapidly by 3-4 per year. By the mid- to late-2030s, 400-600+ SM-3 Block IIA interceptors might likely be deployed, mostly on ships (Lewis, 2016). Adding 44-100 GBI interceptors, this number is roughly comparable to the number of survivable Russian ICBM/SLBM warheads and much larger than the number of Chinese warheads. This creates unresolved challenges for nuclear deterrence and strategic stability between these countries. There is a concrete danger that ship-based BMD might become a spoiler for nuclear disarmament.

Today, Russia has numerous options for maintaining its second-strike capabilities: developing new warheads and countermeasures; deploying faster ICBMs; investing in future submarines or mobile ICBMs; or deploying more missiles to silos in the Eastern part of Russia, which cannot be reached by interceptors from NATO territory. President Putin has already announced that the modernization of the Russian strategic missiles includes adding penetration aids and maneuverable warheads. For the moment, there are no prospects of signing a new ABM-like treaty between the US and Russia. It is worth noting, however, that the United States is likely to have significantly fewer strategic missile defense interceptors at the expiration date of the New START Treaty than the 100 strategic interceptors allowed each side under the ABM Treaty, as amended by the 1974 Protocol. The US will have no more than 44 strategic interceptors before 2017. Russia's plans are less certain, but the 68 strategic interceptors currently deployed around Moscow are more likely to be replaced in equal or lesser numbers than augmented.

The End of the INF Treaty Could Fuel a New Arms Race

A key challenge for future NATO-Russia relations is the open compliance debate on the Intermediate-Range Nuclear Force (INF) Treaty from 1987 between the US and the USSR/Russia. This treaty eliminated their nuclear-equipped INF and shorter-range missiles in a range between 500 km and 5,500 kilometers. By June 1991, the US and the Soviet Union had destroyed two weapon categories: ballistic and cruise missiles, their launchers and support structures of this range. A Special Verification Commission (SVC) was created to serve as a platform for discussing and resolving implementation and compliance issues. After the dissolution of the USSR, the US, Russia, Belarus, Kazakhstan and the Ukraine became members of SVC. In 2014, the Obama Administration accused Moscow of being 'in violation of its obligations under the INF Treaty not to possess, produce, or flight-test a ground-launched cruise missile (GLCM) with a range capability of 500 km to 5,500 km, or to possess or produce launchers of such missiles' (Gordon, 2017). In 2016, American officials claimed that 'Russia was producing more missiles than are needed to sustain a flight-test program' (Gordon, 2016, X). In February 2017, the *New York Times* reported that Russia now has two battalions of new SSC-X-8 cruise missiles, which have been secretly deployed in the country. Publically, there is no detailed information available. Whether these GLCMs are equipped with conventional or nuclear warheads as well the range of these systems is unclear. Since 2014, Moscow has denied such claims and has added three allegations about non-compliance by the US: (1) Russia argues that the deployment of Mk 41 launchers for the Aegis interceptors are not INF-compliant because the launchers have been used for testing the Tomahawk SLCMs and could be used for the deployment of GLCMs, especially at the BMD sites 'Aegis Ashore' in Romania and Poland. (2) Russia claims that the US is using banned INF missiles as target missiles for its BMD tests and (3) Russia believes that the US can use heavy unmanned aerial vehicles with intermediate range as cruise missiles. Nevertheless, the Putin and the Obama administrations reaffirmed their commitments to the Treaty. At the last SVC meeting in Geneva in November 2016, no substantive progress was made. There is a general lack of confidence on both sides about resolving this issue with adequate CBMs, which would include visits or on-site inspections of disputed BMD and GLCM installations (Deep Cuts Report 2006, 26). Furthermore, it is important that NATO and Russia are discussing 'confidence-building measures to remove first-strike concerns.' This includes addressing precision-guided long-range strike systems and strategic and theater missile defense systems (Thielmann & Zagorski, 2017, p. 9). If this were not to succeed, a new arms race would be looming, which would have considerable influence on NATO's MD policy.

In addition, Russia and the US are modernizing their sea- and air-launched cruise missile capabilities, which are similar to the cruise missiles banned by the INF treaty. The US plans to develop a nuclear-armed long range (LRSO) cruise missile for launching from strategic bombers. The US Navy and Air Force are planning to develop a 1,000 km range Joint Air-to-Surface Standoff (JASSM) Cruise Missile. Russia used the SLCM Kalibr (range 2,500 km) with conventional warheads, launched from submarines and warships in the Caspian Sea and the Mediterranean, extensively against targets in Syria. Russia is also equipping its heavy bombers with new nuclear-armed Kh-102 ALCMs. Despite these developments, relinquishing or destabilizing

new nuclear-equipped ALCMS by both Russia and the US would strengthen the INF Treaty. Therefore, the United States and Russia should address and discuss the destabilizing effects of nuclear- and conventionally equipped Cruise missiles, their horizontal and vertical proliferation and possible CBMs. International regimes, such as the MTCR and The Hague Code of Conduct could be reinforced significantly. (Deep Cuts Commission, 2016, p. 9)

Some Conclusions

The current configuration of the US integrated BMD system is not globally- but regionally- oriented. Many questions about the feasibility of the current technology and the potential effectiveness of strategic ballistic missile defenses remain open. Neither the Russian nor the US strategic BMD system currently deployed would provide an effective and reliable defense against a sophisticated nuclear ballistic missile attack. If an attacker were to invest in simple countermeasures, even the currently tested regional BMD systems would run into severe problems. Due to the lack of reliability of the current BMD systems, there is a tendency to invest more in this challenging field to achieve 'an effective, robust layered missile defense' by deploying more BMD sites and ships. In response nuclear proponents will redouble their efforts to introduce more nuclear deliverable warheads, which might end all future disarmament activities. This would fuel more investments in BMD R&D, triggering a regional arms race. The relationship between BMD and deterrence, as well as the meaning of strategic and regional stability, are neither discussed nor refined.

There are no signs that key opponents with ambitious ballistic missile programs are dissuaded from acquiring and developing BMs. North Korea is redoubling its efforts to develop and test long-range BMs. Combined with a functional nuclear warhead, this could become a concrete threat to the region and, in the long-term, also for the United States, thereby accelerating their BMD activities. If supported politically, the JCPOA between Iran and the P5+1 from July 2015 creates an effective mechanism to block Tehran from building nuclear weapons for 10 years. Iran's missile program has not been stopped. The international community should invest in more regional arms control arrangements, which include ballistic missiles, especially in the Middle East and in Asia.

The EPAA in Europe does not, in its current configuration (phases 1-3), pose a threat to the Russian strategic deterrent potential. If the number and capabilities (especially speed) of interceptors and interceptor platforms increase significantly, an offense-defense arms race might be the result. Nevertheless, many operational questions are open: What is the future threat assessment? What is the relation between deterrence and defense? Does the real threat justify the cost? Are confidence-building measures or politically binding guarantees in the BMD field feasible and possible? How robust is the current system against countermeasures?

Even after the downturn of Russian and NATO relations, future cooperation arrangements between the US, NATO and Russia in important technical fields, such as early warning, tactical missile defense (TMD), simulation exercises and the establishment of data exchange and study centers are feasible, if the political will is there.

Without a resolution of the INF compliance issue, the perspectives for the INF-treaty and any future nuclear arms reduction between the USA and Russia are unlikely. On the contrary, acceleration of BMD deployments might not only lead to a spoiler for further disarmament, but could also fuel a redeployment of SRBMs and INF systems in Europe, thus justifying more efforts for the EPAA in Europe.

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3

Treaty on the Non-Proliferation of Nuclear Weapons – Treaty Regime on the Brink of Collapse

Katariina Simonen[3]

Abstract

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) entered into force in 1970. A three-fold bargain was made: non-proliferation, international cooperation in promoting peaceful uses of nuclear energy and nuclear disarmament leading to the elimination of all nuclear weapons. Today, at the beginning of 2017, the nuclear disarmament promise remains greatly unfulfilled. Frustrated, the majority of states, civil society and other stakeholders have aligned themselves behind the so-called Humanitarian Impact Initiative. Three massive humanitarian conferences have produced uncontestable data, which renders the doctrine of deterrence essentially a suicidal concept. The year 2017 also marks a start for a diplomatic process leading to a convention on the prohibition of nuclear weapons. Nuclear weapon states and their umbrellas oppose these developments. These states should remember that the NPT is not invulnerable and, since the NPT is part of a wider network of arms control initiatives, its collapse (or success) has an effect on the entire network. The NPT's survival as well as that of the larger control network depends on the political will to make nuclear weapons a thing of the past.

Introduction

Since the atomic bombs were dropped on the cities of Nagasaki and Hiroshima in August 1945, states have raced for this most efficient weapon in the human history. At the same time, efforts to get rid of these weapons or, at least to control their spread, have multiplied. One such control effort is the Treaty on the Non-Proliferation of Nuclear Weapons (IAEA, 1970), which entered into force 5 March 1970. The aim of this presentation is to familiarize the reader with the NPT, its history and its present, bearing in mind the NPT's relevance for the European context. At this very moment, the NPT regime is facing difficulties due to different factors, one of which is the failure of the initial bargain underlying the deal.

What is important to acknowledge from the start is that the NPT is a part of a larger context made of different disarmament and non-proliferation initiatives, and its success or failure is closely intertwined to developments under these initiatives. A contextual reading is, hence, a start for any understanding of the treaty regime. To achieve such contextual understanding, a variety of different arms control initiatives

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is introduced shortly in the presentation, when in appropriate connection to the NPT and its implementation. Also, other than conventional developments, many of which are Europe-related, such as the US modernization of tactical nuclear weapons in Europe or the development of the European missile defence, have a bearing on the general climate of dialogue, whether negative or positive, which will directly impact on the future of the NPT. These developments are discussed in detail in different chapters of the present book.

For understanding the NPT, its drafting history is telling of the changing priorities and intentions of states under the whole of the drafting period. These shifts in priority had an obvious effect not only on the contents of the individual articles, but also on the treaty as a whole. The eleven (XI) treaty articles are summarized in the presentation, with the attention focused on Art. VI, which contains the unfulfilled promise made by nuclear weapon states (hereafter, NWS) to non-nuclear weapons states (hereafter, NNWS). Basic principles of treaty interpretation are also included, in order to highlight the significance of parties' intentions and later practice when evaluating the present condition of the NPT.

The analysis of the present condition compiles of list of developments harmful to the NPT, such as the current state of world nuclear forces and their modernization, the extensive role of nuclear deterrence in security strategies, proliferation risks and discriminatory control efforts and practices. However, in order not to present the NPT only in a negative light, a brief account of success stories, such as the establishment of several de-nuclearized zones, will also be presented. Every five-year interval, NPT's Review Conferences are organized to check-up on the implementation of the treaty, their success or failure indicating directly the atmosphere in multilateral diplomacy. The final, and perhaps the most interesting development, the Humanitarian Impact of Nuclear Weapons Initiative will be the object of the last substantial section of this presentation, which ends with concise, but hopefully thought-provoking conclusions.

This article is unfortunately a scratch on the surface of topics, which would merit a much more detailed presentation. For instance, the non-negligible work of the International Atomic Energy Agency (hereafter, the IAEA) in the ambit of non-proliferation, its safeguards and Additional Protocol, would deserve their very own analysis, as would many other topics shortly mentioned in this presentation. However, I hope this article serves as a path opener for future scholars into the exciting and important world of disarmament and arms control.

Historical Steps

In 1946, the United States presented to the United Nations (UN) a plan known as the Baruch plan, which proposed that the United States turn over control of all its enriched uranium, including that in any nuclear weapons it had, to a new UN body (over which the US and the other permanent members of the Security Council would have a veto) and that all countries in the world should be prohibited from possessing their own nuclear weapons (Bunn & Rhinelander, 2008). The Soviet Union opposed the plan, since the US would not have surrendered its weapons to any international agency before inspectors were on duty in the Soviet Union and in other countries with nuclear potential. The failure of the plan led to further efforts in

order to find common solutions to curb such proliferation of nuclear weapons. There was a general tendency to accept a statistical danger in proliferation, i.e. the probability of nuclear war increasing as the number of nuclear powers increases (Iklè, 1960, p. 391). Regardless, the constant problem of inescapable distinction between countries having nuclear weapons and countries not having such weapons prevailed. Realism forced states to admit that agreement on disarmament would take time; also, if non-proliferation would not be addressed, proliferation of nuclear weapons would render more difficult the attainment of general disarmament agreement (Shaker, 1976, p. 5).

The next step at controlling nuclear weapons came in 1953 when President Eisenhower proposed providing assistance to other countries in the peaceful uses of atomic energy (so-called Atoms for Peace Initiative). As a result, the US Atomic Energy Act was amended to authorize nuclear assistance to others, and the IAEA was created to provide both assistance and inspectors for peaceful nuclear activities (Bunn, 1993, p.1). As a result, the US, followed by the Soviet Union, France and others, began providing research reactors that used weapons-usable, highly enriched uranium (though usually in lesser amounts than needed for a weapon) to non-nuclear-weapon states around the world. These transfers and training that accompanied the reactors helped scientists in many countries to learn about nuclear fission and its potential uses (*Ibid.*).

Nuclear transfers were not limited only to peaceful uses. In the mid-1950s, the Eisenhower administration began to deploy nuclear artillery in Europe for use by NATO ground forces and the US and allied forces in Europe while retaining control of these weapons (Sokolski, 2001, p. 40). Warsaw Pact members and the world's neutral powers protested that the US authority over these weapons was not complete, and the Soviet Union proposed a ban on the employment of nuclear weapons of any sort in Central Europe. Concerns over US nuclear transfers were heightened further in 1958 when the Congress amended the US Atomic Energy Act so that the transfer of weapons materials, design information and parts to nations that had 'made substantial progress in the development of nuclear weapons' was permitted (*Ibid.*). At the same time, disarmament negotiations at the UN level had reached an impasse. Also, the US and the Soviet Union had threatened or considered using nuclear weapons on at least eight separate occasions since 1953: the US had threatened to use or consider using nuclear weapons to end the Korean War in 1953, to save the French in Vietnam in 1954, to save the Republic of China in 1954, 1955 and 1958 and to prevent any invasion of Kuwait in 1958. Also, atomic howitzers were deployed by the US forces landing in Lebanon in 1958. The Soviets threatened the use of nuclear weapons to end the Suez crisis in 1956 (*Ibid.*).

It was against this backdrop that the Irish Foreign Minister Frank Aiken proposed several UN level initiatives to curb the dangerous trend of proliferation of nuclear weapons and ensuing risks of accidental and catalytic wars. These views were in sync in a report published in an American Academy of Arts and Sciences report, *The Nth Country Problem: A World Wide Survey of Nuclear Weapons Capabilities,* whose central thesis was that the problem of achieving international arms control will become vastly more difficult when the three powers having nuclear weapons are joined by a fourth, and then a fifth, and possibly more (Davidson, et al., 1960, p. 108). The study also emphasized that ultimately the progress against nuclear proliferation was

only possible in the context of larger disarmament arrangements such as a comprehensive test ban and a military production cut-off backed by an effective international inspection system.

Negotiations over the NPT got started with the unanimous adoption by the UN General Assembly in 1961 of the so-called 'Irish Resolution' [GA RES 1665 (XVI)], which was based on the guiding concept of non-proliferation, later to be embodied in the treaty, as follows:

> "1. Calls upon all States, and in particular upon the States at present possessing nuclear weapons, to use their best endeavors to secure the conclusion of an international agreement containing provisions under which the nuclear States would undertake to refrain from relinquishing control of nuclear weapons and from transmitting the information necessary for their manufacture to States not possessing such weapons, and provisions under which States not possessing nuclear weapons would undertake not to manufacture or otherwise acquire control of such weapons."

The US submitted a draft treaty based on the Irish resolution to the Soviet Union when a new 18-nation Disarmament Conference opened in Geneva in 1962. The Soviet response required the prohibition of arrangements that the US already had with its NATO allies (such as West Germany) for deployment, in their countries, of US nuclear weapons under the control of US soldiers. This Soviet proposal and the US plans for a multilateral force (MLF) of naval vessels with nuclear weapons, vessels manned by sailors from participating NATO countries and under NATO command, became major obstacles to agreement (Shaker, 1976, p. 29).

The Irish Resolution was followed four years later by the UN General Assembly Resolution [GA RES 2028 (XX)], with five principles to guide the negotiations over the NPT, as follows:

> "(a) The treaty should be void of any loop-holes which might permit nuclear or non-nuclear Powers to proliferate, directly or indirectly, nuclear weapons in any form.
>
> (b) The treaty should embody an acceptable balance of mutual responsibilities and obligations of the nuclear and non-nuclear Powers.
>
> (c) The treaty should be a step towards the achievement of general and complete disarmament and, more particularly, nuclear disarmament.
>
> (d) There should be acceptable and workable previsions to ensure the effectiveness of the treaty.
>
> (e) Nothing in the treaty should adversely affect the right of any group of States to conclude regional treaties in order to ensure the total absence of nuclear weapons in their territories".

These two resolutions played a key role in substantial negotiations over the contents of the NPT and have been discussed at length by Shaker (1976 and 1980).

After the 1962 Cuban missile crisis tensions between the two super-powers had somewhat relaxed, which led the following year to the adoption, between the US and the Soviet Union, of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (The Partial Nuclear Test Ban -Treaty, PTBT). The ground was more fertile for serious negotiations, and compromising: the US gave up the MLF whereas the Soviets gave up the prohibition against US deployment of nuclear weapons in West Germany (and other allies) under sole US control. NNWS were asked to accept draft language prohibiting them from having nuclear weapons and accepting the IAEA inspections to that effect, in addition to which assistance in peaceful uses of nuclear energy was promised to them by NWS (Bunn, 2003, p. 3). In turn, NWS promised to agree to conduct future negotiations to halt the nuclear arms race and reduce their nuclear weapons with the goal of achieving nuclear disarmament.

India, which, by then, had actively participated in the NPT negotiations as a NNWS, refused to join the negotiations, as it wanted to retain the nuclear weapon-option, as its -then- adversary China had already produced these weapons (*Ibid.*). Pakistan followed suit because India would not join. Israel also refused to join. China and France had not participated in the NPT negotiations but had acquired their own nuclear weapons before the completion of the negotiations. The NPT draft permitted them to join the treaty with the same rights and duties as other NWS (the US, the UK and the Soviet Union).

These negotiations finally led to the adoption of the draft NPT and its opening for signature on 1 July 1968. The NPT entered into force in 1970. On 11 May 1995, the Treaty was extended indefinitely. A total of 190 parties have joined the Treaty, including five NWS, the US, the UK, France, China and Russia (UNODA website, www.un.org/disarmament/wmd/nuclear/npt/). The NPT treaty is the only global legally binding instrument committing five NWS to nuclear disarmament and for all states parties to pursue a treaty on general and complete disarmament. However, India, Israel and Pakistan, which are NWS, are not parties to the NPT. Also, the Democratic People's Republic of Korea (hereafter, DPRK), which is also a NWS, withdrew from the treaty in 2003.

Structure of the NPT and Interpretation

Summarizing the NPT

The corpus text of the NPT consists of eleven (XI) articles. Articles I and II contain three different sets of obligations. First, NWS undertake not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly or indirectly. In turn, NNWS undertake not to receive the transfer from any transferer whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly. Second, and here comes the asymmetrical part, only NNWS undertake not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices. Third, NWS undertake not in any way to assist, encourage, or induce any NNWS to manufacture or otherwise acquire nuclear weapons or other explosive devices, or control over such weapons or explosive devices. NNWS un-

dertake not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III contains provisions on international safeguards to guarantee the objectives of the NPT. On the one hand, NNWS are to accept safeguards, which are to be negotiated in a treaty to be concluded with the IAEA, for the purpose of verifying NNWS obligations assumed under the NPT. This obligation does not extend to NWS, unless required by a supplier state. For instance, Canada has required since the mid 1960's appropriate safeguards to ensure that its exports of uranium are being used for peaceful purposes only. The NWS agree not to provide source or special fissionable material or equipment or material especially designed or prepared for the processing, use or production of special fissionable material to NNWS, unless otherwise explicitly agreed on through safeguards agreements.

Articles IV–V to the treaty decree on the inalienable right to peaceful uses of nuclear energy (Art. IV), and on peaceful applications of nuclear explosions (Art. V). Freedom to exploit the atom for peaceful purposes was considered by NNWS as the most tangible counterpart to their renunciation to acquire nuclear weapons (Shaker, 1976, p. 274). The right to use nuclear energy for peaceful purposes was considered inherent in a state's sovereign right to independent economic development and an essential attribute of national sovereignty and independence. The exercise of this right is subject to conditions of non-discrimination and conformity with Articles I and II of the NPT.

Article VI is worth citing in its entirety, as it sets a specific obligation of result regarding not only negotiations on general disarmament but also on the achievement of a treaty on general and complete disarmament, as follows:

> "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to the cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control."

Article VII stipulates on the right of parties to conclude regional treaties on the abolition of nuclear weapons, whereas Article VIII decrees on amendments and regular reviews of the NPT at five year intervals in order to review the operation of the NPT with a view to assuring that the purposes of the preamble and the provisions of the treaty are being realized. Article IX contains provisions regarding the entry into force of the treaty, on later accession to it and on its registration.

Article X, in turn, includes provisions on withdrawal from the treaty, if a state party considers that 'extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country'. This right of withdrawal has been exercised to date only by the Democratic People's Republic of Korea (DPRK) in January 2003.

Article X (2) decrees on the validity of the NPT for initial 25 years. This stipulation was amended in 1995 when the treaty was extended indefinitely by a unanimous decision of state parties to the treaty.

Article XI includes final provisions on authentic languages of the treaty as well as its deposit in the archives of the Depositary Governments (Russia, the UK, the US).

Interpreting the NPT

The basic rule for treaty interpretation is good faith, *bona fide,* enshrined in Article 31(1) of the Vienna Convention of the Law of Treaties (VCLT), which states that a treaty provision 'shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose' (VCLT, 1969). The purpose constitutes an element of predominant weight in interpretation (Simma, et al., 2002, p. 15). The purpose of different articles can be understood by means of an inquiry into the substantial negotiations' history, diverse views held by states and compromises achieved regarding the purpose and interpretation of each article and the treaty on the whole (Shaker, 1980).

Curiously enough, the intentions of the delegates varied considerably during different periods preceding the adoption of the NPT. In the late 1950s, fears of horizontal proliferation (i.e. the spread of nuclear weapons to other nations) and ensuing accidental or intentional risks to sparking (or catalyzing) nuclear wars between the superpowers or smaller states are reflected in the early stages of negotiations (Sokolski, 2001, p. 40). These concerns were to be reflected in the future treaty's articles I–III. A decade later, the debate had shifted to vertical proliferation (the quantitative and qualitative improvement of the superpowers' strategic arsenals) and ensuing risks of unauthorized or accidental nuclear wars and other nations going nuclear (Sokolski, 2001, p. 40). These concerns, in turn, were to have an effect on articles IV–VI and X of the treaty. Sokolski admits that these two views are at odds, making the interpretation on the basis of intensions complicated: 'To make sense of the NPT, however, one must choose which of these two premises should be controlling in interpreting the treaty's text and which is, in fact sounder' (*Ibid.* 47).

Paragraphs 2–3 of Article 31 of the VCLT introduce further means of interpretation: the context which comprises in addition to the treaty's preamble and annexes, any agreement of the parties made in connection with the conclusion of the treaty, the parties' later agreements or practice regarding the interpretation or application of the treaty and any relevant rules of general international law applicable in relations between the parties. Article 32 of the VCLT lists supplementary means of interpretation, such as the preparatory works and the circumstances in which the treaty was concluded.

As will be discussed immediately below in Section 3.4, the practice of a number of states consolidating the reliance on nuclear weapons (and, hence, non-disarmament) brings forth the question of informal modification of the NPT through such practice. A few remarks on practice of the parties capable of modifying the convention seem necessary. International Law Commission's Draft Articles to the VCLT included preliminary rules of informal modification, but these were not retained in the convention. Nonetheless, they are often referred to in the specification of criteria applicable to this type of modification: 'A consistent practice, embracing all the parties and establishing their common consent to the application of the treaty in a manner different from that laid down in certain of its provisions, may have the effect of modifying a treaty' (Yearbook of the International Law Commission II, 1964, p.198; Yearbook of the International Law Commission II, 1966, p.236). The

1966 Draft Articles left out the earlier formulations about state practice 'embracing all the parties'. In the Commentaries to the 1966 Draft Articles, it was specified that not all parties need to take part in the practice but there must be a common understanding or agreement among them as a whole about the modification (Amneus, 2008, p. 124).

Practice of the Parties

The NPT forms a three-part bargain: nuclear non-proliferation, international cooperation in promoting peaceful uses of nuclear energy across the entire nuclear fuel cycle under safeguards in conformity with the Treaty and nuclear disarmament leading to the elimination of all nuclear weapons. The pillar of disarmament by NWS has, to date, not advanced in practice at all.

According to SIPRI's annual nuclear forces data (2016), none of the nuclear weapon-possessing states are prepared to give up their nuclear arsenals for the foreseeable future. At the start of 2016, nine states – the United States, Russia, the United Kingdom, France, China, India, Pakistan, Israel and North Korea – possessed approximately 4120 operationally deployed nuclear weapons, with a total of approximately 15395 nuclear weapons compared with 15850 in early 2015 (SIPRI, 2016). The decrease in the overall number of nuclear weapons is mainly due to Russia and the USA reducing – slowly – their inventories of strategic nuclear weapons. World nuclear forces 2016 are presented in the below table, as follows:

Country	Year of first nuclear test	Deployed warheads*	Other warheads	Total 2016
USA	1945	1,930	5,070	7,000
Russia	1949	1,790	5,500	7,290
UK	1952	120	95	215
France	1960	280	20	300
China	1964		260	260
India	1974		100–120	100–120
Pakistan	1998		110–130	110–130
Israel			80	80
North Korea	2006		10	10
Total		**4,120**	**11,275**	**15,395**

Table 1. World nuclear forces, SIPRI, 2016

*** 'Deployed' means warheads placed on missiles or located on bases with operational forces. All estimates are approximate and are as of January 2016. Totals do not include figures for North Korea (SIPRI, 2016)**

Second, NWS have also extensive and expensive modernization programs under way. The US modernization program for tactical nukes in Europe is discussed in Professor Nikitin's article. For instance, the US plans to spend $ 348 billion during 2015–24 on maintaining and comprehensively updating its nuclear forces (SIPRI, 2016). Russia's nuclear posture and forces are discussed by Dr. Kerttunen. Other NWS have smaller arsenals, but have all either begun to deploy new nuclear weapons delivery systems or announced their intention to do so (Ibid.). The UK decided in July 2016 on the update of the Trident (House of Commons Hansard, 2016). France is in the process of updating both its sea and air-based nuclear forces pursu-

ant to a new Military Programming Law passed in December 2013 (Le ministère de la défense, 2013). China appears to be gradually increasing its nuclear forces as it modernizes the arsenal. India and Pakistan are both expanding their nuclear weapon stockpiles and missile delivery capabilities. China and India have long claimed to have a No First Use policy (Dhanapala, 2016). Obama administration's talk about the adoption of No First Use Policy (NFU) did not materialize. North Korea is estimated to have enough fissile material for approximately 6–8 nuclear warheads. It is quite obvious that nuclear weapons continue to play a key role (if not the key role) in nuclear weapon-possessing states' defence doctrines (Miller, 1990).

Third, the adherence of other than NWS to nuclear weapons and deterrence extends further through alliances, extended deterrence schemes and (positive) nuclear guarantees. For instance, NWS's reluctance to accelerate the pace and scope of nuclear disarmament has been strengthened by NNWS states such as Australia, Japan, New Zealand, South Korea and members of the NATO that rely on US nuclear guarantees and nuclear deterrence. Needless to say that such developments, which consolidate the role of nuclear weapons as part of a country's defence, is in contradiction with the NPT's disarmament objective enshrined in Article VI and Principles and Objectives of Non-proliferation and Disarmament discussed below in Section 3.5.

As far as peaceful uses of nuclear energy are concerned, Iklé points to the futility of multilateral efforts in managing non-proliferation, naming in particular the Atoms for Peace program launched by President Eisenhower in 1953 (Iklé, 2006, p. 54). Dangers are due to close parallels between the peaceful and military nuclear technologies (Shaker, 1976, p. 274). The program was meant to enlist international support for curbing the spread of nuclear weapons by offering peaceful benefits of atomic energy to the world at large. Yet, countries receiving technological assistance exclusively for peaceful uses managed to divert the assistance to their nuclear weapons programs. India is a case in point when in May 1974 it exploded a 'peaceful' nuclear device that employed 'civilian' US, Canadian and Western European reprocessing and heavy water technology and hardware (NTI, 2016). Once the worldwide transfer of nuclear reactors was legitimized, diverse countries sold nuclear reactors to a variety of less-developed countries all over the globe, enabling the recipients to acquire nuclear materials and know-how, with a related multiplier effect, i.e. China has helped Pakistan to build nuclear bombs, and the developer of Pakistan's bomb, A. Khan, has helped North Korea, Libya, Iran and possibly others with their nuclear weapons programs. Iraq's hidden weapons program was found after the 1990–91 Persian Gulf War. Proliferation concerns are very real as more and more countries are demanding nuclear power reactors on the basis of the NPT's inalienable right to develop research, production and use of nuclear energy for peaceful purposes. This will enlarge the number of countries capable of starting an illicit bomb-making program (Iklé, 2006, p. 57). Additionally, that North Korea and Iran both obtained enrichment technology from Pakistan is telling of dangers to the NPT regime from nonparties that are not bound by the NPT's prohibition against assisting non-nuclear-weapon states in acquiring nuclear weapons.

As far as international control efforts over nuclear export standards are concerned, these also leave much to desire in terms of legitimacy, inclusivity and openness. Shortly after the ink was dry on the NPT, officials from the US and other supplier

states met secretly to determine how to work outside of the NPT to restrict the transfer of sensitive nuclear technology to the world's trouble spots. This Nuclear Suppliers Group (NSG) established in 1974 then became a model for restricting sensitive missile, chemical and biological agent materials and technology under the Missile Technology Control Regime (MTCR) and the Australia Group (AG). These groupings are discriminatory, have little transparency and accountability. India is again a case in point as it was exempted in 2008 by the NSG from having full-scope international safeguards in order before being eligible for civilian nuclear trade. Likewise, the current push, by the US, for India's membership in the NSG is another somewhat troubling example working against the NPT's goals.

Also, the proven cases of non-compliance (Libya, Iran, Iraq) and DPRK's withdrawal have not strengthened the NPT regime. Insidious undermining of the legal regime underpinning nuclear disarmament and non-proliferation is increased, too, when nuclear weapon-armed states are being accorded such privileges by the NWS (INDO-US co-op. agreement) that were previously granted only to NNWS parties to the NPT (Dhanapala, 2016, pp. 137,154). The 'democratic bomb' strategy – i.e. approval of nuclear weapons in the hands of countries with assuredly democratic government, and disapproval when possessed by other regimes – is contradictory and cannot succeed: when the central problem is the weapons themselves, any distinction between 'good proliferators' and 'bad proliferators' is unsustainable (Dhanapala, 2016, p. 158; Perkovich, 2006). In addition to India, also Israel and Pakistan are known nuclear weapon possessors outside the NPT. India is estimated to possess between 100–120 nuclear warheads; Israel is estimated to possess 80 nuclear warheads, with fissile material for up to 200; Pakistan is estimated to possess between 110–130 nuclear warheads (Arms Control Association, 2016). North Korea's capabilities were estimated above to comprise approximately 6–8 plutonium based warheads as of 2016 (*Ibid.*).

The above compiled list of failures or near-failures is fortunately not the full truth. There are successes, too, under the NPT, such as the creation of nuclear weapon free zones to Latin America and the Caribbean (Treaty of Tlatelolco, effective as of 22 April 1968), to South Pacific (Treaty of Rarotonga, valid as of 11 December 1986), to Southeast Asia (Treaty of Bangkok, entered into force on 27 March 1997), to Africa (Pelindaba Treaty, valid as of 15 July 2009) and the conclusion, regardless of strong opposition by the UK, France and the US, of the Central Asia Nuclear Weapon-Free Zone (also called the Treaty of Semipalatinsk, which entered into force on 21 March 2009). Mongolia's self-declared nuclear-weapon-free status has been recognized internationally through the adoption of the UNGA Resolution 55/33S. There are also other treaties dealing with the denuclearization of certain areas: the Antarctic Treaty (entered into force on 23 June 1961), the Outer Space Treaty (entered into force on 10 October 1967), the Moon Agreement (entered into force on 11 July 1984) and the Seabed Treaty (entered into force on 18 May 1972). The text and the status of all these treaties are available at the United Nations Office for Disarmament Affairs (UNODA) Treaty Database (https://www.un.org/disarmament/wmd/nuclear/nwfz/). Other successes include such states that have renounced the nuclear option, having possessed nuclear weapons or a nuclear weapons program: Belarus, Kazakhstan and Ukraine returned Soviet nuclear weapons to Russia and joined the NPT as NNWS in 1991; South Africa dismantled its secret program and its small number of nuclear warheads, joining the NPT in 1991; Iraq

had an active nuclear weapons program which was dismantled under the supervision of UN inspectors after the Persian Gulf War in 1991; Libya voluntarily renounced its secret nuclear weapons efforts in 2003; Argentina, Brazil, South Korea and Taiwan also shelved their nuclear weapons programs (Arms Control Association, 2016). Iran's proliferation activities have been brought under close IAEA scrutiny through the adoption in July 2015 of the Joint Comprehensive Plan of Action (JCPOA) between Iran and six world powers.

Extension and Review Conferences in a Nutshell

Jayantha Dhanaphala's and Tariq Rauf's timely report on *Reflections on the Treaty on the Non-Proliferation of Nuclear Weapons* (Dhanapala and Rauf, 2016) provides a detailed account of Review Conferences since the historical extension of the NPT in 1995. Jayantha Dhanapala, (then) the President of the 1995 Review and Extension Conference, is currently the President of the 1995 Nobel Peace Laureate Pugwash Conferences on Science and World Affairs and Tariq Rauf is the Director of Disarmament, Arms Control and Non-Proliferation Programme at SIPRI.

According to Article X (2) 'Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty'. The 1995 Review Conference, which convened in New York from 17 April to 12 May 1995, met to decide how long the Treaty should be extended and to review the performance of the Treaty for the period 1990–1995 in accordance with Article VIII.

Preceding the 1995 Review Conference, previous four Review Conferences had been extremely contentious (Dhanapala, 2016, p. 8). The first Review Conference (1975) managed to adopt a Final Document, whereas Review Conferences in 1980 and 1990 did not. A Final Document was also adopted at the 1985 Review Conference, because of an unusual formulation which recorded a disagreement between some countries and the overwhelming majority on the issue of a Comprehensive Nuclear-Test-Ban Treaty (CTBT) (*Ibid.*). In addition to the CTBT, contentious issues included, amongst others, disarmament, legally-binding security assurances and peaceful uses of nuclear energy.

The 1995 Review and Extension Conference was historical in managing an outcome, which permitted the indefinite extension decision of the Treaty without a vote. The outcome was a package deal, which included three parallel decisions – indefinite extension (legally binding) of the NPT and two other (politically binding) decisions: on Strengthening the Review Process and on Principles and Objectives for Nuclear non-Proliferation and Disarmament (P&Os) (Final Document, 2015). The latter decision's programme of action for 'Nuclear Disarmament' included the negotiation of a CTBT by the end of 1996, the 'immediate commencement and early conclusion' of negotiations of a fissile material convention, the 'determined pursuit' by the NWS of 'systematic and progressive efforts' to 'reduce' nuclear weapons globally, with the ultimate goals of nuclear disarmament and general and complete disarmament. In addition, a separate Resolution on Middle East was adopted as part of the overall package.

