1-1-2022

International Humanitarian Law and Artificial Intelligence: A Canadian Perspective

Mahshid Talebian Kiaklayeh
University of Windsor

INTERNATIONAL HUMANITARIAN LAW AND ARTIFICIAL

INTELLIGENCE: A CANADIAN PERSPECTIVE

by

Mahshid Talebian Kiakalayeh

A Thesis
Submitted to the Faculty of Graduate Studies
through the Faculty of Law
in Partial Fulfillment of the Requirements for
the Degree of Master of Laws
at the University of Windsor

Windsor, Ontario, Canada

INTERNATIONAL HUMANITARIAN LAW AND ARTIFICIAL

INTELLIGENCE: A CANADIAN PERSPECTIVE

by

Mahshid Talebian Kiakalayeh

APPROVED BY:

R. Nelson
Department of History

W. Aoun
Faculty of Law

C. Waters, Advisor
Faculty of Law

December 1, 2021

DECLARATION OF ORIGINALITY

I hereby certify that I am the sole author of this thesis and that no part of this thesis has been published or submitted for publication.

I certify that, to the best of my knowledge, my thesis does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations, or any other material from the work of other people included in my thesis, published or otherwise, are fully acknowledged in accordance with the standard referencing practices. Furthermore, to the extent that I have included copyrighted material that surpasses the bounds of fair dealing within the meaning of the Canada Copyright Act, I certify that I have obtained a written permission from the copyright owner(s) to include such material(s) in my thesis and have included copies of such copyright clearances to my appendix.

I declare that this is a true copy of my thesis, including any final revisions, as approved by my thesis committee and the Graduate Studies office, and that this thesis has not been submitted for a higher degree to any other University or Institution.

ABSTRACT

Artificial Intelligence (AI) is one of the most remarkable achievements in the technology world. AI can be used dually by both civilians and combatants, serving with both beneficial and harmful aims. In the military realm, by empowering military systems to perform most warfare tasks without human involvement, AI developments have changed the capacity of militaries to conduct complex operations with heightened legal implications. Accordingly, it is vital to consider the consequences emanating from its use in military operations. International Humanitarian Law (IHL), also known as the laws of war, or the Law of Armed Conflict (LOAC), is a set of rules which regulates armed conflict between States, as well as civil wars. IHL protects people who are not involved or have ceased participating in hostilities and restricts the means and methods of war. While capabilities of new means of military AI continue to advance at incredible rates, on an international level, IHL principles should be revisited to account for the new reality in military operations. Additionally, on a national level, the impacts of military AI developments on military power for international competition have attracted the attention of national authorities. Therefore, studying both international and national pathways will be necessary as the first step toward promoting transparency in legal rules. Ultimately, central to my research is analyzing the Canadian perspective on IHL and the military use of AI at both national and international levels. Using a comparative approach with the American perspective, I conclude that if Canada develops more cohesive policies on the new military use of AI, it could become a legal leader in this realm.

DEDICATION

I dedicate this thesis to:

My mother, my warrior and savior angel for her unconditional love and support, who has believed in me since the beginning of my first steps, and never let me down.

The memory of my father, who was always by my side, encouraged me to pursue my studies, and taught me to be strong facing hardships.

My beloved brothers, who stand by my side in all ups and downs, for their everlasting love and encouragement throughout my life.

ACKNOWLEDGEMENTS

The world is a wonderful place for your presence

TABLE OF CONTENTS

LIST OF ABBREVIATIONS/SYMBOLS

AI	Artificial Intelligence
AP(s)	Additional Protocol(s)
APLs	Anti-Personnel Landmines
AWS	Autonomous Weapon System
CAF	Canadian Armed Forces
CCW	Convention on Certain Conventional Weapons
CF	Canadian Forces
CIDA	Canadian International Development Agency
CIL	Customary International Law
CNCHL	Canadian National Committee for Humanitarian Law
DND	Department of National Defence
DoD	Department of Defence
DRDC	Defence Research and Development Canada
GAC	Global Affairs Canada
GC(s)	Geneva Convention(s)
GGE	Group of Governmental Experts
HRV	Human Rights Watch
ICBL	International Campaign to Ban Landmines
ICRC	International Committee of the Red Cross
IHL	International Humanitarian Law

IHRL	International Human Rights Laws
JAIC	Joint Artificial Intelligence Center
LAWS	Lethal Autonomous Weapon System
LOAC	Law of Armed Conflict
MHC	Meaningful Human Control
NGO(s)	Non-Governmental Organization(s)
RCMP	Royal Canadian Mounted Police
ROE	Rules of Engagement
UAV	Unmanned Aerial Vehicle
UCAVs	Unmanned Combat Aerial Vehicles
UN	United Nation

CHAPTER 1

INTRODUCTION

By imitating human intelligence, Artificial Intelligence enables machines and computer systems to learn from, act, and perform tasks like a human. The definition of AI, as proposed within the European Commission's Communication on AI is as follows:

> "Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals…"[1]

AI technology is now being applied in various industries, including the military, with a key role in current and future military applications. AI technologies promise to revolutionize the face of warfare as new means and methods of warfare are increasingly emerging. But the path to the future of technological advancements is not always clear as AI technologies are rapidly evolving.

Implementing AI in military operations raises ethical and legal challenges. One of the major challenges is that advances in AI technology are changing the capabilities of weapons in modern warfare, reducing or eliminating the need for human oversight and involvement. AI can perform most warfare tasks without any human involvement; AI could empower fully military weapon systems in algorithmic warfare to carry out attacks, or to take decisions independently without human involvement. By their nature, such weapons cannot guarantee what will happen when encountering a new situation endangering non-

---

[1] Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe, Brussels, 25.4.2018 COM (2018) 237 final. See also
Ed Burns, Nicole Laskowski & Linda Tucci, "What is artificial intelligence?" (TechTarget, 2021), online: *TechTarget* https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence:
"Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems."

combatants. If artificial intelligence can perform any warfare task without human involvement, humanitarian debates arise as to whether this technology can distinguish between military and civilian targets or not. [2] Non-combatants are protected by International Humanitarian Law (IHL, one branch of public international law), and therein lies the challenge.

IHL is the legal framework applicable to situations of armed conflict governing the conduct of hostilities. It governs relations between States aiming to limit the effects of armed conflict[3] and the methods of warfare protecting those who are not or no longer participating in an armed conflict or hostilities.[4] IHL aims to reduce the suffering caused by warfare, mitigate its consequences, protect victims of armed conflict, and preserve human dignity in times of armed conflict. Accordingly, IHL deals with the humanitarian aspects of a conflict, without considering the legality of using force in the first instance, and is therefore known as *jus in bello.*[5] Its regulations are the result of balancing between military necessity and principles of humanity. According to IHL, to balance military necessity with humanitarian requirements, the military's needs can never justify the use of inhumane weapons. However, AI technology has substantially altered the nature of weaponry and battle strategies, complicating compliance with IHL.

---

[2] This is known as the distinction principle of International Humanitarian Law.

[3] 32nd International Conference of the Red Cross and Red Crescent, *Report on International Humanitarian Law and The Challenges of Contemporary Armed Conflicts*, 32IC/15/11 (Geneva, Switzerland, International Committee of the Red Cross, 8-10 December 2015), online: <https://www.icrc.org/en/document/international-humanitarian-law-and-challenges-contemporary-armed-conflicts>.

[4] Defining the rights and obligations of the parties to a conflict in the conduct of hostilities is another aim of this body of law. See; International Committee of the Red Cross*, War and International Humanitarian Law* (2010), online: www.icrc.org/eng/war-and-law/overview-war-and-law.htm.

[5] See for example International Committee of the Red Cross, *Jus Ad Bellum and Jus In Bello* (2020), online: https://www.icrc.org/en/document/jus-ad-bellum-jus-in-bello

What I argue here is that if a rise in the militarization of AI becomes a highly destabilizing development, it can unbalance international equilibrium[6] which means more competition among global powers to achieve military supremacy in AI. This technology, by potentially empowering weapons systems in algorithmic warfare, may alter the behavior of governments,[7] leading to greater military competition.

These issues raise legal concerns for not only state decision-makers but also the future of humankind. To help chart a course forward, I propose to review national and international approaches, exploring grey areas that ought to be addressed. In particular, I will explore Canadian approaches to IHL and military use of AI. Specifically, I ask, what is the Canadian perspective on military uses of AI under IHL?

This question will be accompanied by the following sub-questions to discuss other challenges resulting from the militarization of AI, and possible national and international solutions:

1. Can Canada develop a transparent and IHL-compliant national AI military strategy?

2. What solutions should be applied to fill gaps and clarify national AI strategies and international legislation?

---

[6] Horowitz, Michael C. "Artificial Intelligence, International Competition, and the Balance of Power" (2018) 1:3 Texas National Security Review, online: TNSR < https://tnsr.org/2018/05/artificial-intelligence-international-competition-and-the-balance-of-power/>. Also here https://repositories.lib.utexas.edu/bitstream/handle/2152/65638/TNSR-Vol-1-Iss-3_Horowitz.pdf?sequence=2.

[7] International Committee of the Red Cross, *Report on the Ethics and Autonomous Weapon Systems: An Ethical Basis for Human Control?* (Geneva, 3 April 2018), online (pdf): <https://www.icrc.org/en/download/file/69961/icrc_ethics_and_autonomous_weapon_systems_report_3_april_2018.pdf>.

This study hypothesizes that Canada has, broadly speaking, followed a transparent and identifiable perspective toward AI and IHL. More clarification, however, is needed in some aspects of militarized AI including addressing controversial military technologies adequately such as the regulation of autonomous and lethal autonomous weapon systems that I will investigate further. Given this hypothesis, studying the Canadian perspective as an example of national transparent practice, and bringing in a comparative example of U.S. policies, I demonstrate that States must clarify AI military conduct under the principles of IHL, and their flexibility in regulating the technologies. I also ultimately suggest that creating an independent regulatory organization(s) can be the effective and "decisive step in ensuring the comprehensive implementation of IHL"[8]. I also examine the American perspective because the U.S. has taken explicit policies about military AI and legal justifications for their use. There still exist gray areas that are the source of debate about transparent national policy in that country.

With the comparative approach, I identify strengths and weaknesses in national and international rules regarding military AI boundaries since law needs to maintain the same rate of progress as militarized AI. In this thesis, I attempt to explore further challenges that are resulting from militarized AI. I will point out that one of the best ways to determine how to regulate military AI is by studying national and international regulations simultaneously. This approach may be useful in applying national regulations under IHL and will be reached by looking at the literature on the relationship between national and international law and describing its relevance to my study.

---

[8] International Committee of the Red Cross, *A Manual on the Domestic Implementation of International Humanitarian Law* (Geneva, ICRC, 2015) at 131, online (pdf): https://www.icrc.org/en/doc/assets/files/publications/icrc-002-4028.pdf.

The relationship between national and international law

While there is a theory that accepts that national and international legal systems form a universal legal system, [9] another theory holds the view that international law and national law (domestic law) are two separate legal systems. [10] However, holding distinctive perspectives between national and international law does not mean there is no relationship between these interconnected legal systems. As it happens many States apply partially each of these perspectives to apply international law in their national legal systems. Below, I explain the status of national law in international law and vice versa that will help to lay the groundwork for the next portion of this analysis.

National law and its status in international law

The national law of States has a privileged legal status in international law. First, national law applies within the boundaries of a country whilst international law regulates relations between countries by signing treaties and conventions. A separate and distinct legal system of international law is created between States and may be made in several ways[11] such as treaties and customary international law (CIL). [12] Second, even though

---

[9] A monist perspective holds the view that international law and domestic law form part of a single universal legal system. See Myres S. McDougal, "The Impact of International Law upon National Law: A Policy-Oriented Perspective" (1959) 4 S.D. L. Rev. 25 at 29, online (pdf): < https://heinonline-org.lawlibrary.laws.uwindsor.ca/HOL/PrintRequest?public=true&handle=hein.journals/sdlr4&div=5&start_page=25&collection=usjournals&set_as_cursor=0&men_tab=srchresults&print=section&format=PDFsearchable&submit=Print%2FDownload>.
See also Madelaine Chiam, Monism and Dualism in International Law (Oxford Bibliographies, last reviewed: 24 February 2021), online: https://www.oxfordbibliographies.com/view/document/obo-9780199796953/obo-9780199796953-0168.xml
[10] A dualist perspective treats the international and domestic systems of law as separate and independent. *Ibid*.
[11] Christopher P.M. Waters, "War Law and Its Intersections" in *Ethics, Law and Military Operations*, ed by David Whetham (New York, NY: Palgrave Macmillan, 2011) 90 at 92-93.
[12] Customary International Law along with general principles of law and treaties is one of the primary sources of international law involving the principle of custom. See *Statute of the International Court of Justice,* 26 June 1945, Can TS 1945 No 7 (entered into force 24 October 1945, ratification by Canada 09 November 1945).

national law and international law differ in many respects, many perspectives, insights, and practices of national law influence the development of international law, and general legal principles of national law may be transferred to international law.

Simply put, national law has a pivotal role in international practices and CIL. This is one of the reasons why I will be looking at a national perspective, to better understand the formation of CIL generally, as state practice is an element of CIL.[13] To briefly describe CIL (a primary source in international law) at this stage, it should be said that it consists of unwritten rules derived from the general practice of States accepted as law.[14] In other words, it consists of practice accompanied by a belief that States are bound by that practice as a legal obligation. A practice's acceptance as law is referred to as *opinio juris*.[15] As such, two elements of CIL are consistent international practice by states and approval of the practice by the international community (*opinio juris*). In customary IHL, this practice is present in a number of official documents, including military manuals, national legislation, and case law in addition to official accounts of military operations.[16]

Through national constitutions and legislative provisions, ensuring respect for and prohibiting the violation of international law can be guaranteed. Constitutions often specify how international law should interact with domestic law as they contain provisions that regulate the status of international law in the domestic legal system.[17] So it is another

---

[13]See for example Michael Byers, Custom, Power and the Power of Rules: International Relations and Customary International Law" (1995), 17:109 Michigan Journal of International Law 110 at 136.

[14] *Statute of the International Court of Justice*, *supra* note 12.

[15] It is the opinion or belief in legal obligation that a specific action is legally required, or an action was carried out as a legal obligation and it can be claimed by military powers to repudiate reaching the most comprehensive legal structure in national and international legislation.

[16] International Committee of the Red Cross, *Customary International Humanitarian Law: Questions & Answers*, 15-08-2005, online: *ICRC*: https://www.icrc.org/en/doc/resources/documents/misc/customary-law-q-and-a-150805.htm

[17] Antonio Cassese, Modern Constitutions and International Law" (1985) 192 RECUEIL DES COURS 331.

reason why I look at a national perspective to better understand IHL, specifically because the behavior of States during armed conflict could be subject to principles outside of the realm of treaties.[18] As such, looking at the relationship between national and international law in the domestic constitutional order, and international legal order is vital.