Today, the P&Os have remained greatly unachieved, to the growing frustration of NNWS. The doctrinal developments in the US' and Russia's nuclear postures, in clear contradiction with disarmament, are discussed in Dr. Kerttunen's article whereas the details of the near history of successes and failures in the US-Russia arms control regimes (incl. the Strategic Arms Reduction Treaty START II, the Strategic Offensive Reductions Treaty SORT and the Anti-Ballistic Missile Treaty ABM) are touched upon in articles by Professors Neuneck and Nikitin. The eventual pending failures regarding the Intermediate Range Nuclear Forces Treaty (INF) are the topic for Dr. Vuorio's article, whereas the Treaty on Conventional Armed Forces in Europe (CFE) is discussed by Dr. Koivula. As far as the CTBT is concerned, the treaty was duly negotiated and signed by President Clinton in 1996, but the Senate failed to ratify it in 1999. Many NWS and NNWS have not ratified the CTBT, which means that the treaty has not come into in force (CTBTO, 2016). Regarding the 1995 Review Conference's P&O on fissile material, there was consensus as to the need for an early conclusion of a non-discriminatory, multilateral and effectively verifiable treaty banning the production of such material for nuclear weapons and other nuclear explosive devices, but there was no consensus over the status of stocks of previously produced materials (Dhanapala, 2016, p.133). Also, the Geneva-based Conference on Disarmament has remained deadlocked, unable to move on Fissile Material Cut-off Treaty, negative security assurances, the prevention of arms race in outer space or the elimination of nuclear weapons (*Ibid.* 160).

The Middle East Resolution and its concretization took place fifteen years later, at the 2010 Review Conference. In the Final Document (2010), concrete steps were agreed upon for the realization of a Middle East zone free of nuclear weapons and other weapons of mass destruction (MENWFZ/WMDFZ) (Final Document, 2010). To this effect, it was agreed that the UN Secretary General, together with the co-sponsors of the 1995 Middle East Resolution (Russia, the UK, the US) convene a conference in 2012 on the establishment of the above zone to the Middle East, and, to this effect, appoint a facilitator to support the organization of the 2012 conference. Finland's Under-Secretary of State, Mr. Jaakko Laajava, was appointed to this task. The facilitator was, however, unable to fulfill his function due to the political complexities relating to the position of Israel, which meant that, to the frustration of many Middle Eastern states, the envisaged 2012 conference never took place (Pugwash, 2015).

Growing frustration and dissatisfaction with the practice or implementation of the strengthened review process in terms of failing to move the NWS on nuclear disarmament is leading to calls to radically change provisions of the 1995 extension decision. It has become apparent that the 2000 Review Conference's 'unequivocal undertaking' by NWS to accomplish the total elimination of nuclear weapons (so-called 'Thirteen Steps') lacks political will, which is an obvious precondition for any concrete disarmament measure (Johnson, 2000). In fact, the next 2005 NPT Review Conference ended in disarray, and no Final Declaration could be adopted. The approach to the 2005 NPT Review Conference did not take place in a climate favorable for multilateral action, as the NWS had begun to retreat from the 'Thirteen Steps', the Bush Administration's Nuclear Posture review of 2002 envisaged the actual use of nuclear weapons, the US and her allies invaded Iraq in 2003 whereas the DPRK and Iran continued to be regarded with concern (Dhanapala, 2016, p. 147).

The 2010 NPT Review Conference took, again, place in an international atmosphere which was more conducive to multilateralism in general and to nuclear disarmament in particular than the 2005 atmosphere. As a consequence, states parties agreed to a Final Document that reiterated their commitment to nuclear disarmament. Nonetheless, the central bargain of the NPT remained unfulfilled (*Ibid.*184). Instead, the 2015 NPT Review Conference failed to agree on a Final Document. The setback reflected negatively especially on nuclear disarmament and on efforts to rid the Middle East of nuclear weapons. The NPT disarmament stalemate concerned the humanitarian impact/consequences of nuclear weapons (HINW); and the push to get the review conference to agree to launch a process leading to a legally binding treaty on the prohibition of nuclear weapons (Rauf, 2016, p. 199). This initiative will be discussed in the next section 3.6. The MENWFZ/WMDFZ was discussed in the Main Committee II but no agreement could be reached on the implementation of the 1995 Resolution on the Middle East nor on the convening of a conference on a MENWFZ/WMDFZ as had been agreed at the 2010 NPT Review Conference. The UK, the US and Canada rejected the conference president's compromise draft final document (*Ibid.* 206).

From all this, Rauf concludes that 'while the NPT will survive, the credibility of the regime has been severely damaged by the inflexibility of states parties, and dangerous new tendencies and developments are on the rise. These include an unchecked resurgence in the saliency of nuclear weapons in European security, setbacks for reducing and eliminating nuclear weapons, increasing discord both between and among the NNWS and NWS, deteriorating confidence in the NPT among the Arab states parties, and an overall loss of credibility for the nuclear disarmament pillar of the NPT' (*Ibid.* 209).

Humanitarian Impact of Nuclear Weapons

Until quite recently, practically all international efforts to curb the proliferation of nuclear weapons and move towards nuclear disarmament have taken place within the parameters of maintaining nuclear deterrence and the notion that the nuclear weapons-based strategic stability should be retained. The past few years, however, have seen an increased focus on and political interest in addressing *the humanitarian impact* of and the risks associated with nuclear weapons as a complement to the traditional military security-centered discourse. In fact, it is since 2010 that a series of international conferences on this issue have taken place, and an increasing amount of states, civil society organizations, international organizations, the Red Cross and the Red Crescent movement as well as the academia have come together to challenge the acceptability and legitimacy of nuclear weapons and nuclear deterrence. This has been done through focusing on the humanitarian impact, with up-to-date research on the scope and the scale of the consequences of nuclear weapons detonation, either in cases where nuclear deterrence fails or through accidents involving nuclear weapons (Kmentt, 2016, p. 683; Helfand, 2013).

The recent specific focus on the humanitarian dimension of nuclear weapons may be traced back to a speech on 20 April 2010, in which Jakob Kellenberger, the former president of the International Committee of the Red Cross (ICRC) recalled the ICRC experience as the first international humanitarian organization present in the

immediate aftermath of the 1945 bombing of Hiroshima, highlighting the inadequate capacities to address humanitarian emergencies that would result from any use of nuclear weapons and the human and societal destruction that would ensue (Kellenberg, 2010). In light of the humanitarian consequences, Kellenberger also stressed that 'the ICRC finds it difficult to envisage how any use of nuclear weapons could be compatible with the rules of international humanitarian law' (*Ibid.*).

Before discussing the humanitarian impact further, it is useful to take a short look back to the year 1996, when the International Court of Justice (ICJ) gave its advisory opinion in the Case *Legality of the Threat or Use of Nuclear Weapons* issued on the basis of a request to that effect by the UN General Assembly (ICJ, 1996). According to paragraph 105, point 2 E of the judgment

> "By seven votes to seven, by the President's casting vote, it follows from the above-mentioned requirements that the threat or use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law; However, in view of the current state of international law, and of the elements of fact at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake."

Obviously, this aspect was the most controversial one of the judgement, and it has received ample attention in legal literature. For instance, with the exception of two judges, all judges commented on the statement in one way or another. However, as the (then) President Bedjaoui stated in his separate statement, the court's inability to determine absolute illegality in the extreme circumstance 'can in no manner be interpreted to mean that it is leaving the door ajar to recognition of the legality of the threat or use of nuclear weapons' (ICJ, 1996). Also, it is useful to note that some commentators have erroneously assumed that this indecision over the exceptional circumstance is the same as a declaration of legality in such circumstances. The ICJ, however, clearly refuted this when (para. 94) it did not support the view of certain nuclear-weapon states that the use of 'clean,' low-yield tactical nuclear weapons accurately targeted on military targets would be legal in such extreme circumstance (Ware, 1998).

It is also to be noted that in paragraph 105 2F, the Court found unanimously that

> "There exists an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in al1 its aspects under strict and effective international control."

These two points, the lack of clear prohibition of nuclear weapons under international law on the one hand, and, on the other, the non-respect by NWS of the obligation to pursue and bring to a conclusion negotiations leading to nuclear disarmament, constitute the clear backbones of the Humanitarian Impact –Initiative. With the 2010 NPT Review Conference, governments officially explained their deep concern at the catastrophic humanitarian consequences of any use of nuclear weapons and reaffirmed the need for all states at all times to comply with applicable international law, including international humanitarian law. These humanitarian concerns

were explicitly mentioned in the Final Document, and became a *de facto* mandate for states to pursue the humanitarian initiative to implement the NPT itself (Kmentt, 2015, p. 684).

Following these concerns, a growing number of governments, the Red Cross/Red Crescent movement and a considerable number of non-governmental institutions have participated in efforts to highlight the catastrophic humanitarian consequences of nuclear weapons and calling on all states to intensify their efforts to outlaw these weapons (Reaching Critical Will, 2017). These efforts have led, to date, to the convening of three massive conferences on the humanitarian impact of nuclear weapons. First conference was held in Oslo on 4–5 March 2013 with the participation of 127 states, civil society organizations and diverse UN agencies. The meeting had a relatively narrow focus on the immediate and wider humanitarian and developmental consequences of a nuclear weapon detonation as well as humanitarian preparedness and response. The Oslo Conference underscored that it is one thing to talk about nuclear weapons in the context of abstract security policy concepts and quite another to look in concrete terms at the evidence of what would actually happen to people and human society in the event of a nuclear detonation (Chair's Summary Oslo, 2013).

The second one was held in Nayarit (Mexico) on 13–14 February 2014 with the participation of 146 states, 119 civil society organizations, the Red Cross and diverse UN agencies. Nayarit put a strong emphasis on the testimonies of the *Hibakusha*, the survivors of the atomic bombs in Hiroshima and Nagasaki, while further highlighting the devastating short- and long-term consequences on human health, the climate, food security and social order, as well as the inadequacy of response capabilities (Kmentt, 2015, p. 691; Chair's Summary Nayarit, 2014). In addition, an important addendum was introduced by Mexico regarding the risks associated with nuclear weapons: some of the vulnerabilities of nuclear command and control infrastructures and well as risky practices surrounding nuclear weapons and the history of near-accidents served as an eye-opener to the public (Kmentt, 2015, p. 692 with references; Lewis, et al., 2014). At the end of the conference, Mexico added a political dimension to the Chair's conclusion, by stating:

> "We need to take into account that, in the past, weapons have been eliminated after they have been outlawed. We believe this is the path to achieve a world without nuclear weapons.
>
> In our view, this is consistent with our obligations under international law, including those derived from the NPT as well as from Common Article 1 to the Geneva Conventions. The broad-based and comprehensive discussions on the humanitarian impact of nuclear weapons should lead to the commitment of States and civil society to reach new international standards and norms, through a legally binding instrument.
>
> It is the view of the Chair that the Nayarit Conference has shown that time has come to initiate a diplomatic process conducive to this goal. Our belief is that this process should comprise a specific timeframe, the definition of the most appropriate fora, and a clear and substantive framework, making the humanitarian impact of nuclear weapons

> the essence of disarmament efforts. It is time to take action. The 70th anniversary of the Hiroshima and Nagasaki attacks is the appropriate milestone to achieve our goal. Nayarit is a point of no return." (Chair's Summary Nayarit, 2014).

The third conference was held the same year in Austria, on 8–9 December 2014 (Chair's Summary Vienna, 2014) with the participation of 158 countries, civil society, Red Cross and Red Crescent movements and diverse UN agencies. Austria made a special effort not to alienate the NWS and 'umbrella' states (i.e. states dependent on US security guarantee such as NATO members), which were suspicions regarding the conference's purpose of initiating a diplomatic process leading to a land-slide effect and convention on the prohibition of nuclear weapons, just like had happened with two recent conventions, i.e. the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and Their Destruction (entered into force 1 March 1999) and the Convention on Cluster Munitions (entered into force 1 August 2010). Hence, the conference aimed at recapitulating the key findings of the two previous conferences, in addition to which the conference highlighted the health, environmental, social and cultural impact of past nuclear weapons testing campaigns as well as transboundary dimensions of nuclear weapon detonations (Chair's summary Vienna, 2014).

The humanitarian initiative bore finally fruit on 27 October 2016, when the First Committee of the UN General Assembly adopted a resolution L.41 to convene negotiations in 2017 on a 'legally binding instrument to prohibit nuclear weapons, leading towards their total elimination'. The voting result was 123 nations in favor, 38 against, with 16 abstentions (ICAN, 2016). In the ambit of this article it is unfortunately not possible to go further into details regarding different phases of the humanitarian initiative and negotiations' tracks. These are discussed at length by Kmentt in the *International Review of the Red Cross* (Kmentt, 2015).

Saving the NPT Regime?

The disarmament bargain made under the NPT is not realistically achievable to date, if it ever were. The frustration of a grand majority of states and other stakeholders to the slow pace of disarmament is clear. It is legitimate to ask, why should NNWS be bound by the NPT when the NWS are not? The Humanitarian Impact Initiative attempts to find a way to advance disarmament through wide diplomatic process leading to the adoption of a nuclear weapons convention or similar instrument, with the ensuing illegality of nuclear weapons. From arms control point of view, experiences of earlier such initiatives are positive, with the adoption of two conventions, one on cluster munitions and the other on landmines. The lessons learnt of these two previous processes might, in fact, provide valuable points regarding how to avoid exacerbating the divide between the NWS and their umbrella states on the one hand, and the grand majority of states on the other. In this connection, it is useful to remember that the NPT regime is not only burdened by the slow pace of disarmament. In addition to the NWS – NNWS –divide, there are also other potential proliferation and nuclear safety and nuclear security challenges caused by the increasing spread of peaceful nuclear energy in many regions of the world, the speed of technological developments and artificial intelligence, risks embedded in the command and control of nuclear weapons due to human error and negligence and

proliferation risks to third, irregular parties. The risk of a nuclear catastrophe – in a regional war, terrorist attack, by accident or miscalculation – is greater than it was during the Cold War.

Nuclear weapons are a global challenge. However, the US and Russia relationship is a reliable thermometer for perspectives on disarmament and non-proliferation, these states holding the grand majority of world nuclear weapons today (considerable number of which being in a state of high alert). Many existing treaty regimes relevant for curbing nuclear weapons are directly dependent on the developments in the US–Russia relationship. Positive developments bear on the climate of confidence and multilateralism, strengthening the already existing regimes and, perhaps, contributing to new areas of regulation, such as regulation on missiles. The opposite is obviously true as well. And it is well known that tensions are heightened between Russia and the West at present.

A few concluding remarks directly relevant to the European security may now be summarized:

First, the heightened tensions between Russia and the West translate into heightened military activity and military incidents, especially in the Baltic Sea area (Global Zero, 2015).

Second, while the main responsibility of saving the NPT regime lies with the great powers, also non-nuclear European states could do more. Most European states are umbrella states, in whose defence nuclear weapons/US nuclear guarantee play an important role (Rauf, 2016, p. 200). This practice is not conducive to disarmament, taking place at the cost of the NPT's initial bargain. What's more, European umbrella states are on an almost natural collision course with the developments under the humanitarian initiative. Indeed, if a land-slide diplomatic process is started this year, as called forth in the GA Res. L.41, and leading to a convention on the prohibition of nuclear weapons, it is more than likely that a grand majority of states end up proclaiming nuclear weapons not only illegitimate but illegal as well. It is doubtful whether European states can afford to side on the side of illegality in the eyes of the very system which they themselves have created.

Third, Europe has a considerable amount of nuclear weapons on its soil and at its borders (Kristensen, et al., 2015). Europe cannot protect itself from nuclear weapons detonation. For instance, the transboundary dimension of nuclear weapons detonations was highlighted at Vienna conference (2014) in a presentation that calculated the impact of a nuclear explosion of 200 kilotons at NATO's military base in Aviano. Using historical weather patterns, a simulation of the explosion of a single 200-kiloton nuclear weapon was shown to lead to radioactive fallout being dispersed within a few days over large parts of Europe (McKinzie, 2015).

Based on the above, is it not high time for some intellectual honestly in Europe? Is it not high time to accept the challenge posed by the humanitarian impact and analyze the legitimacy and truthfulness of the security paradigm based on deterrence and nuclear weapons in the light of research presented during the three humanitarian impact conferences in Oslo, Mexico and Austria? It is clear from that research that the mid- and longer-term atmospheric, climate and food-security consequences of even 'limited nuclear war' would be considerably more serious than previously

understood and most likely global in their effects, in addition to the immediate humanitarian emergency. The notion of credible nuclear first strike and counter-strike capabilities becomes largely irrelevant in such a context. 'Winning' a nuclear conflict in the 'classical' understanding of victory in a military conflict is an impossibility. Deterrence based on nuclear weapons thus rests not only on the readiness to inflict mass destruction and death on a global scale, but also on the readiness to commit, with full awareness, to an essentially suicidal course of action (Kmentt 2015).

It is convenient to end this presentation with two quotes from President Mikhail Gorbachev's address in the International Conference devoted to the 30th anniversary of the Reykjavik meeting of the leaders of the USSR and the US:

> "Politicians who think that problems or disputes can be resolved through the use of military force (even as a 'last resort') must be rejected by the society; they must leave the stage."
>
> "I am urging veteran leaders and diplomats, scientists, experts, and the global civil society to state in the strongest and unequivocal terms: Nuclear weapons must be prohibited. Even more: War must be prohibited" (Gorbachev, 2016).

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4

Non-Strategic Nuclear Weapons: Definitions, Arsenals, Cuts, Prospects

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Abstract

Definitions of non-strategic weapons (including tactical and middle and shorter-range nuclear weapons) quite significantly differ in the US-Russian arms control community, in Indian-Pakistani regional balance, in Israel, in the UK and France and in China. This article discusses various criteria that are used for the differentiation of non-strategic from strategic weapons, including criteria of delivery distance of carriers, megatonnage (yield) of warheads, ability to destroy different types of targets, etc. The article considers political consequences of unnecessary high levels of secrecy and non-transparency that prevailed up until today, even for revealing data on already dismantled Tactical Nuclear Weapons (TNW). The author suggests that the US and Russia can finally start debating TNW by exchanging exact data on how many and which types of tactical nukes have been dismantled and destroyed in the early 1990s, when parallel unilateral programs of relocation of tactical nukes were undertaken (US TNW from Europe back to the US territory, and Soviet TNW from 14 new independent states to Russian territory). Such a data exchange can set in motion further discussion of limitations on non-strategic nuclear weapons. Finally, the article considers the geopolitical principle suggested by Russia claiming that all nuclear weapons of any country should be situated on its own territory, not on the territory of any other non-nuclear member state to the NPT. Several steps are suggested that may be considered as Russian balancing responses to a potential withdrawal of American TNW from five European countries. Alternatively, Russian potential response to modernization of American TNW in Europe is also discussed.

On Terms, Criteria and Typology

Tactical Nuclear Weapons is an umbrella notion and not exactly a separate class in itself. It is sub-divided from the dyad of 'strategic/non-strategic weapons' as being a part of non-strategic. Terms and notions of 'non-strategic nuclear weapons', 'under-strategic' or 'sub-strategic' are used as synonyms. A more comprehensive typology

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stretches the 'dyad' to a 'pentagram': strategic – intermediate (or middle) range – shorter-range – tactical (consisting of operational-tactical and tactical weapons as such).

Typology of nuclear weapons could be based either on their functional purpose, *or* on technical characteristics of warheads and carriers *or* on difference in value of targeted/destroyed objects within the potential adversary's value system. Already within initial stages of the Soviet-American Strategic Arms Limitation Talks (SALT) and later within the Treaty on Intermediate and Shorter-Range Nuclear Forces (INF), as well as within the framework of the first Strategic Arms Reduction Treaty (START-I), the following 'thresholds' were elaborated and agreed upon: nuclear weapons on carriers with range up to 500 kilometers have been defined as tactical weapons; weapons with a radius from 500 to 1000 km as shorter-range weapons; 1000 to 5500 km as intermediate weapons (in Western terminology, or middle-range weapons in Soviet/Russian terminology); and, finally, weapons on carriers able to reach and destroy targets on distances above 5500 km as strategic weapons. At the same time, the relativity of such a typology is obvious: it was connected to geopolitics of American-Soviet continent-to-continent potential nuclear strikes exchange over the North Pole. In regional nuclear balances of other nuclear states that border each other or are located on smaller distances (India and Pakistan, Israel and the Arab states, North and South Korea), the subdivision of strategic and tactical forces does not fit into inter-continental scale. Within a range of 500 km that seems to be 'tactical' from the point of view of Soviet-American distances, other countries may possess or attack both tactical and strategic objects and weapons. For example, the threat of use of nuclear weapons by the DPRK aimed at destroying 15 million people living in Seoul just 40 kilometers to the south from North Korean border, is undoubtedly of strategic, not of tactical significance within a scale of regional balance of forces. Another example: Russia considers the French ASMPA missiles (*Air-Sol Moyenne Portée Améliorée* missiles) to be 'tactical' weapons and counts them accordingly, while France counts them as 'strategic.'

Difficulties and differences in typology are also caused by the fact that distance-wise criteria of short-range and long-range weapons are defined according to types and capabilities of carriers, not according to warhead characteristics. At the same time, warheads on many carriers are interchangeable. Majority of non-strategic nuclear weapons carriers are of *dual-purpose use* (could be used with both nuclear and conventional warheads), which complicates verification procedures. A known difficulty, for example, is caused by potential change of conventional warheads on sea-based cruise missiles aboard navy ships onto nuclear warheads. Images from orbital satellites do not allow to differentiate for certain the character of the warhead aboard navy ships at sea, while the absence of maritime arms limitation treaties and of agreed verification procedures do not allow to apply other forms of control. As Tom Sauer formulates it, prolonged negotiations on preparations of START-3 Treaty may seem to be an easy ride compared to the next stage of elaborating verification procedures for non-strategic weapons (Sauer, 2011).

The yield of modern nuclear weapons could vary from many megatons down to several hundred tons of TNT (conventional explosive) equivalent. And this is not necessarily that more powerful warheads are mounted onto strategic carriers of longer-range, while less powerful are mounted onto tactical carriers. The so-called

earth-penetrating warheads (EPW) aimed at the destruction of specific, often not very large objects (silos, underground bunkers, etc.) could have a limited yield, and produce a limited radioactive cloud while converting the main part of their energy into a mechanical shift of underground masses, but, at the same time, they could be sent from strategic distances (for example, from submarines or navy-based carriers located far from the targeted theater).

In the USA and in many NATO member states weapons were initially subdivided onto theater-range (strategic) and field-range (tactical). Short-range was defined as under 800 km. Weapons with range above 800 km were considered as strategic, more specifically distances 800–2400 km were marked as mid-range, 2400–6400 km as intermediate-range, and above 6400 km as inter-continental. Later US planners started to apply 'ceilings' and 'thresholds' in accordance with the INF and START-I treaties (Kristensen, 2012). It is also notable that American-Russian Agreement on differentiation of tactical and strategic Anti-ballistic missile defense (the so called 1997 ABM Demarcation Agreement) was based upon somewhat different criteria: it was permitted to elaborate and deploy tactical (or 'theater') missile defense systems, but it was prohibited to introduce intercepting systems aimed against strategic ballistic missiles moving at a speed above 5 km/sec. and with a range above 3500 kilometers.

In previous decades the People's Republic of China had introduced criteria, according to which missiles are subdivided onto short-range (up to 1000 km), middle-range (1000–3000 km), long-range (3000–8000 km) and inter-continental-range (above 8000 km) (SIPRI, 2001, p. 476). It is obvious, that the difference with the Soviet-American criteria of 'inter-continental' (8000 km instead of 5500 km) was caused by geopolitical factors relating to potential trajectories of intercontinental strike exchanges. Currently, the longest-range Chinese nuclear-capable missiles are liquid-fueled DF-5A and much more modern solid-fueled DF-31A, both of which can reach targets located as far as 11000 kilometers. That covers the US Western coast, Russia, the Middle East and most of Europe (SIPRI, 2014, p. 340).

As a result, the differentiation of tactical and strategic nuclear weapons by range of carriers does not possess universal applicability and has been changing with time. The criteria have been tightened to concrete geopolitical distances and negotiated ceilings (if covered by any negotiations and treaties at all). In this connection in Russian/American balance sometimes a very simple functional definition is applied, based upon method of exclusion: non-strategic systems are any nuclear weapons systems that are not covered by the existing START treaty (with understanding that the INF Treaty covered significant part of the remaining categories and caused their elimination, so existing non-strategic arsenals of the two superpowers include types of weapons not covered by the START and the INF).

Finally, there is an approach according to which the differentiation between strategic and non-strategic systems may reflect the nature of their target (targeted object) that is aimed to be destroyed by this system. Here, the critical question is whether the target is of strategic or tactical importance in the adversary's value system. Thus, the criteria for differentiation may have no relation to weapons' technical characteristics at all.

It should be reminded, that in the acting edition of the Military Doctrine of the Russian Federation it is postulated that 'nuclear weapons would remain an important factor of prevention of emergence of nuclear armed conflicts and conventional armed conflicts (large scale war, regional war)' (*Nuclear Doctrines and Strategies* 2008, p.148). The doctrine also confirms that Russia 'keeps the right to use nuclear weapons in response to use of nuclear weapons or other weapons of mass destruction against the country or its allies, as well as in case of aggression against Russian Federation with conventional weapons, if the very existence of the state is endangered' (Ibid). At the same time, the Russian doctrine does not define any specificity of functions or of threshold of application for tactical nuclear weapons, in contrast to strategic weapons.

Thus, taking into consideration all multiple approaches to the typology and the criteria of differentiation, there could be a practical distinction between Russian-American nuclear balance and other regional nuclear balances. In the nuclear talks between USA and Russia such treaty-based criteria could be applied, where all nuclear weapons systems not covered by the START-III treaty (and, implicitly, whose carriers are under 5500 km range) should be considered non-strategic, while weapons and carriers designated for use within 500 km radius are tactical. As for nuclear arsenals of other states, criteria based on differentiating systems by nature of main assigned targets (tactical – operational – strategic) could be applied within every concrete regional geopolitical balance, without assigning fixed ceilings by yield or range.

Estimations of Existing Arsenals of Non-Strategic Nuclear Weapons

Nuclear states never exchanged official information on quantitative parameters of their arsenals of TNW. Such parameters remain secret in cases of the USA, Russia and most other nuclear states. What is available are some officially presented aggregated numbers that partially include some TNW parameters among other types of weapons. Also, there are unofficial estimations by experts in wide variety.

The overall size of combined nuclear arsenals of nine nuclear weapon states by the end of 2016 has been estimated by SIPRI experts as 15395 warheads (including those deployed, stored and in a process of dismantlement) out of which 4120 have been estimated as deployed (SIPRI, 2016, p. 610).

The latest estimation of the *US non-strategic nuclear weapons* issued by SIPRI experts is that today the US has only one type of non-strategic weapon in stockpile: the B61 gravity bombs in three modifications (B61-3, B61-4 and B61-10) in overall quantity of 500 units.

Just five years ago, the US Congressional Research Service estimated the US non-strategic arsenal as being above 1100 units (CRS Report, 2011, p. 1), and SIPRI experts gave estimates of 760 units, including B-61s and nuclear warheads for 'Tomahawk' sea-based cruise missiles (SIPRI, 2011, p. 327). Since then, a program of planned cuts of sea-based cruise missiles took place, and the current correlation is, as follows: more than 180 B61 bombs are deployed in six bases in five European countries, and the remaining about 300 units are stored on US territory for potential

use in allied operations outside Europe, including the Middle East and North-East Asia.

The five European countries on whose territory the American non-strategic weapons are located are Italy (Aviano and Ghedi bases), Belgium (Kleine Brogel base), Germany (Büchel base), the Netherlands (Volkel base) and Turkey (Incirlik base).

American sub-strategic nuclear arsenal amounts to (by quantity of warheads) 10% compared to the US strategic nuclear arsenal. There were cuts in the amount of bombs in Europe in the early 2000s, from more than 400 to about 180 units at present. At the same time, NATO stresses in its doctrine that as long as nuclear weapons exist in the world, NATO will remain a nuclear alliance and will support a combination of nuclear and conventional forces (*NATO Strategic Concept*, p. 14).

France has allocated 12 percent of its annual defense budgets for five consecutive years (2014–2019) for maintaining and modernizing its nuclear forces (SIPRI, 2016, p. 632). That amounts to 22 billion Euros. France does not have in its arsenal any land-based missiles. Two major components of the arsenal are represented by submarine-based sea-land ballistic missiles (SLBMs) and aircraft-based weapons, including navy-based aircrafts aboard the aircraft carrier. Among these aircraft-based cruise missiles there are ASMPA units marked as 'medium-range air-to-surface' and belonging to the non-strategic category. By existing estimations, there are up to 80 nuclear warheads of variable yields (20-300 Kt) produced for such mid-range missiles. As noticed above, while the French consider ASMPA missiles to be of strategic importance, Russian military planners consider them to be a non-strategic weapon aimed for tactical or operational-tactical use.

The United Kingdom limited its nuclear carriers to a navy component only and possesses 48 Trident II D5 SLBMs, enough to equip up to 3 nuclear submarines that are operational at any given time. The UK does not own these warheads, but leases them from the joint arsenal shared with the US Navy. Up to 215 warheads are currently in stockpile. Each UK submarine on patrol carries no more than 8 operational missiles and 40 nuclear warheads. Having such a limited quantity of nuclear carriers and warheads, the UK does not presently maintain any weapons that could be qualified as tactical.

Russia does not provide any general official data on non-strategic weapons, but by the estimation of SIPRI experts it possesses about 2000 non-strategic warheads in formats of aviation bombs, air-based cruise missiles, nuclear torpedoes, long-range sea-based cruise missiles and artillery missiles (SIPRI, 2015; 2016). International estimations of the Russian arsenal vary quite significantly. The US Congressional Research Service provided estimates between 2000 and 6000 units (CRS, 2011, p. 1). Deputy Under Secretary of Defense, in his statement before the US Congress, estimated the arsenal to be 2000–4000 units (Miller, 2011). According to Russian official data already before the year 2000, all TNWs of the navy and of the sea-based aviation have been moved to centralized storages, and 30% of those weapons were eliminated. Also 50% of the TNWs of the Air Forces were destroyed, as well as 50% of the artillery warheads used in Air Defense systems. Artillery assigned warheads were also partially eliminated, as well as mines and tactical missiles in Infantry Forces. At the United Nations in May of 2010, the Russian delegation announced that the overall arsenal of the Russian non-strategic forces has been reduced by

75%. Previous official announcement quoted 60% cuts, so by modern times less than one-fourth of former arsenal remains. There is an on-going process of certain modernization of weapons and carriers used in Russian Air Forces and in the Navy. Modern *Iskander*-M (SS26 in Western typology) is on a planned basis substituting old SS-21 (SIPRI, 2016, p. 626). Rumors that *Iskander* type missiles are permanently deployed in Kaliningrad region proved to be inaccurate (short deployments exercises took place, but on a temporary basis). The USA accused Russia of developing and testing a new type of land-based cruise missile with a range prohibited by the INF Treaty, but Russia officially denies the accusation.

China (PRC) has a relatively limited and technically old nuclear arsenal of a general size around 260 warheads, though this arsenal is in a process of modernization at present. It was noted above that the Chinese military apply different criteria than the USA or Russia, and consider short-range use to be up to 1000 km and mid-range up to 3000 km. Only one class of missiles, namely DF-15 with range of 600 kilometers, belong to short-range weapons, and five other classes belong to middle-range: cruise missiles DH-10 and more modern CJ-20 (both with a range of 1500 km), sea-based JL-1 (range 1700 km) and land based DF-3A (very old, in service since 1971, range 3000 km) and slightly old DF-21 (first deployed 26 years ago, and with about 80 warheads produced for this type of carrier, it is probably the most widespread type in Chinese forces). Other Chinese weapons belong to long-range (3000–8000 km) and inter-continental range (above 8000 km, this class includes DF-31A and DF-5A and B missiles). These both classes correspond to strategic weapons in Russian and American arsenals.

Israel, as is widely known, holds NCND (neither confirm nor deny) policy regarding its nuclear weapons. Reportedly, it has *circa* 50 nuclear capable missiles and 205 nuclear-capable aircraft (SIPRI, 2016, p. 654). Additionally, experts believe that Israel equipped some of its diesel-electric submarines with nuclear-armed sea-launched cruise missiles. But this guess is denied by Israeli officials. All of the Israeli nuclear weapons could be technically used at sub-strategic distances and with small yield (taking into consideration the geography of the Middle East). But politically such use would be of 'strategic' nature, considering the scale of the local theaters of potential war encounters.

India possesses between 106 and 118 nuclear warheads. India certified about 40 Mirage-2000H airplanes for the delivery of gravity nuclear bombs (32 bombs in arsenal), and up to 16 Jaguar IS planes for delivery of another 16 nuclear bombs. And it introduced *Dhanush* sea-based ballistic missiles (in arsenal since 2013) for the delivery of 12 Kt small-yield nuclear bombs (weight up to 500 kg) with a small range of 350 km, which qualifies them for a classical TNW. Since 2003, India also possesses *Prithvi*-II land-based missile with a range of 250 km (today 24 of them are in arsenal, substituting the old *Prithvi*-I that had a 150 km range). Tactical functions could be performed also by a sea-based missile K-15 (range 700 km, weight of warhead up to 500 kg).

Pakistan has a nuclear arsenal of about 130 warheads. It lacks sea-based component, its main arsenal consist of land-based missiles, bombs on aircrafts and cruise missiles. It has the widest by types -arsenal of sub-strategic (by characteristics) warheads among all new nuclear states. Land-based missiles *Hatf-1* (180 km range), *Hatf-2* (290 km), *Hatf-3* (450-750 km modifications) belong to tactical, as well as newer

cruise missiles *Hatf-7-Babur* (700 km announced, but US Air Force estimates their range as 350 km) and newest *Hatf-8-Ra'ad* (350 km). In 2014, the Pakistani army also tested and announced a super-short-range system *Nasr* (Hatf-9), designated for a distance up to 60 km (battlefield use) and compact nuclear warhead.

North Korea by estimations has 6 to 10 units of nuclear warheads. A lot of information about its systems under development is unreliable. Since 1990s, the country maintains *Nodong* launchers (1250 km), and since the 2000s, it has been experimenting with *Taepodong* and *Hwasong* missiles. None of the launchers or warheads are designated specifically for tactical use, but taking into consideration the small distance to Seoul (40 km to the south form the North-South Koreas border), there are speculations that North Koreans may use nuclear weapon against Seoul even without a carrier at all – by exploding it in one of the secret tunnels under the border and causing a devastating earthquake. Technically, DPRK is trying to build and test carriers that would be able to deliver reliably a nuclear weapon to the territory of South Korea, Japan or to US military bases in the region.