International law and its status in national law

A distinctive feature of the international and national legal system is primary sources. In international law, primary sources are treaties or conventions, i.e. agreements between states, CIL, and general principles of law. Needless to say, although many international rules have been codified by states in international treaties, customary rules still remain relevant in contemporary armed conflicts. CIL and general principles of law are defined in Article 38 of the International Court of Justice Statutes as sources of law.[19] When primary sources of international law like treaties or CIL are unavailable and undeveloped, international tribunals rely on these general principles, common to different legal systems, to fill gaps. General principles of law help resolve both procedural and substantive concerns. The advent of international legal regimes, such as IHL, has given this source much importance. Good faith[20] is an example of a general legal principle which in armed

---

[18] *Ibid*. For example, the Geneva Conventions of 1949 are written agreements in which states formally outline certain rules.

[19] *Statute of the International Court of Justice, supra* note 12. According to Article 38 of the International Court of Justice Statute, the "general principles of law recognized by civilized nations" are sources of international law. General principles of law may arise either from national law or by international law. They address international issues not already protected by treaty provisions or customary rules. One of the most important principles of international law is good faith, which forms the foundation for treaty law.
See also Bin Cheng, *General Principles of Law as Applied by International Courts and Tribunals* (1953, reprinted by Cambridge University Press 2006).

[20] See Steven Reinhold, "Good Faith in International Law" (2013), 2 UCL Journal of Law and Jurisprudence 40, online (pdf): <https://discovery.ucl.ac.uk/id/eprint/1470678/1/2UCLJLJ40%20-%20Good%20Faith.pdf>. Talya Uçaryılmaz, "The Principle of Good Faith in Public International Law" (2020), 68 1 Estudios de Deusto 43. DOI: <https://doi.org/10.18543/ed-68(1)-2020pp43-59>. The author says "good faith manifests itself as pacta sunt servanda as the basis of international treaty law. As a principle referring to honesty, loyalty and reasonableness, it guarantees the prohibition of the abuse of power and provides equitable solutions in legal relationships." See also *Vienna Convention on the Law of Treaties,* 23

situations, along with proportionality may be useful in complementing and enforcing IHL. General principles of law are derived from national legal systems and can be understood as concepts of domestic law that apply to all legal systems.

In contrast, primary sources of national law are laws and regulations containing constitutions, statutes, acts, legal cases, judicial decisions, and so forth. The national law of each state can be considered as evidence of state practice, as a unilateral international legal action under certain circumstances.[21] In some cases, domestic court decisions can rely directly on international law, having a dynamic effect on international law, as they contribute to either shaping it or helping interpreters ascertain it.[22] Domestic judicial decisions enable states to respect their international obligations by enforcing international law domestically.

Second, in the domestic law of some states, international law is explicitly referred to. States which refer to international rules in their domestic law, may recognize and accept

---

May 1969, 1155 UNTS 331, art. 26: "every treaty in force is binding upon the parties to it and must be performed by them in good faith." The general legal principle of good faith applies to both international and non-international armed conflicts and must be upheld for both types of conflicts. See International Committee of the Red Cross, *IHL database, Customary IHL-Rule 66. Non-Hostile Contacts between the Parties to Conflict.* Online: https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule66. For the protection of civilians during military operations, IHL rules must be interpreted in good faith.

[21] *Nuclear Tests Case (New Zealand v. France),* Judgment, [1974] I.C.J. Reports 472 at para 46. The International Court of Justice (ICJ) stated: "It is well recognized that declarations made by way of unilateral acts, concerning legal or factual situations, may have the effect of creating legal obligations. Declarations of this kind may be, and often are, very specific. When it is the intention of the State making the declaration that it should become bound according to its terms, that intention confers on the declaration the character of a legal undertaking, the State being thenceforth legally required to follow a course of conduct consistent with the declaration. An undertaking of this kind, if given publicly, and with an intent to be bound, even though not made within the context of international negotiations, is binding. In these circumstances, nothing in the nature of a quid pro quo nor any subsequent acceptance of the declaration, nor even any reply or reaction from other States, is required for the declaration to take effect, since such a requirement would be inconsistent with the strictly unilateral nature of the juridical act by which the pronouncement by the State was made." See also Byers, *supra* note 13.

[22] Samantha Besson, "Human Rights Adjudication as Transnational Adjudication: A Peripheral Case of Domestic Courts as International Law Adjudicators", in August Reinisch, Mary E Footer, & Christina Binder eds., *International Law and ...: Select Proceedings of the European Society of International Law*, (Oxford: Hart Publishing, 2016) 43-66, at 48.

international law in various forms, either as supreme law or as their applicable domestic

law such as the private law. Generally, any state bound by international law is obliged to

lay down appropriate rules or regulations in accordance with its domestic law to implement

international obligations within its territory. Note that states have no right to invoke the

provisions of domestic law as justification for their non-compliance with international law.

Article 27 of the Vienna Convention on the Law of Treaties[23] states: "a party may not

invoke the provisions of its internal law as justification for its failure to perform a treaty."

Thus, the national implementation of legislation does not justify a state's violation of any

international obligation as a matter of international law.[24]

Moreover, although domestic law is enacted only to regulate internal affairs within the

territory of a state, this does not mean that domestic law is invalid at the international level

or can be invoked. International law, on a broader scale, includes the law of treaties, as

well as customary international law that is evidenced in part, by state practice which itself

can be evidenced through reference to domestic law. Thus, international law and domestic

law are not separate from each other and are interrelated. This interrelationship is revealed

in the two ways in which Canada receives international law as Canada takes a different

approach depending on the source of international law in question.

Concerning treaties (as a matter of international law), the Government of Canada

signed and ratified agreements to create binding legal obligations on Canada. For example,

with respect to IHL, national governments must formally adopt IHL treaties by the process

---

[23] *Vienna Convention on the Law of Treaties,* 23 May 1969, 1155 UNTS 331, *supra* note 20 (accession by
Canada 27 January 1980).
[24] Secretary of State Bayard, *Instruction to Mr. Connery, charge to Mexico, Nov. 1, 1887*, II MOORE'S
DIGEST 235, online: *Office of the Historian* https://history.state.gov/historicaldocuments/frus1887/d491
 "A government cannot appeal to its municipal regulations as an answer to demands for the fulfillment of
international duties. Such regulations may either exceed or fall short of the requirements of international law,
and in either case that law furnishes the test of the nation's liability and not its own municipal rules."

of ratification or accession. However, generally speaking neither ratification nor signature suffice for a treaty to apply as a matter of national law,[25] and states must undertake "certain domestic actions of compliance including passing legislation and taking regulatory and practical measures"[26] for the rules of IHL to be fully effective. In Canadian law, the adoption of a treaty is a legislative act. Treaties must be implemented through legislation in the Canadian legislature before they can have the force of law domestically.[27]

In contrast, concerning CIL, it does not require legislative implementation and it is adopted via the doctrine of adoption as part of Canadian law.[28] Due to the fact that CIL is uncodified in any particular sources, either determining its rules can be complicated or all states may not accept CIL rules to be entered automatically into their national law. As such, the position of international law within national law depends upon a state's domestic legislation, and states may enact domestic legislation to implement international law such as treaty provisions.

The goal of this thesis is to improve and align domestic policy making with international legal obligations as it pertains to new military AI technologies. Accordingly, a study of the interface between national and international regulation will be undertaken in building more cohesive national policies in compliance with IHL rules and creating more comprehensive provisions on new military AI technologies.

---

[25] See Hugh M. Kindred et al, *International Law: Chiefly as Interpreted and Applied in Canada*, 8th ed (Toronto, Emond Montgomery Publications, 2014), at 9, 160.

[26] International Committee of the Red Cross, *International Humanitarian Law in Domestic Law* (January 1, 2015), online: < https://www.icrc.org/en/document/international-humanitarian-law-domestic-law>

[27] André Ouellette, *Report of Canada's System of Justice on Bijuralism and Taxation: International Aspects (Ottawa, ON: Canada, Department of Justice, 2003), Interpretation of Treaties and Domestic Law (Date modified: 2015-01-07), online: <https://www.justice.gc.ca/eng/rp-pr/csj-sjc/harmonization/ouell/toc_int-tdm_int.html>*

[28] *Nevsun Resources Ltd. v. Araya,* 2020 SCC 5 at para 90.

This thesis is composed of five chapters. Following this introductory chapter, Chapter Two sets out the military and legal context, describing artificial intelligence in military systems and its implications. Chapter Two also outlines the general framework of international humanitarian law, before exploring IHL's applicability to AI.

Chapter Three explores international pathways on military AI and the importance of IHL coverage, with a specific focus on IHL treaties as well as the Martens Clause. I will also show the lack of details in some Articles of the IHL conventions that ought to be addressed and revisited.

The fourth chapter will be an attempt to study national approaches to military AI and the importance of transparent national strategies. For that purpose, the Canadian perspective will be analyzed at both national and international levels to find out what are the implications of AI to Canadian policymaking. I also take a comparative perspective by touching on American approaches to military AI. The reason I explore the US perspective is to show what kind of activities have attracted legal justification on military AI in the leading military power and a close ally of Canada and to examine what gray areas have not been properly addressed in that country. Specifically, I argue that Canada has not sufficiently addressed controversial military technologies namely lethal autonomous weapon systems.

In the fifth chapter, recommendations will be explained by proposing suggestions to address deficiencies and ambiguities in international law. I also recommend measures to address emerging technologies adequately in Canada's policy.

In conclusion, I provide a framework for evolving Canada's regulatory approach to align new military AI with IHL obligations. Canada's approach can set a needed example for other states, where exceptions to legal principles cause flaws and shortcomings in the advanced military AI arena.

CHAPTER 2

ARTIFICIAL INTELLIGENCE AND INTERNATIONAL HUMANITARIAN

LAW

The historical period of rapid military technology development traces back to World Wars I and II. World War I is recognized as a period in which advanced technologies, such as the tank and aircraft, were introduced into modern warfare. World War I, as the first technology war, "was history's single largest revolution in military tactics and technologies." [29] The development of technologies for combat and weaponry laid the groundwork for incremental technology improvements thereafter. The Second World War also saw advances in technologies for the purpose of winning the war. After World War II, not only did the desire to develop military capabilities using advanced technologies increase among international actors, but many developed and developing states have been investing heavily in the advancement of means and methods of warfare that rely on AI. [30] One of the major outcomes of AI innovation is the prominent growth of autonomy in weapons systems, namely the Autonomous Weapon System (AWS). But the question is, what is AWS?

Autonomous Weapon Systems (AWS)

Autonomous advances in the means and methods of warfare are among the AI breakthroughs that fundamentally change the conduct of war and decisions on the battlefield. The development of AWS appears highly desirable for militaries to deploy as

---

[29] David T. Zabecki. "Military Developments of World War I" (2015), online: *International Encyclopedia of the First World War* (pdf): https://encyclopedia.1914-1918-online.net/pdf/1914-1918-Online-military_developments_of_world_war_i-2015-05-07.pdf.

[30] National Security Commission on Artificial Intelligence, *Final Report: National Security Commission on Artificial Intelligence* (Arlington, VA: National Security Commission on Artificial Intelligence, 2021) online (pdf): https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf

it offers undeniable capabilities. Since there is a lack of accepted definitions regarding AWS and what constitutes AWS internationally, providing an overview of the current definitions about AWS is essential.

This definition, based on capability parameters of AWS, provided by the United Kingdom and used by the UK Armed Forces explains AWS as follows:

> An autonomous system is capable of understanding higher-level intent and direction. From this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state. It is capable of deciding a course of action, from a number of alternatives, without depending on human oversight and control, although these may still be present. Although the overall activity of an autonomous unmanned aircraft will be predictable, individual actions may not be.[31]

Another definition favored by the International Committee of the Red Cross (ICRC)[32] -the lead international agency on IHL- emphasizes the nature of tasks that AWS performs autonomously. The definition presents autonomous weapons that would encompass any type of weapon with autonomy in its critical functions. The ICRC defines AWS:

> An autonomous weapon system can learn or adapt its functioning in response to changing circumstances in the environment in which it is deployed. A truly autonomous system would have artificial intelligence that would have to be capable of implementing IHL.[33]

---

[31] British Ministry of Defence, Development, Concepts and Doctrine Centre (DCDC*). JDP 0-30.2: Unmanned Aircraft Systems: Unmanned Aircraft Systems* (DCDC: Shrivenham, August. 2017), online (pdf): < https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/673940/doctrine_uk_uas_jdp_0_30_2.pdf>.

[32] International Committee for the Red Cross (ICRC) is the principal humanitarian organization ensuring humanitarian protection and assistance for victims of war and people affected by armed violence. State parties to the Geneva Convention and its Additional Protocols gave this organization a specific legal mandate to act in the event of an armed conflict where IHL determines when it occurs, in legal terms protecting victims of international and internal armed conflicts. The operation of ICRC is based on IHL comprising the four Geneva Conventions, the Additional Protocols, the Statutes of the International Red Cross and Red Crescent Movement, as well as the resolutions of the International Conferences of the Red Cross and Red Crescent. As a result, working toward promoting IHL and universal humanitarian principles are examples of its humanitarian missions. See; International Committee of the Red Cross, *Mandate and Mission*, online: ICRC: https://www.icrc.org/en/mandate-and-mission

[33] International Committee of the Red Cross, *Report* 2015, *supra* note 3.

The second part of this definition explicitly recognizes that regulating AI weapons' compliance with IHL is crucial. Notably, an increasing number of combat operations are expected to be carried out by AWS in the future which raises concerns, especially about the lack of transparency[34] and unpredictability of these weapons systems.[35]

While the military use of AWS seems unavoidable, military technologies have been addressed through several international measures such as the United Nations (UN) Convention on Certain Conventional Weapons (CCW)[36] as the appropriate forum[37] for the discussion of military autonomous technologies including Lethal Autonomous Weapons

---

[34] *Ibid*, at 13.

[35] IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems, *Reframing Autonomous Weapons Systems*, (IEEE Standards Association) online (pdf): <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead_reframing_autonomous_weapons_v2.pdf>

[36] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983).
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, Protocol on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices (Protocol II), 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15). (entered into force 2 December 1983).
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, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III), 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15) (entered into force 2 December 1983).
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, Protocol on Blinding Laser Weapons (Protocol IV), 13 October 1995, 1380 UNTS 370 (entered into force 30 July 1998).
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, Protocol on Explosive Remnants of War (Protocol V), 28 November 2003, 2399 UNTS 1 (entered into force 12 November 2006).
The provisions of this convention apply to those countries which agree to be bound by its terms. The CCW was adopted in 1980, and it has also referred to as the Inhumane Weapons Convention. The Convention only contains general requirements. There are no clear regulations restricting the use of specific weapons. The Protocols attached to the Convention contain provisions prohibiting or restricting the use of specific weapons. See; Jozef Goldblat, Inhumane conventional weapons: efforts to strengthen the constraints", in SIPRI Yearbook (1995) on Armaments, Disarmament and International Security, online (pdf):<https://www.sipri.org/sites/default/files/SIPRI%20Yearbook%201995.pdf>

[37] Informal Meeting of Experts, *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, (Geneva, United Nations Office for Disarmament Affairs, 2016) online (pdf): https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-_Informal_Meeting_of_Experts_(2016)/ReportLAWS_2016_AdvancedVersion.pdf.

Systems (LAWS). Integrating AI in the context of the military arms race and armed conflict has caused significant debates concerning the legality of this kind of AI weapon as a special type of autonomous military system that uses AI to independently search for, identify, engage targets, and employ a weapon system without human intervention.

Lethal Autonomous Weapon Systems (LAWS)

Militarized AI has already become a new reality of warfare and decreases the influence of humans on the immediate decision-making of using force in armed conflicts. AWS is increasingly being used in contemporary armed conflicts, which can increase the possibility of AI use in future weapons systems, especially LAWS as weapon systems with full autonomy that are able to identify, select and target without "Meaningful Human Control (MHC)."[38] MHC is a key topic in IHL arguments over how to limit the application of LAWS and allow humans to make meaningful decisions that comply with IHL and other requirements. Autonomy in AI, as some argue, is the ability to function without a human operator.[39] For LAWS, however, there is some controversy as to what autonomy means or how it operates.

Although there is not an agreed definition of LAWS, the U.S. Department of Defense (DoD) Directive defines LAWS as "weapon system[s] that, once activated, can select and engage targets without further intervention by a human operator."[40] The concept is also

---

[38] According to the principle of "meaningful human control", the ones who should ultimately remain in control of, and responsible for decisions about lethal military operations are humans, neither computers nor algorithms. See; Filippo Santoni de Sio & Jeroen van den Hoven, "Meaningful Human Control over Autonomous Systems: A Philosophical Account" (2018), Front. Robot. AI, doi: 10.3389/frobt.2018.00015.

[39] George A. Bekey, *Autonomous Robots, From Biological Inspiration to Implementation and Control* (Cambridge, UK: MIT Press Books, 2005).

[40] United States Department of Defense, *Autonomy in Weapon Systems*, *DIRECTIVE No.3000.09* (United States, Department of Defense, 2012 Incorporating Change 1, May 8, 2017), online (pdf): <https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodd/300009p.pdf>.

known as "human out of the loop" or "full autonomy."[41] Human out of the loop is defined by Human Rights Watch (HRW, a prominent non-governmental organization that serves as global coordinator of the Campaign to Stop Killer Robots) as robots with the capability to select targets and deliver force without any human intervention.[42] As of yet, weapon systems with full lethal autonomy have not been deployed; however, weapons with varying degrees of autonomy and lethality have been deployed by some countries.[43] They are the reality, and using them in military operations is not only inevitable but also possible. The most controversial aspect is about the development and use of LAWS that are capable of making decisions regarding human targets.

Another related concept is "human in the loop"[44] or semi-autonomous weapon systems. The Patriot missiles systems fit the definition of semi-autonomous weapons that can identify individual or specific targets selected by a human operator, as it requires a human

---

This directive "establishes DoD policy and assigns responsibilities for the development and use of autonomous and semi-autonomous functions in weapon systems, including manned and unmanned platforms."

[41] Kelley M. Sayler, *Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems (Washington, DC: Congressional Research Service, CRS Rpt IF11150, 2020), Online: <https://crsreports.congress.gov/product/pdf/IF/IF11150>.*

[42] Lethal autonomous weapons are pre-programmed or empowered by humans using algorithms to make decisions and select targets using the weapon's sensors and software. The algorithm-based decision-making process used in autonomous weapons enables weapons to act quicker and at much greater scale. Such weapons can change their pre-programmed parameters or even alter their goal function. For example, there will be a need to program autonomous and lethal autonomous weapons to differentiate between their targets, but such programming may result in inaccurate interpretations of information, making an indiscriminate attack possible, especially where human intervention is limited. See also Bonnie Docherty et al., *Losing Humanity, The Case against Killer Robots (Human Rights Watch, 2012), online: <https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots#>.*

[43] Including United States, the United Kingdom, Israel, and the Republic of Korea. See; Women's International League for Peace and Freedom - Reaching Critical Will Program, *Fact Sheet on Fully Autonomous Weapons*, online: https://www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/7972-fully-autonomous-weapons

[44] In addition to human in the loop, there is a definition for "Human-on-the-Loop Weapons as robots that can select targets and deliver force under the oversight of a human operator who can override the robots' actions." It is believed by the US Air Force and the UK Ministry of Defence that fully autonomous weapons will be developed within the coming years, and their capabilities are expected to be so high that humans will no longer be able to contribute effectively to a wide range of systems and processes. See Docherty, *supra note* 42.

operator to initiate an attack. The Patriot anti-missile system can select targets autonomously but requires humans to launch a missile. Once the missile is launched, it can hit its target, and human control will not be possible afterward. Another example of human-supervised autonomous weapon system is Israel's Iron Dome as a defense system to counter rocket attacks.[45] The increasing speed of AI developments in the military and its growing role in future operations makes it likely that human control will decrease in military operations over time.

A clear example of this is an Unmanned Aerial Vehicle (UAV),[46] commonly known as a drone, another automated weapon system (remote-controlled weapons systems) that uses algorithms to select a target and carry out an attack without human intervention and human decision-making. The Harpy weapons system for instance is the current autonomous UAV in use developed by Israel Aerospace Industries. Once launched, it can detect or attack enemy radar systems without any human intervention.[47]

The employment of new AI weapons raises substantial legal and ethical issues, as well as the danger of causing significant human suffering. It is consequently critical to assess the legality of new weapons, means, and methods of conflict under IHL, including CIL. With these evolving systems and their growing importance in mind, legal review of

---

[45] Christoph Bartneck et al., "Military Uses of AI" in: *An Introduction to Ethics in Robotics and AI. SpringerBriefs in Ethics*. (UK: Springer International Publishing, 2021), DOI: https://doi.org/10.1007/978-3-030-51110-4_11. Michael Schmitt, "Autonomous Weapons Systems and International Humanitarian Law: A Reply to the Critics" (2013) 4 HARV. NAT'L SEC. J. 1, 3.

[46] An unmanned aerial vehicle (UAV) operates with no pilot on board. It may operate under a human operator's control, as remotely-piloted aircraft (RPA). See ICAO Cir 328, AN/190, *Unmanned Aircraft Systems (UAS)*, (International Civil Aviation Organization, approved by the Secretary General and published under his authority, Order Number: CIR328, 2011), online (pdf): <https://www.icao.int/meetings/uas/documents/circular%20328_en.pdf>.

[47] Ariel Shapiro, *Autonomous Weapon Systems: Selected Implications for International Security and for Canada*, no. 2019-55-E, (Ottawa, Canada: Library of Parliament, 2019) online (pdf): <https://lop.parl.ca/staticfiles/PublicWebsite/Home/ResearchPublications/InBriefs/PDF/2019-55-e.pdf>.

military AI technologies that present new implications must be addressed in different forums. Inconclusive debates at the CCW on AWS demonstrate that states are aware of these realities.

One of the increasing debates in military operations concerns Unmanned Combat Aerial Vehicles (UCAVs), also known as combat drones or battlefield UAV Combat drones. The Manual on International Law Applicable to Air and Missile Warfare defined UCAVs as "unmanned military aircraft of any size which carries and launches a weapon, or which can use onboard technology to direct such a weapon to a target."[48] No doubt evolving UCAVs and UAVs provide militaries with an unprecedented scale to conduct operations which will ultimately raise profound questions for IHL and its applicability.

The implications of AI in AWS, and LAWS (with no internationally agreed definition which leads to a range of possible working definitions) would result in great ethical and legal controversy. If the use of AWS and LAWS develops, it would not only complicate the application of the IHL principles but also could be a catastrophic threat to humanity. This issue as raised by some is that "no particular autonomous or artificial intelligence system currently has the necessary skills to discriminate between combatants and innocents."[49] As a result, in light of the new revolution in the military use of these sorts of weapon systems, the rapid pace of militarized AI advances has drawn the international community's attention. In this context, if the international community fails to prohibit or

---

[48] Produced by the Program on Humanitarian Policy and Conflict Research at Harvard University, *HPCR Manual on International Law Applicable to Air and Missile Warfare* (Cambridge, UK: Cambridge University Press, 2013).

[49] Erin A McDaniel, *Robot Wars: Legal and Ethical Dilemmas of Using Unmanned Robotic Systems in 21st Century Warfare and Beyond (Master's Thesis, U.S. Army Command and General Staff College, 2008), (Accession Number: ADA502401 P77), at 77, online: < https://apps.dtic.mil/sti/citations/ADA502401>.*

even regulate AWS and LAWS under IHL, these weapons are likely to play unclear roles in the future of warfare.

There is no doubt that AI military technological advancement is still at an initial stage. This, therefore, begs the question of what the implications would be of military use of AI. By way of technical context then, in the next section, I aim to investigate the significance of military AI, particularly, in AWS and LAWS. In the second part of this chapter, I will set out the applicable IHL framework.

Artificial Intelligence in Military Systems

AI demonstrates a wide variety of abilities in military applications, to the level of human intelligence and beyond, that can operate in new environments where human intervention is limited. There are a wide variety of implications, ranging from the various operations this technology can perform to the dangers it poses. Regardless of advantages that can be brought about by the concept of military AI use (assisting militaries in their decision-making as an example), it also has the ability to make decisions independently while deploying AWS. Rapid improvements in AI with unique capabilities to enhance military operations have propelled anew vast aspects of this technology to the forefront of military attention. Based on the development of AI and its capability to revolutionize the future of warfare, militaries are inclined toward implementing AI algorithms in new means of warfare systems.

The military AI systems with significant AI capacities, however, makes the situation difficult to precisely assess the associated dangers, risks, challenges, and consequences in warfare. Even attempting to control new military AI technology is difficult because not enough can be predicted about its consequences. It is vital to have extensive conversations

about the possible repercussions of militarized AI in warfare. Other implications of military use of AI are the tendency of a small number of states to be a supreme power in the military realm, a threat to security,[50] raising the possibility of a global arms race, and putting humanity in danger which I will subsequently discuss.

Military AI could potentially promote an AI arms race, changing the character of war and the future scenarios of warfare. As such, the advent of this technological advancement has given rise to potential national and international challenges, in particular when it comes to the reliance on AI technologies by military powers. This dependence propels "great powers"[51] to make an effort to strengthen their AI competencies to be a supreme power on both national and international levels. A rise in military AI will lead to more competition between states to be equipped with the most progressive technologies to surpass their rivals. What complicates this matter is "taking this competition seriously"[52] by military powers. Due to this tendency towards applying AI in military systems and states' quest for superiority in the military realm, states could develop weapons to project any target which could conflict with international legal regimes and endanger both state and civilian security.

---

[50] For the United Nations Security Council meeting in 2021 on the role of emerging technologies, such as Artificial Intelligence, in peace and security, see; Denise Garcia, UN Role in Restraining the Dark Side of Emerging Technology (2021), online: *Toda Peace Institute* <https://toda.org/global-outlook/un-role-in-restraining-the-dark-side-of-emerging-technology.html>

[51] Gerry J. Simpson, *Great Powers and Outlaw States: Unequal Sovereigns in the International Legal Order* (Cambridge, UK: Cambridge University Press, 2004), DOI: <10.1017/CBO9780511494185>.

[52] National Security Commission on Artificial Intelligence, *supra* note 30. See also *Artificial Intelligence Key to Maintaining Military, Economic Advantages, Leaders Say* (U.S Department of Defence, 2021), online: *DoD news* https://www.defense.gov/News/News-Stories/Article/Article/2567486/artificial-intelligence-key-to-maintaining-military-economic-advantages-leaders/

Meanwhile, some countries such as the United States are integrating AI in military systems and combat.[53] For Canada, some argue that it "must adopt the military AI technologies as they become mainstream."[54] In the near future, more countries are likely to see AI and the substantial abilities offered by AI systems as providing a competitive edge for their militaries in global leadership.

On the one hand, the leadership of countries in developing AI animates concerns about international competition and security. Since AI can affect both national and international security, the international community is dealing with this consequence from several angles, moving from the future development of weaponized AI to changes in the nature of conflicts and conduct of countries to meet a civilian-centered approach in all debates that means "putting people at the core of the security discussions."[55] On the other hand, the capabilities of military AI continue to advance at incredible rates, and AI will make military systems more autonomous. As a result, developments in military AI may not only lead to a global arms race, but their application to any weapon system makes the use of such technologies questionable from ethical and legal perspectives.

While AI technologies are increasingly finding unprecedented military usage, investigating the consequences of AI technology regulation should be done on a larger scale either through international measures or national policies to cover possible legal

---

[53] Kelley M. Sayler, *Artificial Intelligence and National Security* (Washington, DC: Congressional Research Service, CRS Rpt R45178, 2020), online: https://crsreports.congress.gov/product/details?prodcode=R45178
[54] Maj Amir ElMasry, *Army of the Future: Artificial Intelligence and Its Impact on Army Operations (Service Paper, Canadian Forces College, 2018), online (pdf): <https://www.cfc.forces.gc.ca/259/290/405/192/elmasry.pdf>*.
[55] Branka Marijan, *Protecting Civilians in Armed Conflict: The Importance of Humanitarian Disarmament* (2019), online: Humanitarian Disarmament <https://humanitariandisarmament.org/2019/06/10/protecting-civilians-in-armed-conflict-the-importance-of-humanitarian-disarmament/>.

challenges and conflicts. These existing debates need to respond to the questions: what is IHL? and how do IHL rules apply to militarized AI systems?