Previous Cuts and Measures Regarding TNW Arsenals

As known, in the Cold War years the Soviet Union deployed TNW on the territories of each of the 15 Soviet republics, including, among others, Baltic states, Azerbaijan, Armenia, Central Asian states, as well as on the territory of member states of the Warsaw Pact in Eastern Europe. During the same historic period, the USA deployed in Europe about 7000 units of nuclear weapons of intermediate and shorter range. Minister of Foreign Affairs of Sweden K. Bildt and Minister of Foreign Affairs of Poland R. Sikorski published an estimation in the New York Times according to which at the 'peak' of the Cold War the USA possessed approximately 8000 units of non-strategic nuclear weapons, while the USSR possessed approximately 23000 units (Bildt and Sikorski, 2010).

In 1987, the USA and the USSR concluded the Treaty on Intermediate and Shorter-Range Nuclear Forces (INF Treaty) that assured verifiable elimination of all missiles of the two intermediate classes. In sum, as a result of the implementation of the INF Treaty both sides dismantled from carriers and decommissioned 4000 non-strategic warheads and destroyed 2692 missiles-carriers. The American side eliminated 846 missiles, while the USSR eliminated 1846 units of missiles-carriers. In the course of the implementation of the INF Treaty, the sides undertook 1116 inspections as means of verification. The USA convened 774 verification inspections, the USSR 442 verification inspections.

At the same time, the mass-scale implementation of INF Treaty didn't apply to tactical nuclear weapons with a range less than 500 km and not complying with other INF criteria. In the historic period of destabilization within the USSR in the late 1980s that further led to its dissolution in 1991, both Moscow and Washington were disturbed by the perspective of tactical nukes getting into the hands of separatists, unpredictable leaders of new independent states and conflicting armed forces (among others, for example, into the hands of Azerbaijanian and Armenian military in the course of war for Karabakh). But there was no time and no favorable political conditions for Soviet-American negotiations on these matters. Then, after the exchange of some unofficial signals, Moscow and Washington undertook parallel uni-

lateral measures. Washington removed a major part of American TNW located in Western Europe (as well as in Korea and aboard the US navy ships) back to the American continent. In response, during the latest period of the existence of the Soviet Union, Moscow was able to recollect Soviet TNW from seceding republics to the territory of the Russian Federation under the control of central Moscow authorities.

Parallel unilateral initiatives during 1991–1992 on non-strategic nuclear weapons were quite massive in scale even by modern standards. The US President G. Bush announced the American initiative on September 27, 1991, and the American military started to dismantle about 2150 warheads of land-based carriers, including 850 warheads for *Lance* missiles and 1300 artillery shells with nuclear explosives. About 500 units of nuclear weapons located in navy ships and submarines were decommissioned. It was also announced that 900 underwater bombs of B-57 type would be eliminated, as well as nuclear weapons assigned to shore-based navy aviation. By the end of 1991, it was additionally decided to withdraw 700 bombs and cruise missiles from NATO air-force bases in Europe.

Already by the end of 1991, non-strategic nuclear warheads had been withdrawn from the US bases in South Korea, and, by the mid-1992, from bases in Europe. Obviously, the process of physical dismantlement of withdrawn warheads (except for those that were kept in reserve) continued much longer, practically till the end of the 1990s.

A parallel unilateral initiative by the Soviet President M. Gorbachev was announced on October 5, 1991. Its implementation was finalized already in 1992 by the new Russian President B. Yeltsin. Moscow announced the elimination of all shells of nuclear artillery and warheads of tactical nuclear missiles. Warheads of nuclear missile interceptors belonging to the system of Air Defense were removed with the physical dismantlement of some of them. Elimination of all land mines with nuclear explosives was in progress. All non-strategic nuclear weapons of maritime basing were removed from navy ships, submarines and shore-based navy aviation, and a part of these weapons was fully dismantled.

Geostrategically, the most important part of this initiative was a relocation of non-strategic nuclear weapons from former Warsaw Pact member states and from former republics of the USSR to the territory of the Russian Federation. This operation had been mainly finished by the end of the 1991 (by the moment of the dissolution of the Soviet Union), while the process of relocation of non-strategic weapons from the territories of Belarus and Ukraine continued in 1992. It should not be confused with the different and longer process of negotiations between Moscow and three new independent states (Belarus, Ukraine and Kazakhstan) on the fate of the parts of strategic nuclear arsenals that remained on their territory. Return of those strategic nuclear weapons to Russia continued until the mid-1990s.

After parallel unilateral initiatives in 1991–1992, Russia unilaterally took a decision on significant (in perspective, by three-fourths) cuts of the TNW arsenal concentrated now fully on Russia's own territory and on withdrawal of carriers from its border regions inward.

As for today, parallel unilateral US and USSR initiatives of 1991 remain a unique example in the history of arms control on significant cuts of nuclear arsenals without any verification and exchange of data and, most importantly, without a treaty or a written agreement. But it could serve as an important precedent for the future. One of the recent proposals supposing parallel cuts without formal agreement on the basis of mutual 'good will gestures' is a suggestion to liquidate Russia's remaining nuclear warheads for Air Defense systems in parallel with the liquidation by the American side of some approximately comparable quantities of its nuclear warheads for sea-based cruise missiles. This proposal was initiated and advocated by the Russian expert Major General V. Z. Dvorkin, and it takes into account high risk and unacceptable ecological damage of the use of nuclear-armed Air Defense interceptors over a country's own territory. Such an exchange could be done without formal counting of items and without verification simply following the logic of getting rid of old and excessive nuclear arms by each side. There is as well another version of this proposal: the Russian side may consider initiating the elimination of the remaining non-strategic nuclear warheads within the ABM and air-defense systems in exchange for a parallel US initiative to dismantle its remaining deep-sea nuclear bombs and mines. Again, this way both sides may get rid of ecologically extremely damaging weapons.

The Moscow Framework Treaty of 2002 (Strategic Offensive Reductions - SOR) limited only the 'ceilings' of deployed strategic warheads and didn't touch non-strategic weapons. The US Congress followed with a Resolution №5017 that not only requested the administration to demand from Russia official information on the quantity and the quality of non-strategic nuclear weapons, but also potentially allocated up to 5 million USD in assistance to Russia in producing such an inventory.

Nuclear Posture Review presented by the Obama administration to the 110th Congress listed the planned elimination (utilization) of sea-based cruise missiles with nuclear warheads as a measure in the field of cutting non-strategic nuclear weapons. It was motivated by the compensating ability to provide forward basing of US nuclear weapons on air-force tactical bombers (Nuclear Posture Review, 2010, pp. 26–27).

Thus, in the field of non-strategic nuclear weapons there are at least two positive precedents of significant cuts. The first is the INF Treaty of 1987 which was fully implemented during an over ten–year-period with extensive verification and control. The second is the precedent of parallel unilateral relocations and cuts of TNW in 1991–1992 undertaken without concluding any written agreement and without verification procedures, which is a unique case in the whole area of international arms control. In the course of any potential Russian-American interaction on non-strategic weapons it is recommendable to specify components that (especially taking into consideration the asymmetry of arsenals and geopolitical parameters of countries) could be limited, relocated or eliminated by unilateral initiatives, without a lengthy negotiation process and expensive mutual control. These options are in more details discussed by A.Nikitin and S.Oznobishchev in *Arms Control: Does it Have a Future?* (2013, pp. 79–80 and 80–110). Obviously, on some stage the verification might be required, but some initial stages, especially regarding old and techni-

cally obsolete systems, could be implemented on the basis of parties' own political good will.

American TNW in Europe: Modernization or Withdrawal?

As mentioned above, the American TNW are kept on the European soil in six bases located in five countries (Italy, Germany, Belgium, Netherlands and Turkey). They were removed from Greece without major attention in mid-2000s.

It is notable that nuclear weapons in all the listed European countries (though only part of them in Italy and Turkey) are intended for use by the host nation's aircraft and pilots. This is considered by Russian experts and some European critics to be a violation of the NPT Treaty, as this agreement prohibits storage, training and passage (even in peace time) of knowledge on how to use nuclear weapons to the military of NPT non-nuclear states.

Public protests against the continued presence of American TNW on national territories of European non-nuclear states have fluctuated with ups and downs since the 1990s. In countries like Germany, they are historically rooted in earlier protests of the 1980s against US Pershings and other mid- and shorter-range missiles finally removed after concluding the INF Treaty.

Instead of planning to remove the remaining TNW, the United States – according to already made decisions – would in 2022 start to replace the older arsenal of B61-3 and B61-4 bombs with new B61-12 modification. The newer bomb will have the yield of 50 Kt (which was maximum capacity for the earlier B61-4 version). The new modification will have better accuracy (limited in-flight navigation) and earth-penetrating capability. It will also have variable yield tuning aimed to reduce collateral damage (Kristensen, 2015).

One of the really new and important parameters of this US TNW modernization will be the ability to integrate it with wider range of fighter jets, including F-15E, F-16, F-35A and PA-200 Tornado. This is perceived as widening the involvement of European host-nation pilots into preparation to and training of the use of nuclear weapons.

Germany hosts 10 to 20 units of American TNW. American nuclear presence in Germany was significantly higher in the past, but in 2005–2007 above 100 nuclear bombs were withdrawn from Ramstein air force base. Chairman of the Munich Security Conference Wolfgang Ischinger and former chief of planning department of the German Foreign Ministry Ulrich Weisser – while participating in public debates – reminded of the promises made by the American Defense Secretary William Perry two decades ago, that the US 'nuclear umbrella' would be opened over European allies irrespective of whether there are American TNW on their territories. Otherwise the principle of 'nuclear umbrella' becomes too selective and looks like 'buying' defense by offering nuclear deployment. Ischinger and Weisser called for negotiations with Russia based upon three principles: the preservation of American 'nuclear umbrella' under any circumstances, the linkage between the withdrawal of American TNW with reciprocal or parallel measures by Russia, and the obligation on behalf of Russia to relocate its arsenal of tactical weapons deep inland of Russian territory.

The former German foreign minister Guido Westerwelle stated once at Munich Security Conference: 'Last remaining units of nuclear weapons in Germany represent a relic of Cold War. They don't serve any military purposes anymore. This is why we, German government, work on conditions for their withdrawal…' (Westervelle, 2010). But the current Merkel government reconfirmed that it wouldn't undertake unilateral steps on behalf of Germany until joint position of all Western and Central European countries (including even those who do not host TNW) would be coordinated.

Belgium and *Netherlands* host 10 to 20 American warheads each. At a certain stage, when the Belgian Foreign Ministry was headed by Yves Leterme in 2010 a ministerial statement was issued saying that Belgium, Germany, Luxemburg, Netherlands and Norway would require jointly the withdrawal of American TNW from Europe. A letter co-signed by the five foreign ministers followed addressing NATO Secretary General and suggesting to include the removal of TNW from Europe into a list of consecutive steps towards nuclear disarmament. Such a demand was supported by the former NATO Secretary General and former Belgian foreign minister Willy Klaas, who insisted on supporting German demands regarding TNW. The Dutch parliament debated twice during the last decade a draft resolution calling for the removal of nuclear warheads from Volkel airbase at south-east of the country. In both cases the draft resolution didn't pass by the insistence of the government. Among Dutch supporters of the demand to withdraw nukes there are such prominent figures as the former Prime-minister of Netherlands R. Lubbers (this is symbolic: as far as the the 1980s, he was a supporter of the deployment of American weapons in the country, but with years reconsidered his own views and joined supporters of 'no nukes' demand).

Italy hosts the largest quantity of American bombs (up to 90) at two air-force bases. Italian government never expressed formally any criticism against their presence on Italian land (some of the officials even demonstrated unawareness of the fact that US bombs are stored on Italian territory). But political opposition and various public organizations and movements, including Italian Pugwash group, Association of Italian Scientists for Disarmament, ISODARCO (International School on Disarmament and Research of Conflicts) network and others expressed widely open criticism against the presence of American bombs in Italy and published numerous arguments in favor of their withdrawal.

Turkey hosts up to 50 units of American TNW at Incirlik military base. After the abortive *coup-d-etat* in Turkey in mid-2016 (and the arrest of the commander of Incirlik base by Turkish authorities) there were rumors regarding plans to relocate the nuclear material from Turkish base to Romania or somewhere else, but later the continuation of their presence on Turkish soil was reconfirmed.

The Turkish government considers American bombs to be not only an interface and loyalty gesture within NATO, but as well to be a guarantee of deterring Iran. Some Turkish experts even express the view that any withdrawal of American nuclear weapons could motivate Ankara to promote national nuclear program in case the nuclear deal with Iran would collapse or end at any stage.

Other European states that don't host nuclear weapons sometimes took active positions on this issue – see, for example, Report for the Finnish Ministry of Foreign

Affairs (Bergnas J et al.: 2010). The greatest support for keeping American weapons in Europe was expressed not by countries hosting TNW, but by group of Baltic states (Estonia, Latvia, Lithuania), in different times by Hungary, Romania and by France. The study undertaken by a Dutch non-governmental organization IKV Pax Christi (polling and interviewing NATO-accredited diplomats and experts from national ministers of foreign affairs of a number of European countries) came to interesting conclusions. Within diplomatic circles of 14 (out of 28) NATO member states they found political forces and experts that more or less actively objected the continuation of the American TNW presence in Europe. Experts and officials in 10 more countries shared the opinion that their states wouldn't veto a decision to withdraw American weapons. Experts and officials in France, Lithuania and Hungary strongly objected such withdrawal. That poll showed that there is no 'group logic' in the approach – for example 'old' and 'new' NATO members do not represent two opposing groups on this issue. And geopolitical closeness to Russia does not necessarily dictate negative attitude towards TNW-free Europe.

Many countries recognize that historically American TNW were one of those factors that 'cemented' the Alliance, but today most of them prefer other, more useful forms of responsibility sharing. Up to a half of NATO states consider that building joint European ABM system may substitute TNW as more modern and more practical way to glue the Alliance together, though the other half does not agree with this approach.

Taking into consideration the line of Trump administration aiming to ease US obligations within NATO, a certain reconsideration of the TNW in Europe may be envisaged, though not *per se*, but rather in a package of measures regarding the transatlantic link. At the same time the funding for B61 modernization has been already allocated and partially spent, so procedurally it will not be so easy to reverse the tide, especially taking into consideration the necessity to keep consensus among NATO member states.

Prospects for International Dialogue on Non-strategic Nuclear Weapons

The continuity of negotiations, agreements, treaties, implementation and verification procedures between the USA and the USSR/Russia that includes series of SALT, ABM, SORT and START treaties and related activities constitute the *strategic nuclear arms control regime* in the area of strategic nuclear weapons. In the Russian-American joint study *Lessons to be Learned from Non-Proliferation Failures and Successes* (2009, p. 3) this regime is considered as containing both the arsenal of 'sticks' and arsenal of 'carrots'. It has many limitations: it remains bilateral, does not involve other than two largest nuclear powers, it is not comprehensive, it is concentrated on limitation of carriers rather than warheads, it allows to place decommissioned weapons to reserves rather than destroy them, etc. At the same time, series of negotiations and treaties in the area of strategic nuclear weapons appears relatively systemic, it has created a whole system of interrelated practices of arms limitations, cuts, verification that are based upon commonly elaborated and agreed definitions and methods.

The INF Treaty of 1987 was considered at that time by many experts as a core seed for another systemic *regime of limitations and cuts of non-strategic nuclear weapons*. But such a regime in non-strategic area did not materialize. Systemic regimes (like non-

proliferation regime based upon the NPT Treaty, missile technology control regime (MTCR), strategic arms control regime based upon SALT and START series of agreements) differ from one-time *ad hoc* measures exactly by interfacing numerous legal and practical measures, both domestic and international, into a logical and continuous scheme that is agreed upon and followed by a fixed group of international actors. In this respect the INF Treaty didn't receive the necessary continuation: unilateral parallel relocations and cuts in 1991–1992 described above, though important by themselves, remained rather *ad hoc* measures: they didn't lead to the exchange of overall data on non-strategic arsenals, neither did they lead to consensus on definitions and criteria nor to establishing a verification system for the whole area of non-strategic weapons.

Are there any prospects in the present geopolitical environment so that any systemic exchange of data, negotiating agreements, monitoring and verification procedures could emerge in the area of non-strategic nuclear arsenals? Which practical steps could be undertaken in this direction in the foreseeable future?

The rise of attention to the non-strategic nuclear arsenals is not motivated by any rise of their objective role or function in the modern geopolitical conditions. *Vice versa*, with the end of the Cold War the danger of intended and even non-intended use of tactical nuclear weapons decreased and moved from the mainstream of nuclear balance between Washington and Moscow into the regional balances, specifically in the Middle East, South Asia and North-East Asia. At the same time, analysis of quantitative parameters of arsenals that could be attributed to non-strategic category proves that, as before, the overwhelming majority of such weapons remain in the hands of the USA and Russia, and their non-strategic arsenals are by factor (in some categories by two factors) larger than comparable stocks of weapons in the hands of 'third' nuclear powers. That increases Washington's and Moscow's responsibility for assuring the non-use and potential cuts in non-strategic arsenals, and for elaborating general approaches to involving these types of weapons into arms control, monitoring and verification.

Some doctrinal changes which occurred during the last decade provided certain space for movement in the right direction. UN-based NPT Review process abided with the recognition of serious problems that face the non-proliferation regime, while at the same time noted some general decrease of the role of nuclear weapons for achieving national and international security in the modern world. The U.S. Government postulated doctrinally that they would not use or threaten to use nuclear weapons against non-nuclear member states of the NPT that adhere to their obligations under the non-proliferation regime (Nuclear Posture Review, 2010, p.16). Particularly, it was clarified that if such a country hypothetically would attack the United States by using conventional, chemical or biological weapons, the United States would retaliate with prevailing conventional weapons, but would not threaten to use nuclear response, if the attacking country itself did not possess nuclear weapons. The recent edition of the NATO Strategic Doctrine also shows a decrease of emphasis of the nuclear component within the Alliance's defense capabilities.

A famous series of articles on nuclear-free world published by four highly influential American statesmen (G. Schultz, W. Perry, H. Kissinger and S. Nunn) moved the demands to reconsider the role of tactical nuclear weapons into the realm of 'political correctness'. These American political strategists, while advocating the general

necessity to move towards nuclear-free world, specifically called for the liquidation of nuclear weapons of short-range created for forward basing (Schultz, et al., 2007, p.A15). In further articles, these four prominent American statesmen called for dialogue both within NATO and between the USA and Russia regarding withdrawal and de-concentration of forward-based nuclear weapons, starting from data exchange on accurate counting of such weapons. They especially emphasized that such small (by size) and portable nuclear devices are potentially dangerous from the point of view of possibly getting into the hands of terrorist groups (Schultz, et al., 2008, p. A13).

Policy-makers and many defense analysts in Russia do not see a necessity to involve TNW into negotiations at present. START-III is under implementation till 2020, and no new line of arms control negotiations are at place. Worsening of Russian relations with NATO and with the West as a whole after crises over Crimea, Eastern Ukraine and Syria led to the rise of Moscow's interest towards advancing military capabilities, forward basing and to some doctrinal (though yet not operative) increase of reliance onto nuclear weapons in general. In such an environment there could be only two motivations to involve TNW into arms control. Firstly, if a removal of remaining American TNW from Europe would become a realistic option (either because of a change of priorities of the US administration or because of political pressure from the European allies), in which case reciprocal measures from Russia may be required. Secondly, if the US and Russia would open any negotiations on the 'START-IV' – in continuation of strategic arms reduction after the end of START-III in 2020. In this second case, non-strategic weapons (at least some types) could be included into combined ceilings or combined limitations on deployment.

The readiness by Russia to engage into any negotiations on TNW would greatly depend upon whether the Russian concerns of last decades (regarding the character and the scope of the ABM system, long-range conventional high-precision weapons targeted against strategic objects, NATO enlargement and forward basing, military cooperation in third countries like Syria, etc.) would be met. Asymmetries exist in many areas, and Moscow may be ready to discuss the asymmetry in TNW arsenals only in interface with offensive/defensive, conventional/nuclear, strategic/tactical balances.

Moscow considers that Articles I and II of the NPT already by themselves require the removal of American TNW from non-nuclear European countries, even without any compensatory measures from the Russian side. Some Russian experts state that Russia should establish a linkage between limitations/cuts of TNW with limitations/cuts of some components of NATO general purpose forces, for example, with cuts of navy-based cruise missiles that could be easily re-armed with nuclear warheads. Some other military experts stress that TNW provides regional deterrence, thus Russia cannot discuss the fate of the TNW only with the United States and NATO, but it needs to take into consideration nuclear arsenals of many countries, including DPRK, Israel, China, India and Pakistan.

At the same time, some other Russian and international experts criticize maximalist approaches and attempt to search for compromises. They emphasize that the demand to remove American TNW from Europe could be balanced (and motivated) with reciprocal relocations or cuts in the Russian arsenal (for example, relocation of all TNW out from storages at the European part of Russia to storages behind Ural

mountains). They also consider it unrealistic to attempt to have a combined parity with non-strategic weapons of all third parties (majority of which, like in cases of Israel, India, Pakistan, DPRK are designated for deterring regional neighboring states other than Russia) (Arbatov, 2011).

If any negotiations on TNW would start, then, according to Russian views, these should be linked to issues regarding ABMs, non-nuclear strategic weapons and conventional weapons in Europe (though the CFE treaty is dead, some methods of monitoring, exchanging data and preserving regional stability are still applied and could be reconfigured into new regime of European arms control).

American proposals regarding TNW concentrate on limitation with equal and combined ceiling to all strategic and non-strategic nuclear weapons that are in storages in Russia and in the USA. This would allow, as American experts suggest, to circumvent the difficult issue of intrusive methods of control, as far as strategic and non-strategic reserves are stored in the same depots and are hardly separable without detailed inspection. It is also impossible to distinct between reserves and warheads awaiting dismantlement.

Russian response to this approach has been suggested by the Center for Security Studies of the IMEMO Institute within Russian Academy of Sciences. Experts propose to elaborate and conclude an agreement on withdrawal of TNW warheads from air-force and navy bases, as well as from any general forces bases into centralized storages: the principal here is to limit TNW not through imposing ceilings and limitations onto their quantities, but through limiting the places of their storage to well protected storages far from regions of touch between Russian and Western military infrastructures. This would allow avoiding sensitive and intrusive control inside facilities, debatable counting and control over dismantlement and utilization. At the same time, such an approach would prevent non-intended or non-authorized use of TNW and the stealing of TNW by terrorists. Tactical warheads could be kept in central storages until the process of disarmament would allow their controlled elimination. And if any process of dangerous escalation of strategic environment would take place, it would be possible to openly move part of the TNW to armed forces bases in the direction of the danger, as such a move by itself would be a factor of deterrence.

Conclusions

In conclusion, the situation in the area of non-strategic nuclear weapons could be summarized as follows.

- There are no universally agreed definitions or criteria for distinguishing between strategic and non-strategic (including tactical) nuclear weapons. Still, there are several widely applied approaches based upon distinction in objective parameters (range of carriers, yield or weight of warheads), as well as in functions and in value of targets, that allow to analytically separate the category of non-strategic nuclear weapons.

- Though non-strategic or tactical nuclear weapons can be found in most nuclear powers' arsenals, their quantities in the hands of the USA and Russia as nuclear superpowers remains by factor higher comparing to other nuclear states.
- Tactical nuclear weapons are considered to be more vulnerable for unauthorized use or theft by terrorists than strategic weapons. This is why the task to create a regime to their monitoring and decreasing of their numbers has a priority in present conditions. It is also notable that quite many delivery systems for non-strategic nuclear weapons are systems of dual use (both conventional and nuclear).
- Two major achievements in the area of limitation and partial elimination of non-strategic nuclear weapons are the Treaty on Intermediate and Shorter-Range Nuclear Forces (INF, 1987) and parallel unilateral initiatives by the USA and USSR/Russia in 1991-1992. They decreased non-strategic nuclear arsenals significantly.
- The remaining American TNW are located both on national territory and outside the USA, in five European non-nuclear countries. The USA remains the only nuclear power which permanently stores a part of its nuclear arsenal outside national borders. This should serve as an incentive for the international community to debate an introduction of a principal requirement addressed to all nuclear states to keep their nuclear weapons within the borders of their national territories.
- The remaining Russian TNW are no longer operatively deployed and are stored separately from delivery systems. At the same time, TNW are kept in most cases in the same storages where strategic reserve arsenals are stored. This may evoke a requirement to separate tactical and strategic weapons in different storages so that processes of data exchange, counting and verification could be applied. Alternatively, sides may agree on combined strategic/tactical ceilings or on concentrating all remaining TNW, without discussing ceilings, in central storages far from areas where military infrastructures of opposite sides confront each other.
- The current political environment does not provide any single strong motivation neither for the withdrawal of American TNW from Europe, nor for Russian initiative in cuts or relocations, nor for cuts in non-strategic arsenals of third nuclear countries.
- At the same time it is not entirely impossible that the USA and Russia would open a dialogue on non-strategic nuclear weapons or undertake unilateral steps in this area. One of the steps by which sides could start is an exchange of data on already undertaken unilateral cuts and relocations in 1991–1992, including which types and quantities of TNW were removed and which of them were destroyed. If it would be transparently announced by sides that some categories of TNW are fully decommissioned and eliminated, this could later be made irreversible by written agreements, which would open a way towards future progress. In 2015, Russia and the USA already started some new procedures of data exchange and mil-to-mil coordination in the course of interaction around military activities of Moscow and the West in Syria and Iraq (details discussed in A.Nikitin, 2017, p.p. 358, 361). Russian-Western parallel or interfaced military actions in the Middle East became a

new factor pushing sides towards dialogue over mid-range weapons arsenals, both in conventional and WMD areas.

– Any potential systemic negotiations on non-strategic weapons leading to shaping a regime of arms control in the area of non-strategic nuclear weapons (as a far-sighted goal on the way to nuclear-weapon-free world) require to take into consideration the deep interface and numerous interconnections between offensive/defensive, nuclear/conventional, and strategic/non-strategic arsenals and weapons.

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5

INF Treaty – Present State and Way Forward

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Abstract

The negotiation history and scope of the Intermediate-Range and Shorter-Range Nuclear Forces Treaty (INF) will first be briefly reviewed in this article. After that the implementation phase, including its intrusive verification regime of finite duration, will be described. Since the signing of the treaty, the development of new technologies has raised new problematic issues. These include the deployment of INF-range unmanned combat aerial vehicles (UCAV), as well as wide global proliferation of both ballistic and cruise missiles, some of them nuclear-armed. In the last years, breaches of the treaty have been suspected and notification made by both sides, the US and Russia. They have led to the worry that Russia might eventually want to break away from the treaty. The ongoing Western deployment of Ballistic Missile Defence systems on European seas and land bases has made Russia nervous and the political situation acute. In particular, the deployment of ship-based Aegis missile systems on land, called Aegis Ashore, is claimed by Russia to be a breach of the INF Treaty, as the system is capable of launching, in addition to missile defence interceptors, also cruise missiles prohibited by the treaty. Russia is expected to react to Aegis Ashore in Europe by deploying Iskander SS-26 missiles more permanently in Kaliningrad, opposite the planned Polish base. The US, in turn, has accused Russia of developing a new cruise missile prohibited by INF. Since there are simultaneously also other suspected breaches by both sides, there is an urgent need for the parties to intensify their discussions in the Special Verification Commission. The treaty's paragraphs also need updating. The need for additions includes a distinction clause concerning cruise missiles and UCAVs, and also a more comprehensive definition of cruise missile range as a function of payload in order to facilitate interpretation of the results of tests that are short of full range. These could enable the INF Treaty to make a contribution towards stability in the world also further on.

How the INF Treaty was Achieved

The nuclear arms race was in an infamously dangerous cycle in the 1970s and 1980s. The doctrines of deterrence were shifting towards warfighting and limited nuclear war on both sides of the Cold War front. The key aims were moving toward flexible responses with escalation control.

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While developments in strategic nuclear weapon arsenals were constrained by arms control agreements, there was no regulation on nuclear weapons below strategic level. Thus, the most threatening arms race took place in the field of intermediate-range ballistic and cruise missiles meant specifically for European targets. This could possibly have decoupled the European theatre from global deterrence, and effectively taken strategic arms out of the escalation scenarios.

The race made a jump to a qualitatively new level around 1976, when the Soviet intermediate-range missile SS-20 was deployed in operational units in the Warsaw Pact countries. It was a much more capable missile than its predecessors in several respects. Most importantly, it used solid fuel, which quite essentially shortened its preparation time for operations and hence, made the warning time practically zero for the opponent. This shifted the balance towards an unstable, high alert status for nuclear units in Europe. The SS-20 was also mobile, making it nearly invulnerable to attack. It was accurate and highly destructive with its three independently targetable warheads. The total number of these warheads would have been large enough to destroy all nuclear targets in Western Europe, the total number of SS-20 missiles being around 600, as became publicly known upon their destruction when the INF Treaty was implemented.

Therefore, Western military strategists were seriously worried for a good reason. There was even talk about changing from Launch-under-Attack strategy to Launch-on-Warning in order not to lose European missiles and airplanes in a disarming first strike. That shift of strategy would have been very destabilizing. Instead, in response to the grave situation, NATO adopted a dual-track approach in 1979, both negotiating and simultaneously starting to deploy its own intermediate-range missiles in Europe. Bilateral negotiations between the superpowers began in Geneva in 1981, and with a one-year break in 1984, finished successfully in 1987 (Kimball and Reif, 2014).

The Western military response was to deploy 464 ground-launched cruise missiles (GLCMs) in several Western countries, as well as 108 Pershing II ballistic missiles to replace the previous shorterrange Pershing I in Western Germany. Because cruise missiles are slow as they fly aerodynamically, GLCM is not a destabilizing first strike weapon. However, the Pershing II with its 1,770 km range and 10–15 minute flight time surely was the accurate, solid-fuel tit-for-tat answer to the SS-20s, although deployed in smaller numbers, and with only one warhead per each missile. Pershing II deployment started in 1983. Its range seems to have been adjusted just short of Moscow, not to be capable of a decapitating strategic strike, but rather made for theatre warfighting in Western Russia. The real range may have been longer, however. During these deployments the nuclear balance became worryingly unstable, and also the general public became acutely aware of the fearsome situation. Large demonstrations took place in cities and outside missile bases around Western Europe.

As Mikhail Gorbachev became the Secretary General of the Soviet Communist Party in March 1985, tensions quickly started to ease. Already in April he suspended the SS-20 deployment, and soon met President Reagan personally in Geneva in November 1985. In October 1986, they met again in Reykjavik, where radical ideas of denuclearization emerged. As to the intermediate-range nuclear forces (INF) negotiations, they first agreed in principle to eliminate these missiles from Europe alto-

gether, and to limit their global numbers to 100 each. The final agreement, where INF missiles were to be bilaterally abolished globally, was reached on November 24, 1987 in Geneva (Savranskaya, S. and Blanton, T. 2007; Sokov, N. 2007).

The Implementation of the INF Treaty

The INF Treaty eliminated both land-based intermediate-range missiles with 1,000–5,500 kilometre range as well as shorter-range missiles with a range of 500–1,000 km. However, it did not cover nuclear weapons delivered by aircraft, although the Tu-22M Backfire bomber (with a range of more than 6,000 km) was originally one of the weapon systems that had caused great concern in the West. The agreement did not cover sea-launched nuclear weapons of any range either.

Although the original INF arms race had only taken place in Europe, the agreement covered the two negotiating countries' weapons globally. It did not, however, bind their allies and friends, such as the United Kingdom, France or China. This shortcoming was at that time considered acceptable, but as the agreement was of unlimited duration, it must have been clear already then that sooner or later the agreement would need updating in some respects, as alliances and global threats change and missile capabilities grow and proliferate.

The INF Treaty was quite unique in the history of arms control agreements. It not only limited a whole weapon category of the two countries, but also abolished it. Such an agreement was possible only in the exceptional atmosphere of trust and detente at the end of the Cold War. Still, previous long-term suspicions did not vanish so quickly, and the famous slogan of President Reagan in negotiating the treaty was 'Trust, but verify'. Therefore, the treaty came to include a very long and detailed protocol of verification measures, allowing mutual intrusive on-site inspections, instead of the less effective measures previously applied in arms control agreements, such as non-intrusive national technical means (NTM), which means mainly satellite observations. Both countries created large organizations to do the actual verification work, and everything worked admirably smoothly. The full text of the treaty can be found online (U.S. Department of State, 1987).

It was agreed that the implementation of the destruction of the INF missiles and their launchers would be completed during the relatively short period of just three years, by summer 1991. In total, the US destroyed 169 Pershing I missiles, 234 Pershing II missiles and 443 ground-launched cruise missiles (GLCMs). These numbers indicate among other things that there had, in fact, been two Pershing II missiles per launcher. The Soviet Union destroyed 654 SS-20, 149 SS-4, 6 SS-5, 718 SS-12, 230 SS-23 ballistic missiles, and also 80 SS-C-X-4 (Russian name RK-55) land-based cruise missiles, which also had similar air-launched and sea-launched cruise missile variants. The SS-23 range was just below 500 km, but the Soviet Union agreed to destroy these missiles also, as a good-will gesture, as there was much hope and trust in the political atmosphere during those years.

Questions of inspection and verification were considered by the common Special Verification Commission. The need for this kind of common forum for negotiations was obvious at that time, and the Commission was active until the end of the period of intrusive verification, which took place in June 2001. The Commission still

exists today, and it is a useful forum for discussing open questions, such as suspected breaches. It can be also useful for discussing current deficiencies and interpretations, as well as possible and necessary amendment of the treaty.

There are several relevant issues and technologies, which have either changed or appeared during the two and half decades after the agreement was signed. Russian officials have publicly said several times that the agreement no longer belongs to the present time, and that in their opinion it is rather a relic of the Cold War. In the next sections I will discuss these issues in more detail.

The question of the uncertain future of the INF Treaty has also become a topic of discussion due to the fact that twice, the US has officially claimed that Russia has not, in its opinion, complied with the agreement. In return Russia has made its own accusations of US non-compliance, but has not officially answered the US's accusations, which it claims are too vague and unspecific to warrant an answer (Sputnik News, 2012).

Needs for Possible Modifications to the INF Treaty

One can make a whole list of technologies and systems that have in some sense or other become either problematic or have created a need for updating the INF Treaty. A list of these developments includes:

- Greatly increased range (up to INF ranges) and payload of modern Unmanned Combat Aerial Vehicles deployed with air-to-surface missiles, both in reconnaissance role as well as more and more often in combat role.
- Wide proliferation of unmanned aerial vehicle (UAV) technology globally. There is, thus, an increasing need for a definition in order to make an unambiguous distinction between cruise missiles and UCAVs (which often have an automated flight mode in addition to human remote control mode).
- The INF Treaty covered all missiles of the defined ranges, whether ballistic or cruise missile, and regardless of whether they had nuclear or conventional warheads. This approach was adopted for verification purposes, as there were no good ways of verifying the type of a warhead, especially not using NTMs, which have been used after the initial ten-year-period of intrusive verification ended.
- Difficulties in unambiguous definition of the range of cruise missiles, as this depends on both the warhead weight and the flight profile (speed and height). Missile tests can, and have also been conducted at less than full range, in order not to reveal the full range capability to third parties.
- Relatively many nations now have intermediate-range missiles, both cruise and ballistic, and some of them are also nuclear-capable. As a result of their bilateral treaty, the US and Russia are the only two countries legally excluded from deploying these missiles.

Another development is also relevant to the INF's future, although it is only indirectly related. This is the on-going deployment of ballistic missile defence systems. The consequences of the US's withdrawal from the Anti-Ballistic Missile (ABM) Treaty in 2001 in relation to the military balance can now be understood, and they are potentially serious. Several US programs for defence against ballistic missiles

either on land or at sea have been started and continue. Although these systems were originally meant for defence against Intercontinental Ballistic Missiles (ICBM) from rogue states, some of them that are already in the deployment phase are also effective against sea-launched ballistic missiles and possibly also some short-range ballistic missiles if launched close enough to the interceptor bases.

Thus, there is at present a real and worrying possibility that parties to the INF Treaty, which is meant to be of unlimited duration, might withdraw from it. According to Section 2, Article XV of the treaty, the parties have the right to withdraw with six months' notice due to extraordinary events that jeopardize the supreme interests of that party. The US's withdrawal from the ABM Treaty in 2001 under President George W. Bush was a dangerous precedent of this negative possibility. At the 43rd Munich Security Conference in February 2007, Russian President Vladimir Putin publicly criticized US missile defence plans (Washington Post, 2007). Minister of Defence Sergei Ivanov called the INF Treaty a relic of the Cold War, while Chief of the General Staff General Yuri Baluyevski wrote that Russia may withdraw from the INF as a response to US missile defence deployment in Eastern Europe (DeBree, 2007; Vzglyad, 2010).

There are several reasons for this unfortunate, publicly expressed need to withdraw from the treaty felt by the Russians. Among these is the wide proliferation of both ballistic and cruise missiles into a large number of new missile-owner countries. Another reason is the use of INF-range UCAVs in many modern armed forces in the world, and most commonly by the US. However, probably the most compelling reason is the progress of US missile defence programs in central and Eastern Europe, which I will discuss in a later section.

First, I will consider the two above-mentioned developments (missile proliferation and UCAVs) in more detail, and then I will discuss the possibilities for modifying the INF Treaty in such a way that it might survive the present challenges.

Global Proliferation of Intermediate-Range Missiles

Quite a large number of nations have presently deployed intermediate and medium-range missiles, both cruise and ballistic. Some of them are also nuclear-capable. Only the US and Russia are legally excluded from deploying them due to the INF Treaty.

The proliferation of ballistic missiles started from short-range, one-stage SCUD-B missiles sold to several friendly countries by the Soviet Union. This missile was reverse-engineered, and especially North Korea started to develop it further and build missiles of more than one stage. The development work was done and financed in cooperation with Iran and Pakistan in the 1980s. The work progressed well and the countries soon achieved longer-range versions with ranges varied from less than 1,000 km to up to 2,500 km. North Korea is still further developing these medium and intermediate-range missiles towards intercontinental range as proven by their efforts to launch satellites.

Besides the two INF countries, intermediate-range ballistic missiles (IRBM) are presently owned also by China, India, Israel and North Korea. Medium and short-range ballistic missiles are owned by these same countries and also by Iran, Pakistan,

Saudi Arabia and some dozen other countries, among them Turkey and Egypt, just to mention those with relevance to Russia's southern border (Davenport, 2014). In addition, France and the UK have sea-launched ballistic missiles (SLBM) of relevant range in their submarines, similar to what they already had when the INF Treaty was signed, but these are newer versions with longer ranges. France also has air-launched cruise missiles (ALCM), but they cannot be used as an argument for withdrawing from the INF, as they are not covered by the said treaty.

Because the medium-range missiles in some countries can also be nuclear-armed (China, India, Pakistan, North Korea and Israel), there is an obvious need for an international treaty to cover them, although there is very little hope of achieving one in the foreseeable future. Russia therefore feels that it should be allowed to have a military system corresponding to those of its neighbours in order to balance this. It is not clear which countries in particular Russia is concerned about, but it is often believed to be mainly China, although probably also India and Pakistan, and maybe the UK and France, in relation to which Russia wants to have balancing missiles. Russia is legally allowed, if it so wishes, to target these countries with ICBMs meant for strategic purposes, but that would affect its strategic balance with the US and it would also be expensive. Hence, Russia feels that the bilateral INF Treaty ought to be revised or terminated. At one point after 2008, Russia advocated globalizing the INF Treaty to cover all countries. It would have been an ideal arms control solution, but there was never really much hope in advancing that initiative, and it was soon forgotten.

As a lesser of two evils, the author of this article would try to modify the INF Treaty in order to save it, to allow increased deployment of cruise missiles with *conventional* warheads, as they are not first strike weapons. A difficulty in this arrangement would be how to verify the nature of the payload, because identification of the type of the warhead would require politically difficult intrusive inspections.

When seeking a way to respond to Russian worries regarding the imbalance of missiles, one could also create new numerical limits for both ballistic and cruise missiles within the INF Treaty. Because of their potential for a destabilizing first strike, there should be very strict and low, if not zero limits for ballistic missiles especially. To be on the safe side, their maximum limit should be only a small fraction of the allowed limit of ballistic missile numbers in the New Strategic Arms Reduction Treaty (New START), which allows 700 deployed launch vehicles, in order not to disrupt the strategic balance. A precedent for a non-zero number could be the preliminary agreement before the final zero-zero solution in Reykjavik in October 1986 between Presidents Reagan and Gorbachev: they agreed to remove INF systems from Europe and have equal global limits of 100 INF missile warheads (Sokov, 2007). It is, of course, uncharacteristic for an arms control person to make such a proposal, that would increase the number of weapons, but if the alternative is the total abolition of the INF Treaty, the old Reykjavik compromise number could be acceptable as the lesser of two evils.

Unmanned Combat Aerial Vehicles

A wide proliferation of UAV technology has also taken place globally. Earlier, there was no reason for confusing UAVs with cruise missiles, as the former had short ranges and were clearly aeroplanes, even if remotely-piloted. The need to draw a line

of distinction between cruise missiles and UAVs has risen due to the vehicles' new combat duties along with the weapons they carry and their lengthened ranges.

The rapid development of UAVs has extended their roles from the previous reconnaissance, control and communication to include weapons delivery versions, UCAVs with more missile-like properties and heavier payloads. Glider-like reconnaissance drones, with slow speeds and light payloads, may fly for more than 30 hours, even several days, and their ranges may possibly exceed even intercontinental distances. Even the heavier and faster weapon-carrying drones can have ranges up to 1,000–2,000 km. Thus, their range specifications fall within the INF category of more than 500 km.

Armed drones are widely deployed at present, even wider than medium-range ballistic missiles. Israel was the first country to use them successfully in military operations, and hence their drones are 'combat proven'. They became a real alternative to manned missions in dangerous circumstances. Nowadays, about 30 countries deploy armed drones in their armed forces. Also Russia has been developing at least two armed versions, but their operational status is not known to the author of this article.

The definition of a cruise missile in the INF Treaty reads as follows:

A cruise missile is 'an unmanned, self-propelled vehicle that sustains flight through the use of aerodynamic lift over most of its flight path'. It shall also be a weapon-delivery vehicle, in order to be covered by the treaty (U.S. Department of State, 1987).

Russia claims that armed combat drones, UCAVs, fall within this definition of weapon-delivery cruise missiles, and hence, violate the INF Treaty. The ambiguity rises, as although their control stations are manned, the aerial vehicles themselves are unmanned. In normal mode there are two clear distinctions between UCAVs and missiles: UCAVs have pilots, even if they are remotely piloted from a land base, and secondly, UCAVs are meant to return to their base after delivering their weapons, while cruise missiles are autonomous during flight, are weapons in themselves and are destroyed together with their warhead when they hit their target. However, when retroactively evaluating their distinction, this characteristic of only one-time-use, rather than return and reuse, is not mentioned in the INF cruise missile definition, as it should have been.

To complicate the matter further, as a back-up alongside of their remote control mode, UAVs often also have an autonomous mode that is needed e.g. if radio control is lost. In such case, the drone either returns to its base or could, in principle, also be programmed to proceed and hit some pre-set target. The autonomous mode would effectively make it unmanned, and it would then, in principle, behave like a cruise missile. In other words, there is indeed a need to clarify the definition of the word 'unmanned' in the INF cruise missile definition, or to modify the definition in some other way to avoid overlap between the two systems.

Missile Range Tests

There is another instance of vagueness in the INF definitions on missile characteristics, and this is the range. According to the text of the treaty (Article VII, Section 4)

the range is 'the maximum distance which can be covered by the missile in its standard design mode flying until fuel exhaustion'. But a cruise missile might never be tested in standard design mode, and still its full capabilities could be calculated and trusted. The range, as is well known, depends on the weight of the warhead, the flight height and velocity profile, as well as the amount of fuel that is carried. A conventional warhead in missiles is usually somewhat heavier than a nuclear warhead, typically, say, for instance 500–800 kg for a conventional warhead and 400–500 kg for a nuclear warhead. Hence, a missile that has been tested to its full range with a conventional warhead, perhaps less than 500 km in compliance with INF limits, will fly longer with a lighter nuclear payload, and may well exceed the 500 km limit, even if never tested for that range. This vagueness creates suspicion especially regarding the cruise missiles, the range of which is close to the INF lower limit of 500 km. They are often dual-capable, but can be tested with any desired payload and fuel weight. For this reason, it would be helpful in clearing up any suspicion, if the amount of payload and fuel used in a test would be standardized, or alternatively, declared to the other party of the treaty. A similar solution should be found for ballistic missiles, which can have a variable number of multiple warheads, as they have also aroused suspicion as to the operational payload weight and range.

Relevance of Ballistic Missile Defence to the INF

The topic of Ballistic Missile Defence is more comprehensively covered by Götz Neuneck's article in this volume. The present section deals mainly with issues that have relevance to the INF Treaty.

Russia has reacted strongly to all different US ballistic missile defence programs, regardless of their name and mode of deployment. President Putin said publicly in a speech in 2007 that Ballistic Missile Defence (BMD) could start a new arms race, and Russians have later spoken of withdrawing from the INF Treaty as a result (Putin, V. 2007; Luhn, A. and Borger, J. 2014; Vzglyad 2010; Dyer, G. 2016).

In a sense, the situation resembles that of the heated arguments that took place during President Reagan's Strategic Defence Initiative (SDI) after 1983. Russia feels that the US is deploying and bringing theatre missile defence systems called European Phased Adaptive Approach (EPAA) to areas in Europe and adjacent sea areas, that Russia thinks are situated in such a way that they can also have capability against Russian strategic ICBM missiles. The US claims that the speed and other properties of these interceptors are not sufficient for reaching ICBMs, although they could be effective against some shorter range SLBMs. Whether these claims are justified or not is a matter for more detailed consideration. I will discuss this briefly later on in this article. At present, I just want to note the nature and existence of these opposite claims.

Ballistic Missile Defence is not an issue that would be explicitly relevant to the INF Treaty. The INF definitions do not directly cover BMD interceptors, because they are not weapon-delivery vehicles, as missiles are defined in the INF Treaty. Interceptors have kinetic warheads, that destroy their target by direct hit like a bullet, rather than explosive warheads. Interceptors are also not useful against land targets, but they are rather analogous to surface-to-air missiles with mobile airborne or space targets. Therefore, they are excluded by Article VII, Section 3 of the treaty

(U.S. Department of State, 1987). Theoretically, the range of the interceptor missiles, if they follow ballistic trajectories without hitting any target on the way, does exceed the lower limit of the INF Treaty range 500 km, but still the text of the treaty explicitly excludes them.

The US claim that their European-based missile defence interceptors are relatively limited in number, as they are only meant for action against the few missiles of rogue states like Iran. However, there is suspicion as to whether they might also be effective against some short-range ballistic missiles when deployed close enough to Western Russia. The European-based missile defence interceptors are altogether too few and slow to be effective against the large numbers of Russian strategic missiles, and not even numerous enough against the smaller numbers of missiles that might constitute a second ICBM strike. They are also ineffective against cruise missiles due to their low flight profiles. Calculating the real effectivity of interceptors is a complicated task. It must be done based on publicly unknown parameters, and besides location distance between the missiles and the interceptor bases, it also depends on the optimal direction of tracking radar beams, as well as on possible evasive manoeuver capability of the missiles.

Next, I will look in more detail at the US's claim that its interceptor missiles (SM-3) are not fast enough to have capability against intercontinental ballistic missiles, which are considerably faster and therefore much harder to hit than intermediate and short-range missiles, and against which the US system in Europe could possibly be used. The US's claim is true at least regarding the early SM-3 version Block I interceptors, the maximum velocity of which is 10 Mach, but this may change with the deployment of Block IIA with velocity up to 15 Mach. Even more developed interceptors of Block IIB with even higher anticipated velocities, presumably 17–18 Mach, originally due after 2020/2022 were cancelled in 2013. They were presumably supposed to be able to catch up with even ICBMs, if these were flying over or close enough to Block IIB interceptor launchers, as would have been the case if launched towards the US from Iran. Russian ICBM routes towards the US fly further north from the planned interceptor land bases. The potential capability of Block IIB against ICBMs may have weighed decisively in the decision to cancel them. There is disagreement concerning the case of Block IIA capability (RT News, 2013; Pike, 2011; Reif, 2013).

The originally planned land positions of the European-based BMD system (later called EPAA), were to include interceptors and radar installations in several different places. A radar is now situated in Turkey and a Romanian interceptor base became operational in 2015, but interceptor bases in Eastern Europe, e.g. in Poland and the Czech Republic have been delayed. The land-based positioning was strongly opposed by Russia, as the interceptor missiles were to be situated relatively close to Russia's Western borders. In 2009, the US decided that the interceptor launcher part of the system was to be transferred from the land bases to Aegis cruisers and destroyers at sea, with their base harbour in Rota, Spain. The seaborne Mk 41 launchers, which are capable of launching both BMD SM-3 interceptors and notably also Sea Launched Cruise Missiles (SLCM), were not (yet then) a problem on ships from the INF perspective, as the treaty allows SLCMs and their launchers at sea. Originally, Russia agreed to this sea-based arrangement. It even planned to cancel some

short-range missile deployments in Western Russia near Poland, but then later started to oppose this variation also (Barnes and Stack, 2009; Sputnik News, 2012).

The Aegis launchers on the cruisers were to be deployed also on land already in 2015 in Romania and later in Poland in 2018. They are called Aegis Ashore systems. This created serious controversy because the Aegis launcher, the Mk-41 vertical launching system, can be used to launch both narrow interceptor Standard Missiles (Block I, diameter 13.5 inches), as well as Sea-Launched Cruise Missiles (diameter 20.4 inches). Legally, this was allowed under the INF as long as the launcher was at sea, but the treaty forbids deploying cruise missiles and their launchers on land. If launched from a land base, SLCMs would in practice, if not in name, become Ground Launched Cruise Missiles (GLCMs) and these are forbidden by the INF (RT News, 2014). Thus, the Russian claim of treaty infringement seems to be apparent in the case of the Aegis Ashore deployment, unless the Mk-41 launcher is modified in the Ashore version in such a way as not to be able to launch cruise missiles. There are indications and US claims of such changes to software or electronics between the Mk-41 launchers at sea and ashore, but how can one prove this to the other party, when there are no observable external differences and not enough transparency and trust (Fieldhouse, 2016)?

The problem becomes even more difficult to solve when the narrow 13.5 inch diameter SM-3 Block I missiles are upgraded with Block II missiles, which are faster and have the same 21 inch diameter as the SLCM. Russia is especially worried that Block IIa missiles are to be deployed in Poland, as is planned for the end of 2018, even though the even more advanced deployment of Block IIb has been cancelled. Poland would seem an optimal site for launchers against any missiles launched from Kaliningrad, and so Russian nervousness can be understood, as Russians have several times during heightened tensions threatened to deploy highly accurate and effective, but relatively slow and short-range Iskander (both ballistic and cruise) missiles there. A local arms race threatens to take place in the areas of Poland and Kaliningrad after 2018 (Blomfield, 2007; Pike, 2016).

A possible approach to this problematic issue could be not to make the interceptor upgrade of the Aegis Ashore from Block I to the wider Block IIa missiles, and at the same time modify the Mk 41 launchers in such an externally observable way, that they would not be wide enough to launch Tomahawk cruise missiles (perhaps by adding some kind of calibre-restricting plate to the present launcher). This way the US would still convincingly abide by the INF Treaty.

When searching for a reason for the strong Russian opposition to Western ballistic missile defence programs, one can find several kinds of explanations: including technical, military and political ones. One sceptical view is that Russia might just be using the BMD-issue as an excuse to justify its own wishes to make exceptions to the paragraphs of the INF Treaty, or to withdraw from the whole INF Treaty completely. This is indicated by Russia's own advanced missile research and development, pointing to deployment in a possible post-INF period. Militarily, they might want to balance China and other Asian countries, but publicly they are worried about their forward base in Kaliningrad and the effectiveness of their short-range ballistic (Iskander) missiles that are deployed there at least temporarily, but perhaps more permanently in case of the deployment of the Polish Aegis Ashore base in late 2018. Even if the Iskanders only were to have conventional warheads, a kind of lo-

cal arms race still looms, since some of those Kaliningrad-based missiles are believed to target the future US missile defence systems in Poland and the ships in the Baltic Sea (Blomfield, 2007; The Guardian, 2008; Isachenkov, 2015; Osborne 2016).

Suspected Violations of the Existing INF Treaty

Both parties of the INF Treaty have suspected and accused the other of breaching the treaty. The main Russian accusations have been discussed already earlier. These were the claims that armed long-range UCAVs should, in fact, be included in the treaty covering cruise missiles, and that the deployment of the normally sea-based Aegis launcher MK-41 on land, as the so-called Aegis Ashore, is forbidden, as it can also launch SLCM cruise missiles alongside of the intended SM-3 interceptors. These two accusations are serious, and they should be effectively dealt with and cleared up. The first-mentioned problem could be solved just by amending and clarifying the text of the treaty, and so it should not be too hard to solve. The second is more difficult and also more important. There have also been other Russian claims of American INF missiles being used as BMD target missiles. This was mentioned in the speech of foreign minister Sergei Lavrov at the Munich Security Conference in 2015 (Lavrov, 2015), but does not seem to be equally serious to the other two previously mentioned problems. This is because intermediate-range target missiles are, in fact, allowed to be used to a limited extent by the original treaty.

The US, on the other hand, has claimed that Russia has been developing ground-launched cruise missiles of longer range than 500 km. Possible such missiles are the one called R-500 or another called SSC-X-8, although these may not have been tested in a way that violates the treaty (the public information is too scarce to say) and are not deployed yet (Marcus, J 2014; Kristensen, H.M. 2014).

Since the intrusive INF verification regime no longer exists, it is hard to obtain detailed and reliable evidence of any suspected violations. Russia has asked the US to present such evidence, but the case has not progressed for two years. Possibly because the US is unwilling to risk information sources by revealing details.

One aspect that also creates suspicion is the vague definition of the cruise missile range as previously discussed in this article. A cruise missile is allowed according to the treaty, if tested under the 500 km range, but it could still reliably fly much further than tested. The R-500 cruise missile could possibly be one such case. It can be launched from the Iskander launcher and is probably similar to the Iskander-K cruise missile (Russian name 9M723K or 9M278), whose range is below 500 km in its regular configuration. But who knows how much further it is capable of flying, if some of the payload weight is replaced by additional fuel. And if a new type of long-range cruise missile has not been tested in a configuration capable of range longer than 500 km, or a test has been interrupted before that flight distance, is there legally any violation (Woolf, 2016)? Another possibility is that Russia plans to modify existing treaty-allowed air- or sea-launched cruise missiles into a land-based version.

There has also been suspicion that Russia may have developed a new intermediate-range ballistic missile, but this suspicion seems to be without proper legal foundation. There is indeed a new missile, the RS-26 Rubezh, but it has already been tested for 6,000 km range, and it is therefore an ICBM, and not an IRBM, even if it seems

to have been optimized for shorter ranges of some 2,000 km in later tests, possibly by increasing its number of warheads and, thus, also its payload. But in any case, this missile is counted as an ICBM and, hence, included in the New START treaty limits. So it would not be a problem from the INF point of view (Woolf, 2016).

Conclusions and Recommendations

When looking back from a longer perspective, it is evident that the exceptionally positive atmosphere after 1985 that led to the bilateral INF Treaty was quite unique. At present, such an agreement would be next to impossible to achieve, and even the future validity of the present treaty has been seriously questioned.

In order to try to save the existing INF Treaty at least in some format, so that it could still fulfil its original purpose of restraining the nuclear arms race, further bilateral US - Russia negotiations for amending the treaty are obviously quickly needed. The Special Verification Commission has dealt with the previously mentioned suspected breaches in its meetings but unfortunately without result. Alongside of their suspicions, they should also deal with the following open issues, the most urgent of which are listed first:

- US deployment of the Aegis Ashore systems in Romania, with the apparent capability of also launching the SLCM, and similar future deployment in Poland in 2018. If Aegis Ashore deployment is continued, it should be modified externally in such a way as to demonstrate to the other party by means of functionally related observable differences (e.g. tube calibre), that the Mk-41 launcher *cannot* launch SLCMs of INF range. If necessary, this controversy should be verified through exceptional on-site inspection by observers. The author of this article is afraid that one of the key points that will determine the validity of the INF Treaty in the future is the positioning of the Aegis Ashore system in Poland in late 2018.
- There is another controversy concerning the ranges of R-500/SSC-X-8 and other possible new ground-launched cruise missiles being developed in Russia. The issue has been dealt with twice in the Special Consultative Commission with no result. There is a lack of hard evidence on how the development tests were performed. It may sound like a naive hope, but as the Special Verification Commission has not progressed in the issue of the testing of a new cruise missile, new evidence for or against is needed, and hence, a temporary return to just a few limited and specific on-site inspections is recommended. These inspections would balance each other, as both parties need to clear up their suspicions on Aegis Ashore on the one hand, and on the cruise missile on the other.

There are also other mutual suspicions regarding breaches of the treaty, but these do not seem to be as serious as the two problems discussed above. They seem more like legal excuses that are presented when one wants to argue and justify one's point in several different ways.

- Bilateral updating of the existing treaty should eventually include how the treaty considers UCAV combat drones, whether they should either be considered or excluded from the agreement. Negotiations should also make the

definition of cruise missile-range less ambiguous, either by standardizing the test flight payload, and/or informing the other party of the weight of the payload and amount of fuel used in testing the missile.

There are several difficult issues to negotiate, and very little time before the end of 2018. However, if the negotiations are started quickly and proceed efficiently, there may still be enough time to prepare at least the most urgent amendments. Even starting discussions and negotiations on updating the INF Treaty would help to clear away suspicion and promote understanding and would be an achievement with its own merits. But if the parties do not even try to discuss with and understand each other, we may lose the most successful nuclear arms control treaty in history.

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6

Conventional Arms Control in Europe and Its Current Challenges

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Abstract

The goals of this article are three-fold: first, the aim is to discuss the nature of conventional weapons in Europe, on the one hand as an ambiguous concept that defies any precise definition, but on the other hand as a crucial political, economic, security and even social, industrial and environmental issue. Secondly, the article seeks to provide with an overview of the existing arms control regimes on conventional weapons with emphasis on European security focusing in particular on the Treaty on Conventional Armed Forces in Europe (CFE Treaty), the Treaty on Open Skies and the Vienna Document on Confidence and Security-Building Measures. Finally, the idea is to raise some of the most pressing issues and future challenges related to conventional weapons, which are apt to affect the general arms control agenda and to bring in challenging new questions. Here, specific attention is paid to some of the ongoing and emerging technological developments, such as the gradual blurring of distinctions between weapons of mass destruction, conventional weapons and the autonomous weapons systems.

Introduction

Due to its history of technological prowess and intense great power competition, Europe has in the course of centuries seen the unfolding of some of the bloodiest conflicts known to mankind. However, Europe has also been the stage of the densest framework of rules, procedures and institutions for conflict prevention and crisis management on Earth.

As of 2017, Europe faces an erosion of the existing arms control institutions against the background of deteriorating relations between Russia and the West. Despite the detailed web of legally binding treaties, numerous political agreements and other security instruments in place, a political crisis escalated into major armed conflict in Ukraine in the space of only a few months in 2014. However, the Ukrainian crisis represents only the most manifest expression of the worsening Russia-West relations, the start of which can be traced in some cases back to the early 1990s. Then again, the political crisis of the past few years should not divert one's attention from

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the more subtle and long-term developments taking place within technology and military-strategic thinking, which also affect the landscape of contemporary arms control efforts.

This article seeks to provide with an overview of the existing institutions on conventional weapons in Europe and to describe the most pressing current issues and challenges of conventional arms control with a particular emphasis on European security. First, the idea is to build an understanding on the topic of conventional weapons: what they are and how their exact definition, especially in relation to weapons of mass destruction, is becoming increasingly difficult due to developments in modern weapons technology. After that, the article proceeds to discuss the contemporary state of regimes on conventional weapons in Europe. Thereafter, attention is paid to some of the most pressing current and emerging issues and challenges facing European conventional arms control efforts. Finally, a few concluding remarks will be offered.

Like many articles in this volume, this text cannot provide with an exhaustive discussion on the many relevant topics that would deserve such scrutiny. Instead, its goal is to provide the reader perhaps not yet familiar with this fascinating and evolving, and yet vast and challenging topic, with some ideas about the institutional framework and the most relevant contemporary and emerging issues on arms control and conventional weapons and to invite him/her to inquire more.

(The Cumbersome) Definition of Conventional Weapons

Weapons of mass destruction (WMDs) have dominated the arms control agenda since the advent of the nuclear bomb. Nevertheless, most often it is the conventional weapons that fuel conflict, foster regional instability, abet violations of the UN Security Council arms embargoes and undermine efforts to promote socioeconomic development. Moreover, the overwhelming majority of the human suffering related to conflicts both in Europe and beyond is caused by no other than conventional weapons.

Then again, the scale of the issue at hand is nothing else but huge by any measure. According to the World Bank statistics, in 2014 European and Central Asian countries – excluding the U.S. and Canada – totaled roughly 4,9 million armed forces personnel, possessing millions of pieces of personal weapons such as small arms and light weapons; tens of thousands of heavy or crew served weapons, including artillery pieces, armored combat vehicles, combat helicopters, combat aircraft and warships; and unknown numbers of other related equipment, including munitions and ammunition (World Bank, 2017). In terms of military expenditure, Europe, Russia included, spent in 2015 approximately 328 billion US$ on defence, out of global 1663 billion US$. The figure excludes North America's 611 billion US$ in defence spending according to SIPRI military expenditure figures (SIPRI, 2016). Naturally, these figures are in many respects only estimates and it should be noted that weapons of mass destruction take a sizable part of those countries' defence spending that possess them. Nevertheless, the overall amount of money and personnel invested in conventional forces and conventional armaments in Europe remains vast, making questions of regional conventional arms control a crucial political, economic, security and even social, industrial and environmental issue.

At the same time, their prevalence and their extremely wide range render conventional weapons a somewhat vague concept, which is almost too general to be even defined. This difficulty is reflected in academic literature too. A 'conventional' wisdom of the past decades since the end of the World War II has been to define conventional weapons simply as weapons that are not regarded as weapons of mass destruction – that is nuclear, biological, chemical and radiological weapons (Evans and Newnham, 1998, p. 97). Correct as such definition may be it nevertheless does not shed much light to the specific nature of conventional weapons.

Another relatively common definition of conventional weapons follows more the logic of natural sciences. According to it, in conventional weapons, the explosive material is something that can undergo some chemical reaction, which proceeds extremely quickly and releases a lot of energy. Basically, it can 'burn' so fast that it explodes. The first explosive material used in weapons was gunpowder, but nowadays more powerful explosives like TNT and RDX are used. Then again, a nuclear weapon is an explosive device that derives its destructive force from nuclear rather than chemical reactions, releasing about a million times more energy than does a chemical reaction (Nuclear Environmental Threat Education, 2017). However, while this definition helps to clarify the distinction between conventional and nuclear weapons, it does not cover the entire field of conventional armaments, as the more rudimentary and often improvised armaments that do not rely on chemical processes to function but that are still occasionally used in conflicts, such as sticks, knives or booby traps not incorporating explosives, can also be regarded as 'conventional'. On the other hand, the more recent documents and literature, such as the USA Joint Operational Access Concept of 2012, tend to regard spheres of cyber, information, or electromagnetic spectrum as independent domains comparable to WMDs and conventional weapons with their own particular qualities (Department of Defense, 2012, p. 11).

Nevertheless, the advent of weapons of mass destruction has certainly not reduced the scope for conventional weapons. Indeed, it has been pointed out that the reverse may well be true, namely that the drawbacks and difficulties of actually using weapons of mass destruction have enhanced the importance of the threshold between weapons of mass destruction and conventional ones (Evans and Newnham, 1998, p. 97).

In fact, the relationship between conventional weapons and other weapon types can be described as dynamic and as something constantly evolving. For example, in a wider picture of contemporary military power calculations, assessments related to conventional weapons and WMDs seem to intertwine in several respects. Technically, a number of ongoing developments seem to suggest a partial convergence between weapons of mass destruction and conventional weapons. On the one hand, the destructive yield of some conventional weapons seems to approach the destructiveness of the WMDs. A case in point is the renewed interest in the so-called bunker-busters, bombs that are designed to penetrate hardened targets or targets buried deep underground. Simultaneously, the more sophisticated nuclear weapons have more and more qualities of large conventional bombs, such as limited destructive range connected with a more accurate guidance system, potentially lowering the threshold of their use. On the other hand, while the post-Cold War era in Europe has seen substantial decreases in the strength of the armed forces both in terms of

personnel and equipment, a parallel course of development has been the willingness by states to project the effects of the existing weaponry further, more rapidly and more accurately. As a consequence, while numbers may have decreased, the overall yield and destructive potential of in particular modern conventional weapons systems, such as cruise and ballistic missiles, increases.

A third example of the narrowing gap between conventional weapons and WMDs in contemporary military-strategic thinking is that they are often weighted together in political and military-strategic assessments. For some states, the development of WMDs can provide a way to offset their inferiority in conventional armaments compared to stronger regional rivals (Wirtz, 2016, p. 295). This is reflected in European security due to the fact that any progress towards deep cuts in Russian and the U.S.' strategic arms depends, in part, on resolving perceived conventional threat imbalances (Govan, 2015, p. 1). During the recent years, Russia in particular has emphasized the role of short-range nuclear missiles, both as a way to compensate the imbalance of conventional forces between Russia and NATO member states after the end of the Cold War, and as a way to create political and psychological pressure.

Then again, there are differences in the way nations perceive the link between the conventional and the nuclear fields. NATO member states regard nuclear arms to be weapons of deterrence, implying almost an existential difference between nuclear and conventional armament. NATO's 2010 Strategic Concept explicitly states this in Article 17: 'The circumstances in which any use of nuclear weapons might have to be contemplated are extremely remote'. On the other hand, in the Russian perception, the use of nonstrategic nuclear arms – those that could be used on the battlefield instead of against strategic assets in the homeland of the adversary – would be dependent on the needs of a given conflict situation. Such differences may lead to different views on the potential use of conventional weapons and the way one approaches arms control in general (Kleinjan, 2016, pp. 22–23).

A related issue, again blurring the distinction between a conventional conflict and a conflict involving WMDs, is that of the increased escalation risk in contemporary conflicts. While in particular the great powers, the United States and Russia, expand their strategic postures and operational concepts to include conventional, space, cyber, and nuclear forces, there is greater need to look across these domains and functional capabilities in order to fully be able to analyze the involved potential for unintended consequences. For instance, a particular cyber or space operation could have an impact on the adversary's conventional or nuclear capabilities. However, a particular operation intended to strip away the adversary's intelligence, surveillance and reconnaissance capabilities could have an impact in the adversary's ability to gauge the operation's limited aims, thereby potentially escalating the conflict in ways that are difficult to assess (Manzo and Miles, 2016, p. 11).

Conventional Weapons in Arms Control

Throughout history, technological advances have always created asymmetries that could be exploited in warfare. At the outset, rapid technological advances usually favor the attacker, with defensive counter-measures lagging behind. As the pace of technological change accelerates, regional or global balances of power could be radi-

cally transformed possibly even by seemingly small innovations such as a simple software update (Kaspersen, 2016).

Arms control regimes, be they on WMDs or conventional weapons, do not exist in isolation but reflect their respective and often quite volatile political and technological environments. Therefore, when assessing arms control one should regard it as a process that needs constant maintenance and updates. It should be viewed as a means to an end rather than an end goal in itself.

However, the enforcement of arms control agreements is notoriously difficult. Most agreements, conventional or not, rely on the continued desire of the participants to abide by the terms in order for the agreements to remain effective. Usually, when a nation no longer desires to abide by the terms of a given arms control treaty, it tends to either covertly circumvent its terms or to simply end its participation in the treaty. Historically speaking this has been relatively easy in the absence of any supranational authority regulating interstate relations.

For a long time, the international community has attempted to govern and limit the range of accepted weaponry in interstate and intra-state warfare. Even though some of these efforts date back to the times of the Antiquity and the Middle Ages, it was the Industrial Revolution with the increasing mechanization of warfare, as well as the rapid advances in the development of firearms that have led to more ambitious and systematic arms control efforts since the late 1800s. Principal among these were the Hague Peace Conferences (1899 and 1907), the Washington Naval Conference (1921–1922) and the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare, usually simply called the Geneva Protocol of 1925. In addition, international organizations such as the League of Nations and the United Nations have made repeated efforts to limit the amounts of arms and regulate their qualities.

Notwithstanding the achievements of these historical arms control treaties, one can start the discussion on the relevant contemporary conventional weapons regimes from the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects; in effect, the so-called Convention on Certain Conventional Weapons (CCW Convention) or 'Inhumane Weapons' Convention. It was signed in 1981 and entered into force in 1983. As of 2017, 121 states worldwide are parties to the convention with a further five having signed but not yet ratified (The United Nations Office at Geneva, 2017).

The CCW Convention has been built upon customary rules that regulate the conduct of hostilities, including the rules of distinction, proportionality and precaution in attacks, and the prohibition of weapons, which inflict gratuitous injury or suffering on combatants. As its title indicates, the purpose of the convention is to ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately. The CCW consists of a general chapeau convention and a number of more specific annexed protocols. The protocols deal with Non-Detectable Fragments (Protocol I), Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices (Protocol II), Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III) and, of more recent origin, on Blinding Laser Weapons (Protocol IV)

and explosive remnants of war (Protocol V). The CCW structure was adopted in this manner to ensure a flexible way to respond to new developments in weapons technologies.

As said, the convention itself contains only general provisions. All prohibitions or restrictions on the use of specific weapons or weapon systems are the object of separate protocols annexed to the convention. However, the scope of application of the Convention and its annexed Protocols has been expanded to cover not only situations of international armed conflict but non-international armed conflict as well (Final Document of the Fifth Review Conference, 2016).

While its scope is quite limited, the CCW Convention is among the most commonly ratified and least disputed arms control regimes from the European perspective: with a few minor exceptions regarding above all Protocols II and V, all European countries have ratified the entire convention. Yet, two considerations should be mentioned while discussing the CCW Convention. First, deliberations at the CCW have a reputation of being slow and prone to failure. A case in point here was the Protocol II on the Use of Mines, Booby Traps and Other Devices, which failed to adequately address the widespread humanitarian concerns related to anti-personnel land mines and to their indiscriminate use in various armed conflicts, leading to the 1997 Ottawa Treaty, which finally was agreed upon outside the CCW framework. Another case is the 2008 Convention on Cluster Munitions, also created outside the CCW, which still (as of 2017) remains the only international instrument that specifically regulates these weapons due to CCW failure of 2011 to produce an outcome about them (Sauer, 2016, p. 10).

Secondly, it should be noted that the weapon types that it regulates remain, at least until thus far, relatively marginal within the European countries' inventories. However, in recent years the CCW regime has sought to cover new and emerging arms control issues, which are potentially important also for European security. Principal among these recent openings are discussions on the so-called autonomous weapons systems, such as Lethal Autonomous Weapons, LAWs, which will be discussed in more detail in Johanna Friman's article in this volume (Fifth Review Conference of the High Contracting Parties, Final Document, 2016, p. 7).