International Humanitarian Law (IHL)

Modern humanitarian law on warfare traces back to the eighteenth century. The 1899 Hague Regulations provide an important landmark in this development. The "Hague law," "Hague stream" or "Hague conventions"[56] include a series of international treaties and declarations that contain rules regulating warfare, and governing the use of means, methods of warfare as well as the conduct of hostilities. Due to the importance of human protection, under Article 23(e) of the Hague Regulations, for example, the employment of arms or projectiles that cause unnecessary suffering or superfluous injury is prohibited.[57]

In addition to the provisions of the Hague Conventions that are among the main treaty sources of IHL forming the core of this legal regime, the four 1949 Geneva Conventions (GCs) -sometimes called the "Geneva stream"- are also part of the IHL rules which first were codified in the 19th century. A particular landmark in this stream was the adoption of the 1864 Geneva Convention[58] that was expanded on in subsequent iterations, including the 1949 GCs to protect non-combatant civilians and soldiers who had been taken out of

---

[56] The First Hague Peace Conference of 1899 succeeded in adopting a Convention on land warfare to which Regulations are annexed. The Convention and the Regulations were revised at the Second International Peace Conference in 1907. See; *Convention Concerning the Laws and Customs of War on Land (Hague IV) with Annex of Regulations,* 18 October 1907, 36 Stat 2277 (entered into force 26 January 1910).
(entered into force 26 January 1910). Online: *ICRC*: https://ihl-databases.icrc.org/ihl/INTRO/195

[57] International Committee of the Red Cross, *Rule 70. Weapons of a Nature to Cause Superfluous Injury or Unnecessary Suffering states: the use of means and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering is prohibited*. Online: *ICRC*: https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule70

[58] Geneva Conventions concluded in Geneva between 1864 and 1949 for the purpose of ameliorating the effects of war on soldiers and civilians. See
Geneva Convention for the Amelioration of the Condition of the Wounded in Armies in the Field, 22 August 1864, 22. Stat 940 (entered into force 22 June 1865).

combat by virtue of injury or capture. In the wake of the first treaty's adoption in 1864, it was revised and later replaced by the GCs in 1906, 1929, and 1949. The first and second GCs are close in structure covering the protection for the wounded and sick of soldiers on land during the war, and shipwrecked military personnel at sea respectively. The Third Geneva Convention concerns the treatment of prisoners of war and replaced the Prisoners of War Convention of 1929.[59] These conventions were concerned with only combatants, not with civilians. But the Fourth Geneva Convention is about the protection of civilians in times of war and concerns the protection of populations against certain consequences of war.

The rules emanating from the GCs govern the protection of war victims. In order to protect those who are not fighting in the armed conflict, the GCs dictate what can and cannot be done during warfare. The GCs of 1949, however, did not develop the Hague rules. These two streams have been advanced in the 1977 Additional Protocols (APs).[60] The 1977 APs were "created to fill gaps left"[61] by the 1949 GCs and have been playing an important role in strengthening both the Hague rules and the GCs. Additionally, the APs complemented the GCs in terms of rules applicable to non-international armed conflicts.

The Two APs were adopted in response to an increasing number of non-international armed conflicts (civil wars), and the third AP was adopted in 2005 creating an additional

---

[59] *Geneva Convention (III) relative to the treatment of prisoners of war,* 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950).
[60] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I]. see also *Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)*, 8 June 1977, 1125 UNTS 609, art 1 (entered into force 7 December 1978). [AP II]. *Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Adoption of an Additional Distinctive Emblem (Protocol III),* 8 December 2005, 2404 UNTS 261 (entered into force 14 January 2007). [AP III].
[61] Waters, *supra* note 11. at 101.

protection emblem, the Red Crystal. The GCs and their APs are international treaties that contain the rules protecting people who do not take part or no longer participate in the hostilities as well as protecting combatants from superfluous injury/unnecessary suffering. Most importantly, the Protocols provide for comprehensive protection for civilians and civilian objects against the effects of military operations "given that a majority of victims of warfare are victims of civil wars."[62]

Since the focus of this thesis will be on IHL as *lex specialis*,[63] applicable to the occurrence of armed conflict, which seeks to protect civilians from the abuses of war and violence, different types of armed conflict and IHL principles will be addressed in the following section.

Types of Armed Conflict and IHL Principles

There are two types of armed conflicts in legal terms that IHL distinguishes: an international armed conflict (a conflict among two or more states) and a non-international armed conflict (a conflict between government forces and nongovernmental armed groups, or between such groups only[64] "within the territory of a single state.")[65]

International armed conflict under IHL treaties will be placed within the scope of common Article 2 to the Geneva Conventions of 1949 as follows:

---

[62] *Ibid.*

[63] *lex specialis* is a doctrine which means law governing a specific subject matter. It relates to the interpretation of laws and can be applicable in both domestic and international law contexts. See for example "Lex Specialis" in Oxford University Press, Max Planck Encyclopedia of Public International Law, (Oxford, UK: Oxford University Press, article last updated November 2015).

[64] International Committee of the Red Cross Opinion Paper. *How is the Term "Armed Conflict" Defined in International Humanitarian Law?* (2008), online: https://www.icrc.org/en/doc/resources/documents/article/other/armed-conflict-article-170308.htm

[65] Michael N. Schmitt, Charles H.B. Garraway & Yoram Dinstein, *The Manual on the Law of Non-International Armed Conflict with Commentary* (Sanremo, Italy: International Institute of Humanitarian Law, 2006), online (pdf): <https://www.legal-tools.org/doc/ccf497/pdf/>.

In addition to the provisions which shall be implemented in peacetime, the present Convention shall apply to all cases of declared war or of any other armed conflict which may arise between two or more of the High Contracting Parties, even if the state of war is not recognized by one of them. The Convention shall also apply to all cases of partial or total occupation of the territory of a High Contracting Party, even if the said occupation meets with no armed resistance.[66]

Protections in non-international armed conflict, which are less restrictive on states than in international armed conflict, are governed by common Article 3 to the GCs of 1949[67]; and Article 1 of AP II[68]. Generally, IHL governs the conduct of armed forces engaged in an armed conflict, determining who and what is protected or targeted, and under what restrictions or limitations on weapons or tactics. Since the determination of when an event constitutes armed conflict under international law is regulated by the body of IHL, several IHL fundamental principles particularly apply to military AI activities during an armed conflict in which states are required to comply to choose the means and methods of warfare. Some of the key principles to start with, as recognized in Article 51 of Protocol I Additional to the Geneva Conventions, are namely:

1. Distinction: the necessity of distinguishing between civilians and combatants, also the prohibition of indiscriminate attacks.[69] Article 48 of AP I imposes a stringent obligation on

---

[66] *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field.* 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950), art 2.
Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea. 12 August 1949, 75 UNTS 85 (entered into force Oct. 21, 1950).
[67] *Ibid.*, art 3. Common Article 3 applies to "armed conflicts not of an international character occurring in the territory of one of the High Contracting Parties".
[68] *Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)*, 8 June 1977, 1125 UNTS 609, art 1 (entered into force 7 December 1978). [AP II], *supra* note 60. Article 1 of Additional Protocol II applies to armed conflicts "which take place in the territory of a High Contracting Party between its armed forces and dissident armed forces or other organized armed groups which, under responsible command, exercise such control over a part of its territory as to enable them to carry out sustained and concerted military operations and to implement this Protocol."
[69] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I], *supra* note 60. Indiscriminate attacks are:
a) those which are not directed at a specific military objective;

the Parties to the conflict to distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives at all times.

2. Proportionality[70]: This principle is codified in Article 51(5)(b) of AP I and repeated in Article 57.[71] This rule, also considered to be a norm of CIL in both international and non-international armed conflicts as a result of state practice, specifies that parties to a conflict must not launch an attack against lawful military objectives if the attack "may be expected to cause" excessive civilian harm. Determining whether an attack is proportionate or not needs a human judgement that a fully autonomous weapon could not have. Canada has also considered this principle in its codes of conduct and LOAC manuals several times[72] LOAC manuals are quite useful for recognizing relevant treaties and CIL provisions. Developing IHL manuals facilitates policy makers and legislators' compliance with IHL and its

---

b) those which employ a method or means of combat which cannot be directed
at a specific military objective; or
c) those which employ a method or means of combat the effects of which cannot be limited as required by this Protocol;
and consequently, in each such case, are of a nature to strike military objectives and civilians or civilian objects without distinction. Protocols I and II are international treaties that supplement the Geneva Conventions of 1949. They significantly improve the legal protection covering civilians and the wounded, and - for the first time - lay down detailed humanitarian rules that apply in civil wars.

[70] Jean-Marie Henckaerts & Louise Doswald-Beck (eds.), *Customary International Humanitarian Law* (2005) Vol. I: Rules, Vol. II: Practice, (Cambridge, UK: Cambridge University Press, 2005), at 46, Rule 14: "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". See also Protocol I art 51(5)(b).

[71] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I], *supra* note 60, arts 57(2) (a) (ii) & (b)

[72] See i.e. Canada's LOAC Manual (2001) sets out: "the principle of proportionality establishes a link between the concepts of military necessity and humanity. This principle implies that collateral civilian damage arising from military operations must not be excessive in relation to the direct and concrete military advantage anticipated from such operations." Canada, Department of National Defence, *Law of Armed Conflict at the Operational and Tactical Levels* (Office of the Judge Advocate General, 2001), Joint doctrine manual, B-GJ-005-104/FP-021, online (pdf):
<https://www.fichl.org/fileadmin/_migrated/content_uploads/Canadian_LOAC_Manual_2001_English.pdf>

implementation at the domestic level. CIL will be shaped by state practice, and manuals can help create or develop state practice, thereby state practice can be used as evidence to support these rules as norms of CIL.

3. Precautions in an attack are also norms of CIL. Precautions are included in article 57 of AP I, providing that constant care must be taken to spare the civilian population, civilians, and civilian objects in the conduct of military operations. Parties must take all possible precautions when selecting the methods and means of warfare so as to prevent and minimize incidental civilian loss of life, injury, and objects damage.[73]

One of the main purposes of IHL principles is the protection of civilians. Article 51 sets out that the "civilians shall enjoy general protection against dangers arising from military operations."[74] Many of the rules are derived from the principles of distinction and proportionality to protect civilians. The distinction principle with proportionality must be balanced against military necessity.[75] The necessity of military action can be determined through an objective analysis of a situation. The practical requirements of a military situation should be limited by the humanity principle. Fully autonomous weapons are unlikely to be able to balance between the IHL principles of military necessity and humanity. Since AI weapons systems including autonomous lethal weapons systems raise ethical and legal issues related to human control, particularly when it comes to critical

---

[73] Henckaerts & Doswald-Beck, *supra* note 70, Rule 15. Principle of Precautions in Attack, at 51. See also *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I], *supra* note 60.

[74] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I], *supra* note 60, art 51 — Protection of the civilian population: The civilian population and individual civilians shall enjoy general protection against dangers arising from military operations.

[75] Waters, *supra* note 11, at 103.

functions such as target selection and engagement,[76] it appears a formidable task for states to develop AI weapons systems that behave like a human or even more cautiously than a human being during battle. However, the learning capacity of AI would be followed up by the significant outcome of surpassing humans[77] and breaking human control. In this regard, the European Union Committee on Legal Affairs has declared:

> Ultimately there is a possibility that within the space of a few decades AI could surpass human intellectual capacity in a manner which, if not prepared for, could pose a challenge to humanity's capacity to control its creation and, consequently, perhaps also to its capacity to be in charge of its destiny and to ensure the survival of the species.[78]

Although drafted prior to the development of AI, these IHL rules apply to all weapon systems in warfare. Under IHL, states have a responsibility to ensure that their weapon systems use is consistent with the conduct of hostilities rules. Therefore, examining the applicability of IHL to new weapons and AI is necessary.

IHL Applicability to AI

Even though the primary IHL instruments were drafted before the development of AI, the scope of the IHL application is designed to regulate all military activities, including new weapons, during armed conflicts. As mentioned above, IHL through its rules on means and methods of warfare places limits on the development and use of AWS. Although IHL rules apply to AWS technologies, it is not without challenges. Regarding LAWS and IHL regulation, the UN Group of Governmental Experts (GGE) [79] has confirmed that

---

[76] European Parliament, *Resolution on Autonomous Weapon Systems*, 2018/2752(RSP).

[77] Alan L. Schuller, "At the Crossroads of Control: The Intersection of Artificial Intelligence in Autonomous Weapon with International Humanitarian Law" (2017) 8 Harv. Nat'l Sec. J. 379, 379 at 391.

[78] European Parliament, Committee on Legal Affairs. *Draft Report with recommendations to the Commission on Civil Law Rules on Robotics*, 2015/2103(INL), online (pdf): <https://www.europarl.europa.eu/doceo/document/JURI-PR-582443_EN.pdf>.

[79] The United Nations Group of Governmental Experts (GGE) created under the auspices of the CCW Convention, is a UN-mandated working group that the Secretary-General requested to establish it on

"international humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems."[80] There are indeed IHL legal principles providing constraints to shape the behavior of states,[81] but there is still a need to review IHL to realize the applicability and suitability of its rules as technology advances.

Clearly, technological advances and challenges exert pressure on existing legal norms of warfare giving rise to concerns that new law is needed, or other policies should be taken. The most practical challenge is that autonomous technologies have not yet been banned. I suspect that this is mainly because a complete ban is nearly impossible as these technologies are developing incrementally, there is no internationally agreed definition for them, and militaries are inclined toward maintaining a technological edge. This is why a complete ban is likely neither possible nor can be universally accepted. Thus, some strategies for regulating AWS in the context of armed conflicts should be developed.[82] On top of that, there should be clear definitions to fully understand these kinds of technologies and their specific aspects so as to regulate them quickly.

Advancing Responsible State behavior in cyberspace in the context of international security, see; Group of Governmental Experts, online: *United Nations Office for Disarmament Affairs* <https://www.un.org/disarmament/group-of-governmental-experts/>
In 2014, France and Germany decided to begin talks within the CCW, which led to the GGE foundation, see Denise Garcia, *supra* note 50.
[80] Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibition or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, *Draft Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, Agenda Item 6, CCW Doc CCW/GGE.1/2019/CRP.1/Rev.2 (report adopted 21 August 2019). Annex IV, 'Guiding principles', para (a), online (pdf): <https://undocs.org/pdf?symbol=en/CCW/GGE.1/2019/CRP.1/REV.2>.
[81] IHL regulates the conduct of hostilities and is intended to minimize humanitarian harms to civilians.
[82] Saad, Christiane. & Gosal, Ewa. "Autonomous weapons systems: how to work towards a total ban?" (2019), The Canadian Bar Association, online: <http://www.cba.org/Sections/International-Law/Articles/2019/Autonomous-weapons-systems-how-to-work-towards-a>

All military AI systems and weapons shall be capable of operating in compliance with these IHL rules, and states are obliged to ensure this capability while developing new warfare systems including AWS. It is questionable whether the necessary decision-making capabilities can be programmed into a machine. Applying such capability to machines is still challenging for states.[83] The capability of making decisions by such weapons is not accompanied by either responsibility or accountability like a human, and it may cause a problem to comply with IHL rules on the conduct of hostilities.[84] As a result of the deployment of these weapons, there will be a need to hold humans accountable or responsible for violations of IHL. Given the number of possible scenarios on the battlefield, fully autonomous weapons might not be preprogrammed to determine if anticipated military advantage outweighs anticipated civilian harm on a case-by-case basis,[85] especially in the context of an arms race. As a result, these types of weapons would potentially violate IHL, endangering civilians. AWS and LAWS, currently are incapable of assessing the harm to the civilian population or civilian objects and cannot be trained to observe the rule of legal norms and IHL. Therefore, the military application of AI in autonomous weapons is unlikely to fully respect IHL principles due to the lack of certainty about how AI will behave in emerging technologies. Consequently, in light of the development of new military AI technologies, carrying out legal reviews is of the utmost importance.

---

[83] Ross W Bellaby, "Can AI Weapons Make Ethical Decisions?" (2021), 40(2) Criminal Justice Ethics 86–107, DOI: <https://doi.org/10.1080/0731129X.2021.1951459>.

[84] Hin-Yan Liu, "Categorization and Legality of Autonomous and Remote Weapons Systems" (2012) 94:886 Intl Rev Red Cross 627 at 629, online (pdf): <https://www.icrc.org/es/doc/assets/files/review/2012/irrc-886-liu.pdf. See also Docherty, *supra note* 42; Due to the autonomy of fully autonomous weapons, they create a responsibility gap.

[85] Bonnie Lynn Docherty, *Heed the Call: A Moral and Legal Imperative to Ban Killer Robots,* (Human Rights Watch, 2018) online: Human Rights Watch <https://www.hrw.org/report/2018/08/21/heed-call/moral-and-legal-imperative-ban-killer-robots>.

To carry out a review of IHL or the new weapons, CIL should also be taken into account. IHL treaties alongside CIL are sources of international law, and states recognize that they are both binding. Pacta sunt servanda is a rule of CIL under which " a state is bound to carry out in good faith the obligations which it has assumed by a treaty."[86] The application of CIL by national and international courts and tribunals demonstrates its binding nature.[87] To take the provisions of two Conventions on land warfare as an example, they are considered as embodying rules of CIL which means they are binding on states that are not even formally parties to them.[88] As such I will elaborate on CIL in the coming section to point out its role in regulating international relations and military activities.

Customary International Law (CIL)

CIL refers to a set of legal principles that limit the activities of states but are neither codified nor written down. When states continuously participate in a pattern of behavior and a consensus develops among them that the activity is required under international law, CIL emerges.[89] CIL comes into effect when necessary, particularly when states have not ratified IHL treaties. It is accepted that the rules and principles of IHL treaties governing the conduct of hostilities and protecting people who are not taking a part in hostilities apply to all states regardless of whether they adhere to such treaties. For example, the four GCs of 1949 have been ratified universally, while other treaties of IHL such as the 1977 APs to

---

[86] "Article 20. Pacta Sunt Servanda," (1935) 29:S2 AJIL977. DOI: <https://doi.org/10.2307/2213687>.
[87] See, for example, in the Canadian context, *R. v. Hape*, 2007 SCC 26. In that case, the Supreme Court of Canada considered that "the doctrine of adoption operates in Canada such that prohibitive rules of customary international law should be incorporated into domestic law in the absence of conflicting legislation." (at para 39) It also held that "[a]bsent an express derogation, the courts may look to prohibitive rules of customary international law to aid in the interpretation of Canadian law and the development of the common law."
[88] *Convention Concerning the Laws and Customs of War on Land (Hague IV) with Annex of Regulations,* 18 October 1907, 36 Stat 2277 (entered into force 26 January 1910), *supra* note 56.
[89] *Supra* note 15.

the GCs have not[90], but are relevant for all current international and non-international (civil wars) armed conflicts.[91] It is said that a number of customary rules of IHL define the obligations of parties to a non-international armed conflict in much greater detail than treaty law.[92]

Even if there is a gap resulting from the lack of ratification of relevant IHL treaties, CIL fills these gaps, and all states are bound by customary law. The advantage of CIL is that it is not necessary for states to formally accept rules to be bound by it. CIL is created through state practice provided that state practice is "extensive, virtually uniform, representative and accepted as law."[93] As the IHL treaties and CIL are both sources of the same body of law, there is in one sense no difference in their applicability. In general, treaties and international conventions are binding on states that have expressed their consent to be bound by such treaties, usually through ratification. Therefore, states and militaries have a responsibility to ensure respect for the law. If any violation through any kind of means and methods of military technology happens, IHL rules on accountability must be applied (although unfortunately, they have not always been enforced).

Accordingly, this study addresses the possibilities of developing the regulation of the military use of AI by focusing on international and national pathways on AI. The fact is

---

[90] Geneva Conventions and their Additional Protocols, *supra* note 60.

[91] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I] and Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), 8 June 1977, 1125 UNTS 609, art 1 (entered into force 7 December 1978). [AP II], supra* note 60.

[92] International Committee of the Red Cross, *Customary International Humanitarian Law: Questions & Answers*, *supra* note 16.

[93] International Committee of the Red Cross, *Customary Law*, online: *ICRC* https://www.icrc.org/en/war-and-law/treaties-customary-law/customary-law#:~:text=Customary%20international%20law%20consists%20of,the%20protection%20offered%20to%20victims

that international legal rules are still required to keep pace with the AI technologies in military content, and widespread legal measures should be applied. In the next chapter, I will discuss other relevant IHL conventions to evaluate if the coverage of international norms is adequate to regulate military AI.

CHAPTER 3

INTERNATIONAL PATHWAYS ON MILITARY AI: THE IMPORTANCE OF

IHL COVERAGE

As previously mentioned, IHL provisions limit the means and methods of warfare. In cases of armed conflict, IHL mandates that participants follow the principles of distinction, proportionality, humanity and military necessity. However, the more military AI technology advances, the more clarification of existing international rules are needed because military AI, particularly AWS and LAWS, are likely to be non-compliant with IHL principles. Simply put, the rapid advancement of AI technologies, and their integration into autonomous weapons results in tremendous conflicts and challenges which ultimately have revealed the necessity of clarification in IHL as the main international pathway to assess the legality of the new generation of militarized AI.

Clarification of IHL Coverage with a glance at Article 36 & Common Article 1

In general, there is no doubt about the applicability of IHL to new weaponry and other technological developments, as Article 36 (new weapons) of the First Additional Protocol to the Geneva Conventions declares:

> In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.[94]

The Article imposes a practical obligation on states to demonstrate that their right to choose the means of warfare is limited. It shows that states are under an obligation to

---

[94] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I),* 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I]. *supra* note 60, art 36.

determine whether the employment of a new weapon, means, or method of warfare would be prohibited by IHL or any other relevant rules of international law which is a mechanism of weapon review or legal review. [95] This obligation, however, shall bind all states regardless of being party to Protocol I or not as a result of CIL.[96] Although, states are required to conduct legal reviews of weapons, means, or methods of warfare to determine if their use is forbidden by international law, examining the legality of weapons with automated and autonomous features poses several difficulties in testing weapon performance and evaluating the risks associated.[97]

Automated weapons, drones (remote-controlled weapons systems), unmanned weapons, and other modern weaponry are already in use in armed conflicts. Whether these weapons were created or will be developed in accordance with the requirements of Article 36 of AP I can be questioned. Consequently, it is not outside the realm of possibility that their use in armed conflicts violates IHL regulations.

Besides the necessity of conducting a legal review of weapons, states are committed to ensuring respect for IHL under the 1949 GCs, Common Article 1, and customary international law that creates a binding obligation to obey rules governing employment of military technologies in warfare. Therefore, considerations must extend to the legal obligation of states to address the challenges and opportunities, along with the wider

---

[95] Vincent Boulanin & Maaike Verbrugge, *Article 36 Reviews: Dealing With The Challenges Posed By Emerging Technologies (Solna, Sweden: Stockholm International Peace Research Institute, 2017), online (pdf): <https://www.sipri.org/sites/default/files/2017-12/article_36_report_1712.pdf>*
[96] International Committee of the Red Cross, *Customary International Humanitarian Law: Questions & Answers*, *supra* note 16.
[97] Vincent Boulanin, *Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems (Solna, Sweden: Stockholm International Peace Research Institute, 2015), online (pdf): SIPRI <https://www.sipri.org/sites/default/files/files/insight/SIPRIInsight1501.pdf>*.

implications of new military strategies while ensuring respect for IHL. Common Article 1 to the four 1949 GCs declares: "the High Contracting Parties undertake to respect and to ensure respect for the present Convention in all circumstances."[98]

Common Article 1 has been accepted as a universal obligation for states and international organizations to ensure that IHL will be implemented wherever a humanitarian problem arises. The International Court of Justice in its advisory opinion on the Legality of the Threat or Use of Nuclear Weapons has reinforced this assertion that common Article 1 is "binding on all states and competent international organizations."[99]

The Article is one of the basic rules governing the implementation of IHL. States should deepen their discussions about practical measures to ensure respect for IHL when developing and using new military AI systems. Under Article 26 of the 1969 Vienna Convention on the Law of Treaties, the parties to a treaty in force are bound by it, and they

---

[98] *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field.* 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950), *supra* note 66, art 1: Respect for the Convention.

[99] It is noted that "a great many rules of humanitarian law applicable in armed conflict are so fundamental" and "these fundamental rules are to be observed by all States whether or not they have ratified the Conventions that contain them." *Legality of the Threat or Use of Nuclear Weapons,* Advisory Opinion of 8 July 1996, [1996] I.C.J. Reports 226.

States could gain a competitive advantage if they combined nuclear weapons with artificial intelligence technology. It could lead to nuclear war by shifting leaders' incentives to use nuclear weapons. There have been several incidents involving automated conventional weapons systems in the nuclear world, including the shooting down of two fighter jets by Patriot missile batteries in March 2003, which resulted in the deaths of their crews. See Connor Mclemore & Charles Clark, "The Devil You Know: Trust in Military Applications of Artificial Intelligence" (Texas National Security Review, AI and National Security, 2019), online: https://warontherocks.com/2019/09/the-devil-you-know-trust-in-military-applications-of-artificial-intelligence/?fbclid=IwAR15Wczbr9uLN0nFhYkIW1QFyQrkA7F9Ql0UqIrhDiAO5LPL0Yku81Jn9ZQ

The complexity of AI systems has become increasingly difficult for humans to comprehend, raising concerns about what would happen if nuclear weapons rely on AI. For example, it may be possible to use machine learning to improve nuclear delivery systems' autonomy and precision with no need to rely on human guidance. Also, UAVs, particularly, UCAVs, can serve as a nuclear weapon delivery system by being autonomous enough to fly much longer missions than their manned counterparts. See *The Impact of Artificial Intelligence on Strategic Stability and Nuclear Risk*: *Volume I Euro-Atlantic Perspectives*, ed by Vincent Boulanin (Sweden: Stockholm International Peace Research Institute, 2019), at 56, online (pdf): https://www.sipri.org/sites/default/files/2019-05/sipri1905-ai-strategic-stability-nuclear-risk.pdf.

must perform it in good faith [100] States are responsible for fulfilling their obligations in good faith. This fundamental rule is enshrined in Common Article I. It is therefore worth noting that when states commit themselves to a treaty, it is assumed that they also intend to implement a treaty and not violate its provisions. Obviously, the States Parties to the GCs Conventions and APs are bound to implement these international instruments in general and the common article in particular.

It can be interpreted that one of the forms of obligation contained in this will be achieved through ratification of these international instruments by states. Ensuring compliance with this Article means that State Parties in their national law must monitor the operations of relevant executive and administrative bodies issuing the necessary instructions in this regard. In peacetime, the State Parties should take the necessary measures, including training, to ensure that military forces comply with the norms of international instruments even in cases of military necessity. During peace time, and mainly through the training of the military and even civilians, it is possible to ensure better or more compliance with the provisions of humanitarian law.

In the interpretation of common Article 1 and ensuring respect, there is a view supported by the ICRC which reflects today's consensus. The view is that Article 1 requires states to ensure that the Conventions are respected by other states and non-State Parties.[101] In its updated Commentaries, the ICRC interprets common Article 1 as requiring reasonable steps for states in order to avoid and end foreseeable IHL violations by other

---

[100] *Vienna Convention on the Law of Treaties,* 23 May 1969, 1155 UNTS 331 (accession by Canada 27 January 1980), *supra* note 20, art 26.
[101] *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field.* 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950), *supra* note 66. Commentary of 2016, art 1: Respect for the Convention.

actors.[102] The phrase "at all times" in the Article implies applicability to states that are not State Party, or in non-international armed conflicts regardless of military necessity. In all situations, other states should ensure that other states' activities are in compliance with IHL.

Nonetheless, as a greater array of AI technologies enters into the modern battlefield, the lack of details in this Article can be observed concerning how states will ensure respect in practice. As currently worded, it is not clear if any specific action is required or not. There is no guidance on how states should ensure adherence to IHL. It is necessary to move beyond the framework provided by IHL to make progress in its application, particularly in the context of Article 1. The lack of clarification in this Article is one of the examples of a need for more clarification and adequacy of international rules' coverage in regulating military AI. The lack of details in this Article provides states with broad latitude for abrogating their obligations in some areas. To look broadly at IHL coverage, some other relevant IHL treaties must be discussed in the next section.

International Treaties on IHL

Setting aside the four 1949 Geneva Conventions, their Additional Protocols, and the 1907 Hague Conventions, IHL is codified through specific agreements that prohibit the use of certain weapons. These agreements include:

- the 1972 Biological Weapons Convention (BWC);[103]

---

[102] Lawrence Hill-Cawthorne, *GCIII Commentary: Common Article 1 and State Responsibility* (ICRC, 2021), online: *Humanitarian Law & Policy* <https://blogs.icrc.org/law-and-policy/2021/01/28/gciii-commentary-common-article-1-state-responsibility/>.

[103] *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction,* 10 April 1972, 1015 UNTS 163 (entered into force 26 March 1975). Confidence-Building Measures (CBMs) was introduced in 1987 under this Convention.

- the 1980 Conventional Weapons Convention (CCW), and its four protocols;[104]

- the 1992 Chemical Weapons Convention (CWC);[105]

- the 1997 Ottawa Convention on anti-personnel mines;[106]

- the 2008 Convention on Cluster Munitions (CCM);[107] and

- the 2017 Treaty on the Prohibition of Nuclear Weapons.[108]

Other agreements that are part of IHL but do not prohibit the use of certain weapons include:

- the 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict, and its two protocols;[109]

---

[104] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.

[105] *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction,* 03 September 1992, 1974 UNTS 45 (entered into force 29 April 1997).

[106] *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction,* 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999).

[107] *Convention on Cluster Munitions,* 30 May 2008, 2688 UNTS 39 (entered into force 1 August 2010). Cluster munitions are not able to distinguish between civilians and combatants. The use, development, production, acquisition, stockpiling and transfer of cluster munitions are prohibited under the Cluster Munition Convention as a humanitarian law instrument. Canada is a state party to this convention.

[108] *Treaty on the Prohibition of Nuclear Weapons,* 07 July 2017, 57 ILM 358, UN Doc A/CONF.229/2017/8. The nuclear weapon is the most lethal weapon that is inherently indiscriminate and disproportionate. Given its destructive nature, the *Nuclear Test Ban Treaty, Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water,* 5 August, 1963, 480 UNTS 43 (entered into force 10 October, 1963). It was signed on 1963, in Moscow, Russia, with the goal of limiting nuclear weapons. However, the number of countries with nuclear weapons has risen. Existing nuclear weapons, with advanced technologies, pose not only a threat to humanity's existence, but the use of indiscriminate nuclear weapons is also a challenge to the implementation of IHL. As it is unclear whether the creation of such weapons were or are in accordance with the requirements in Article 36 of the AP I.