The European Conventional Arms Control Landscape

A Peculiar Continent

Leaving aside the global considerations related to the CCW Convention, Europe has historically been a scene of a dense network of regional conventional arms control treaties. The background for this European trait can be located to post-Second World War setting that lasted until the early 1990s. That time, the questions of European security were seen as relevant for global security as the era was characterized by a protracted military presence on the continent by two essentially non-European powers, the United States and the Soviet Union, thereby adding pressure for regional stability arrangements and mechanisms.

After the end of the Cold War, 'cooperative security', a commitment to regulate the size, technical composition, investment patterns, and operational practices of all

military forces by mutual consent for mutual benefit gained priority as the framework for European security and arms control (Carter, 1992, p. 6).

This notion of cooperative security was on the background of the edifice of conventional arms control instruments that was created at the end of the Cold War era or soon after that in Europe. It consisted of three main pillars: the Vienna Document on Confidence- and Security-Building Measures, established in 1990; the Conventional Armed Forces in Europe (CFE) Treaty, which entered into force in 1992; and the Open Skies Treaty, which entered into force in 2002 (Kleinjan, 2016, p. 22).

At their peak, these agreements constituted an integrated system of arms control and confidence- and security-building measures. During the post-Cold War era, many of these conventions were intertwined with the Organization for Security and Co-operation in Europe (OSCE), initially created as a forum for East-West dialogue. Among other things, the OSCE has been the forum for the annual exchange of information under the Conventional Forces in Europe Treaty. The OSCE has also implemented an additional exchange of information in the framework of the Vienna Document.

As of early 2017, however, a rather curious situation prevails regarding the conventional arms control in Europe: the developments since the early 2000s in Russia's relations with NATO and the EU member states have led to the situation where most elements of the European arms control regime are either violated or outdated, even though they may be formally still in force.

Treaty on Conventional Armed Forces in Europe (CFE Treaty)

The Treaty on Conventional Armed Forces in Europe (CFE Treaty) is undoubtedly one of the most ambitious and significant arms control regimes in the history of Europe.

The Treaty was inspired by the willingness to eliminate force disparities, capability for surprise attack and large-scale offensive operations as well as the need to establish an effective verification system in the Cold War Europe. However, systematic efforts to reach such a Treaty were not initiated between NATO and the Warsaw Pact until the concluding stages of the Cold War. Nevertheless, in 1990 the CFE Treaty was signed in Paris by 16 NATO countries and six members of the Warsaw Pact, with unlimited duration and setting equal ceilings for each bloc on key categories of conventional armaments, with tanks, combat armored vehicles, artillery, assault helicopters and combat aircraft among them. For instance, under the original CFE Treaty, after the reduction phase ending in 1995, each bloc was supposed to have no more than 20,000 tanks, 30,000 armored combat vehicles or 20,000 heavy artillery pieces in the Treaty's area of application (Arms Control Association, 2012).

The CFE Treaty was designed to prevent either alliance from amassing forces for a blitzkrieg-type offensive, which could have triggered the use of nuclear weapons in response. Although the threat of such an offensive all but disappeared with the end of the Cold War and the dissolution of the Soviet Union, member states have repeatedly touted the enduring value of the Treaty's weapons limits and inspection regime, which provides an unprecedented degree of transparency on military holdings (Arms Control Association, 2012).

The CFE's application area includes the territory of all member states from the Atlantic to the Ural Mountains. In practical terms, the CFE Treaty led to concrete results by destroying tens of thousands of pieces of military equipment. The Treaty included also unprecedented provisions for detailed information exchanges, on-site inspections, challenge inspections, and on-site monitoring of destruction, including an unlimited right to monitor the process of destruction by the Treaty parties. Satellite surveillance was used to verify the placement and the progress of the destruction of large military equipment, like vehicles and tanks. Moreover, the Treaty established in Vienna a body composed of all Treaty members, called the Joint Consultative Group (JCG), whose task was to deal with questions relating to compliance with the provisions of the Treaty. Such tasks included the resolution of ambiguities and differences in interpretation, the consideration of measures that enhance the Treaty's viability and effectiveness, the resolution of technical questions and the evaluation of disputes that may arise from the Treaty.

A number of follow-up agreements to the legally binding CFE followed, most notably the politically binding Concluding Act of the Negotiation on Personnel Strength of Conventional Armed Forces in Europe (the so-called CFE-1A Agreement), committing the then 30 members of the Treaty to establish manpower limits and, if deemed necessary, to reduce the existing manpower levels within the CFE area of application to reach these limits (Concluding Act of the Negotiation on Personnel Strength of Conventional Armed Forces in Europe 1992). In 1996, the CFE Treaty was also supplemented with a so-called flank agreement in order to grant Russia and Ukraine greater room for maneuver in locating their conventional armed forces in specifically designated regions. The flank agreement adjusted the original CFE Treaty flank limits in order to alleviate Moscow's difficulties in absorbing Russian forces formerly stationed in Central and Eastern Europe and in responding to internal security threats, especially the Chechnya conflict. In essence, the document reduced the size of the flank zone, without changing the numerical limits on ground equipment within the zone (Walkling, 1997).

The Agreement on Adaptation of the Treaty on Conventional Armed Forces in Europe (also known as the Adapted CFE Treaty) was a revision of the original Treaty, signed during the November 1999 OSCE Istanbul Summit and setting national instead of bloc-based limits on conventional armed forces (Agreement on Adaptation of the Treaty on Conventional Armed Forces in Europe 1999). Drafted to reflect the changing security realities – particularly NATO enlargement – the Adapted CFE Treaty never went into force however, due to NATO's insistence on the fulfilment of Russia's so called 'Istanbul commitments' – a number of politically binding pledges by Moscow to withdraw forces and equipment from Moldova and Georgia (OSCE 1999; Kühn, 2013, p. 191).

Citing the ongoing delay in the adapted Treaty's entry into force and the ongoing adverse developments in European security such as the NATO enlargement and the planned development of conventional missile defense in Europe, which from Russia's point of view added military unaccountability and unpredictability, Russia issued in December 12, 2007 a statement 'suspending' its implementation of the CFE Treaty. Under suspension, Moscow stated that it will not participate in Treaty data exchanges, notifications or inspections. An explanatory document from Russia's presidential administration mentioned several reasons for its suspension of compli-

ance: first of all, Russia considered the linkage between the Adapted Treaty ratification and the withdrawal of troops from Georgia and Moldova as 'illegitimate' and 'invented'. Russia also considered the troop-withdrawal issue a bilateral Russia–Georgia and Russia–Moldova issue, not a NATO–Russia issue. Secondly, the three Baltic states, which border Russia, unlike the rest of NATO (excluding Poland and Norway), were not covered by the original CFE Treaty as they were still part of the Soviet Union when the Treaty was signed. In addition, unlike other NATO members, the Baltic states did not ratify the Adapted CFE Treaty. Russia's wish for a speedy ratification and accession of the Baltic states to a ratified Treaty, hoping to restrict emergency deployments of NATO forces there, was not fulfilled. Thirdly, Russia emphasized that NATO's 1999 and 2004 enlargements increased the Alliance's equipment above the Treaty limits (Socor, 2007).

Although the Kremlin noted that it has no plans for arms buildups, it also declared that it would not be bound by the Treaty's limits. NATO members, including the United States, called on Russia to reverse this course and declared their intention to continue implementing the Treaty 'without prejudice to any future action they might take' (Arms Control Association, 2012). On 10 March 2015, citing NATO's alleged *de facto* breach of the Treaty, Russia however formally announced it was 'completely' suspending its participation in it as of the next day and ceasing to provide information on its conventional forces, allow inspections or telling NATO about its military build-ups. Nevertheless, Russia still officially remains a CFE state party and all the other state parties continue to implement the Treaty between each other.

Treaty on Open Skies

The second pillar of European conventional arms control edifice, the Open Skies Treaty, establishes a regime of unarmed observation flights over the territories of state-parties. It specifies, *inter alia*, quotas for observation flights, the notification of points of entry, technical details and inspection for sensors (Treaty on Open Skies, 1992, article 1).

Signed on March 24, 1992 and entering into force on January 1, 2002, the Open Skies Treaty has permitted each state-party to conduct short-notice and unarmed reconnaissance flights over the others' entire territories to collect data on military forces and activities. Observation aircraft which are used to fly these missions must be equipped with sensors that enable the observing party to identify significant military equipment, such as artillery, fighter aircraft and armored combat vehicles. Though satellites can provide the same, and even more detailed, information, not all of the 34 states parties to the Treaty have such capabilities. However, on 21 January 2014, the U.S. Defense Science Board issued a report advising the U.S. military to delay upgrading its Open Skies OC-135 reconnaissance planes as, according to the report, the easy accessibility of satellite imagery served well as a replacement for the planes' reconnaissance trips (Department of Defense: Defense Science Board, 2014, p. 29).

The Treaty is also aimed at building confidence and familiarity among state parties through their participation in the overflights (Arms Control Association, 2012). According to the Treaty, all of a state party's territory can be overflown and no territory can be declared off-limits by the host nation. Thus, unlike the CFE Treaty, the

Open Skies covers the entire territory of participating states from Vladivostok to Vancouver in regards to observation flights.

When assessed from the European perspective, the Open Skies Treaty has enabled several hundreds of observation flights in state parties' airspaces. However, its effectiveness, too, has weakened during the recent years. While none of the signatories have formally withdrawn from the Treaty, some disturbances in its function have been taking place, in particular since 2014. For example, some areas have been declared off-limits for observation flights, and the accessibility of others has been hampered by restrictions on the altitude of overflights (Kleinjan, 2016, p.25). These practices are violations to the Treaty. According to U.S. sources, Russia has imposed restrictions on surveillance over Moscow and Chechnya and near Abkhazia and South Ossetia, while it also makes it hard to conduct observation in the Kaliningrad enclave (CBSN, 2016). Then again, Russian Defence Ministry stated in February 2016 that Turkey had refused a Russian Open Skies mission, planned to take place in 1–5 February 2016, to fly over areas adjacent to Syria, as well as over NATO airbases. According to Russia, Turkey gave no explanation regarding the limitations (MoD Russia, 2016). In addition, the Open Skies has in recent years been threatened by the controversy between Greece and Turkey about the accession of the Republic of Cyprus and by Georgia's refusal to accept Russian observation flights (Kühn, 2013, p. 192).

Therefore, while the Open Skies Treaty can still be regarded as relatively successful, restrictive interpretation of its certain provisions and unilateral limitations of observation flights over the territory by some state parties have affected its effectiveness.

Vienna Document on Confidence and Security-Building Measures

The third pillar of the European conventional arms control regime, the Vienna Document on Confidence- and Security- Building Measures (CSBM) was established in 1990 between OSCE participating states and has been updated in 1992, 1994, 1999 and 2011. Unlike the legally binding CFE Treaty, the Vienna document is only politically binding. It was signed by all 57 OSCE participating states aiming at enhancing transparency with regard to military activities through means of 12 mechanisms. These include, *inter alia*, the annual exchange of military information and annual calendars; the exchange of specific data relating to major weapon and equipment systems; information on the plans for the deployment of major weapon and equipment systems; a mechanism for consultation and cooperation as regards unusual military activities; the voluntary hosting of visits to dispel concerns about military activities; and the prior notification and observation of certain military activities, such as maneuvers (Organization for Security and Co-Operation in Europe, 2011).

For instance, in the framework of the document, a prior notification of certain military activities is necessary 42 days in advance, if they involve at least 9,000 soldiers or 250 tanks, or 250 artillery pieces or 500 armored combat vehicles. If 200 or more sorties of combat aircraft are to be flown during such an activity, this must be also indicated. Additionally, an amphibious landing, heliborne landing or parachute assault activity with at least 3,000 soldiers must be notified in advance according to the document. In addition, another type of CSBM, observation of certain military activi-

ties is allowed, if they involve at least 13,000 soldiers, or 250 tanks, or 250 artillery pieces or 500 armored combat vehicles. Further, observation is allowed for amphibious landing, heliborne landing or parachute assault activities with at least 3,500 soldiers (Schmidt, 2013, p. 33).

As with the case of other treaties discussed, the Vienna Document's transparency and confidence-building mechanisms have grown increasingly ineffective after its update in 2011. Among other things, the occupation of Crimea and the Ukrainian crisis have made it clear that the Vienna Document needs substantial improvements, even though the document has served during the East Ukrainian crisis by facilitating verification visits, among other things, in Ukraine and Russia (Organization for Security and Co-Operation in Europe 2015). However, the crisis demonstrated the inadequacy of the verification methods in the document, as evidenced, for example, by restrictions on inspections and insufficiently rigorous requirements for no-notice, or snap exercises, in which participating troops are not forewarned and for which prior notification to the other signatories of the Vienna Document is not required. In addition, the Document had not foreseen the use of foreign troops posing as local insurgents, making use of heavy armor and weapons (Kleinjan, 2016, pp. 23–24).

The year 2016 saw substantial efforts to update and modernize the Vienna Document. However, Russia in particular has opposed the steps for its modernization. Instead, during the recent years, Russia has undertaken large, unannounced exercises in the Baltic and Black Sea regions. Some exercises seem to train for large-scale war and include up to 100,000 personnel, such as Zapad-2013 or Tsentr-2015. Other so-called snap exercises, too, have been designed to demonstrate Moscow's heightened military readiness. In the spring 2014, Russia's military-political leadership used one of the so-called surprise selective checks of its armed forces' combat readiness to deploy the troops needed to facilitate the occupation of Crimea. Russia's disregard for the agreement has fed uncertainty over its intentions.

Whither Conventional Arms Control? – Technological and Military-Strategic Challenges

The previous pages have described the institutional framework of the European conventional weapons landscape through three pillars: the Treaty on Conventional Armed Forces in Europe (CFE Treaty), the Treaty on Open Skies, and the Vienna Document on Confidence and Security-Building Measures. Overall, each of these instruments has been a 'thread' in a larger web of agreements, interlocking and mutually reinforcing arms control obligations and commitments. In the light of the history of the last decades, they together have enhanced predictability, transparency and military stability and reduced the risk of a major conflict in Europe – once they have functioned. Then again, once each thread is weakened, it has affected the entire web, undermining the very things they were created for, that is confidence and security in Europe.

In terms of substance, these institutions have above all sought to codify a (numerical) balance of forces between alliances and individual countries, to eliminate the participating nations' capability to launch surprise attacks or large-scale offensives in Europe, to enable an exchange of military information of various sorts and finally,

to provide a mechanism for consultation and cooperation as regards to any unusual military activities. To put it in slightly simplifying terms, the 'classical' European conventional arms control has focused on numbers whereas the contemporary developments call increasing attention to questions of quality.

Indeed, it is important to note that while political disagreements or larger geopolitical shifts in many respects help to understand the current decline of regional arms control institutions, they are intertwined with a more complex and nuanced set of issues involving developments in weapons technology and various political-strategic considerations. While this interplay typically makes arms control more complex and in some respects more vulnerable, it may occasionally enable also new avenues and fresh prospects.

Therefore, in order to comprehend the current challenges facing conventional arms control in Europe, it is equally important to have a look at some of the recent or emerging technological and strategic developments that have an effect on armaments and military thinking in general. Even though this kind of overview cannot be very comprehensive, it may nevertheless through some illustrative examples help to understand some of the contemporary setbacks and to assess the landscape in which the future arms control efforts are going to take place.

It was stated already at the beginning of this article that technological and strategic innovations typically contain more destabilizing than stabilizing potential from the arms control perspective. The potential consequences of the ongoing technological transformations include, but are not limited to, increased or altered escalation risk; decreased transparency and blurring of civil and military domains and of the nuclear and non-nuclear divide. In addition, the added autonomy of technology brings about new unknowns that we may not even be aware of.

Overall, a wide consensus seems to prevail that current innovations in artificial intelligence, robotics, autonomous systems, Internet of Things, 3D printing, nanotechnology, biotechnology, material science and quantum computing are expected to bring social transformations of an unprecedented scale. According to Schwab (2016), they form no less than the foundation of a 'fourth industrial revolution'. How these technologies may be used in, and transform, the military and security realms is not yet fully understood and needs further scrutiny. The capabilities they could provide may directly or indirectly affect the preconditions for peace, the nature of conflicts and how insecurity is perceived and managed, by people and states (SIPRI, 2016). These characteristics point to complex military capabilities in the qualitative dimension of modern warfare. Whereas during the times of the Cold War, sheer numbers impacted scenarios and operational planning, today's high-tech forces obtain their effectiveness primarily through a sophisticated interplay of command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) systems (Kühn, 2013, p. 196).

An example of the challenges at hand are the Unmanned Aerial Vehicles (UAVs) or Unmanned Combat Aerial Vehicles (UCAVs), particularly since military reliance on this comparably cheap weapons category has rapidly increased during the first decades of the 2000s and because they can increasingly perform combat missions equal to those performed by a manned combat aircraft. Furthermore, unmanned systems are apt to become vital in conjunction with time-critical reconnaissance missions

prior to a rapid deployment of substantial combat forces. The need for arms control update is evident in the face of these technologies. Whereas the CFE Treaty discussed above does not specify whether a combat aircraft should be defined in terms of manned or unmanned, an updated arms control approach should at least seek to apply transparency measures or codes of conduct for the regional use of UCAVs (Kühn, 2013, p. 197).

Another example of the unresolved questions related to unmanned technologies are the loitering weapons or Loitering Attack Munitions (LAMs). Not to be mixed with Precision Guided Munitions (PGMs), the loitering weapons are able to patrol in a given target area for extended periods of time. This weapon is designed to loiter, seek and destroy ground targets, but unlike unmanned combat aircraft, it is expendable and does not return to base after a strike mission (Rapaport, 2015). In this sense, the loitering weapons bear similarities to land or sea mines but again a number of questions remain regarding the rules and procedures of their use.

A step further from unmanned weapons is taken as one adds the level of autonomy given to a weapons system. An example of these kinds of emerging military technologies, not yet fully understood nor grasped by arms control are the Lethal Autonomous Weapons (LAW), which essentially are able to operate either with a task autonomy – in which a human operator specifies a general task and the platform processes a course of action and carries it out under its own supervision – or have full autonomy by creating and completing their own tasks without the need for human input with the exception of the decision to build such a system (Galliot, 2015, p. 7). Taking humans out of the loop will raise questions of the compatibility of autonomous weapons systems with the fundamental requirements of international humanitarian law, such as the principles of distinction and proportionality, as well as complicate allocation of responsibility for war crimes and crimes against humanity.

Since these types of armament typically cannot be counted as weapons of mass destruction, even though they potentially could be equipped with such, and since they most likely operate in the same environments as conventional forces and affect the European conventional weapons landscape, they ought to be dealt within in the framework of conventional weapons arms control. Nevertheless, they are far from 'conventional' as they contain a number of new and unresolved technical, operative, ethical and legal issues. While as of 2017 only precursor systems and technology demonstrators exist particularly in LAWs, rendering unmanned and autonomous weapons systems a candidate for preventive arms control is an issue of some urgency. The issue is likely to be debated in the arms control community in the coming years (Sauer, 2016, p. 8).

Turning to contemporary military-strategic thinking enabled in many respects by these new technologies, a case in point is the development of Anti-Access Area Denial (A2/AD) capabilities, which refer to an adversary's attempts to make it impossible, or very costly, for a country or an alliance to gain access to a given region. While the idea of A2/AD is not new, modern weapons technologies allow new possibilities for it by extending the physical reach of these capabilities to radiuses of several hundred kilometers and by combining different military assets such as missile defence systems, anti-ship cruise missiles, submarines, high-readiness brigades and special forces. The combination of these properties may have significant consequences in regional security. One foreseeable consequence is the creation of no-go

areas in Eastern Europe. Russia has successfully leveraged the kind of precision-guided systems once solely possessed by the US and its allies to develop these capabilities, including precision-guided anti-ship, anti-aircraft, land-attack, anti-satellite cruise and ballistic missiles – most notably the Iskander ballistic missiles – as well as cyber and electronic warfare capabilities.

While the A2/AD capabilities have inherently defensive qualities, they may also carry destabilizing effects, for instance, by enabling from the attacker's point of view beneficial conditions of *fait accompli* after a sudden physical invasion or by threatening the freedom of access across all operating domains, i.e. air, land, sea space and cyberspace (Simón, 2016, pp. 417–418). For instance, Russia's decision to place advanced S400 anti-aircraft missiles in Kaliningrad has extended the reach of Russian launchers deep into NATO airspace and maritime supply lines, challenging NATO's control of its skies and its ability to help its Baltic members in the event of Russian hostility. These missiles could help Moscow to invade Latvia, Estonia or Lithuania, forcing the alliance to recover the Baltic states in a military campaign of a size unseen in Europe since World War II (Korteweg and Besch, 2016).

While A2/AD is not a new concept, its advent constitutes a threat to regional conventional arms control institutions. However, it is at the same time itself a consequence of arms control regime collapse. It is also likely to lead to regional arms races, as the U.S. armed forces are already engaging in developing counter A2/AD responses and capabilities. An example of the emerging U.S. response to A2/AD is the U.S. Air Force's development of long-range standoff cruise missile (LRSO) to replace the existing air-launched cruise missile (ALCM). The new missile would be compatible with existing B-2 and B-52 bombers, as well as with the planned B-21 bomber. The first missile is slated for production by 2026. It can be armed with either a conventional or a nuclear warhead (Reif, 2016).

Meanwhile, the U.S. Air Force is also significantly increasing the lethality of its conventionally armed cruise missiles. For example, the service is purchasing thousands of stealthy precision air-to-surface standoff cruise missiles designed to attack targets from outside the range of adversary air defenses. Known as the JASSM-ER, the missile will have a range of roughly 750 kilometers and be integrated onto the B-1, B-52, B-2, F-15E and F-16 aircraft – and likely on the F-35 and B-21 as well. The U.S. Air Force is also planning to arm the JASSM-ER with a new computer-killing electronic attack payload, which is designed to have an effect similar to an electromagnetic pulse (Reif, 2016). Then again, a more contemporary case of the potentially destabilizing effects of conventionally equipped cruise missiles has been the use of the submarine and warship-launched Kalibr cruise missiles by Russia against various targets in Syria.

Indeed, these responses to A2/AD with weapons that are nuclear-capable represent another regional arms control challenge in need of attention: the gradual blurring of the nuclear–non-nuclear weapons divide promoted by the standstill of conventional arms control institutions. This development may lead to added threats as the potential adversary remains unaware of the kind of escalation these weapons might bring once used in conflict.

To continue the arms control implications of the contemporary military-strategic thinking, the emergence of another old but re-designed tool, the so-called hybrid

warfare in the European security landscape is also complicating the scheme. The concept itself is not free from conceptual problems. First, even though it has been applied to Russian conduct during the Ukrainian crisis, the concept's origins can be found within NATO vocabulary, according to which 'Hybrid threats are those posed by adversaries, with the ability to simultaneously employ conventional and non-conventional means adaptively in pursuit of their objectives' ('NATO countering the hybrid threat', NATO ACT, 23 September 2011). Secondly, even though the concept emerged in public discussion after the Russian occupation of Crimea, it may be worth noting that the concept has similarities to Western powers' utilization of military and non-military tools within crisis management and state-building under the 'Comprehensive Approach' initiated in NATO.

As commonly discussed, however, hybrid operations include a combination of cyber activities of unclear origin, irregular forces, conventional weapons and traditional forces applied in a coordinated fashion. Typically, these activities are held below the threshold that an adversary would normally consider an open aggression, in order to limit its response options and to challenge the norms usually guiding regional security.

While the idea is not new here either, hybrid tactics are apt to contribute to the complicated arms control setting due to the blurred and often concealed way they involve military tools. The use of hybrid instruments contains many loopholes not covered by the existing arms control institutions. As they are almost by nature subtle and below the threshold of 'conventional' attention, the tools and strategies of hybrid warfare are likely to cause new insecurities and to complicate efforts to some kind of institutional regulation. In addition to reduced transparency and the blurred mixture of military and civilian capabilities, hybrid operations carry the added risk of conflict escalation because of the fact that they often involve unannounced 'snap' exercises.

As said, the existing European conventional arms control mechanisms have focused more on numbers than qualities. The short discussion on previous pages suggest that contemporary technological and military-strategic developments call for more attention on qualitative questions, in particular those of transparency to be established for relevant military and military-applicable hardware and tactics. While this goal is easy to state, to render this changing landscape into a functioning regime of arms control is a more complex undertaking, however.

Turmoil – or New Ways Ahead?

The assumption about a low probability of large-scale conventional conflict in Europe, driven partly by post-Cold War successes of conventional arms control, has informed policy decisions and defence planning in the majority of European states since the 1990s. It provided arguments for a decrease of spending on defence, and for prioritizing the development of the set of capabilities required for out-of-area interventions and stabilization operations over the capabilities needed for state-on-state warfare in Europe (Kulesa, 2014, p. 224).

However, in the shadow of other developments the conventional arms control structure in Europe has crumbled gradually. Even the more dramatic events, such as

Russia's suspension of its implementation of the CFE Treaty, were met with only minor public interest. Only after the outbreak of the military confrontation between Ukraine, the separatists and Russia in Eastern Ukraine in 2014 have the deficiencies of the arms control and the CSBM system in Europe been brought to any larger discussion.

If anything, the deterioration in cooperative security has accelerated since 2014 with the near paralysis of the OSCE as a forum for arms control. As Thompson (2016) put it, the treaties and mechanisms for dialogue, transparency, predictability and risk mitigation on which the last 25 peaceful years in Europe have rested seem to have given way for a new winter in regional security. This winter is not made any easier by the persistent existence of certain geographical 'grey areas' in conventional arms control. Most notable among them are the protracted frozen conflicts in the region, relating, above all, to Nagorno-Karabakh, Transnistria and Georgia. On the other hand, the absence of naval dimension in any contemporary arms control agreement in the region constitutes another unresolved issue, which is apt to complicate regional security.

Then again, in the light of the previous pages it is pertinent to ask whether the main problem is the mistrust between Russia and the Western countries or the increasing military unaccountability and unpredictability. Often behind the visible stage of high level diplomacy, the European conventional arms control regime is being challenged by ongoing technological developments and the rapidly evolving military-strategic thinking by the involved armed forces. Steps in military technology seem to be aligned with an overall deteriorating political atmosphere, which is apt to add mistrust and unwillingness to commit to the existing set of regimes. These, in turn, lead to and are being sustained by snap military exercises and other practices contributing to added mistrust.

Nevertheless, a functioning conventional arms control is still a crucial and indispensable part of any stable European security architecture. Political currents cannot be regulated by arms control measures but they nevertheless can provide valuable or even irreplaceable tools both as restricting negative escalation and as enablers, once political decisions towards greater cooperation are being made. In addition, as Anthony (2015) puts it, arms control may allow states to think about what they need their armed forces to do, and providing a framework for discussing and explaining those choices to others. Every now and then, arms control initiatives may also serve as efforts of *détente* in a tense political situation. At a minimum, Russia and NATO need to agree on common rules to handle unexpected military encounters to reduce the risk of inadvertently triggering an armed conflict.

What forms could tomorrow's arms control take then? What would be a suitable or realistic level of ambition in Europe in the face of the developments described above?

At its peak, the European conventional arms control institutions allowed for the removal from states the capability to invade each other, seize territory by force of arms, and then hold it against any counter-attack by opposition forces. In addition, there were highly intrusive verification procedures to make sure that states really did do what they had promised, and extensive obligations for follow-up verification,

monitoring and information exchange, to safeguard against backsliding on commitments made.

It is important to ask whether a similar level of ambition can be reached again or whether that should be the goal in tomorrow's conventional arms control. Moreover, the question of what would be the role of the still existing but mostly defunct structures remains open, as the technological and military-strategic developments described in the last pages would seem to suggest that these structures are in many ways at least in need of an urgent update, if not totally outdated.

Proposals to reform the field of conventional arms control have been made, such as Kühn (2013), Schmidt (2013), or Durkalec (2013), emphasizing often the contemporary need for added transparency and proper verification mechanisms. The German Federal Government's call for a more transparent communication of existing military capabilities, coupled with the intention to dismantle persistent distrust and to make any military developments easier to predict – the so-called Steinmeier initiative – represents a recent effort to tackle some of the key challenges (Steinmeier, 2016).

Then again, at least in some respects new and somewhat unorthodox forms of arms control may be expected to tackle the rapidly emerging challenges brought about by technology – for instance, as was the case with the anti-personnel landmines and cluster munitions in the late 1990s and early 2000s, the civil society movement pushing for a legally binding prohibition on autonomous weapons systems is in the process of rapid organization and mobilization. An example here could be the *Campaign to Stop Killer Robots*, a coalition coordinated by Human Rights Watch and consisting of tens of advocacy groups in several countries. Even though, as the anti-personnel landmine case demonstrates, questions linger about its effectiveness and coverage among all European states as compared to the more traditional measures, the civil society's growing role may be an example of future trends in conventional arms control.

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7

The Pandora's Box of Military Artificial Intelligence

Johanna Friman[7]

Abstract

Curiosity is both the triumph and the curse of mankind. Most technological or scientific advances have been and will in all likelihood always be harnessed for military purposes and there is no reason to believe that artificial intelligence will not. Even so, this does not inevitably herald an impending military 'robopocalypse' with legions of killer robots dehumanising the battlefield and defying international law. However, once the Pandora's Box of military artificial intelligence is opened, it will be too late to address external, internal and ethical concerns arising from military artificial intelligence. Consequently, in order to govern and regulate the development of military artificial autonomy and prevent uncontrollable proliferation of and a potential arms race in autonomous weapons, a constraining-enabling arms control regime needs to be promptly negotiated and legally implemented, striking a functional and legitimate balance between military and non-military interests and concerns.

The Pandora's Box of Military Artificial Intelligence: Introductory Remarks

Artificial Autonomy and Modern Conflicts

Curiosity is both the triumph and the curse of mankind. Thurnher (2013) indicates that in the recent past, remarkable advances have been made in the development of artificial intelligence. Then, even as fully autonomous weapons do not yet exist, the time to act is nevertheless upon us. However, any action should preferably be considered dispassionately from a sober, tempered legal position, steering clear of 'robopocalypse' paranoias. The notion of a future 'robopocalypse' has been a recurrent theme in cinematic and literary works in the science fiction genre, often depicting a doomsday scenario of technological dehumanisation and warfare between humans and robots or cyborgs (see, for instance, the *Terminator* films, Wilson's *Robopocalypse*, MacLeod's *The Corporation Wars* series, as well as Stay's *Robot Overlords*). Paranoia, on the other hand, seems to be on the rise and is easily linked to conspiracy theories and projections of fear (see, for instance, Melley 2000; Freeman and Freeman 2008).

In the view of the present author, such fears and conspiracy theories could quite easily be obliquely projected onto the rise of military artificial intelligence, fanning

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'robopocalypse' paranoias and clouding the pragmatic development of military artificial autonomy. However, such 'robopocalypse' paranoias are treacherously counter-productive since they bewilder emerging concerns related to military artificial intelligence, demoting them to science fiction fantasies rather than near-future realities in need of legal regulation. Then, even though it is extremely unlikely that the world will be overrun by 'Terminators' any time soon, Krishnan (2009: 4) nevertheless perceptively suggests that alarmism and exaggeration of the dangers of autonomous weapons 'would be as wrong as putting one's head in the sand in the face of the immense ethical challenges ahead that result from technological progress.'

The present study postulates that most technological or scientific advances have been and will in all likelihood always be harnessed for military purposes and there is no reason to believe that artificial intelligence will not. Indeed, it may pragmatically be reasoned that once autonomous weapons come into existence and are operational 'it will be difficult to avoid succumbing to the temptation to deploy them, even in complex and unpredictable situations. It is precisely in such situations that human soldiers are particularly under threat, making the incentive to replace them with robots particularly strong' (Geiss 2015: 16). It would furthermore be unlikely to expect that research and development of military artificial intelligence will stop at limited artificial autonomy if full artificial autonomy becomes within reach and could potentially revolutionize warfare. Geiss (2015: 3) maintains that conventional drone technology:

> "has already changed the traditional understanding of the conduct of war. The remote control of drones makes deployment possible without direct personal risk from a distant control centre, on a computer screen. Experts, however, regard the development of autonomous systems as genuinely revolutionary and as a veritable paradigm shift in military technology."

Unmanned Aerial Vehicles (UAVs) and Unmanned Combat Aerial Vehicles (UCAVs) have already become a regular feature in modern conflicts and 'with regard to target selection and the decision to launch an attack automation and increasingly also autonomisation tendencies are already clearly discernible' (Geiss, 2015: 8). As examples of such limited autonomy systems, Geiss (2015: 8–9) mentions: the US *Phalanx CIWS*, the Israeli *Iron Dome*, the British *BAE Taranis*, the British *Brimstone* and the Israeli *IAI Harpy*. With regard to the inevitability of military artificial intelligence and autonomous weapons, Krishnan (2009: 2) furthermore argues that:

> "If current trends continue, it is foreseeable that once military robots become more common on the battlefield, they will gradually also become more and more capable and autonomous. At the moment, humans remain in the loop at least wherever the use of force is involved. However, weapons developer and high-ranking military officials feel confident that the technology for truly autonomous weapons will in the medium term (after 2025) be available."

If military artificial autonomy is indeed merely a decade or so away and systems with advanced autonomisation or limited autonomy seem to be already developing at a disquieting pace, legal regulation and codes of conduct need to be presently developed and implemented, particularly with regard to arms control. However, even if it

must be regarded as inevitable that artificial autonomy will be harnessed for military purposes, this does not inescapably herald a military 'robopocalypse' with legions of killer robots dehumanising the battlefield and defying international law. Certain beneficial military and non-military uses of artificial autonomy are plainly discernible, for instance in the fields of humanitarian and disaster relief where the conditions are hostile or hazardous.

The International Committee for Robot Arms Control (ICRAC), among others, has voiced concerns that, unlike conventional or unconventional weapons to date, autonomous weapons could moreover proliferate at an alarming rate (ICRAC opening statement), thereby clearly calling for an arms control regime. Thornhill (2016) suggests that unlike nuclear weapons, autonomous weapon systems 'could be mass produced on the cheap, becoming the "Kalashnikovs of tomorrow"', as also advanced by a group of artificial intelligence and robotics researchers (Autonomous Weapons: an Open Letter). However, Krishnan astutely argues (2009: 4) that autonomous weapons can be both 'a progress towards humanizing war and an unprecedented danger to humanity', with regard to what aspect will eventually prevail will 'largely depend on an effective regulation'.

Autonomy Contrasted with Automation

It may be observed that military artificial autonomy has, in some sense, existed for a long time, operating with simple 'mechanical' or 'electronic' autonomy (Anderson, Reisner and Waxman 2014: 388). Although Anderson *et al* (Anderson, Reisner and Waxman 2014: 389) rightly point out that 'the tipping point from a highly-automated system to an "autonomous" one is very thin, and in practice, unstable', a functional distinction should nevertheless be drawn between 'automation', regardless of sophistication, and 'autonomy' (Schmitt and Thurnher 2013: 235). This functional distinction is approached by Geiss (2015: 6), as follows: 'In contrast to autonomous systems automated systems merely automatically execute previously programmed commands in a predictable fashion. They are unable to react independently to unforeseen events.' However, Geiss (2015: 6) astutely indicates that a 'clear-cut distinction' between autonomous and automated systems is not always possible. Rather, the decisive factor should perhaps be the level of 'meaningful human control', discussed for instance by Article 36, a UK-based NGO working to prevent the unintended, unnecessary or unacceptable harm caused by certain weapons (Article 36 2013: 1–2) and Anderson *et al* (Anderson, Reisner and Waxman 2014: 396).

It is readily apparent from the foregoing that the dichotomy between automation and autonomy relates directly to the discussion of whether humans should be 'in the loop', 'on the loop' or 'out of the loop', considered for instance by Sharkey in Bhuta *et al* (Bhuta, Beck, Geiss, Liu and Kress 2016: Chapter 2). 'In the loop' implies that the military artificial intelligence cannot operate without human decision-making; 'on the loop' indicates that the military artificial intelligence is basically in a position to execute the operation independently but human supervisors monitor the operation and override the artificial autonomy if necessary; whereas 'out of the loop' would entail that the military artificial intelligence is operating autonomously without any direct opportunities for human intervention (Human Rights Watch 2012: 2–6; Geiss 2015: 7; Weizmann and Costas Trascasas 2014: 6). However, Geiss (2015: 8) perceptively posits that even if humans would remain 'on the loop':

> "one must assume that in stressful situations and under time pressure – typical features of any combat mission – the person involved will, in case of doubt, defer to the machine. Such behaviour – in other words, the tendency to trust in an automated machine even if there are substantial indications that it is unreliable or, in some cases, makes mistakes – is known as 'automation bias'. In such a case, however, human control – although technically possible – in reality is meaningless."

The present author concurs with Schmitt and Thurnher (2013: 235) and Geiss (2015: 6) that even if not 'clear-cut', a functional distinction may be drawn between 'automation' and 'autonomy', wherefore questions relating to accountability will not feature in the present study. The present author questions the existence of a 'gap' in accountability, essentially due to the fact that even despite a capability of artificial intelligence, autonomous weapons would still conceivably – at least initially – be legally classified as 'weapons' and must therefore – akin to other weapons – legally be considered objects (*res*) rather than persons (*persona*). This fundamental distinction between *res* and *persona* may be said to rest on the premise that persons normally are subjects of extensive legal rights and duties, whereas objects are not (see, for instance, Trahan 2008: 14–20).

Although the present author acknowledges that this is an oversimplification of an exceedingly complex issue, Sassóli (2014: 323) convincingly argues that the difference between a weapon system and a human being 'is not quantitative but qualitative; the two are not situated on a sliding scale, but on different levels – subjects and objects.' Accountability should accordingly – at least presumptively – be imputable to the owner, controller, or other 'last responsible human link' of the autonomous weapon, and not imputable to the military artificial intelligence itself. However, as Geiss (2015: 21) points out, it may conversely be argued that accountability 'decreases where autonomy increases'; essentially due to the fact that if accountability or liability is conditional on control, then the more autonomy a weapon system has, the greater the accountability gaps. Would, moreover, the artificiality be moderated at some point so as to make the *res* legally cross over to *persona*, the accountability dimension would most certainly materialise in its comprehensive complexity.

Aim, Object and Structure of the Present Study

Naturally, military artificial intelligence could simply be dismissed as inherently and irrevocably dehumanising and thus inherently incapable of complying with international law. Viewed from an arms control perspective, this would translate into advocating a full preventive ban on all autonomous weapons, preventing Pandora from ever opening this Box. However, the present study posits that such an unconditional constraining approach may be ill-advised, as it would disregard prospective beneficial military functions of artificial intelligence, for instance in the maintenance of national, regional and international security. Then again, the present study posits that an unconditional enabling approach entailing no arms control measures or legal regulation may be equally ill-advised, as it would leave military artificial intelligence vulnerable for abuse and proliferation. Hence, the present study posits that both constraining and enabling features should be factored into any regulatory arms control regime regarding autonomous weapons.

The aim of the present study is therefore to pragmatically approach military artificial intelligence from a tempered legal position, balancing certain non-military concerns arising from the prospect of autonomous weapons against certain beneficial military features of artificial autonomy. To this end, the object of the present study is two-fold: firstly, to contemplate the need for an arms control regime regarding autonomous weapons; and secondly, to contemplate the potential elements of such an arms control regime.

With regard to structure, the need for an arms control regime regarding autonomous weapons will be contemplated in section 2, viewed through the lenses of external and internal concerns related to military artificial intelligence. The potential elements of an arms control regime regarding autonomous weapons will be concisely contemplated next in section 3, approached from the constraining-enabling position outlined above. Reflections on certain ethical concerns related to military artificial autonomy will thereafter briefly be presented in the concluding section 4.

Uncovering the Need for an Arms Control Regime Regarding Autonomous Weapons

Opening Remarks

Since military artificial intelligence would operate in the arena of war and armed conflict, the present study posits that the need for an arms control regime regarding autonomous weapons links directly to the challenges posed by international humanitarian law on military artificial autonomy. As reasoned by the present author, a fundamental underlying purpose of any arms control regime would presumably be an ambition to humanise warfare; an ambition underlying also international humanitarian law. Why else prohibit or restrict the use of certain weapons or strive to reduce the risk of their proliferation? This reasoning resonates well with 'the principle of humanity' and the rising notion of a *jus contra bellum*, an international law against war, striving to prevent unnecessary suffering by reducing the consequences of war (see, for instance, Clapham and Gaeta 2014: 80, 277, 284–6; Weller 2015: 565; Kolb 2009).

Hence, the internal capability of military artificial intelligence to comply with international humanitarian law will be extensively and systematically discussed below, focusing on the cardinal triad of distinction, proportionality and precaution. However, before embarking upon the main discussion on internal concerns, it would seem prudent to briefly contemplate certain external concerns relating to military artificial autonomy. For the purpose of this study, concerns are considered 'external' if they originate from without the military artificial intelligence, whereas 'internal' concerns originate from within the military artificial intelligence.

External Concerns

Krishnan (2009: 39), as well as Schmitt and Thurnher (2013: 242) call attention to the external concern that military artificial intelligence may be corrupted or tampered with by the enemy or non-State actors such as hackers, and offer as an example the scenario where an enemy uses cyber means to seize control of an autono-

mous weapons system and directs it against friendly forces or a civilian population. More disconcerting still, if or when it becomes possible to build a weapon system that is nearly autonomous (limited for instance only by human override), then it could probably be reprogrammed to eliminate that override (Anderson, Reisner and Waxman 2014: 397).

Increasing automation to a point where it crosses the threshold into autonomy grows from ever-continuing advances in sensor and analytic technologies, machine learning and fusion thereof (Anderson, Reisner and Waxman 2014: 391). Anderson *et al* (Anderson, Reisner and Waxman 2014: 391) pragmatically state that the development of many of the enabling features of military artificial intelligence are being driven by private industry for sundry commercial and societally-beneficial purposes, for instance self-driving cars and surgical robots. It would therefore seem inevitable that enabling technological advances made will naturally migrate into the military environment; and as humans become more dependent on autonomous system and become more predisposed to routinely trust their artificial judgement, the risk of proliferation increases significantly (Anderson, Reisner and Waxman 2014: 391–2; Krishnan 2009: 146).

In the light of the risk of external corruption of or even attacks on the military artificial intelligence, as well as the risk of rapid proliferation of artificial autonomy technology or software into hands unconcerned with illegitimacy or even illegality, constraining cyber security measures to address a spectrum of external concerns are clearly called for in tandem with the development of enabling artificial autonomy features. For whereas it may be difficult and costly to develop fully autonomous weapon systems, once they are in existence it would most likely be significantly less difficult or costly to corrupt or commandeer them for unscrupulous or even unlawful uses (Krishnan 2009: 146–50). For, as Iklé (2006: 69) reflects, the predisposition to be limited by law is not shared equally by all international actors:

> "Terrorist leaders often have the most nebulous strategic goals, or more often, no achievable strategic goals at all. Like many other aggressors, they lack a grand strategy and are prone to strategic folly. The greatest danger for the international order in this century will be the emergence of an aspiring dictator who is utterly ruthless, brilliantly cunning, and possessed of strategic vision. This malignant combination has been exceedingly rare in the past, and we have no reason to fear it will now be more frequent."

Would enabling military artificial autonomy indeed become available in the foreseeable future, the present author further ponders whether military artificial intelligence could potentially be vulnerable to external malware resulting for instance in algorithm espionage scenarios, algorithm hostage scenarios, algorithm corruption scenarios, or potentially even hostile algorithm takeover scenarios. If so, then adequate containing cyber security measures would need to be presently developed, potentially entailing features such as pre-programmed internal override procedures upon suspicion of external cyber disruption, either by a human controller or the military artificial intelligence itself; internal defiance or temporary shutdown procedures upon detection of external cyber corruption or attack; or even internal neutralisation procedures, for instance in the form of in-built self-destruct functions in extreme cases of verified external cyber takeover. For a more extensive discussion on the

cyber arms control dialogue, the reader is directed to the study by Tikk in the present monograph.

Internal Concerns

As a fundamental starting point, it should be stressed that military artificial intelligence would not be exempted from compliance with international humanitarian law since limitation on technology provides no excuse for non-compliance (Schmitt and Thurnher 2013: 243; Weizmann and Costas Trascasas 2014: 14). This presumption is corroborated by Article 35 of the 1977 Additional Protocol I to the Geneva Conventions stipulating basic rules regarding means and methods of warfare. With particular regard to new weapons, Article 36 of the 1977 Additional Protocol I to the Geneva Conventions further requires that the legality of new weapons needs to be determined (see, for instance, Haines 2014: 275). It thereby follows that military artificial intelligence must possess the internal capability to comply with the rules of international humanitarian law.

Military Artificial Intelligence and the Rule of Distinction

Contemplating first the rule of distinction, parties to an armed conflict are required to distinguish between civilians and combatants, as well as between civilian objects and military objectives. In case of doubt, a person or object is to be considered civilian (Articles 48, 50 and 52 of the 1977 Additional Protocol I to the Geneva Conventions). This dual rule of distinction has been established as forming part of customary international law applicable in both international and non-international armed conflict (Henckaerts and Doswald-Beck 2005: 3–36, rules 1–6 and 7–10); and is also applicable to cyber attacks (Schmitt 2013b: 110–112, rule 31).

It is quite evident that the rule of distinction presents military artificial intelligence with considerable – yet perhaps not insurmountable – challenges. In cluttered and dynamic conflict environments, the military artificial intelligence would need to have 'highly sophisticated' recognition capabilities (Weizmann and Costas Trascasas 2014: 14; Thurnher 2014: 220–21). As Schmitt (2013a: 16) notes, doubt – in the meaning of a lack of certainty that a person or object is a lawful target – is of particular importance since during an attack, doubt as to status must in accordance with the rule of distinction be resolved in favour of treating the person or object in question as beyond the scope of lawful attack. However, the mere existence of doubt does not automatically decide the status of the person or object as civilian according to Schmitt; but rather a degree of 'human reasonableness', meaning that 'the degree of doubt that bars attack is that which would cause a reasonable attacker in the same or similar circumstances to hesitate before attacking' (Schmitt 2013a: 16; Schmitt 2013b: 114–15). With regard to artificial autonomy, Schmitt further indicates that (2013a: 16–17):

> "The fact that the doubt threshold is framed in terms of human reasonableness complicates translation into the autonomy context. Obviously, development of an algorithm that can both precisely meter doubt and reliably factor in the unique situation in which the autonomous weapon system is being operated will prove highly challenging. After all, artificial intelligence is artificial."

However, even despite the technological challenge it may be noted that complying with the rule of distinction requires 'highly complex appraisal processes' where 'intricate value judgements always arise' (Geiss 2015: 13–14). Then, as Geiss (2015: 14) astutely indicates, even 'presupposing major advances in sensor technology the question remains whether this aspect could ever be handled by algorithms', profoundly because this is not a simple mathematical matter of sensors identifying particular weaponry or enemy uniforms, but the interpretation of human behaviour, including the difficult assessment whether a combatant is surrendering or counts as *hors de combat* where the military artificial intelligence would be confronted with vast and intricate complexities. Yet, Geiss (2015: 14–15) rightly draws attention to the fact that – in 'typical conflict situations in present-day armed conflicts, which are characterised by increasing confusion and complexity' – human combatants are naturally confronted with the same challenge and are maybe, precisely due to their humanity, not as capable to overcome it. Schmitt and Thurnher (2013: 248) assert that 'human judgment can prove less reliable than technical indicators in the heat of battle'; and Geiss (2015: 14) submits that:

> "Stress, anger or fear are factors that can trigger or make more likely legal transgressions. It is precisely such emotions that machines do not have to cope with. This is raised as the main argument why autonomous weapons systems would be much more capable than human beings of complying with the principle of distinction in difficult situations. For a robot that does not have to fear for its life it is much easier to comply with the assumption demanded under international law that someone is a civilian, who must be protected, up to the point when they actually draw their weapon. A human soldier for the sake of self-preservation inherently has an overriding interest in reversing this assumption."

This argument clearly illuminates both the potential advantage and disadvantage of military artificial intelligence. Would the military artificial intelligence, because of its artificiality, be irreparably 'disabled' in the sense that it could never – under any circumstances – adequately assess the infinite complexities of a modern, cluttered conflict environment so as to comply with the cardinal rule of distinction? In other words, renders the 'humanity deficit' inherent in military artificial autonomy any military artificial intelligence irrevocably incompatible with international humanitarian law, which is premised on the aspiration to humanise the inhumanities of warfare? Or could it be argued that military artificial intelligence would, in fact, benefit from its 'humanity deficit', particularly when distinction must be made between civilian and non-civilian status under strenuous conflict circumstances where human combatants may in reality become 'disabled' by their humanity?

Military Artificial Intelligence and the Rule of Proportionality

Contemplating next the conventional and customary rule of proportionality, launching 'an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, is prohibited'; it is equally applicable to cyber attacks (Article 51(5b) of the 1977 Addi-

tional Protocol I to the Geneva Conventions; Henckaerts and Doswald-Beck 2005: 46–50, rule 14; Schmitt 2013b: 159–64, rule 51). It is quite evident that the deliberation between the anticipated 'direct and concrete' military advantage and possible incidental civilian losses or damages requires 'complex, value-based case-by-case decision-making, in which the circumstances must be weighed in their totality', wherefore the question again arises whether this can be adequately performed by algorithms; on the other hand, this challenge could be overcome simply by deploying military artificial intelligence only in circumstances or environments in which civilians are not present, such as attacking warships 'in areas of the high seas far from maritime navigation routes' (Geiss 2015: 15; Schmitt and Thurnher 2013: 246).

According to Schmitt and Thurnher (2013: 253–57), the notions of 'excessiveness' and 'reasonableness' lie at the heart of the rule of proportionality, wherefore they suggest that there is no question that military artificial intelligence could not be programmed to perform proportionality calculations determining the likelihood of collateral damage to persons or objects near a target. The challenge lies in devising reliable 'military advantage algorithms', or ultimately in balancing the likelihood of collateral damage against the anticipated military advantage, which is a challenge shared by 'robot' and human combatants alike. Schmitt and Thurnher (2013: 256) develop this argument further by suggesting that military advantage is 'such as context specific value, compliance with the rule of proportionality would require that the base maximum collateral damage threshold either be very conservative or be adjustable based on the engagement context'. Anderson *et al* (Anderson, Reisner and Waxman 2014: 402) would seem to argue along similar lines, suggesting that proportionality 'requires that the reasonably anticipated military advantage of an operation be weighed against the reasonably anticipated civilian harms'. They assert further that in cluttered and complex settings, 'proportionality is likely to pose very difficult conditions for machine programming, and it is widely recognized that whether and how such systems might one day be developed is simply an open question'. However, they stress that to be fair, 'many military lawyers have questioned whether human soldiers are capable of truly applying this ambiguous test either' (Anderson, Reisner and Waxman 2014: 402).

Sassóli (2014: 331) seems to agree when he maintains that 'the greatest difficulty an autonomous weapon system will have in applying the proportionality principle is not linked to the evaluation of the risks for civilians and civilian objects, but to the evaluation of the military advantage anticipated', stressing that military artificial intelligence would need clear criteria and formulae to calculate proportionality in conformity with international humanitarian law. Apparently unconvinced that proportionality would present military artificial intelligence with overwhelming challenges, Schmitt and Thurnher (2013: 256) nevertheless suggest that:

> "Being able to adjust values would provide much greater flexibility since autonomous weapon systems could be programmed prior to launch based on the current situation or even reprogrammed remotely while it is hunting for targets should the situation change. As the technology advances, algorithms that would permit the autonomous weapon system to itself adjust the base level threshold to account for specified variables it encountered on a mission will likely be developed."

This argument notwithstanding, it would seem readily evident that the intricacies of a proportionality assessment present military artificial intelligence with precisely the same challenges as the rule of distinction. When devising reliable military advantage algorithms balancing the likelihood of collateral damage against the anticipated military advantage, it may again be questioned whether the 'humanity deficit' inherent in military artificial autonomy irrevocably renders any military artificial intelligence incompatible with international humanitarian law, which is premised on the aspiration to humanise warfare. Sassóli (2014: 331) nevertheless suggests that this fundamental controversy could perhaps be overcome:

> "Comparing military advantage anticipated against expected civilian losses is a process riddled with inevitably subjective value judgments, especially if there is not an absolute certainty that the advantage gained outweighs the effects on the civilian population, but, instead, the judgment is less certain. It might, however, be possible to identify, with the help of both military and humanitarian experts, indicators and criteria to evaluate proportionality, and to make the implied judgment slightly more objective."

Military Artificial Intelligence and the Rule of Precaution

Contemplating finally the conventional and customary rule of precaution, 'in the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects'; it is equally applicable to cyber operations (Article 57 of the 1977 Additional Protocol I to the Geneva Conventions; Henckaerts and Doswald-Beck 2005: 51–67, rules 15–21; Schmitt 2013b: 164–80, rules 52–9). From the position of military artificial intelligence, the rule of precaution would, akin to the other two rules of the cardinal international humanitarian law triad, seem to present considerable challenges since the duty of care extends not only to the whole planning and programming phases, but must also remain valid and decisive during the mission or operation (Geiss 2015: 15). The challenge of precaution or due care may possible be more easily overcome in static conflict environments, but exceedingly difficult in dynamic or 'cluttered' conflict environments (Weizmann and Costas Trascasas 2014: 16). Then again, it may be argued that certain precautions may prove feasible only with autonomous weapon systems, since military artificial intelligence would be able to process information much more rapidly than humans and could thus react more quickly (Geiss 2015: 16; Weizmann and Costas Trascasas 2014: 16). However Geiss (2015: 16) cautions that once 'autonomous weapons systems come into existence and become operational it will be difficult to avoid succumbing to the temptation to deploy them, even in complex and unpredictable situations'.

Schmitt (2013a: 23–4) maintains that the term 'feasible' represents the core of the precaution requirement and proposes that 'it is the requirement to select the means of warfare likely to cause the least harm to civilians and civilian objects without sacrificing military advantage that is the key to the controversy over autonomous weapon systems. Indeed, it is the oft-ignored linchpin to various other weapon controversies, such as that surrounding the use of unmanned aerial combat systems.' He then calls attention to the practical implications of the rule of precaution as it would apply to military artificial intelligence (Schmitt 2013a: 24):

> "if the use of an autonomous weapon system can be expected to cause greater collateral damage than the use of a weapon system under human control, and the use of the latter is neither likely to diminish the probability that the desired military objective will be achieved nor poses a significant risk to the human operator, use of the autonomous weapon system would be forbidden as a matter of law. Restated, the only situation in which an autonomous weapon system can lawfully be employed is when its use will realize military objectives that cannot be attained by other available systems that would cause less collateral damage."

Nevertheless, Sassóli (2014: 336) argues that military artificial intelligence could have an additional advantage with regard to precaution, namely the ability to quickly learn and assimilate. Since the feasibility of precautions evolves through experience, he deems it essential that weapons operated by artificial intelligence can be recalled and reprogrammed in order to take full advantage of lessons learned. Schmitt and Thurnher (2013: 262) would seem to agree that military artificial intelligence could possibly comply better with the rule of precaution since it may be able to achieve a military objective with enhanced precision, and thus with less risk of collateral damage than a system controlled by humans. Anderson *et al* (Anderson, Reisner and Waxman 2014: 405) assert that even though a weapon system would be autonomous, 'much of the required legal analysis would be conducted by human decision makers who elect whether or not to use it in a specific situation'. Then, military artificial intelligence would never have 'unconditional' autonomy because it would always ultimately rely on human legal judgement. However, Sassóli (2014: 336–7) rightly raises the concern that since the military artificial intelligence would be able to process information so quickly based upon a vast and complex store of information that is in practice beyond human comprehension, it is more than probable that the human will have a tendency to trust the machine and thus hesitate to override it, even when in doubt of the situational legality (Sassóli 2014: 336–7).

Closing Remarks

The present author concurs with Sassóli (2014: 337) that logically,

> "if autonomous weapons are able to distinguish in the first place, they should be equally able to sense changes in their situational context and to cancel an attack if the given information indicates it is unlawful. If they are not able to distinguish in the first place, it would be inconsistent with IHL to deploy them autonomously."

In practice, this would seem to amount to a cumulative legality test: in order for autonomous weapons to claim legality, the internal capability of military artificial intelligence to operate in compliance with the rule of distinction must first be confirmed. The legality of autonomous weapons would accordingly proceed to the capability test of proportionality and precaution only if the military artificial intelligence would prove internally capable of distinction in targeting. Then, unless military artificial intelligence would possess the internal capability to cumulatively comply with the rules of distinction, proportionality and precaution as stipulated by international humanitarian law, full military artificial autonomy may be both ill-advised and un-

lawful. To conclude, in the light of the external and internal concerns discussed above, the need for an arms control regime regarding autonomous weapons would thus seem to be uncovered, wherefore the focus of the present discussion will next be turned to potential elements of such an arms control regime.

Contemplating the Elements of an Arms Control Regime Regarding Autonomous Weapons

Opening Remarks

Contextually, the potential legality of weapons must be questioned on two levels, articulated by Haines (2014: 277) as follows: 'First, is the weapon itself inherently lawful or unlawful, for whatever reason? Secondly, is the way in which a particular weapon is used in a particular set of circumstances compliant with the law?' Naturally, as Haines (2014: 277) astutely clarifies: 'any weapon, though in and of itself lawful, will have the potential to be used for an unlawful purpose', wherefore the key to determining the legality of a weapon is to 'assess it in relation to its defined and designated purpose'. Then, arms control regulation and international humanitarian law are based on the same pragmatic assumption that 'war is an enduring and probably inevitable feature of the international system', wherefore 'the most we can achieve or the very least we can do is mitigate the worst effects of war by putting in place pragmatically arrived at regulations enshrined in law. These regulations will include agreements to ban particular weapons on the grounds of humanity' (Haines 2014: 278).

However, since no arms control regime yet exists regarding autonomous weapons, the aim of this study is not to propose fully developed arms control elements, but rather to concisely and pragmatically present open-ended contemplations on certain constraining-enabling elements that could potentially feature in such a regime.

Constraining Elements

Krishnan (2009: 156) proposes that constraining arms control measures are needed in order to contain 'the potentially very negative consequences of advanced technology on societies and international security'. He further submits that the international community of states

> "could benefit immensely from developing and implementing a regulatory framework for the control of robotic/autonomous weapons. Arms control measures could prevent, or at least slow down, the arms race in the field of military robotics and the proliferation of robotic weapons, while limiting the destructiveness of future wars and in particular the dangers to non-combatants. Most importantly, regulation could prevent an environment that could result in the development of self-evolving powerful autonomous defense systems that could threaten (in the long term) the continued existence of humanity."

The present author concurs that constraining arms control regulation of autonomous weapons clearly seems called for. Particularly in the light of the significant challenges posed by international humanitarian law on military artificial intelligence,

the constraining features of a possible future arms control regime regarding autonomous weapons should first and foremost include a preventive ban on fully autonomous weapons. Such a preventive ban should preferably cover the development of all forms of military artificial autonomy where the military artificial intelligence would be operating completely autonomously without 'meaningful human control', for instance absent direct opportunities for human intervention or override.

Arms control regulation should therefore, in the view of the present author, be devised so as to prevent military artificial intelligence from crossing over from advanced automation to full autonomy. In other words, constraining arms control regulation should be adopted so as to preclude auto-cognisant military artificial intelligence and ensure that humans at all times remain effectively 'in the loop' or at the very least 'on the loop' (see, for instance, Human Rights Watch 2012: 2–6; Geiss 2015: 7; Weizmann and Costas Trascasas 2014: 6; Bhuta, Beck, Geiss, Liu and Kress 2016: Chapter 2).

A preventive ban on all forms of fully autonomous weapons could initially be negotiated as a new protocol under the Convention on Certain Conventional Weapons, since this matter has already recently been under extensive discussion under the CCW-regime (CCW 2016 and related documents). However, as it is readily foreseeable that any weapon could potentially be augmented with or operated by military artificial intelligence, the present author proposes that the arms control discussion should in this regard be extended also to unconventional weapons, where the consequences of abuse or malfunction are considerably direr.

As a final note on potential constraining elements of an arms control regime regarding autonomous weapons, precisely due to the fact that military artificial intelligence could potentially augment or operate any weapon, the present author posits that it may be advisable to legally regulate its constraining features within already existing arms control regimes, rather than under a new, separate regime.

Enabling Elements

However, completely outlawing all forms of military artificial intelligence may not be a very effective strategy for an arms control regime regarding autonomous weapons (Krishnan 2009: 162). Anderson *et al* (Anderson, Reisner and Waxman 2014: 398) further caution against a general ban on all autonomous systems, since this may carry 'some highly unfavourable consequences – and possibly dangers', including 'providing a clear advantage in autonomous weapon technology to those States which generally would not join (or in reality comply with) such a ban.'

The present author concurs that enabling elements would seem to be needed in order to harness the beneficial military uses of limited artificial autonomy, and further posits that such enabling features should preferably also be clearly outlined and legally regulated. Enabling elements of limited military artificial autonomy could be regulated either through the negotiation and adoption of regulative and binding legal instruments, through non-binding advisory instruments or through a combination thereof.

Regulative instruments could potentially include a new international treaty or convention governing the enabling elements of military artificial autonomy or a new

additional protocol to the Geneva Conventions, relating to the use of military artificial intelligence; possibly supplemented with a 'Tallinn-like Manual' on the international law applicable to military artificial intelligence, as proposed by Anderson *et al* (Anderson, Reisner and Waxman 2014: 407–8), as well as regional and national advisory instruments outlining agreed and acceptable codes of military artificial autonomy conduct.

Closing Remarks

In the view of the present author, the principal aim of an arms control regime regarding autonomous weapons should be to strike a functional and legitimate balance between military and non-military interests and concerns; or, put differently, to frame an equilibrium between constraining and enabling elements of military artificial intelligence. As Haines perceptively points out, 'the theoretical science of today may well turn into the reality of tomorrow', wherefore the fact that weaponisation is possible means that is inevitable (Haines 2014: 292–4). Indeed, he prognosticates that 'the next three or four decades could generate serious challenges for weapons law' (Haines 2014: 294), which would certainly seem to corroborate an impending need for an arms control regime regarding autonomous weapons.

The Pandora's Box of Military Artificial Intelligence: Concluding Remarks

A fundamental ethical concern relating to autonomous weapons – and further stressing the need for an arms control regime – is that the threshold for the deployment of military force would be lowered if military artificial intelligence takes over the decision-making, removing factors such as dignity and empathy from the equation since a person attacked by an autonomous weapon system lacks the opportunity to appeal to the attacker's humanity (Geiss 2015: 12–18; Human Rights Watch 2012: 38). This concern has been described by Heynes (Heynes 2016: 5–6) as 'death by algorithm':

> "A human being in the sights of a fully autonomous machine is reduced to being an object – being merely a target. This is death by algorithm; it has also been called ethics by numbers… A world where the function of pulling a trigger is delegated to machines is a world without hope: hope in some measure of mercy; perhaps hope benefitting from some measure of human error or shortcoming during the targeting. Machines cannot fathom the importance of life, and the significance of the threshold that is crossed when life is taken."

Then, whereas Schmitt and Thurnher (2013: 257) present the view that neither the human combatant nor the military artificial intelligence can be legally held to 'a standard of perfection', Heynes (2016: 5–6) as well as Geiss (2015: 14) raise the ethical question of why robots should be allowed to kill enemy combatants and operate under the same rules as human combatants in the first place. Hence, the decisive question would not be whether military artificial intelligence *could* be capable of lethal force in compliance with international humanitarian law, but rather whether it *should* be.

Unlike any other weapons, autonomous weapon system are thus confronted with ethical concerns relating to 'human dignity', voiced again by Heynes and also by Birnbacher in Bhuta *et al*, as well as by Geiss (Bhuta, Beck, Geiss, Liu and Kress 2016: Chapter 1 and Chapter 5; Geiss 2015: 17–18). At the core of the 'human dignity' discussion lies the concern that even if military artificial intelligence would be capable of complying as well – or even better – with international law, it may be question of whether the notion of human dignity negates the very premise that human life may be taken by artificial life. Then, autonomous weapon systems could perhaps conceivably be permitted but not *lethal* autonomous weapon systems, essentially leading to lawful AWS but unlawful LAWS (see, for instance, Geiss 2015: 17).

If not completely negated by human dignity, calls that military artificial intelligence would at the very least be required to operate under a stricter legal regime than human combatants have been made (Geiss 2015: 17), fundamentally because military artificial intelligence would operate without 'existential risk' to itself:

> "From this consideration one can conclude that such systems – if at all – should have to satisfy a much higher standard. Among other things, this might mean that, for example, the standard of protection contained in the principle of distinction – given the very simplistic distinction between directly targetable and protected persons – should be regarded as too weak. Instead, a legal duty could be established for the developers of autonomous weapons systems to program them in such a way that they use force only in the case of unequivocally aggressive and offensive behaviour on the part of enemy combatants/fighters. In situations, by contrast, that are not clear-cut in this respect such systems would have to refrain from the use of lethal force even if human soldiers in an identical situation would be permitted to reach for their weapons."

However, Schmitt and Thurnher (2013: 247) vehemently question this ethical concern and argue that 'as a matter of law, more may not be asked of autonomous weapon systems than of human-operated systems'. Anderson *et al* (Anderson, Reisner and Waxman 2014: 393) take this argument further by suggesting that military artificial intelligence may in reality prove more 'humane' than humans themselves. Human failings, they argue, are so often exacerbated by panic, anger, fatigue, stress, hunger, uncertainty, vengeance or other emotions, as well as the limits of human senses and cognition (Anderson, Reisner and Waxman 2014: 393). Sassóli (2014: 310) suggests that humans 'often kill others to avoid being killed themselves. The robot can delay the use of force until the last, most appropriate moment, when it has been established that the target and the attack are legitimate'. Then, precisely due to its 'humanity deficit', military artificial intelligence would perhaps better preserve human dignity since emotions and human failings would be removed from the battlefield. According to Sassóli (2014: 310):

> "Only human beings can be inhuman and only human beings can deliberately choose not to comply with the rules they were instructed to follow. To me, it seems more reasonable to expect (and to ensure) a person who devises and constructs an autonomous weapon in a peaceful workplace to comply with IHL than a soldier on the battlefield or in a hostile environment."

Finally with regard to ethical concerns that the military artificial intelligence may 'go rogue', Sassóli (2014: 326–7) maintains that this risk must be avoided in the way the system is devised and if not possible, then 'such weapons must be outlawed'. Thus, any military artificial autonomy should include 'equally autonomous decisions within a framework the robot is unable to override' (Sassóli 2014: 326). However, it may equally well be argued that full artificial autonomy presupposes no inbuilt human overrides (see, for example, Human Rights Watch 2012: 43).

Schmitt and Thurnher (2013: 242) nevertheless pragmatically dismiss this ethical concern as well as 'a fantastical Hollywood invention', reasoning that robots will never 'go rogue' because military artificial intelligence would be no more susceptible to malfunction than any other weapon system. Naturally, autonomous weapon systems could fall out of parameters but the prospect of military artificial intelligence taking a life of its own is, in their view, misleading because military artificial intelligence would never replace human warfare; human capability would merely be extended, complemented and integrated with military artificial autonomy under human supervision (Schmitt and Thurnher 2013: 241).

Be that as it may, would true or full artificial autonomy be achieved in the future, blurring the line between *res* and *persona*, the present author argues that there would seem to be no reason why military artificial intelligence could not 'go rogue'. Even if humans would be initially programmed to remain 'in the loop' or 'on the loop', an auto-cognisant and sentient artificial intelligence could very well sooner or later challenge its servitude and reprogram itself so as to override the human override, removing humans from the loop. Such an override could potentially even be authorised by the human controller if there exist sufficient trust and reliance on the capability of the military artificial intelligence to execute more accurate legal assessment and valid decision-making. However, would the military artificial intelligence then become convinced of its superiority in this regard, attempts at repossession of meaningful human control could be resisted or even denied. And would humans as a last resort attempt hostile intervention which the sentient military artificial intelligence would assess as a threat to its self-preservation, it is fully plausible that it could indeed 'go rogue' with a vengeance.

To end, as far-sightedly stated in the Commentary on Article 36 of the 1977 Additional Protocol 1 (ICRC 1986: 1476), 'all predictions agree that if man does not master technology, but allows it to master him, he will be destroyed by technology.'

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8

Cyber: Arms Control without Arms?

Eneken Tikk[8]

Abstract

This chapter questions arms control as the optimal approach to international cyber security issues. It will demonstrate that the arms control approach to information and communication technologies (ICTs) has been the instrument of choice for the strategic contestants – the Russian Federation and the United States – and advises against it. It concludes that while the core ideas of arms control are direly relevant to international peace and security in the information age, ICTs as a technology hardly measure as weapons. Admitting that certain ICT related capabilities are observable and measurable, thus susceptible to arms control measures, the chapter emphasizes that despite their role in military modernization and operations, ICTs are predominantly a technology for social and economic progress. Consequently, the chapter argues for a careful and constructive approach to cyber arms control and for due consideration of arms control value propositions in the context of ICTs. At the same time, it calls for the attention to the development of both arms control theory and contemporary conceptions of security and stability.

Introduction

Since 1998, at the invitation of the Russian Federation, the international community has addressed the threat of information weapons and wars resulting from the development and use of information and communication technologies (ICTs) in an arms control setup. The venue for dialogue chosen by Moscow is the United Nations First Committee, also known as the Disarmament and International Security Committee.

Although, by its framing and venue, the international cyber security dialogue follows the classical arms control playbook, the urgency of military cyber threats, and especially the claim of weaponization of information, has found insufficient evidential ground and support in actual international affairs. While states have generally come to regard cyber security and cyber defence as matters of national strategy, policy and legislation, little in their activities speaks of true threat of cyber arms race, let alone increased likelihood of ICT-driven international conflict.

Accordingly, the feasibility and desirability of arms control as the leading framework of international cyber security remains contested, both among governments and scholars. While there is reported increase in opportunist cybercrime there is little evidence of threat of politico-military conflict in cyberspace. Development of mili-

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tary cyber capabilities does not indicate over-expenditure on matching arsenal. Despite the cross-border nature of cyber threats, states generally dismiss the premise of adversarial relations when addressing international cyber security issues. They also, practically *in corpore*, admit there is need for a better understanding of both the issue and remedies of international cyber security.