[109] *Convention on the Protection of Cultural Property in the Event of Armed Conflict (and its Protocols),* 14 May 1954, 249 UNTS 215 (entered into force 7 August 1956).

- the 2000 Optional Protocol to the Convention on the Rights of the Child, on the involvement of children in armed conflict.[110]

These treaties were created as international responses to humanitarian concerns. One of these specific treaties is the "1997 Convention on the prohibition on the use, stockpiling, production and transfer of anti-personnel mines and their destruction",[111] known by its popular name, the "Ottawa Convention" or "Mine Ban Treaty."[112]

As previously noted, automated weapons are a relatively recent development. By contrast, landmines are the most well-known and widely deployed automated weapon, one indiscriminate in nature. A landmine is an explosive device that is designed to automatically detonate or blow when pressure is applied to it. These devices are often installed to disable pedestrians or vehicles who come into contact with them due to an explosion or fragments. According to Human Rights Watch, antipersonnel landmines are indiscriminate weapons that cannot distinguish between a civilian and a soldier.[113] It can be estimated that civilians are the major victims of deploying such weapons. For its indiscriminate nature, the production, stockpiling, usage, and transferring of landmines have been fully banned by Mine Ban Treaty.

---

[110] *Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict* (Adopted and opened for signature, ratification and accession by General Assembly Resolution A/RES/54/263 of 25 May 2000, entry into force 12 February 2002).

[111] Anti-personnel landmines are considered illegal or immoral because they do not discriminate effectively.

[112] *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction,* 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999)*, supra* note 106. See also Kenneth Epps, The Ottawa Landmines Treaty: A Major Step Toward Human Security (The Ploughshares Monitor, 2008 Volume 29 Issue 1), online: *Project Ploughshares* https://ploughshares.ca/pl_publications/the-ottawa-landmines-treaty-a-major-step-toward-human-security/ This convention is "a major step in a larger disarmament journey that is and will be needed to achieve widespread human security."

[113] Mark Hiznay, *Landmines* (Human Rights Watch, 2003), online: *Human Rights Watch Report* <https://www.hrw.org/topic/arms/landmines>.

According to Article 1 of this Convention, States Parties are prohibited from:

Using, developing, producing, otherwise acquiring, stockpiling, retaining, or transferring to anyone, directly or indirectly, anti-personnel landmines (APLs), or to assist, encourage, or induce, in any way, anyone to engage in any activity prohibited to a State Party under the Convention.[114]

Depending upon whether a state is a signatory of this convention, the APLs are considered illegal because they do not discriminate effectively. In this way, the Ottawa Convention is an example of an international achievement related to the regulation of military technologies, that we can look to. Automated weapons or any weapons, like land mines, that are indiscriminate in nature have been prohibited under existing provisions of IHL (such as article 36 of AP I), even though states are interested in developing automated weapons for their safety, security, and effectiveness in the armed field.

It is clear that the Ottawa Convention has followed an almost comprehensive approach under IHL that seeks the elimination of anti-personnel mines by prohibiting a wide range of activities, specifically the development, use, production, stockpiling, and transfer of the weapon to "protect civilian populations"[115] which is one of the essential aims of IHL. Leaving aside the Ottawa Convention, under general IHL provisions, the use of APLs is restricted.

---

[114] *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction,* 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999), *supra* note 106.

[115] David Atwood, "Implementing Ottawa: Continuity and Change in the Roles of NGOs" (1999) No 4 Disarmament Forum 19, UNIDIR/DF/99/3., at 23, online: < framework-for-a-mine-free-world-en-367.pdf (unidir.org)>. See also Epps, *supra note* 112; The Ottawa Treaty process offers a range of best practice examples for arms control and disarmament initiatives relating to conventional weapons. These initiatives include: The Cluster Munitions Coalition, the Coalition to Stop the Use of Child Soldiers, the International Action Network on Small Arms (IANSA) and the Control Arms campaign.

One of the provisions that are derived from the CIL rules of warfare is that parties to an armed conflict are obliged to distinguish between civilians and combatants and to never use any inherently indiscriminate weapon. This provision is binding on all parties in every situation of armed conflict. Other than the Ottawa Convention, Protocol II of the UN Convention on CCW[116] regulates mines and other devices. What is apparent in the existing CCW rules is that they were not being enforced properly in many recent conflicts when mines were deployed.[117] Even the definition provided by the Ottawa treaty on anti-personnel mines, owing to recent developments in technologies, might need more coverage as to whether it accounts for several types of mines or not. This issue has not been sufficiently addressed, and the need for action regarding this ambiguity can be a concrete step toward more transparency.[118]

The purpose of the Ottawa Convention is to support humanitarian actions around the world, so the treaty's content could be developed to cover future disproportionate humanitarian effects. For instance, the convention does not prohibit the use of anti-tank mines (i.e., those designed to explode when coming into contact with a vehicle) or remotely

---

[116] *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, Protocol on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices (Protocol II),* 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15). (entered into force 2 December 1983), *supra* note 36.

[117]International Committee of the Red Cross, *Banning Anti-Personnel Mines- The Ottawa Treaty Explained* (Geneva, CH; 1998). Online (pdf): http://cidbimena.desastres.hn/pdf/eng/doc13188/doc13188-contenido.pdf

[118] *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction,* 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999), *supra* note 106. Under Article 7 of this treaty on transparency measures, national implementation measures need to be adopted to ensure that the terms of the treaty are upheld in states' territory. This Article shows that treaty has significantly considered the profound influence of transparent measures on domestic level.

controlled explosive devices,[119] and the distinction between antipersonnel and anti-vehicle mines is blurred in this convention.[120]

Owing to recent advancements in landmine technology, the development of the treaty's scope would occur through international actions such as consensus. But what happens when consensus cannot be reached or when some cases cannot be codified through IHL provisions. International practice shows that ensuring compliance with IHL is not limited to the implementation of the provisions of GCs and APs including Common Article 1. Undoubtedly, in today's international society, states are required not only by treaty obligations but also by customary obligations to comply with humanitarian legal rules which I describe in the following section.

Importance of the Martens Clause Coverage and military AI

Although AI in the military context is developing rapidly, what could play a pivotal role in minimizing the conflicts and concerns resulting from this technology can be a near consensus on regulation and how all aspects of militarized AI can be regulated under international regulation. It is certainly true that, more often, some states do not agree with a particular course of action. But if the vast majority come to the conclusion that the advantages of such regulation are worth it compared to challenges, a near consensus can result.

As articulated above, not all aspects of military AI technologies have been codified in IHL. Although AI has not been explicitly regulated under IHL, states are obliged to conduct

---

[119] International Committee of the Red Cross, *Overview of the Convention on the prohibition of anti-personnel mines* (2007), online: *ICRC* https://www.icrc.org/en/doc/resources/documents/legal-fact-sheet/landmines-factsheet-150807.htm
[120] *Banning Anti-Personnel Mines- The Ottawa Treaty Explained*, *supra* note 117.

hostilities following the "principles of humanity and from the dictates of public conscience" according to the Martens Clause. The clause has been recognized as "a safety net for humanity" by the ICRC[121], and represents "the integration of moral considerations into legal analysis."[122] It is a common feature of IHL and disarmament treaties that strives to provide protection for civilians and combatants beyond codified law, in the "absence of specific treaty law or an international agreement"[123] on AI developments in AWS. The Martens clause -which first appeared in the preamble of the 1899 Hague Convention[124] - and appears in virtually all subsequent IHL instruments. The humanity considerations are express recognition of the important examples of the general principles of IHL. Numerous IHL and disarmament treaties have addressed the provision of the Martens Clause. AP I, as an example, specifies:

> In cases not covered by Additional Protocol I or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity, and the dictates of public conscience.[125]

The clause is also referenced in the preambles of conventions such as the 1980 Convention on Conventional Weapons (para. 5),[126] and the 1997 Mine Ban Treaty (para. 8).[127] Put in other words, the Martens Clause is recognized as a customary rule which could

---

[121] International Committee of the Red Cross, *Report* 2018, *supra* note 7.

[122] Docherty, *supra* note 85.

[123] *Ibid.*

[124] *Convention Concerning the Laws and Customs of War on Land (Hague IV) with Annex of Regulations,* 18 October 1907, 36 Stat 2277 (entered into force 26 January 1910), *supra* note 56, preamble.

[125] *Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978). [AP I], supra* note 60, art. 1(2).

[126] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.

[127] *Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction,* 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999), *supra* note 106.

fill gaps in the rules governing warfare by the moral norms. Because completely autonomous weapons are not particularly addressed by international law, this clause applies to them.

However, the rapid development of AI in military technologies such as fully AWS with an ability to select and engage targets without MHC results in violation of the Martens Clause. As such states must urgently scrutinize these weapons closely through the lens of this Clause. Ultimately, existing treaties govern weapons systems in broad terms, thus a legal review of the weapons should take the Martens Clause into account. This would be a useful start to approaching this issue, however, it is likely that even such measures will not sufficiently address the problems resulting from new military AI technologies and other steps are needed. I will describe these in the fifth chapter.

This Clause includes cases not dealt with by conventional humanitarian law. The moral and ethical area of the Clause is seemingly connected with the regulation of the use of new technologies. What makes it difficult is that as states are competing with one another to achieve high-tech military AI, especially, in fully AWS, the risks are increasing at an alarming rate. These risks will be exacerbated by the lack of MHC. Since algorithmic weapons do not possess legal or ethical judgment and can even wrongly act (including as defensive systems), so compliance with the principles of IHL is challenging. The ability of Fully AWS in taking decisions based on algorithms makes it unable to respect human life and dignity. With this respect, Mines Action Canada concluded that:

> A human being will seek to justify her or her own decision before firing. AWS, which could not have empathy, would not be capable of considering such consequences. Deploying AWS in combat displays the belief that any human

targeted in this way does not warrant the consideration of a live operator, thereby robbing that human life of its right to dignity.[128]

Allowing such weapons to make decisions or determinations would be incompatible with the principles of humanity as outlined in this Clause. Providing further evidence of concerns of AWS, the Group of Governmental Experts (GGE) through discussions under the auspices of the CCW has sought to regulate the next class of militarized AI systems. For example, discussions about LAWS have been held at the UN's Convention on CCW in the 2010s. Compliance with IHL, as well as ethical and security considerations, is a fundamental criterion for determining whether military AI systems are acceptable. In addition to considering IHL principles, and the Martens Clause as a central element of discussions on AWS and LAWS, the importance of IHL coverage could be looked at through CCW measures as well.

IHL Coverage with a glance at CCW achievements

In addition to the 1949 Geneva Conventions and the 1977 Additional Protocols, the CCW is a key instrument of IHL. The Convention builds upon customary international rules regulating the conduct of hostilities, including the requirements to distinguish at all times between civilians and combatants, and to prohibition the use of weapons that inflict excessive injury or suffering on combatants.[129]

---

[128] Erin Hunt & Piotr Dobrzynski, *The Right to Dignity and Autonomous Weapons Systems* (Human Rights Watch, 2018), at 5, online: https://www.hrw.org/sites/default/files/report_pdf/arms0818sp_web.pdf

[129] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.

The CCW Meeting of High Contracting Parties in the field of AI systems has been one of the most significant achievements at the multilateral level.[130] However, states and non-governmental experts contributing to the discussion on AWS at the CCW Convention do not agree on how and to what degree existing IHL standards create constraints on the development and use of AWS in certain critical respects.[131] Although several states negotiated the CCW to restrict or outlaw specific types of weapons and states parties are obliged to take legislative and other kinds of measures to ensure their compliance with this convention,[132] some countries including the U.S. at the GGE meeting on LAWS focused on AWS benefits (as effective and useful) in making military actions more precise and following IHL easier.

On the contrary, Canada is a country that supports the work of the Convention to consider LAWS. It is against to use of specific weapons that affect civilians especially about the implications of integrating AI developments into LAWS.[133] Under the CCW convention, to which Canada is one of the signatory states, usage of specific types of weapons is prohibited. However, the CCW convention does not expressly mention AI and

---

[130] United Nations Office for Disarmament Affairs. *Background on LAWS in the CCW*, online: <https://www.un.org/disarmament/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw/>.

[131] Vincent Boulanin, Laura Bruun and Netta Goussac, *Autonomous Weapon Systems and International Humanitarian Law* (Sweden: Stockholm International Peace Research Institute, 2021), online (pdf): < https://www.sipri.org/sites/default/files/2021-06/2106_aws_and_ihl_0.pdf>

[132] The convention has currently five protocols in force. The five Protocols contain restrictions on specific weapons: 1- Protocol I restricts weapons with non-detectable fragments. 2- Protocol II restricts landmines, booby traps. 3- Protocol III restricts incendiary weapons. 4- Protocol IV restricts blinding laser weapons. 5- Protocol V, this Protocol sets out obligations and best practice for the clearance of explosive remnants of war. The problem is that each protocol is only binding on those states-parties that ratified it, and the CCW has failed to achieve consensus among state parties to open negotiations ensuring their commitments under the convention.

[133] Government of Canada, Global Affairs Canada, *Conventional weapons*, (Ottawa, ON: Global Affairs Canada, 2021) online: https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/peace_security-paix_securite/conventional_weapons-armes_conventionnelles.aspx?lang=eng

automated systems. Generally, in response to the development of new technologies and armed conflict scenarios, it strives to maintain flexibility,[134] and its principles seem to apply to some sort of automated systems and surrounding AWS.[135] But the indeterminacy and the "failure of mechanisms resulted from the regulating AWS to account for the real challenges that they pose,"[136] especially for characteristic features of AI in military systems with the likelihood of high humanitarian impacts in the foreseeable future, still remain to be tackled.

One thing is clear; the use of AWS and military systems must hinge on compliance with the IHL principles of distinction and proportionality. In times of armed conflict, AI in military operations will change human interaction profoundly which intensifies the debates on human intervention.

Debates on Human-Machine Interaction & IHL Principles

Militarized AI has the potential to change the nature of warfare by replacing humans in military operations, enabling humans, or eliminating human's control over military AI systems. As some, in the presentation to the CCW Meeting, declared:

> To allow machines to determine when and where to use force against humans is to reduce those humans to objects; they are treated as mere targets. They become zeros and ones in the digital scopes of weapons that are programmed in advance to release force without the ability to consider whether there is no other way out, without a sufficient level of deliberate human choice about the matter.[137]

---

[134] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.

[135] Saad and Gosal, *supra* note 82.

[136] Liu, *supra* note 84.