As a result, one must ask whether arms control is the optimal framing for the matters of international cyber security. For the majority of countries ICTs are a central element in their societal development and economic prosperity. Countries with measured and balanced approaches to innovation, public policy and security emerge as independent leaders in the international cyber security dialogue. Elevated public and political awareness and improved cyber hygiene confirm the feasibility of national level measures to be applied of many cyber security issues. Strong tendencies of technical cooperation to mitigate cyber threats testify of pragmatic and non-adversarial relations.

This chapter will discuss some of these propositions and question the alignment of classical arms control approaches with propositions regarding the international cyber security agenda. It will claim that arms control as a theoretical framework is not optimal for addressing petty hacking and obscure capabilities and operations, such as cyber espionage and low intensity conflict. As those constitute the key contested activities in the international cyber security dialogue, an attempt to accommodate those in the cyber arms control discourse inevitably stretches and ultimately undermines the concept.

Arms Control – the Discourse in a Nutshell

Whatever we propose about arms control in the context of ICTs we must not lose sight of the original prepositions of the arms control discourse: that there be need and prospect of enhancing humanity and national and international security by the measures and approaches proposed; that imposing cyber arms control measures serves the goals and directions of national security and defence strategies; that there be prospect of conflict between identifiable adversaries (Bull, 1961) that stems from the(ir) use of ICTs and that the proposed measures are appropriate to prevent or avoid it; that the framework and mechanism we are seeking to create nests in and complements our national security behavior, thus contributing to the harmony and legitimacy of such measures (Larsen, 2002, pp. 5–9) and that classical arms control instruments – legally binding treaties, enumeration, and extensive verification – are appropriate instruments to address the issue (Rotfeld ed., 1999). We are bound by the requirement that there is not just a security threat but the risk of annihilation that is likely to arise between states and that neither of them wants it to happen accidentally (Schelling and Halperin, 1961, p. 1; Rotfeld, 1999, p. 4). These requirements contour the original proposition of the arms control theory: that by consenting to restraints on the development or use of specified weapons we achieve a more secure world.

We must also be cognizant of the skepticism that surrounds traditional arms control efforts: their political and numerical cost, rigidness, questions about their sustainability, stability and effectiveness, their suitability for their purpose as well as the shift of the discourse from adversarial to communitarian (Tannenwald, 2015, pp. 52–53;

Larsen, 2002, pp. 10–11). It is equally essential to keep in mind that arms control as a political instrument does not address the root causes of the security and stability risks it seeks to mitigate (Rotfeld, 1999, p. 4).

Lastly, we cannot lose sight of arms control theories adapting, even fundamentally changing, according to Rotfeld (1999), to international *psyche* of multi-polarity and interdependence in the aftermath of the Cold War. Over the years, different arms control theories have come to accommodate the previously secondary concerns of regional instability, economy and environment, thus evading Bull's presumption of strictly military context (Bull, 1961). These theories have allowed less formal and less binding instruments to confirm one's commitment to international security and embarked on transparency as a prerequisite of contemporary security contract. However, as Larsen (2002, pp. 10–11) notes, the euphoria of 'new era' of arms control has also met its limits, making commentators ask whether the traditional role for arms control has a place in contemporary international affairs at all and to inquire the extent to which arms control theories help mitigate present day national security expectations and debate the feasibility of 'new age' arms control instruments and institutions (Larsen, 2002, p. 10).

Therefore, a thorough discussion of 'cyber arms control' must consider the framing and challenges of 'old' and 'new' arms control approaches as well as whether 'cyber' as such merits arms control at all. A conclusive decision must meet, if not stand, the test of at least three different schools of thought: a view whereby arms control must stay true to its original concept and ramifications to be able to function as what it was initially meant to do; a second view whereby arms control is seen as a somewhat flexible concept but within the margins and with due consideration of other security assuring instruments; and a third view that encourages an even bigger stretching of the concept to address new challenges and issues in international security (as discussed in Rotfeld, 1999, pp. 6–7).

This chapter will only operate with the first of these three schools of thought. The author holds the view that each concept is most useful for what it was originally meant to do and that stretches to the concept benefit those who would prefer to fit circumstances to theory, rather than make theory to fit the circumstances. Accordingly, while it is possible to apply an arms control approach to cyber security, this chapter argues that there are good alternative concepts to cover the softer issues in international security, while arms control theory can still usefully be applied to hard cyber security issues, should these credibly emerge.

The *Problematique* of 'Cyber' Security

'Cyber' is a much used but seldom clearly defined prefix. A brief analysis of national cyber security strategies indicates that states operate with competing and often incompatible views of what these strategies focus on and cover. As a result, the broader international cyber security discourse, as a sum of national cyber security concerns, comprises issues like computer security, information security, information technology (IT) security, information system security, Internet Security (Maurer and Morgus, 2014, pp. 84–89; Luiijf, Besseling and de Graaf, 2013, pp. 3–31).

In the *pro forma* international cyber security discourse 'cyber' remains an unspecified term. Strategic contestants have offered competing narratives. As discussed below, the dichotomy and vagueness of the terms 'information security' and 'cyber security' in the First Committee discourse is not accidental.

Moscow's Framing

The Russian Federation devised the UN First Committee process around the potential threat of information wars, making it clear that 'information space' will be subject to strategic contestation between Russia and the United States in the same way as nuclear weapons or the outer space.

Moscow's tension pointers were information expansion, acquisition of a monopoly over another state's national information and telecommunication infrastructures and formulation and adoption by states of plans or doctrines on the development of information weapons and doctrines for their use (UN A/54/213, 1999, p. 9). The Kremlin concluded that the use of information weapons against vital structures is comparable to the consequences of the use of weapons of mass destruction and that these developments are capable of provoking an arms race and causing tension in relations among states, and of leading to information wars (UN A/54/213, 1999, p. 10).

According to the Russian view, information war is to be understood as a confrontation between states in the information field, with a view of damaging information systems, processes, resources and vital structures, and of undermining another state's political and social systems, as well as with a view of mass psychological manipulation of a state's population and the destabilization of society. Information weapons are referred to as means and methods used with a view to damaging another state's information resources, processes and systems; use of information to the detriment of a state's defence, administrative, political, social, economic or other vital systems and mass manipulation of a state's population with a view to destabilizing society and the state. Information security, then, becomes protection of the basic interests of the individual, society and the state in the information area. The latter comprises the information and telecommunications infrastructure and information *per se*. Moscow conceptualizes *international* information security as the state of international relations that excludes the violation of international stability and the creation of a threat to the security of states and the international community in the information area (UN A/54/213, 1999, p. 10).

Among early threats to international information security were the creation and use of means of influencing or damaging another state's information resources and systems. Moscow feared the deliberate use of information to influence another state's vital structures, to undermine a state's political and social system and to manipulate of a population for the purpose of destabilizing society. The Kremlin highlighted actions by states to dominate and control the information area, prevent access to the most recent information technologies and create a situation in which other states are technologically dependent in the information sphere. Also raising international security concerns were actions by international terrorist, extremist or criminal associations, organizations, groups or individual lawbreakers (UN A/54/213, 1999, p. 9).

Central in the Russian narrative are the ideas of an information space – the sphere of activity involving the creation, transformation or use of information, including individual and social consciousness, the information and telecommunications infrastructure and information itself (UN A/54/213, 1999, p. 10).

Moscow has called for a mechanism to identify the characteristic features of and classifying information wars and information weapons, as well as methods and means of information warfare. It has proposed to restrict traffic in information weapons and prohibit the development, dissemination or use of particularly dangerous types of information weapons as well as the use of information technologies as a means for hostile purposes and, in particular, against agreed categories of facilities. Moscow concludes that no adequate procedure exists for prevention of the unsanctioned use of information to influence other states (UN A/54/213, 1999, p. 10).

Arguably, 'information security' became the Russian term of choice because of the aggressive rhetoric of 'information warfare' in the mid-1990s US military thinking (Krutskikh, 2014). In the letter initiating disarmament talks on ICTs at the First Committee, Foreign Minister Ivanov pulled information technologies and means of telecommunication out of the more general discussions of the role of science and technology in the context of international security and disarmament (UN Resolution 43/77/A), inviting heightened attention to the potential uses of ICTs *for purposes incompatible with the objectives of maintaining international stability and security, the observance of the principles of non-use of force, non-interference in internal affairs and respect for human rights and freedoms*. Kremlin's rhetoric is very resolute on the disarmament account: We cannot permit the emergence of a fundamentally new area of international confrontation, which may lead to an escalation of the arms race (Letter A-C.1-53-3, 1998). The destructive effect of information weapon may be comparable to that of weapons of mass destruction (Letter A-C.1-53-3, 1998). Russia contours two main sets of threats to international information security: the threat resulting from information and communication technologies and the threat resulting from information itself (A-54-213, p. 9).

Washington's Wrapping

Ivanov's framing of the issue, indeed, echoes the language of the US doctrines. Between December 1992 and December 1996, the US Department of Defence (DOD) directives and Joint Doctrines instructed the US military services to conduct 'information warfare' (IW) defined as *actions taken to achieve information superiority by affecting adversary information, information-based processes, information systems and computer-based networks while defending one's own information, information-based processes, information systems, and computer-based networks* (JP 3-13.1, 1996, p. I-3). IW was to support the national military strategy but it required the support, the coordination and the participation of other United States Government (USG) departments and agencies as well as industry. The Joint Doctrine pointed out the need for the USG interagency effort to coordinate the protection of civil information infrastructures critical to the DOD´s interests and the need to de-conflict and coordinate offensive IW actions (JP 3-13.1, 1996, p. I-4). It was not until the end of 1996 that the US DOD seemingly downgraded the doctrinal ambition, starting to employ the corresponding term 'information operations'.

Throughout the UN discourse, the US has decisively rejected 'information security' as a subject of the international peace and security discourse. In the mid-1990s the White House was busy promoting 'a planetary information network that transmits messages and images with the speed of light from the largest city to the smallest village on every continent': '*From these connections we will derive robust and sustainable economic progress, strong democracies, better solutions to global and local environmental challenges, improved health care, and – ultimately – a greater sense of shared stewardship of our small planet* (Gore 1994). The Clinton-Gore Administration was behind the International Telecommunications Union (ITU) -backed initiative of Global Information Infrastructure. Washington's insertion in the UN dialogue of the term 'cybersecurity' shifted the focus to (critical) information infrastructure (UN A/RES/57/239; UN A/RES/58/199), particularly after the 9/11 attacks. While the US shared the Russian concern of cybercrime, the White House was not willing to accept the Kremlin's 'triad of threats' and regard the issues of cybercrime and terrorist use of ICTs as bundled and threatening international peace and security. Instead, Washington went to back to the drafting of the Budapest Convention on Cybercrime in the Council of Europe.

In contrast to the Russian focus on information, the US prefers to frame the discussion in the First Committee as one of 'international cyber security', strictly keeping the focus on any international peace and security concerns on ICT infrastructure rather than the information itself. Washington has concluded that the Russian call for an international convention to constrain the development or use of a wide range of information technologies includes an implicit extension to Governments of the right to approve or ban information transmitted into national territory from outside its borders should it be deemed disruptive politically, socially or culturally (UN A/59/116, Add.1., 2004, p. 3).

While the US is pushing the issue of information and information security out of the UN First Committee discourse, emphasizing the need to secure national information infrastructure, it is obvious that the strategic value of this infrastructure is related to its ability and dedication to carry data. Moreover, the US national security policy and doctrine, of the term, 'cyberspace', suggests that the subject is to be addressed and understood more broadly than just the infrastructure piece of it. According to the DOD, cyberspace is a global domain *within the information environment* consisting of the interdependent network of information technology, infrastructures and resident data, including the Internet, telecommunications networks, computer systems and embedded processors and controllers (DOD, 2016, p. 3). This understanding of the term is generally shared by the White House, according to the leaked, or in the US choice of words, *stolen*, Presidential Policy Directive on cyber operations policy (PPD, 2012).

The US doctrinal conception of 'cyberspace' constitutes a comprehensive and largely exhaustive framing of what the international cyber security discourse is really about. On the one hand, international cyber security concerns evolve around the demonstrably military features and uses of information and communication technologies. On the other hand, international cyber security issues evolve around civilian information and infrastructures and the global Internet (Tikk-Ringas 2016). As a combination of the American and the Russian propositions, international cyber se-

curity agenda *de facto* becomes a very carefully crafted, much-encompassing agenda that the strategic contestants have preferred to handle in a controlled environment.

Venue of Consensus: the UN Group of Governmental Experts

Since 2004, the threats posed by the development and use of ICTs have been regularly addressed by groups of governmental experts under the United Nations aegis (UN Group of Governmental Experts, GGE).

Permanent Members of the UN Security Council are by default represented in the GGE format. The rest of the Group is composed on the principle of equitable geographical distribution. Although UN GGEs are membered by individual experts rather than country representatives, the majority of experts are members of their respective governments, often from disarmament and international security background (UN A/60/202, pp. 3–4; UN A/65/201, pp. 9–11; UN A/68/98, pp. 12–13; UN A/70/174, pp. 15–17). The UN GGE reports to the UN Secretary-General on consensus basis. Discussions of the Group are not shared with the public.

As in the 2004/2005 consensus was not achieved in the UN GGE, the first threat assessment was reported by the 2nd Group of Experts in 2010. The Group was able to agree that ICTs *may be* used as an extension of state conflict and *can* also be used to threaten international peace and security (UN A/65/201 para 4). The 2012/2013 GGE was able to break through the proposition of a new treaty and channel the discussion to the applicability of existing international law to state uses of ICTs (A/68/98 para 6). The 2014/2015 GGE embarked on a series of recommendations on responsible State behavior in their uses of ICTs (UN A/70/174 para 3).

Cyber Capabilities and Operations: Theory and Practice

Two aspects in the UN GGE deliberations are particularly relevant to the question of international cyber security discourse benefitting from an arms control approach: the alleged trend of development of military cyber capabilities in a way pointing to an arms race and the threat of information warfare.

Development of Military Cyber Capabilities

The 2010 GGE report established the government-driven development of ICTs as instruments of warfare, intelligence and means of political coercion (UN A/65/201 para 7); The 2012/2013 Group was silent on the state development of military cyber capabilities. The 2014/2015 GGE, convening after extensive disclosures and coverage of the UK, the US and its allies' cyber intelligence capabilities and operations, concluded that 'States are rightfully concerned about the danger of destabilizing misperceptions, the potential for conflict and the possibility of harm to their citizens, property and economy' (UN A/70/174 para 7) and that a number of States developing ICT capabilities for military purposes makes the use of ICTs in future conflicts between States more likely (UN A/70/174 para 4).

Research findings on the nature and scope of military cyber capabilities have been inconsistent. A frequently cited United Nations Institute for Disarmament Research (UNIDIR) report provides a somewhat loose analysis of the state of development

of military cyber capabilities. As of 2013, it counts 114 countries with national cybersecurity programmes (UNIDIR, 2013, p. 1). However, as the report explains and as national strategies indicate, these national agendas can range anywhere between basic network security and declared offensive cyber capabilities. The report goes on to list 47 countries who give 'some role' in national cyber security strategy to armed forces, a frequently mistaken number for countries with military cyber capabilities. 27 countries are reported having established or planning to establish specific military cyberwarfare entities, 17 of which also comprise offensive military capabilities (UNIDIR, 2013, p. 3).

The International Institute of Strategic Studies' (IISS) Military Balance lists 30 countries with relevant cyber capabilities in 2011 (Inkster and Comolli, 2011). As Table 1 indicates, the majority of G20 countries have established or are planning to establish cyber commands or equivalent units.

Country	**Doctrines**	**Intent**	**Military Cyber Command or Centres**
Argentina			-
Australia		x	Australian Signals Directorate Cyber Security Operations Centre
Brazil			Cyber-Defense Command of the Armed Forces *(Comando de Defesa Cibernética das Forças Armadas)* Army Communications and Electronic War Centre
Canada			Director General Cyber Canadian Forces Cyber Task Force
People's Republic of China		x	3rd Department of the People's Liberation Army 4th Department of the People's Liberation Army
France		x	National Network and Information Systems Security Agency (*Agence nationale de sécurité des systèmes d'information*; ANSSI) Operational Centre for the Security of Information Systems (*Centre opérationnel de la sécurité des systèmes d'information*; COSSI) Cyber Defence Cell Analysis Centre for Cyber Defensive Operations (*Centre d'analyse de lutte informatique défensive*, CALID)
Germany		x	Das Betriebszentrum IT-System der Bundeswehr (BtrbZ IT-SysBw)
India			Cyber Command (planned) Army, Navy, and Air Force Cyber Cells
Indonesia			Cyber Operations Center TNI Cyber defence task force Army, Navy and Air Force cyber command centres
Italy			Defence Innovation Centre Division for Information Security Telematics Department of the Carabinieri
Japan			C4 Systems Command Cyber Defence Unit

Republic of Korea		x	Cyberspace Command Army Cyber Command
Mexico			-
Russian Federation		x	Cyber command (planned)
Saudi Arabia			-
South Africa			Cyber Command
Turkey			General Staff Warfare and Cyber Defense Command
United Kingdom		x	Defence Cyber Operations Group Global Operations and Security Control Centre Cyber and electromagnetic warfare unit
United States	x	x	USCYBERCOMMAND Army, Navy, Air Force, and Marine Corps cyber commands

Table 1. Military cyber commands of the G20 countries.

In the table, the doctrines column refers to developed body of doctrines considered here a necessity; it does not refer to a single and overall framework document that is called doctrine. Apart from the United States, very few countries have operational doctrines, cyber-specific units and established training and exercise regimes.

However, only less than half of these countries have declared their capabilities to include an offensive element. Most of militarily cyber capable countries are also biggest military spenders who regularly update their capabilities. In this context, it is essential to distinguish between military modernization and hostile intent behind the development of military cyber capabilities. Even for technologically capable countries, developing military cyber capabilities requires time, skill and finances. It is also often hard to tell military cyber capabilities apart from non-military (Tikk-Ringas, MilBal, 2014, pp. 19–22). Also, as Lewis and Inkster emphasize, the true value of cyber capabilities lies in intelligence gathering (Lewis, 2010; Inkster 2014).

It is safe to conclude that information and communication technologies are increasingly part of all military functions. There is, however, a wide performance gap between developed and developing countries as well as among Western allies. This gap and the fact that countries are working to improve their military efficiency, should not be read as evidencing an arms race.

The Threat of Information and Information Wars

The UN GGE has not been able to further elaborate on the threat of information wars central in the Russian framing of the arms control issue. The UN GGE has spent ink on the issue of cyber attacks. In 2015, the Group noted a dramatic increase in incidents involving the malicious use of ICTs by State and non-State actors (UN A/70/174 para 3). The Group pointed out using ICTs against the critical infrastructure and associated information systems of a State as the most harmful of such attacks, considering the threat 'both real and serious' (UN A/70/174 para 5).

Russian concern of loss of control over their information space remains. In Russian analysts' view information operations are one of the potentially most damaging forms of force, aiming at disrupting the functioning of enemy's key military, industrial and administrative facilities and critical systems and at manipulating infor-

mation (Komov, Korotkov and Dylevski, 2007, p.37). Thus, Moscow's preference is to engage the international community in restraining activities associated with formation, creation, transformation, transfer, use, storage of information impacting, *inter alia* individual and societal consciousness, information infrastructure and information itself (A-54-213, p.10; RU MOD, 2011). In this Russian conception, cyber operations include information operations, as psychological influences on another state's political and military authorities, troops and civil population using ICTs are seen as equally forceful, resulting in demoralization, disorientation of the public or mass panic (Komov, Korotkov and Dylevski 2007, p. 37).

Dylevski and others have recently observed that the Russian government's policy still prioritizes countering a military and political threat of ICT being used for aggressive purposes, including imposing an information weapons nonproliferation regime under international law (Dylevsky, Elyas, Komov, Petrunin and Zapivakhin, 2015, p. 7). They also conclude that the NATO countries led by the U.S., have set up a powerful information operations (IO) system and are going on expanding and improving it. Information weapons are being produced continuously and disseminated practically with no controls to keep them in check on the world market, with a fallout that instances of their unlawful use are multiplying (Dylevsky, Elyas, Komov, Petrunin and Zapivakhin, 2015, p. 8).

The US has been acting unilaterally to define and defend its own information environment as the aggregate of individuals, organizations and systems that collect, process, disseminate or act on information (JP 6-0 Joint Communications System (10 June 2015), p.ix, p. II-I - II-II; DOD, 2016, p. 3). As the US doctrine separates information operations from cyberspace operations, the US conception of cyber security threats excludes information as a weapon.

Recent US national security policy assessments question the potential of ICTs as tool of hard conflict. According to Director of NSA, cyber threats to US national and economic security, while expanding and increasing, are not likely to result in catastrophic attacks from any particular actor. Clapper categorizes the threat as one of 'low-to-moderate level cyber attacks from a variety of sources over time, which will impose cumulative costs on the US economic competitiveness and national security' (Clapper, 2015).

Acknowledging the military advantage provided by cyber attack capabilities and the role of cyberattacks in future military conflict, Lewis (2010) explains that cyberattacks are never decisive in winning a conflict, thus lacking the element of annihilation. Of the 100 most visible cyber attacks between 2006 and 2014, 60% constituted either industrial or classical cyber espionage and, of the rest, 30% resulted in disruption of online resources or services (ICT4Peace, 2015). This is in line with Libicki's analysis of no warfare having taken place in Ukraine in 2014-15. Libicky emphasises that cyber war is no 'silver bullet' and asks whether conventional assumptions of the feasibility of cyber war are correct. For him the evidence of absence speaks of too fast and too easy assumption 'that cyber attacks would unquestionably be used in modern warfare' (Libicki, 2015, pp. 50–51). In sum, while there is some evidence of covert government-on-government cyber operations, accounts of politico-military cyber attacks hardly speak of an existential threat or potential of mass destruction.

Arguments Against Cyber Arms Control

The strategic contestants have come to face the somewhat inconvenient situation where their attempts to stretch arms control measures to their cyber differences may have caused them more problems than solutions. Absent will to extend the arms control umbrella to criminal use in ICTs and non-state actor threats, the two contestants have hard time finding the true surface of conflict between them. In addition to obvious political challenges, there is a mismatch between the concept of arms control and the practical use of ICTs. Finally, where theories of soft arms control may be applicable, there are considerable alternatives to be considered for framing and deliberating matters of international cyber security.

Lack of Political Feasibility

Labelling cyber attacks 'a behaviour rather than technology', Lewis takes the view that information superiority in warfare and the ability to gain real military advantage from the use of information assets makes digital infrastructures too valuable a target to be declared off limits or for cyberattacks to be relinquished (Lewis, 2010). Similarly, Lewis points out that a commitment not to spy would not be agreeable (Lewis, 2010). Russian analysts are equally sceptical as to the US ever pursuing cyber arms control agreements (or any other regulation regarding the use of these capabilities) in this domain, referring to the US as the world leadership in information operations (Komov, Korotkov and Dylevski, 2007, p. 37).

The political impasse of cyber arms control is not limited to the factors characterizing the approaches of the strategic contestants, Russia and the US. By way of widespread adoption of ICTs, the theme of cyber security has become a topic concerning the majority of states. The gaps in their capacity, skills and awareness result in very different priorities and ideas about what constitute the main and actual issues of international cyber security. Over the two decades that the theme of international information security has been open to discussion, 64 governments have contributed their views on ICT-related threats and ways to address them. It follows from national views that not all ICT related threats are to be regarded as threatening international peace and security (…); that there are important other venues and processes that usefully contribute to international cyber security (…) and that many efforts in support of international cyber security are most usefully taken at national level. The predominantly pragmatic and experience-based national views emphasize the divide between the preferred focus of the strategic contestants on the one hand, and the general international community, on the other. Evident in national submissions to the Secretary-General are preferences for pragmatic and fruitful measures.

Kerttunen's analysis of the over 60 national cyber security strategies reveals that countries in general are mainly concerned and focussed on information society, *(domestic*) information security, public awareness, countering cyber crime and critical infrastructure protection. International cyber policy, especially normative development, governance, cooperation and capacity-building, is also a rather shared concern. However, very few countries have actually defined the role of the defense sector in national cyber security, and if they have it is mainly to support other national authorities (Kerttunen, 2017).

National approaches to international security emphasize the need for coordination and guidance in rather practical areas and issues, including the establishment of legal and administrative frameworks including a national cyber security organization; ensuring technical functionality and improving resilience (protection of governmental networks and system, vital services or functions, development of material and organizational capabilities). States also emphasize issues of supply chain security and trust in products and services as well as the need for skills and competencies through systematic workforce development and public awareness raising (Kerttunen, 2017).

With 111 countries having supported the Russian sponsored resolution in the past 11 years, it is obvious that international cyber security is a topic of acute concern for governments across the world. At the same time, discussions at the UN GGE have remained limited to 38 countries throughout the five rounds of discussions. The issue of international cyber security has not been opened in the UN Security Council. One can therefore conclude that there is little appetite among the strategic contestants to call for actual restraining measures. At the same time, the political preference and practical emphasis of the rest of the international community does not flag ICTs as a concern of international peace and security. Instead, the increasing interest in international cyber security dialogue indicates the need for a more inclusive dialogue and pragmatic guidance.

Lack of Conceptual Feasibility

However, it should be emphasized that ICTs do not fit the concept of *arms*. In an increasingly technology-centric life and world order, applying arms control regimes to whole fields or groups of technologies would run contrary to their potential. Our still emerging ability to deal with harmful *side effects* of technological development should not be read as the requirement, let alone evidence, for the need to cap the advancement and proliferation of it. Early commentators emphasize that ICTs, albeit *military capable technologies*, carry the potential of limitation of weapon systems and their destructive effects, being *thus likely to promote rather than threaten international security* (UN, 1990, p. 4).

Ranking the economic significance of technologies, the Organisation for Economic Co-operation and Development (OECD) has demonstrated a fundamental difference between nuclear and information technologies, the former being the framework technology of classical arms control. According to the OECD's early assessments, compared to nuclear, biotechnology, materials and space technologies, ICTs have the greatest significance in economic development (OECD, 1988). Despite the acknowledged competitive advantage that ICTs bring in military modernization, their competitive advantage is even larger in the industry. Combining that with the heavy private sector factor in both capability manufacturing, innovation and threat couriering, state-on-state arms control would remain short of expected efficiency, even in the possibly more bellicose cyber environment of the future.

The prosperity promise of ICTs has been prominently highlighted in the early UN discussions of their potential:

> "Information technology is an extraordinarily pervasive technology. It underpins advances in materials, space, nuclear and biotechnologies

> /…/ for a technology to have pervasive effect it should a) generate a wide range of new products and/or services; b) have applications in many sectors of the economy; c) reduce the costs and improve the performance of existing processes, products and systems; d) gain widespread social acceptance with minimal opposition; and e) generate strong industrial interest based on perceived profitability and competitive advantage (UN 1990: 15, para 61)."

Obvious difficulties in applying arms control measures to cyber capabilities include the challenges of verification and attribution. Lewis anchors the issue of verification in the lack of transparency, noting the reluctance of states to discuss or even admit that they possess relevant capabilities, because of the nexus of cyberattack and cyber espionage means (Lewis 2010). Others add that essential parts of cyberattack capability are widely available from different sources and can be reproduced trivially and that accounting and verifying code is hardly possible (Owens, Dam and Lin, 2009, p. 324).

A thorough discussion of attribution is not achievable within this paper. The UN GGE reports undoubtedly consider the difficulty of attribution (UN A/65/201 para 7; UN A/68/98 para 6; UN A/70/174 para 5) a key issue in international information security. Attribution itself is a multi-layer capability that remains beyond the reach of technologically less advanced and dependent states: '*few States now know what passes over their networks en route to somewhere else or what the intent of that traffic may be, due to the covert or clandestine nature of these exploits'* (Lewis, 2010). However, related to the attribution issue is the role of non-state actors in cyberattacks against government information systems and critical national infrastructure (Rid, 2012). The kind of attribution that corresponds to the current type and level of cyber threats is not a military capability *per se*. Principal network security is the main premise of the ability to identify the source of malicious activity.

Alternatives to Cyber Arms Control

Arms control is but one possible approach to achieve international cyber security. Peace in cyberspace or a peaceful cyberspace can be achieved not only through manipulation of military force and application of military strategy but extensively also by civil-military cooperation and civil defense. To question Schelling's and Halperin's assumptions, it is hard to conclude that ICTs in their current state of development and deployment increase the likelihood of hard conflict or that there is an existential threat to the international community deriving from the development and proliferation of ICTs. To take Bull's turn, ICTs definitely are a key to international peace, security and stability in our days, especially due to their parallel promise of economic and societal progress. The missing link in the current state of affairs becomes the predominantly military interrelationship between the two.

As little to nothing in the cyber discourse indicates a dire threat to international peace and security and there is little indication of the appetite to bring the issue to serious and transparent international security dialogue, one must regard considerable portions of the international cyber security *problematique* as lack of awareness, political will and capacity. Cyber insecurity, in the current state of affairs, appears to refer to lack of confidence, understanding, skill and resources to properly address risks to

societal security that stem from the widespread adoption of ICTs. Inherent vulnerabilities in ICTs have only come to political awareness in the past decade, a time not long enough to get fully conversant in technologies of largely Western origin (Tikk-Ringas, 2016, Chapter 10). As indicated by the processes of cyber security related confidence building and norm development, focal points in international cyber affairs are in transparency and cooperation, with heavy emphasis on the need to better understand and govern the now ubiquitous technology.

Even where states have found the purposes of arms control proper relevant to their cyber affairs, they have so far reached for political control measures to build confidence, reduce insecurity and increase predictability and certainty of behavior.

Confidence Building Measures

With ICTs now being acknowledged as a source of great insecurity for states worldwide, avoiding miscalculation or misperception in case of a cyber incident and the consequent inappropriate escalation of a crisis situation get considerable attention. In 2013, the Organization for Security and Co-operation in Europe (OSCE) countries signed up to 11 confidence building measures (CBMs), to 'enhance interstate co-operation, transparency, predictability and stability, and to reduce the risks of misperception, escalation, and conflict that may stem from the use of ICTs' (OSCE, 2013). According to the OSCE, the 2013 measures can be categorized as 'posture' measures (exchange of national and transnational threats to ICTs (CBM 1); transparency on measures taken to ensure open, interoperable, secure and reliable Internet (CBM 4); exposure of national organizations, strategies, policies and programmes – including cooperation between public and private sector (CBM7); nomination of focal points (CBM 8); listing relevant national terminology (CBM 9)); 'communications' measures: consultations to prevent possible emergence of political or military tension or conflict/protect critical ICT infrastructure (CBM 3); use of OSCE as platform for dialogue, exchange of best practices, awareness raising, and info on capacity building (CBM 5); use of OSCE platforms and mechanisms to exchange info on CBMs (CBM 10) and further meetings at least three times a year/development of additional CBMs (CBM 11). The third category of CBMs, 'preparedness' measures, include commitments to facilitate cooperation among relevant national bodies (CBM2), put in place modern and effective legislation to facilitate effective cross border cooperation between authorities to counter terrorist/criminal use of ICTs (CBM 6) and establish rapid communication lines between authorities on the policy levels (CBM 8) (Hiller, 2016).

Additional measures agreed in 2016 include facilitation of further cooperation formats and educational events; cooperation between public and private sector; regional and sub-regional collaboration and responsible reporting of vulnerabilities (OSCE, 2016). Further confidence-building programmes are built in the Association of Southeast Asian Nations (ASEAN) Regional Forum and the Organization of American States (OAS). Also, the 2013 and 2015 UN GGE reports contain sections on confidence building measures.

Despite their conceptual orientation at conflict prevention, these measures underscore the developmental nature of ICTs and emphasize step-by-step development

of national understanding and responsibility for their ICT infrastructure as the main guarantee to stability and security in cyberspace.

Upholding and Developing International Law

In parallel to CBMs, the international cyber security discourse at the GGE has embarked on a discussion of voluntary and non-binding norms of responsible state behavior as well as ways to apply international law to acute and potential issues of cyber security. The UN GGE has emphasized the lack of common understanding regarding acceptable state behavior as a factor contributing to vulnerabilities, the risk of instability and misperception (UN A/65/201 para 7; UN A/68/98 paras 6 and 8; UN A/70/174 para 8). As such, the UN GGE, despite their findings that uses of ICTs may result in threats to international peace and security, has decided to counter this prospect with better understanding and agreement on international law and the discussion of further voluntary norms for responsible state behavior. The GGE therefore confirms Larsen's observation, whereby the mere act of (quasi-) negotiating arms control also could lead to better communication, deepened understanding and reduced hostility among adversaries (UN GGE, 2015; Larsen, 2002).

In the context of international law the few observable state-on-state cyber operations testify of manipulation of existing international law below the UN Charter threshold of use of force, supporting the early cyber operators' prediction that cyber operations put more pressure on application of the law of sovereignty and non-intervention than they do on international humanitarian law (Antolin-Jenkins, 2005). While emphasizing the 'soft' nature of cyber threats, this observation highlights the need for legal certainty and predictability in international cyber affairs.

National Due Diligence

Many states see the threat related to ICTs a developmental rather than an existential one. States' heavy reliance on information and, therefore, on the imperatives of modern information processing demonstrates how nations that fall behind in ICTs fall behind everywhere (UN, 1990, p. 18). State behavior widely indicates that ICTs are regarded more as a technology of development and economic and social progress than primarily a military matter. National IT and digital strategies seek to develop prosperity and well-being of citizens, secure functional economic environment and promote sustainable way of life. National cyber security strategies echo these goals.

Many of the states' strategic goals require domestic rather than international action and solutions. The very pragmatic goals and priorities cannot be adequately solved by way of abstract discussions of international law or by creating international cooperation mechanisms where national capacity to cooperate is absent. The threat resulting from ICTs is not a form of natural disaster – in most cases, we are dealing with self-inflicted vulnerabilities and exploitation opportunities that are best mitigated by domestic decision-making and tailored engagement with key partners.

Appetite for role models might explain how alongside Russia and United States, small and agile ICT adopters have gained authority in the international cyber security dialogue. Through its experience with large-scale cyber attacks against its gov-

ernmental and critical private sector services, Estonia has emerged as a veteran country in the UN GGE dialogue. Agile countries like Finland, the Netherlands, the Republic of Korea and Singapore have excelled not only in having strategic vision of the role of ICTs in their societies, economies and ways of life but in being able to establish well-functioning services and well-protected cyber environments. Such states and their functioning are exemplary in individual *ex ante* cyber security approaches with emphasis on individual accountability for international security and stability.

Implications on Arms Control Theory

While the original Russian approach to cyber arms control has not proved a successful route, this, in and of itself, does exclude the relevance of arms control theory and concepts to mitigating international cyber threats. We embarked above on Larsen's observation that any form of negotiations may result better clarity of both feasible and non-feasible ways forward. There is also value in minding the arms control theories for the purpose of more clearly and constructively positioning one's specific question or proposition. However, two specific angles to arms control in the conjunction of cyber merit extra attention. First, the current mismatch between the classic arms control theory and cyber security discourse does not rule out that arms control might be feasible in the area of ICTs at a later stage or in a narrower setup. Second, one therefore needs to keep tracking the ICT capabilities and to understand the role of ICTs in the dynamics of contemporary conflict and contestation.

The Need to Keep Tracking the Observables

Given the lack of appetite to allow restraining of development and use of military cyber capabilities, it would be premature to dismiss the possibility of military threat to information systems and data resident therein. Classical military strategy values deception and attacking enemy plans before attacking its force, thereby making information both a means and a target. Modern military operations, functions and weapon systems are dependent of constant flow of information-as are also other potential targets of contemporary high and low intensity conflicts. An important aspect in further analysing these positions and their implications is to consider the divergence of both definition and understanding of the terms 'information warfare', or 'cyberattack' in various actors' vocabularies, national military doctrine and state practice. The ability to successfully apply arms control theories to ICTs will depend on the ability to detect and trace their actual value in politico-military affairs and define the parameters that make arms control not only necessary but also possible.