[137] Christof Heyns who was the United Nations Special Rapporteur on extrajudicial, summary or arbitrary executions from August 2010 to July 2016. See: Christof Heyns, *Autonomous Weapon Systems: Human rights and ethical issues*, presentation to the CCW Meeting of Experts on "Lethal Autonomous Weapon Systems" (2016).

Others hold a view that "the military is on the cusp of a major technological revolution, in which warfare is conducted by unmanned and increasingly autonomous weapon systems."[138] As a consequence, the military application of AI through AWS should have MHC which is argued as one of the mitigation risk measures.[139] Since AI can equip weapons with a high degree of unpredictability, it has glorified human intervention. Even the proposal of the Campaign to Stop Killer Robots, a coalition of non-governmental organizations that monitors the countries' positions[140] on banning fully autonomous weapons, is to prohibit any use of lethal force by AWS without meaningful human intervention, supervision, or control over the use of force. A broad definition of the type and degree of human-machine interaction for IHL compliance is not yet provided by IHL.

The prohibition of the use of lethal force by AWS should be achieved through an international treaty, as well as through national laws to enshrine the principle of MHC.[141] This campaign launched by Human Rights Watch and other NGOs[142] is seeking to pre-emptively ban the development, production, and use of LAWS that select and attack targets without any human intervention (it can also ensure compliance with the principles of humanity and the dictates of public conscience of Martens

---

[138] Andrew Ilachinski, "Artificial Intelligence and Autonomy: Opportunities and Challenges" (USA, Arlington, Center for Naval Analysis, 2017), accession number: AD1041749, online (pdf): <https://apps.dtic.mil/sti/pdfs/AD1041749.pdf>.

[139] Forrest E. Morgan et al, (eds.), *Military applications of artificial intelligence* (Santa Monica, CA: RAND corporation, 2020), DOI: https://doi.org/10.7249/RR3139-1

[140] It maintains a list of 30 countries that have so far declared their call for a ban on LAWS.

[141] David Pugliese, "Campaign to Stop Killer Robots Calls for Canada to Support Ban On Fully Autonomous Weapons" (Ottawa, ON: Ottawa Citizen, 2014), online: *Ottawa Citizen* <https://ottawacitizen.com/news/national/defence-watch/campaign-to-stop-killer-robots-calls-for-canada-to-support-ban-on-fully-autonomous-weapons

[142] Human Rights Watch, *Report* on *Stopping Killer Robots; Country Positions on Banning Fully Autonomous Weapons and Retaining Human Control* (Human Rights Watch, 2020), online (pdf): <https://www.hrw.org/sites/default/files/media_2021/04/arms0820_web_1.pdf>.

Clause). Indeed, it is evident that without any MHC, decision-making by LAWS in an armed conflict can hardly be made in compliance with IHL principles mainly because machines or robots cannot make human-like decisions based on IHL principles including distinction, proportionality, and precaution.

However, meaningful control is a subject that needs global debate, especially when the number of emerging countries using military AI is increasing. Canada could play a leading role as an international leader in developing its national policy on questions relating to the emerging technology of LAWS based on Canada's leadership on the landmine issue and the Ottawa process that resulted in the Mine Ban Treaty. As noted by Paul Hannon, Executive Director of Mines Action Canada: "Canadians are uniquely positioned to take on a leadership role in efforts to ensure that humans always have meaningful control over life and death decisions in conflict."[143]

IHL principles in this regard, as argued by some, require "deliberate human judgments" because machines cannot infer things necessary to decide on who is a civilian or a combatant.[144] Others take the view that CCW States Parties generally agree that weapon systems and use of force must be under the "meaningful" or "effective human control", as well as "appropriate levels of human judgment."[145] Otherwise, the delegation of human control to AI systems will be increased.[146] This can frequently be a paradigm shift enabling

---

[143] Hunt & Dobrzynski, *supra* note 128. See also Stop Killer Robotics Canada, Canada's Campaign to Stop Killer Robots and Fully Autonomous weapons, online: https://stopkillerrobots.ca/media/press-releases/
[144] Noel Sharkey. "Saying 'No!' To Lethal Autonomous Targeting" (2010), 9(4) J Mil Ethics 369.
[145] Neil Davison. "A legal perspective: Autonomous weapon systems under international humanitarian law" in UNODA Occasional Papers No. 30: *Perspectives on Lethal Autonomous Weapon Systems*, (New York, NY: United Nations, 2017) 5, online (pdf): <https://www.un.org/disarmament/wp-content/uploads/2017/11/op30.pdf>.
[146] Greg Allen & Taniel Chan. "Artificial Intelligence and National Security" (Belfer Center for Science and International Affairs Harvard Kennedy School, 2017) at 13, online (pdf): <https://www.belfercenter.org/sites/default/files/files/publication/AI%20NatSec%20-%20final.pdf>.

these capabilities to transform the AI battlefield, which makes it nearly impossible to determine the applicability of IHL. AI systems can be trained, but they can't be programmed to cover every scenario, since there will be unanticipated situations that will require the involvement of a human. The problem here is that even though it is essential to preserve the principle of human control, this principle per se is not sufficient to resist all potential risks of AI in armed conflict.

Moreover, according to some scholars,[147] there is a possibility of excessive civilian harm as AI cannot guarantee, by its nature, what will happen when encountering a new situation. It happens when AI is uncertain of target identification or where its action can be supported by *opinio juris* (on the legal application of force). When an armed attack or the "use of force"[148] between states happens, they may resort to applying weaponized AI, but expecting AWS to reliably act in a discriminatory and proportionate manner is questionable.[149]

One controversial debate is that AI in fully autonomous weapons does not have legal and ethical judgment. Due to the proportionality principle of IHL, as described in the previous chapter, commanders are required to determine whether the anticipated military advantage in identifying targets for a particular attack outweighs expected civilian harm. Making such decisions should be based on ethical (Martens Clause) as well as legal

---

[147] Gary E Marchant et al., "International Governance of Autonomous Military Robots" (2011) 12 Colum Sci & Tech L Rev 272 at 280.

[148] Use of force generally considered to be the *jus ad bellum* which determines when one state may lawfully use of armed force against another. See; Waters, *supra* note 11. at 94-100.

[149] Chantal Grut, "The Challenge of Autonomous Lethal Robotics to International Humanitarian Law" (2013) 18:1 J Confl & Secur L 5.

considerations. Weapons with fully autonomy could not be preprogrammed to make such an assessment.

Hence, the capability of AI to partially or completely eliminate human interventions in military warfare should be highlighted. The utilization of a new generation of advanced AI in military systems and AWS that are capable of identifying and destroying targets without human intervention will pose fundamental legal concerns. Looking broader, the probability of delegation of human control to AI military systems is increasing, and in the long term, transforming military AI power and warfare amplifies states' thirst to be dominant leaders which can undermine the current coverage of IHL rules. For the inclination of states toward military superiority, this global arms race has already begun with a quest for dominance in militarized AI technologies. [150] Such an arms race carries less respect for IHL and its fundamental rules, in particular when the widespread availability of arms can endanger civilians as the typical victims who are entitled to be under the protection of IHL.

In addition to this legal concern, further assumptions in the case of AI military use may be overlooked. There are some attitudes under the "trust"[151] domain varying from the effects of AWS on individuals they are supposed to help, to how users and militaries will trust these systems sufficiently to use them in combat. AI capabilities in learning, planning, and generating complex plans would likely make matters worse for militaries to establish

[150] Edward Geist, "It's Already Too Late to Stop the AI Arms Race-We Must Manage It Instead" (2016), Bulletin of the Atomic Scientists, 72:5, 318-321, DOI: 10.1080/00963402.2016.1216672. See also AI specialist Steve Omohundro who warned that "an autonomous weapons arms race is already taking place" in "Fearing Bombs That Can Pick Whom to Kill" (2014) by John Markoff, online: *The New York Times* <https://www.nytimes.com/2014/11/12/science/weapons-directed-by-robots-not-humans-raise-ethical-questions.html>.
[151] Heather M. Roff & David Danks, "Trust but Verify": The Difficulty of Trusting Autonomous Weapons Systems (2018) 17:1 J Mil Ethics 2, DOI: < 10.1080/15027570.2018.1481907 >.

trust with AI weapons systems in the near future. To trust AWS and LAWS, it should be first determined that they are sufficiently knowledgeable about the surrounding environment in which they are applied and the context in which they are used to justify their operations. Recognition of human control over critical functions of military AI systems based on the associated risks seems necessary to many countries.

Adding to these concerns, the need for action against the use of new classes of weapons is urgent. However, looking at new military AI technologies and existing rules, as mentioned previously, shows that legal norms will likely lose their impact on the next-generation weapons that are not specifically regulated under IHL. Both national and international initiatives are required in order to create a comprehensive regulatory approach to emerging AI technologies to be compliant with IHL.

Unfortunately, international competition as mentioned in the previous chapter reduces the possibility of conclusive regulation. So several ideas including the idea of a new treaty[152] (such as a binding international treaty on banning the development of weaponized AI) proposed by some scholars,[153] or negotiating a new legally binding instrument on autonomous weapons suggested by the ICRC,[154] may not be supported by countries with

---

[152] See; Denise Garcia, *supra* note 50. Garcia recommends a new innovative international treaty that would not fit the moulds of existing disarmament and arms control regulations should include three types of limits namely limits solely on military targets, such as incoming missiles and in situations where civilians are not present, the duration and geographic scope of the targeting should be limited to allow a human to oversee even when a machine learning algorithm has provided the target, and human control and supervision are required to allow for prompt intervention. This new treaty addresses how humans can remain involved in overseeing the use of new technologies in current systems.
It should be also mentioned that the Arms Trade Treaty (ATT), establishes standards for international arms transfers and seeks to prevent human suffering and eradicate the illicit trade of conventional weapons. Establishing effective export controls allows ATT's States Parties to prevent weapons flowing to illicit groups including terrorists and criminals and ensure that their arms exports aren't used for illegitimate purposes. *Arms Trade Treaty*, 2 April 2013, 3013 UNTS 269 (entered into force 24 December 2014).
[153] Morgan et al., *supra* note 139.
[154] Denise Garcia, *supra* note 50.

advanced military AI technologies. Therefore, both national and international legal systems might aim for soft law as a deterrent force rather than hard law. Most notably, this is a real challenge that exists in the policies of states on both national and international stages and needs a real effort to decrease the gaps between rhetoric and practice. The following chapter will focus on national pathways on military AI by analyzing the national AI strategy of Canada and the way it could reflect international principles in its policy to find out what steps toward removing the gaps between rhetoric and practice have been taken or should be taken by this country.

CHAPTER 4

NATIONAL PATHWAYS ON MILITARY AI: THE IMPORTANCE OF

TRANSPARENT NATIONAL STRATEGIES

The propensity of military powers toward the deployment of AI programs adds urgency to the need to regulate this technology under the principles of International Law. This chapter considers national strategies and measures that states like Canada could devise and employ when developing military AI to ensure respect for IHL principles.

In general, the existence of a perceived legal vacuum or uncertain landscape of legal principles, on a national level regarding the military use of AI, indicates the necessity of more study on compliance with IHL. On the national level, approaches regarding AI development and its regulation vary widely, depending on the state. Some countries have expressed their desire to impose limits on fully autonomous weapons. While some voices are calling for a more cautious approach, such as a new treaty, others, including many NGOs, suggest that a more incremental approach under existing international rules should remain, in order to maintain meaningful human control on any use of AI weapons. The inclination from only a few countries toward new legislation on banning AWS development could reflect the reluctance of more dominant states on militarized AI to reach a consensus on such a unified treaty. Some states are arguing for new legislation, others tend to promote the use of soft law[155] and guidelines rather than rely on binding legal

---

[155] The term soft law refers to agreements, principles and declarations that are not legally binding or have weaker binding force than hard law. The term hard law refers to legal obligations that are generally binding on the parties involved or can be legally enforced before a court. Traditionally, soft law instruments are associated with international law, although they have been recently transferred to domestic law as well. See for example Stéphanie Lagoutte, Thomas Gammeltoft-Hansen, & John Cerone, *Tracing the Roles of Soft Law in Human Rights* (Oxford, UK: Oxford University Press, 2016*).*

principles. UN General Assembly Resolutions,[156] official declarations, guidelines adopted by international organizations and advisory opinions by international courts are examples of non-binding instruments and soft law which could exert an influence on IHL principles. Conceivably, states can strengthen their domestic legislation related to the implementation of IHL by systematically integrating these soft law sources.

On the one hand, at a national level, developing guiding principles for the ethical, legal, and secure use of AWS and LAWS is the first step for states to take. On the other hand, the importance of finding a more workable legal theme on militarized AI needs to be highlighted as the next step. This study endeavors to investigate the latter by having a glance at Canadian insights and bringing in a comparative example of the U.S.

A Canadian Perspective on the International Stage

The significant role of AI in military applications has fostered international and national legislators' awareness. Addressing AI's risks and comparing domestic legal systems is necessary for finding the best framework to keep pace with this technology. A prerequisite of embracing AI's full potential should be meeting legal and ethical requirements. As such, it is incumbent on legal scholars to investigate the progress and strategies of countries on AI nationally and internationally. In this thesis, I elaborate on both national policy or international measures taken by Canada and the U.S., as well as challenges of militarized AI, and raise questions regarding their strategies. This comparison

---

[156] Not all but certain General Assembly resolutions are examples of soft law.

facilitates providing recommendations regarding the best ethical and legally applicable policy on militarized AI for developing countries to take.

To commence with its measures on an international level, Canada has signed and ratified all the major IHL conventions. It has also adopted domestic laws to implement provisions of these conventions through instruments such as the Geneva Conventions Acts.[157] Under these treaties, and their implementing legislation, Canada is obligated to take appropriate steps in accordance with IHL. One of the international measures taken by Canada on military AI is the involvement of Canada at the Fifth Review Conference to the CCW, in establishing an open-ended Group of GGE on AWS to explore "possible recommendations on options for addressing Lethal AWS."[158] Besides that, at the GGE meeting on LAWS in 2017, Canada stated that it is "committed to maintaining appropriate human involvement in the use of military capabilities that can exert lethal force."[159] To recap, other examples of treaties that Canada has ratified are as follows:

- The 1954 Hague Convention for the Protection of Cultural Property in the Event of an Armed Conflict (Canada is a State Party to Protocol to this convention);[160]

---

[157] *Geneva Conventions Act*, R.S.C., 1985, c. G-3. In this Act and also *Crimes Against Humanity and War Crimes Act*, S.C. 2000, c. 24, the Canadian government has included violations of international humanitarian law as offences.

[158] *Final Document of the Fifth Review Conference*, 23 December 2016, UN Doc. CCW/CONF.V/10, Decision 1, which recalls, in turn, *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS),* 10 June 2016, Un Doc. CCW/CONF.V/2.