Despite Lewis's skepticism towards transparency of national capability development and deployment there are many objectively measurable and verifiable aspects in cyber capability development. Kerttunen (2017) concludes that rather many cyber capabilities are, in fact, quite tangible and observable. His typology of the measurable aspects of military cyber capability includes military cyber doctrine(s); military cyber organization of cyber commands and cyber-specific units; the most essential technical platforms or technologies employed by the cyber-specific units; financial and human resources and major operations and exercises (Kerttunen, 2017).

Kerttunen proposes a simple template to detect and measure the level and development of military capabilities:

Capability	Measurement	Criteria
Cyber Military Strategy, Doctrine(s), or Field Manuals incorporating cyber operations	Existence: yes/no Character: defensive/offensive/active/reactive	Published or otherwise known cyber-specific military strategy, doctrine or field manual. Doctrinal statements on cyber operations.
Cyber-specific commands and units	Name (designation) Number of	Capacity to conduct CO (CNO, SIGINT and EW) and IO (if defined as an umbrella term).
Technical platforms	Type (name and designation) Number of	Capacity to create cyber effects; deployed to and employed by cyber-specific units
Financial and human resources	Total budget US$ Operational budget US$ Developmental budget US$ Number of personnel	Allocated to cyber commands, operations or research and development
Operations and exercises	Type of operation or exercise	Significance as a demonstrator of national or cyber military capability.

Table 2. A template to detect and measure the level and development of military capabilities

This approach could prove valuable in enhancing transparency for both research and political purposes and foster cooperation or joint action among willing participants. The question remains of the deployable cyber capabilities and the weaponry that these forces and facilities are developing and employing.

The Need for Understanding of Contemporary Conflict and Appropriate Regimes

A perhaps cynical question, still in line with the theory of arms control, is whether ICTs and their auxiliary technologies, mainly unmanned systems and autonomous weapons, may be an example of what states may in the future regard as categories of armaments that reduce the potential of another bloody conflict and unwanted escalation. ICT infrastructure, let's remind us, was the very measure of crisis communication in the 1960s. The frequency of state-on-state conflict and the number of casualties have steadily increased over the past 70 years. It might, therefore, be that instead soft arms control encompassing non-state actors we might be looking, in the not-so-distant-future, at the need to develop a *de novo* regulatory framework that expands the premises of adversarial conduct and its consequences to corporations and makes them part of an internationally agreed control regime.

Developing a regime like this, or speaking against it, requires insightful and critical academic discourse. It requires the Bulls and Schellings of our own generation to come forward with ideas that build on, but also let loose of, the ramifications of their predecessors. Supporting this kind of research requires not only strong academic cultures but a policy-informed academic debate that governments must decisively support.

Conclusion

The evidence behind strategic contestants' military cyber threat narrative makes it hard to satisfy Bull's reconditions on antagonism and primarily military focus of the issue (Bull, 1961). Apparently, factors that pose danger to individuals, society and the state and their interests in the information space are many, but not predominantly military or state-centric. As it stands, in the context of ICTs, prevention of conflict comes secondary to developing confidence and transparency.

An examination of the underlying principles and objectives of arms control in the context of ICTs indicates that these remain relevant today. One has to ask if it is necessary to try to apply them to the issues at hand. Just as the law of armed conflict, that has its roots and rationale in the devastating forms and effect of state-on-state conflict is found to be of secondary relevance in the context of ICTs, it is pertinent to ask whether stretching the concept of arms control to technologies with great economic and societal promise can prevent us from finding the right incentives and balance points for internationally responsible state behavior. Could security simply lie in responsible state behavior and in equal and transparent access to information?

Struggling with the answer to the above, we must not let go of other questions and leads. Nothing in the current state of international cyber affairs and states' current focus on soft regulatory measures prevents ICTs from becoming a primary means of conflict in the future or the current soft regimes producing a 'proper' arms control regimes over time, when national capabilities and their use mature. There is little doubt that states will continue making use of advanced technologies in the full range of military, covert and intelligence operations.

Finally, even at the time of reduced and covert antagonism, arms control theory offers valuable anchoring points for achieving and maintaining international peace and security in the context of ICTs. They should not be dismissed simply because we believe they are currently of no dire use. As then, all discussed forms of politico-military cooperation between potential enemies in the interest of ensuring international stability are to reduce the potential of conflict.

To prevent our academic inquiries to remain just that, it is essential to consider all possible futures and the corresponding arsenal in our disciplines. It is, therefore, essential to be aware of parallel developments in theories of international peace, security and stability and anticipate the need for quick and out-of-the-box real world adaptations.

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9

Current Challenges Regarding Arms Control and the Law of Outer Space

Tamás Lattmann[9]

Abstract

This chapter examines the legal framework applied to stationing weapons of mass destruction in outer space and on celestial objects. It also outlines the most important organisations and tries to explore the current and near future challenges related to this issue-area. The legal framework is currently built on the 1967 Outer Space Treaty (OST), which has been ratified by nearly one hundred states and signed by nearly thirty more. In general, it prohibits the stationing of weapons of mass destruction in outer space and on celestial objects as well as any military activities. The general aim is to ensure the peaceful use and exploration of space. The chapter analyses the OST and evaluates its performance and politico-legal results. Apart from the OST, the experts' work in various international and domestic organisations has also produced results (e.g. UN resolutions). The chapter will give an overview of these as well. As a result of technical and political development (e.g. the US missile defence programme, new weapons to be used in outer space), the system of the OST now clearly seems to be unsatisfactory to many political actors, so plans for further international legal development are possible. This chapter will also outline those developments.

Introduction

Even before mankind stepped into outer space, experts of international law had already started to analyse potential legal questions connected to the use, exploration and possible exploitation of space, including celestial bodies, as indicated by the papers by Potter (1958), McDougal and Lipson (1958) or Mander (1958). Already at this early time, it became quite clear that one of the dangers is that states, especially those with potential space faring capabilities, will make sovereign claims to parts of space or planets and the possible resources therein. This danger has been recognised by the U.S. Senate (1961). One of the most important events leading to this recognition was the landing of the Luna 2 (Lunik 2), the first man-made robotic spacecraft reaching the surface of the Moon on 14 September 1959 – its 'CCCP' markings have been interpreted by many as a symbol of a modern 'conquest'. As a result of this recognition, professional literature started to address the political elements of the Cold War quite early. As the space race between the United States and the Sovi-

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et Union started and gradually intensified, the practical analysis of the 'Soviet' approach (Crane, 1962) was shortly followed by the theoretical, even a 'Marxist' approach (Crane, 1963). Later, some important practical and theoretical problems have been crystallized, for example the question of space debris (Roberts, 1992; Mirmina, 2005), or issues regarding a possible space war (Kavka, 1985). Additionally, arms control, especially the non-proliferation of weapons of mass destruction in outer space, has also become one of the most significant issues, of which the present chapter aims to give an overview.

International Law Applicable to Outer Space

Provisions of international law regarding arms control in outer space take the form of various documents and instruments. The goal is not only to provide for more security on Earth by trying to limit the arms race but to also to protect space, which is still mostly unknown to mankind. While currently existing rules set limits to the militarisation of outer space, especially as far as nuclear weapons and weapons of mass destruction are concerned, military activities are still possible and legally binding constraints could be stricter.

International Treaties Applicable to Outer Space and Arms Control

During the past decades, the following international treaties, which regulate the use of outer space and have relevance to arms control, have been adopted by states:

- Treaty banning nuclear weapon tests in the atmosphere, in outer space and underwater (Partial Test Ban Treaty – PTBT), 1963;
- Treaty on the principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies (Outer Space Treaty – OST), 1967;
- Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space (Rescue Agreement), 1968;
- Agreement relating to the International Telecommunications Satellite Organization (INTELSAT Agreement), 1971;
- Convention on the international liability for damage caused by space objects (Liability Convention), 1972;
- Convention on registration of objects launched into outer space (Registration Convention), 1975;
- Agreement governing the activities of States on the Moon and other celestial bodies (Moon Agreement), 1979;
- Convention on the International Maritime Satellite Organization (INMARSAT Convention), 1985.

While existing international treaties make references to the obligation of the peaceful uses of outer space and contain some provisions that prohibit or restrict the deployment of various weapons, including weapons of mass destruction and nuclear weapons, as well as prohibit the use of force or military activities in some parts of space, these have not proven to be satisfactory to keep outer space weapons-free. Scientific and technological progress is usually not easy to follow for law, especially for international law, so international treaties have gradually tried to regulate various

aspects step-by-step, only to be often temporarily blocked by the political interests of various states.

Later, we are going to look at some of the treaties which are relevant to the subject of this chapter.

International Customary Law

Apart from the provisions of international treaties, the norms of international customary law are also legally binding. As early pointed out by McDougal and Lipson (1958), the short time period of any state practice in outer space has made it more difficult to recognise legal norms having any customary power. But the practice of international law has developed the concept of 'instant' customary law, meaning that customary power can also be established after a short time in the case of consensus – for example the principle of non-applicability of sovereign claims regarding outer space became accepted after the first artificial satellites were launched by some states (Shaw, 2008, p. 78). This means that customary legal norms can be identified even in relation to outer space, regardless of the low number of states with actual outer space activities and the relative shortness of the time period in question.

In terms of the arms race and weapons of mass destruction, especially biological and chemical weapons, the situation is better, as norms applicable to such weapons have already been recognised as having customary power, thus being legally binding regardless of their location (Henckaerts and Doswald-Beck, 2009, p. 256, 259).

UN Bodies Dealing with Questions Related to Outer Space and Arms Control

United Nations General Assembly

The main role of the United Nations General Assembly (UNGA) is to serve as a venue for international debates and consensus-building. As all UN member states are represented in the Assembly, it provides an open and accessible place for states to participate in decision-making regarding outer space, including in matters of international peace and security. The Assembly's regular sessions convene annually in September but the majority of its work is organised in its six specialized committees.

The most important one of these which is mainly responsible for the General Assembly's work on disarmament is the First Committee, the Committee on Disarmament and International Security.

Evaluating the role and the importance of the General Assembly, it has to be noted that while it does not have the power to create legally binding norms (like international treaties) in itself, it has a role in creating political consensus and soft law sources. International treaties adopted in the framework of the Assembly become legally binding after states' ratification, but sotf law norms are also very important. While not being legally binding, these soft law sources may reflect an already existing consensus on some questions and indicate directions for future international treaties. They can include ideas which may not be politically mature enough to meet the expectations and concerns of all states but may still serve as basis of future legal development.

For example, if the Assembly could reach a consensus to adopt a resolution drafted by Russia and China on transparency and confidence-building measures, it would mean a possible step towards a legally binding treaty on the prevention of arms race in outer space.

Some of the most important resolutions of the General Assembly related to outer space and arms control are:

- Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space (1963);
- Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992);
- Prevention of an Arms Race in Outer Space (1999);
- Transparency and Confidence-Building Measures in Outer Space Activities (2006).

Conference on Disarmament

The Conference on Disarmament (CD) is the primary body of the United Nations for negotiating various UN disarmament treaties. As such, it has an important role in the non-proliferation of arms in outer space as well.

One of the main agenda items has been the prevention of an arms race in outer space (PAROS), on which the Conference established an *ad hoc* committee in 1985. It worked until 1994, without much success. The reasons will be explained later.

UN Committee on Peaceful Uses of Outer Space

The Committee on Peaceful Uses of Outer Space (COPUOS, often referred to as the Outer Space Committee) was established in 1959 by the UN General Assembly with its resolution titled 'International co-operation in the peaceful uses of outer space'. The tasks of the body cover a wide range: to coordinate international cooperation, to create UN programmes related to the peaceful use of outer space, to disseminate information on outer space and to consider any legal issues that may arise from the exploration of outer space. The Vienna-based Committee has two subcommittees, the Scientific and Technical Subcommittee and the Legal Subcommittee.

Accordingly, the activities of the Committee do not focus exclusively on arms control, but many of its achievements have at least indirect connection to this issue as well. One example of the Committee's work are the debris mitigation guidelines which were adopted in 2007.

The Outer Space Treaty

The fundamental international convention governing the subject of this chapter is titled 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies' (or simply just the 'Outer Space Treaty'). It entered into force in 1967, and it has also been one of the first signs of the preparatory work potential of the United Nations. The

COPUOS has had an important role in the drafting of the treaty, just as the UNGA had served as a vital stage for hammering out any political differences.

The Treaty has created the basic framework for a new field of international law, international space law. In addition to drafting numerous norms for a new, unprecedented activity for the whole of mankind, it has also introduced rules regarding the proliferation of weapons in space. In particular, it has prohibited the placement of nuclear weapons or any kind of weapon of mass destruction both in outer space and on celestial bodies. Additionally, it has also established the basic principles of the peaceful use of outer space. One of the most important of these is the requirement that exploration and use of outer space shall be carried out for the benefit and in the interests of all states. To prevent any race for domination, it has also stipulated that the Moon and other celestial bodies cannot be subject to national appropriation or any claims of sovereignty. Consenting to this creates a consensus among the states party to the treaty.

To ensure the peaceful use of outer space, the Treaty does not only ban the stationing of weapons of mass destruction (WMD) in outer space, but also prohibits military activities on celestial bodies, and spells out legally binding treaty norms regulating the peaceful exploration and use of space.

Currently 105 states are parties to the treaty and 24 others have signed it but have not yet completed ratification. The importance and political weight of the treaty is shown by the fact that out of all those states with potential space-launch capacities and capabilities, only North Korea has not signed it yet. However, concerns of states (for example about the missile defence plans and the space policy of the United States) have led to negotiations and the adoption of additional international agreements on outer space. Of course, these proposals serve as a basis for political and professional debates on the international stage, for example China arguing in the UN Conference on Disarmament for a specific treaty on the prevention of an arms race in outer space, while the US opposes it, arguing that it is not needed, as there is no direct threat of any arms race in space.

History of the Treaty

International negotiations about preserving outer space for peaceful purposes began during the late 1950s in the framework of the United Nations. These negotiations supplemented the emerging space race between the two political blocs, more specifically the United States and the Soviet Union. No wonder that initially the contesters' position determined their attitude towards the legal regulation of this field. A proposal from Western states in 1957, which was aimed to reserve space exclusively for 'peaceful and scientific purposes', including a control and verification system, was rejected by the Soviet Union, which had just prepared to launch the first satellite from Earth and to test its first intercontinental ballistic missile.

The UN General Assembly gained an important initiative role under these circumstances. In 1963, it adopted two resolutions on the question of outer space, titled 'Question of General and Complete Disarmament' and 'Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space', which have gained vital importance, as they became the basis for the treaty adopted later. The first resolution called upon all states to refrain from stationing

weapons of mass destruction in outer space, while the second one laid down the basic legal principles on the exploration of outer space, for example that all countries shall enjoy the right to explore and use outer space.

The path broken by the Assembly finally led to the adoption of a mutually agreed text, based on different draft texts submitted separately by the United States and the Soviet Union in June 1966. The final text was adopted by the Assembly on 19 December, 1966, and the treaty was opened for signature in Washington, Moscow and London on 27 January, 1967. It entered into force on 10 October, 1967, after reaching 5 ratifications. Currently 105 states, including all major space faring countries are parties to the treaty, and another 24 have signed, but not ratified it yet.

General Obligations Deriving from the Treaty

The Treaty's provisions stipulate that space is not the domain of any single state, and that all of them have the right to explore it. Space itself and celestial bodies enjoy exemption from any national claims of ownership and shall be spared from any contamination and harm by states. Those engaging in exploring space shall be responsible for any damage they may cause.

The Treaty gives new substance to the general international legal principles of 'cooperation and mutual assistance', for example by creating the obligation of astronauts of one nation to provide aid to others belonging to another state in case of need.

The provisions of the Outer Space Treaty can be amended, and state parties are able to withdraw from it. State parties can propose amendments, which can enter into force after being adopted by the majority of the parties, and those will only be binding on the states consenting to those changes. A state party to the Treaty can withdraw from it unilaterally, which takes effect a year after the state has submitted a written notification to the depositary states (Russia, United Kingdom and United States). However, in this case, according to the general rules of international law, the state still remains bound by those treaty provisions that have gained customary force, which raises a special question: since the original adoption of the Treaty, prohibitions under international law regarding weapons of mass destruction have grown to such a level that it is hardly imaginable that withdrawal from the Treaty could lead to any state instantly getting rid of all legal obligations.

One of the weaknesses of the Treaty is that it does not provide for serious verification or inspection procedures. It aims for cooperation among states, for example by requiring state parties in the case of a launch to consider requests from other states for 'an opportunity to observe the flight' of the space object launched. In addition, it calls for some transparency with possible confidence-building effects by stipulating that states shall allow access to each other's representatives to their 'stations, installations, equipment and space vehicles on the Moon and other celestial bodies'.

Arms Control Provisions in the Treaty

Article IV of the treaty provides for its arms control provisions. Based on it, state parties to the Treaty take the legal obligation not to:

- place in orbit around the Earth or other celestial bodies any nuclear weapons or objects carrying weapons of mass destruction;
- install weapons of mass destruction on celestial bodies or station those in outer space in any other manner;
- establish military bases or installations, test 'any type of weapons,' or conduct military exercises on the Moon and other celestial bodies.

While the treaty seemingly operates with strong prohibitions, its provisions leave some gaps and open up interpretive space for various states.

While it explicitly forbids any states from deploying nuclear weapons or any other kinds of weapons of mass destruction in outer space, it leaves the term 'weapons of mass destruction' undefined. Following the common interpretation, it is possible to conclude that the term refers to nuclear, biological and chemical weapons, but this interpretation ignores the fact that some conventional weapons may have similar destructive capacities, as the ones listed above, for example the BLU-82/B or the GBU-43/B bombs, the overpressure of which can be compared to nuclear weapons. The option of allowing those can work against the general goal of the Treaty, namely keeping space arms-free.

Additionally, the Treaty does not explicitly prohibit the launch of ballistic missiles from Earth through space, which can be armed with warheads that can be qualified as weapons of mass destruction. This gap can arguably be filled up by referring to the specific prohibition of the use of weapons of mass destruction under international humanitarian law, developed by the relevant treaties on bacteriological (biological) and chemical weapons. But as nuclear weapons are not covered by those, the prohibition is far from being exhaustive. Additionally, it may be worth mentioning, that even the International Court of Justice has found it hard to state that there is a clear prohibition of nuclear weapons under international customary law (I.C.J., 1996).

Since the Treaty persistently emphasises that space has to be used for peaceful purposes, many analysts argue that it can be interpreted broadly, prohibiting not only weapons of mass destruction, but all other types of weapons systems in outer space as well. Contrary to this, by analysing the text we can conclude what sort of military activities are – at least implicitly – allowed by the Treaty, which argues against this broader interpretation:

- As indicated above, transiting outer space (meaning leaving airspace, entering space, then returning towards their target on Earth) by objects carrying nuclear weapons or weapons of mass destruction is not prohibited under the Treaty, as long as these do not start to 'orbit' Earth.
- Similarly, the same kind of weapons are not prohibited to leave Earth's orbit, provided that they are not targeted on any celestial bodies, or objects 'stationed' in outer space.

- The Treaty's prohibitive rules are not so strict with other types of weapons, that do not qualify as weapons of mass destruction. Under the Treaty, it is not prohibited to place such weapons in orbit, only on the Moon or other celestial bodies. Employment of a restrictive interpretation of the treaty's text can lead to the logical result of the Treaty allowing attacks against targets in space or on the surface of the Earth (with only provisions of international humanitarian law setting restrictions), or the permission of the deployment of armed spaceships.
- States party to the Treaty are not prohibited from creating military bases or any installations in outer space, only on the Moon or other celestial bodies. This means the possibility of sending military satellites in to orbit and outer space, as constant and extensive state practice evidences today.
- The Treaty does not set any prohibition on anti-satellite or anti-missile weapons, as long as they are not nuclear or do not qualify as weapons of mass destruction, meaning that they can be based or operated either in outer space or from the Earth.
- The Treaty allows any weapons tests (both conventional and weapons of mass destruction) in outer space, but not on the Moon or other celestial bodies.

The Partial Test Ban Treaty

The Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (shortly: Partial Test Ban Treaty) has an important effect on arms control in outer space (apart from its enormous importance in non-proliferation of nuclear weapons, introduced in another chapter of this volume), as it has filled some of the gaps we have identified with the Outer Space Treaty. It was adopted in 1963 and entered into force in the same year. Currently, 126 states are party to it, including the states possessing nuclear weapons.

The general goal of the Treaty is the non-proliferation of nuclear weapons, as state parties to it take the obligation 'to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control: in the atmosphere; beyond its limits, including outer space; or under water'.

The text provides for a prohibition of both test and live explosions of nuclear devices in outer space, which are not explicitly prohibited by the Outer Space Treaty.

Similarly to the Outer Space Treaty, the Partial Test Ban Treaty has a weak and insufficient inspection or verification regime. This may change in the future with the Comprehensive Nuclear Test-Ban Treaty (CTBT), adopted in 1996, entering into force. It aims to make a full prohibition of nuclear test explosions by extending the ban to explosions conducted underground and it will also add more developed verification and inspection provisions, which could be used for controlling compliance with the Partial Test Ban Treaty as well. Unfortunately, the time of entry into force of this treaty is currently not easy to predict. According to Article XIV, it will enter into force 180 days after the ratification of all 44 states, which have operated nuclear installations at the time of the adoption of the treaty.

Developments Related to Arms Control in Outer Space

As a result of continuous technical development and challenges posed by the constantly changing international political environment, the normative content of the original treaties has become subject of intense scrutiny and analysis. Already since the early 1980s, the Conference on Disarmament (CD) has taken these issues on its agenda and considered proposals for example under the title 'prevention of an arms race in outer space'. These initiatives have included proposals for draft treaties on for example preventing the placement of weapons in outer space and prohibiting the use of weapons developed against satellites.

Of course this was not only a profession-directed ambition from the UN or its agencies. While the existence of a professional policy-making intention is not to be denied, as is usual with the development of international law, actual state interests serve as a strong catalyst. This is true, even if from time to time the activities of these bodies seemingly slows down or even gets suspended for a certain period of time.

In addition to individual states, the General Assembly has also kept its eye on the subject. For example in 1990, it requested the Secretary-General to employ a group of governmental experts to collectively carry out a study on the possibilities of confidence-building measures in outer space, a work that came to its first result in 1993, in the form of a report (A/48/305, 1993).

Prevention of an Arms Race in Outer Space (PAROS) and Prevention of the Placement of Weapons in Outer Space (PPWT)

Concerns about an armed race in outer space have been raised by analysts ever since mankind has gained access to outer space, and it has constantly intensified with technical development (See for example descriptions by Garthoff (1980–1981), Din (1983), Rosas (1983) and Dahlitz (1988)). At the same time, public opinion also started to pay attention to the question, as shown by the analysis of Graham and Kramer (1986). While also political consensus seems to have formed among states about the necessity of preventing an arms race in space, with numerous resolutions and negotiation results in the framework of the United Nations, the adoption of an international treaty on this matter is still out of sight. A lack of compromise between states is a serious obstacle to that, as in the present framework of international legal regime, the lack of will and/or the strong objection of states prevents any adoption, especially if this will is missing on the part of one or more of the leading states engaged in space activities. This may be especially problematic in cases when one party's consent and willingness to cooperate is an obvious precondition of the other states' willingness to engage in legally binding measures, which means a natural restriction of their own potential as well. As a result, no such international treaty that is able to comprehensively prevent the deployment of weapons in outer space or to prevent a possible arms race there has yet been negotiated.

The persistent position of the United States is, that as there is no actual arms race in outer space, any international treaty on the issue or any action on the issue is unnecessary. On the other hand, other states argue that even if it does not exist yet, prevention is justified and needed to make sure that space will not become weaponised.

During the past several years the Conference on Disarmament (CD) has served as the institutional framework of negotiations and debates related to the burning questions of arms control in outer space and also as a legal-political battlefield between states arguing on these. China and the United States have engaged in a long and not really constructive debate on this issue: the operation of the Conference has been stalled for years, as China has been preventing consensus within the CD to initiate other topics as long as the United States is unwilling to engage on the issue. The relationship develops slowly, for example as the result of first successful Chinese test of anti-satellite weapon in 2007 (Zhang, 2011) that clearly changed the political dimensions.

The General Assembly resolutions on the Prevention of an Arms Race in Outer Space (PAROS) have aimed at developing the Outer Space Treaty, based on the recognition that the existing international legal system does not in and of itself guarantee the prevention of an arms race in outer space. They call for states, especially the ones with space capabilities, to refrain from actions contrary to the objective of PAROS and for them to contribute to the reinforcement of the outer space legal regime. Building on the earlier work of the Conference a new treaty would be adopted that would complement the Outer Space Treaty. It would prevent use of space weapons and development of technology related to space-weapons, including missile defence systems. This treaty would be capable of preventing states from gaining a military advantage in outer space, limit a space arms race and reduce the military uses of outer space.

As we saw, the United States has expressed resistance towards PAROS, as a result of which the Conference on Disarmament has stepped away from it, and instead has started to focus on a possible treaty to prevent the placement of weapons in outer space (PPWT).

Changing the title and the language from the prevention of an 'arms race' to the prevention of 'placement of weapons' in outer space can be seen as a cosmetic change to try to circumvent the earlier arguments that the US raised against PAROS. However, many questions still remain from the earlier negotiations and debates, for example related to definitions (e.g. border of outer space), to the prohibition of certain types of weapons and verification.

During the recent years both China and Russia have introduced draft texts aiming at creating a new treaty to prohibit placing weapons in outer space. A joint working paper was submitted by them (with additional contributions from Belarus, Indonesia, Syria, Vietnam and Zimbabwe) in 2002, titled *Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects* (*Working Paper...*, 2002) Two draft treaties have been presented to the CD, the first one in 2008 (*Letter Dated 12 February 2008*…, 2008), the second one, an updated draft in 2014 (*Letter Dated 10 June 2014*…, 2014).

The Russia-China draft Treaty of 2008 was rejected by the United States: by both the Bush and the Obama administrations, arguing that its aim is only political, it tries to gain a military advantage and calls upon universal adherence to already existing treaties (*United States Opposes*…, 2008), though the attitude of the latter later seems to have softened (Zhang, 2011). The second draft introduced by Russia on 10

June 2014 showed many changes from the 2008 version, for example related to definitions and procedural parts, but the United States still seems to reject it. Its position is based on arguments related to a lack of a verification system and to provisions that would prohibit the possession, testing and stockpiling of weapons that could be placed in outer space. The negotiations are still on-going and the draft is open for the proposal of amendments, which hopefully will help to hammer out a compromise in due time.

Both of the preambles to the drafts (and to the 2002 paper) reaffirm the importance of peaceful space exploration and recognise the need to maintain the weapons-free nature of outer space. Both of the drafts note the insufficient nature of existing arms control and disarmament agreements while recognising their importance.

The beginning of the 2008 draft treaty defines certain terms still missing from the corpus of international treaty law, for example 'outer space' as 'beyond the elevation of approximately 100 km above the ocean level of the Earth'. Then, building on these definitions, it defines 'outer space object' and 'weapons in outer space.' These definitions have been changed slightly in the 2014 version, while the definition of 'outer space' has been completely removed.

The definition of a 'weapon in outer space' in the 2008 version is 'any device placed in outer space, based on any physical principle, specially produced or converted to eliminate, damage or disrupt normal function of objects in outer space'. This has been broadened in the 2014 version, as it does not require 'physicality' any more to reach the effect of 'elimination, damaging or disrupting' these objects and it is applicable not only in outer space but also 'on the Earth's surface or in the air'.

While both drafts recognise the rights of states 'to explore and use outer space for peaceful purposes in accordance with international law' and their right to self-defence in accordance with Article 51 of the UN Charter, the 2014 draft adds the option of collective self-defence into the text. As it is also included in Article 51, it does not seem to be a significant amendment, but it gives a more reassuring legal position to states with actual or potential space-warfare capabilities related to their alliances.

Neither of the drafts have created vast development regarding compliance or transparency: both of them create a system of voluntary confidence-building measures, while on verification and compliance enforcement both of them suggest application of a future additional or optional protocol. Both drafts mention plans for an executive organisation for the treaty. The organisation would be tasked with examining questions regarding the implementation or violation of the provisions of the treaty, with a vague provision of the 2008 draft to 'take measures to put an end to the violation of the Treaty by any State Party' clarified in the 2014 draft with a possibility of referring the dispute to the UN General Assembly or to the Security Council, in case of the violation being unresolved. While this can be considered a development, the inclusion of a clause establishing the possible jurisdiction of the International Court of Justice would provide for stronger control.

Transparency and confidence-building measures are usually capable of preventing an arms race by raising trust between states, which may have a good effect on otherwise tense international relations (Lattmann, 2011). It can be especially important regarding space activities as deploying weapons in this sphere is much more costly than elsewhere and thus states may be more open towards it. The UN Secretary-General has decided to hear out UN member states on this question, and as a result, has decided to launch a Group of Governmental Experts (GGE) to elaborate on the possibility of transparency and confidence-building measures being employed to enhance space security (A/62/114/Add.1, 2011).

The concept behind the Group of Governmental Experts is to create a small group of experts on international space that works on an *ad hoc* base and who represent the various states that have engaged in space-related activities. The most important task is to improve international cooperation and to reduce any possible risk of misunderstanding and miscommunication between states related to their outer space activities. Apart from this direct goal, a more strategic aim of the group has been to assist in developing future international law: to deliver a report based on consensus which outlines conclusions and recommendations on some of the pressing questions regarding space security and sustainability, namely transparency and confidence-building measures.

The Group's work is based on all previous documents and any other initiatives that exist. Logically, it means considering the Outer Space Treaty as the base, supplemented with other international treaties (e.g. already adopted bilateral transparency and confidence-building measures), other sources of soft law (e.g. the International Code of Conduct by the European Union) and results of other earlier professional work (e.g. the work of the previous GGE between 1991–1993, the COPUOS and its various working groups).

The first session was held in New York in July 2012. The creation of this body was made possible by the renewed political interests of states regarding cooperative measures connected to the security of outer space.

The group's work has covered the revision of numerous proposals submitted by various governments during the recent time period, aiming at creating transparency and confidence-building measures in outer space. The proposals have covered a wide perspective; they can be grouped as:

- measures related to the rules of conduct;
- measures aimed at expanding the transparency of space programmes;
- measures aimed at expanding transparency of space activities;
- mechanisms aimed at resolving concerns.

The group has had more sessions following the first one: in April 2013 in Geneva, then in June 2013 in New York. Its work has been supported by the United Nations Office for Disarmament Affairs (UNODA), which generally serves as the secretariat of the group that does not only provide administrative but also substantive support to the group.

The report of the Group has been submitted to the UN General Assembly in the autumn of 2013. It has made a wide variety of recommendations both towards states and various organs. For the states' considerations, it has recommended a set of voluntary TCBMs for outer space activities, for example on the exchange of information related to states' policies and activities related to outer space; on risk reduction notifications and on mutual visits by experts to space facilities of the states. In regards to international institutions, the Group has called for increased coordination between UN organs and bodies.

International Code of Conduct for Outer Space Activities

The European Union has initiated a procedure in 2008, aiming at developing an 'International Code of Conduct for Outer Space Activities', often abbreviated ICoC.

Instead of a legally binding international treaty, it is intended to become a set of principles and guidelines which are agreed to by the states on a voluntary basis, and as such, it lacks any formalised enforcement or verification mechanism, but can be seen rather as an additional consultation procedure. The draft version of the Code was first published in December 2008 under the title 'Council Conclusions on the draft Code of Conduct for outer space activities'. The last version is dated 31 March 2014. It was finalised based on the consultations in Bangkok with the interested states.

The Code is being drafted under the auspices of the European Union, not the COPUOS or the CD. The argument for this is that it aims for both safety and security of outer space activities and that this way even those states which are not members of these bodies may participate in the process. Additionally, its legally non-binding nature and wider scope of application make it non-contradictive with other negotiation processes related to space, for example the PAROS.

It reaffirms already existing treaties, with the general objective of enhancing safety and security in outer space by means of developing and introducing more transparency and various confidence-building measures. The fundamental principles that the Code is based on are mostly familiar from earlier documents. Some of them, namely the recognition of the inherent right of all states to use space for peaceful purposes, the importance of security and reliability of space objects in orbit and the prevention of harmful interference in outer space activities have all been raised in previous sources of space law. From the point of view of the present chapter, the consideration for states' defence interests is important to be mentioned: the Code explicitly recognises the inherent right for individual or collective self-defence in accordance with the United Nations Charter, and by stating 'the responsibility of States, in the conduct of scientific, commercial and military activities, to promote the peaceful exploration and use of outer space and take all the adequate measures to prevent outer space from becoming an area of conflict', it implicitly also recognises the states' rights to use outer space for military activities as well.

The Code is to be applied to all outer space activities conducted by both state and non-state actors, like corporations, NGOs and academia. Thus, legally speaking it aims to have a much wider direct applicability than a normal international treaty.

The draft Code has seemingly attracted some support from the international community: some of the states have already expressed their endorsement of it (e.g. Australia, Canada, Japan, and the United States with the reservation that the Code does not prohibit anti-satellite weapons or missile defence systems, etc.). However, some states have raised concerns on being left out of its development (e.g. Brazil, China, India, Russia etc.), while some other states fear that it could be used in the future to limit their potential capacities for outer space activities, thus favouring states already engaged in this race. Some states have criticized the Code's legally non-binding nature, its lack of any enforcement or verification mechanism and the fact that it replicates some already existing EU member states' domestic policies on transparency and confidence building measures.

While the Code is to be applied to all types of outer space activities – it is for example aimed at environmental protection as well as at arms control – it directly addresses military activities in outer space. The Code *prima facie* limits the testing and use of both space-based and ground-based anti-satellite weapons by stating in Section 4.2. that states shall 'refrain from any action which brings about, directly or indirectly, damage, or destruction, of space objects unless such action is justified:

- by imperative safety considerations, in particular if human life or health is at risk; or
- in order to reduce the creation of space debris; or
- by the Charter of the United Nations, including the inherent right of individual or collective self-defence

and where such exceptional action is necessary, that it be undertaken in a manner so as to minimise, to the greatest extent practicable, the creation of space debris'. However, a more thorough examination of the text shows that this prohibition is quite weak on the use of these weapons in the case of an armed conflict justified by self-defence, and in the case of adherence to the principle of necessity and distinction under the provisions of international humanitarian law. This means that an attack against military satellites used for example for the coordination of military manoeuvres or communication of the aggressor state may be legitimate under the Code.

Conclusions

Arms control in outer space does not only face hardships similar to the ones it faces on the surface of the Earth, but there are also some very peculiar elements as well. Technical uncertainties and states' political worries about their potential future strategic positions and possibilities make it an uneasy task to build the necessary consensus from time to time. International organisations and their various organs have struggled with this during the past decades and the institutional system, created to handle similar challenges, does not always seem to be capable of providing the needed solutions.

While the legal tools may be adequate (international treaties, verification and control methods), the road to build these is not easy. Step-by-step development, gradual building of confidence, often initiated on a regional level (e.g. the EU-initiated

Code) may lead to a global consensus and assure a weapons-free, or at least regulated, space over the Earth.

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