[159] Hayley Evans, *Lethal Autonomous Weapons Systems at the First and Second U.N. GGE Meetings*, LAWFARE (2018), online: *Lawfare* <https://www.lawfareblog.com/lethal-autonomous-weapons-systems-first-and-second-un-gge-meetings>, archived at https://perma.cc/PR4G-YLBS. See also Branka Marijan, *Canada to support a ban on autonomous weapons* (Project Ploughshares, 2020), online: https://ploughshares.ca/2020/01/canada-to-support-a-ban-on-autonomous-weapons/. The author suggests Canada must clearly state its view on human control supporting the idea of meaningful human control. The author also says "the meaning of appropriate in this context is anybody's guess. But it seems that there could be instances in which human involvement would not be seen to be necessary."

[160] See; UNESCO, *Implementation of Standard-Setting Instrument, General Monitoring Comprehensive Report, Annex II- Status of Ratification of Conventions and Agreements Adopted under the Auspices of UNESCO*, (2021) Item 23 of Provisional Agenda, UN Doc 212 Ex/23.I.INF, (2021). Online (pdf): https://unesdoc.unesco.org/ark:/48223/pf0000378425_eng/PDF/378425eng.pdf.multi.page=11.

- Amendment to Article 1 of the Convention on Conventional Weapons;[161] and

- Three initial CCW protocols and later additions[162] including, Protocol I on Non-Detectable Fragments, Protocol II on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices, Amended Protocol II, Protocol III on Incendiary Weapons,[163] Protocol IV on Blinding Laser Weapons,[164] and Protocol V on Explosive Remnants of War.[165]

In all aforementioned measures, the initial goal of Canada is to improve its compliance with IHL obligations. To fulfill this requirement, Canada has so far taken different and practical measures beyond signing treaties such as the adoption of the Joint Doctrine Manual Law of Armed Conflict at the Operational and Tactical Levels.[166] A national military manual is one of the aspects of the legal framework that governs the military's operations. It establishes the framework within which commanders can make operational

---

[161] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983*), supra* note 36. See also 2. c *Amendment to Article I of 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, 21 December 2001, 2260 UNTS 82 (entered into force 18 May 2004)*

[162] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.

[163] *Ibid.* see also; *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, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III),* 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15) (entered into force 2 December 1983), *supra* note 36.

[164] *Additional Protocol to 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 (Protocol IV, entitled Protocol on Blinding Laser Weapons*), 30 July 1998, 2024 UNTS 163 (entered into force 30 July 1998).

[165] *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, Protocol on Explosive Remnants of War (Protocol V),* 28 November 2003, 2399 UNTS 1 (entered into force 12 November 2006), *supra* note 36.

[166] Canada, National Defence, *Law of Armed Conflict at the Operational and Tactical Levels*, *supra* note 72.

decisions in compliance with IHL when conducting operations.[167] Canada has military

manuals indicating respect for IHL and binding obligations not only upon the Government

or the Canadian Forces (CF). These manuals can serve as reference guides for legal

advisers as well as commanders. For instance, in Canada's LOAC Manual (2001):

> The obligations binding on Canada in accordance with Customary International
> Law and Treaties to which Canada is a party are binding not only upon the
> Government and the CF but also upon every individual. Members of the CF are
> obliged to comply and ensure compliance with all International Treaties and
> Customary International Law binding on Canada.[168]

Additionally, Canada's Armed Forces Code of Conduct in 2001 states there is a

requirement to obey LOAC and CIL under Canadian military law which includes the

Criminal Code.[169] Canada is committed to seeing that its forces conduct their operations in

compliance with the LOAC.[170]

To comply with existing specific treaties on IHL, Canada was the first state to sign and

ratify the Ottawa convention in 1997. This Treaty shows Canada's leadership and its

cooperation with the International Campaign to Ban Landmines (ICBL), which prohibits

military tactics using APLs. As a State Party to this convention, Canada has also adopted

the Anti-Personnel Mines Convention Implementation Act to implement the convention

and address its humanitarian objectives, [171] Canada is also one of the first countries that

---

[167] Nobuo Hayashi, *National Military Manuals on the Law of Armed Conflict* (Florence, Italy: Forum for International Criminal and Humanitarian Law, 2010, Second Edition), FICHL Publication Series No. 2, at 52, online: <https://www.toaep.org/ps-pdf/2-hayashi-second>

[168] International Committee of the Red Cross, *IHL Database*, *Customary IHL- Practice Relating to Rule 139. Respect for International Humanitarian Law* (Canada), online: <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_cou_ca_rule139_sectiona>

[169] *Criminal Code*, RSC 1985, c C-46.

[170] Henckaerts & Doswald-Beck, *supra* note 70.

[171] Delegation of Canada to the OSCE, *Canadian response to OSCE questionnaire on anti-personnel mines* (2019), FSC.EMI/170/19, online (pdf): <https://www.osce.org/files/f/documents/e/f/422282.pdf>. see also *Anti-Personnel Mines Convention Implementation Act*, S.C. 1997, c. 33.

signed the CCW in 1981, demonstrating that it is against to use of specific types of weapons that affect civilians indiscriminately.

Despite the considerable international measures taken by Canada, Canada needs clarification in some aspects of its IHL approach on the international level to boost its position. For example, while countries including Austria have called for a ban on weapons that don't have MHC over critical functions,[172] Canada has not taken a specific position, despite, among others, some members of the AI research community in Canada calling for an International Ban on the Weaponization of Artificial Intelligence with an open letter.[173] These experts urged the Prime Minister to urgently address the challenge of LAWS and to take a leading position against AWS on the international stage at the CCW meetings in Geneva. Taking a leading position and pursuing more transparent and explicit procedures at the international stage would vividly illustrate the strength of Canada's IHL leadership on the world stage. Following a transparent domestic policy can also indicate how well a country has been able to regulate its national law under international law and IHL principles. The next section describes a current Canadian perspective on military AI at the national level.

---

[172] Ray Acheson & Allison Pytlak, Austria's conference on autonomous weapons offers bold support for a ban (Women's International League for Peace and Freedom - Reaching Critical Will Program, 2021), online: <https://reachingcriticalwill.org/news/latest-news/15402-austria-s-conference-on-autonomous-weapons-offers-bold-support-for-a-ban>.

[173] Ian Kerr et al, "Call for an International Ban on the Weaponization of Artificial Intelligence" in an open Letter to the Prime Minister of Canada (Canada, University of Ottawa, Centre for Law, Technology and Society, 2017), online: < https://techlaw.uottawa.ca/bankillerai>. One observer suggests that: "Canada has generally chosen to remain on the sidelines…Still, the march to autonomous weapons is not inevitable... But regulation of such weapons development will not happen if countries like Canada remain silent", see Branka Marijan, *Canada's deafening silence on the creation of autonomous weapons* (Toronto Star, 2020), online: https://www.thestar.com/opinion/contributors/2020/10/09/canadas-deafening-silence-on-the-creation-of-autonomous-weapons.html?rf.

A Canadian Perspective on the National Stage

When it comes to AI, Canada plays a leading role in all domains ranging from scientific research, transportation, data, and digital infrastructure, information technology, ethics, skills and education, space exploration, and so forth. AI seems to have touched different aspects of AI policy in Canada's strategies. Canada, in 2017, was the first country to release a national strategy for AI.[174] In fact, Canada has pursued various national strategies. For example, the Canadian Institute for Advanced Research (CIFAR, as a state-associate institute) AI program,[175] would enhance Canada's international status as a leader in this area. Enhancing Canada's international profile and visibility in artificial intelligence is one of the objectives of CIFAR's Pan-Canadian AI Strategy. In its guidelines and national strategy on AI, Canada is leading the way in the use of this technology.

As of November 2018, a report on national and regional AI strategies was published by CIFAR that motivated other countries to advance their national AI strategies.[176] In 1982, CIFAR's first research program focused on Artificial Intelligence, Robotics, and Society. Two years later, the Canadian government asked CIFAR to develop and implement the Pan-Canadian Artificial Intelligence Strategy. The Pan-Canadian AI Strategy "as a significant investment is designed to advance research and innovation in AI bringing thought leaders from around the world to examine the broad implications of AI."[177] CIFAR

---

[174] UNESCO, "Canada First To Adopt Strategy For Artificial Intelligence", online: h<ttp://www.unesco.org/new/en/media-services/single-view/news/canada_first_to_adopt_strategy_for_artificial_intelligence/>.

[175] See Nabilah Chowdhury et al., *Pan-Canadian AI Strategy Impact Assessment Report* (CIFAR and Accenture, 2020), online (pdf): https://cifar.ca/wp-content/uploads/2020/11/Pan-Canadian-AI-Strategy-Impact-Assessment-Report.pdf.

[176] See Johnny Kung, "Building an AI World: Report on National and Regional AI Strategies" 2nd ed, (Toronto, ON: CIFAR, 2020) online (pdf): <https://cifar.ca/wp-content/uploads/2020/10/building-an-ai-world-second-edition.pdf>.

[177] UNESCO, *supra* note 174.

has a five-year plan to invest primarily in AI research, talent, and training with specific objectives.[178]As a leader in releasing a national AI strategy, Canada aimed at using AI ethically and positioning the country as a "thought leader"[179] in different aspects of AI implications namely the ethical, policy, and legal implications.[180] Developing thought leadership on different implications of AI at the domestic level, including ethical implications,[181] Canada could prove that it can be one of the states in setting international norms for different AI applications such as military use of AI as a critical application.

Although the CIFAR program does not include policies in strategic sectors such as the military realm, Canada has other policies in place which are separate from the CIFAR strategy, and a need for transparent AI use consistent with legal rules has been addressed in the national policy of Canada. On March 4, 2019, the Treasury Board of Canada Secretariat launched the Directive on Automated Decision Making to guide government departments in the transparent and accountable use of AI. The Directive on Automated Decision-Making of Canada[182] is an attempt toward utilizing AI to be compatible with legal

---

[178] These objectives are:

(1) Attract and retain world-class AI researchers by increasing the number of AI researchers and graduates,

(2) Foster a collaborative AI ecosystem by establishing interconnected nodes of scientific excellence in Canada's three AI centres: Edmonton, Montreal, and Toronto.

(3) Understand the societal implications of AI by developing thought leadership on the economic, ethical, policy, and legal implications of AI, and,

(4) Advance national AI initiatives by supporting a national research community on AI. See, online: https://cifar.ca/ai/

[179] See: what is a thought leader?, online: https://thoughtleadershiplab.com/what-is-a-thought-leader/

"Thought leaders become the trusted sources who move and inspire people with innovative ideas; turn ideas into reality…They create evolutionary and even revolutionary advancements… Thought leadership takes a certain level of commitment and a willingness to buck the status quo or the way things have always been done… As a recognized thought leader, you will have the power to persuade, the status and authority to move things in a new direction."

[180] Daniel Zhang et al., *The AI Index 2021 Annual Report (AI Index Steering Committee, Human-Centered AI Institute, Stanford University, Stanford, CA, March 2021), chapter7: AI Policy and National Strategies (2021), at 151, online (pdf): < https://aiindex.stanford.edu/wp-content/uploads/2021/03/2021-AI-Index-Report_Master.pdf>*

[181] Kung, *supra* note 176.

[182] Canada, Treasury Board, *on Automated Decision-Making (*took effect on April 1, 2019, with compliance required by no later than April 1, 2020). Online: <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592>.

principles such as transparency, legality, and other procedural factors. It is said that this Directive will evolve to ensure that it remains relevant.[183] With the rapid change of AI technology, the military realm would be one of the relevant parts that need to be covered in these kinds of national activities. However, it is not clarified how this directive can remain relevant. Another measure taken by Canada - more specifically- the government of Quebec is the proposal for the creation of an intergovernmental organization[184] dedicated to fostering consensus among member states regarding the standards or practices governing AI applications that should comprise some areas such as the military realm.

Furthering the Canadian national AI strategies which launched through several measures such as enhancing the "Pan-Canadian Artificial Intelligence Strategy"[185] would provide other states with opportunities to make a move in their national strategies by adopting a clear position on AI within the framework of IHL. Over the past years, a growing number of countries have adopted national strategies seeking to develop policies and procedures on the use of AI. For instance, China through its "Next Generation Artificial Intelligence Development Plan"[186] in July 2017, announced its aim to become the world leader in this technology by 2030. These strategies on the national level demonstrate that countries continue to invest in AI research. But they need to assess different AI applications in multiple realms such as the military and its numerous associated risks. The main significant risk arising from military AI and its consequences

---

[183] *Ibid.*

[184] Organisation mondiale de l'intelligence artificielle (Omia), see; UNESCO, *supra* note 174.

[185] CIFAR, "Pan-Canadian Artificial Intelligence Strategy", online: *CIFAR* < https://www.cifar.ca/ai/pan-canadian-artificial-intelligence-strategy>.

[186] PR China, Department of International Cooperation Ministry of Science and Technology, *Next Generation Artificial Intelligence Development Plan Issued by State Council, China's Strengths Creates Innovation Miracles* (2017) No.17, (MOST, P.R. China), online (pdf): <https://www.mfa.gov.cn/ce/cefi//eng/kxjs/P020171025789108009001.pdf>.

would be security. From the perspectives of state actors, the importance of security cannot be denied. For example, in the Canadian Safety and Security Program, there are various priorities taken into account. Among the priorities is improving Canada's capability to prevent, prepare for, respond to and recover from chemical, biological, radiological, nuclear, and explosive weapons.[187] This program should be developed because more attention needs to be given to the military realm under the current national and international regulations. Making efforts to consider advanced military AI in this program enables it to address the legal concerns about military AI implications on safety and security as well.

Regardless of legal debates and repercussions, the ethical implications of AI have been explored separately. To look at the ethical issues of developing human enhancement technology in the military, a research project was conducted at Defence Research and Development Canada (DRDC) [188] proposing both technology and military ethics assessment frameworks to identify potential ethical issues with emerging technologies and their use by militaries. Compliance with National Laws and Codes of Conduct, with *jus in bello* and *jus ad bellum* principles, are among the categories where ethical questions could arise with technology in use.[189]

---

[187] Canada, Defence Research and Development Canada, *Canadian Safety and Security Program*. Online: < Canadian Safety and Security Program - Canada.ca>.

[188] The purpose of DRDC is also to provide the CAF, government departments, public safety, and national security communities with knowledge and technology. See Government of Canada, Defence Research and Development Canada.

[189] Kimberly D. Girling, Joelle B. Thorpe and Alain Auger. *Ethical Issues and Policy Implications of Human Performance Enhancement in the Military,* Scientific Report DRDC-RDDC-2017-R103 (Canada, Defence Research and Development, October 2017), online: < Microsoft Word - D17-0629-1327 FORMATTED DOCUMENT post QA Formatting.docx (drdc-rddc.gc.ca)>, at 10,13. See also Joelle B. Thorpe, Kimberly D. Girling & Alain Auger, "A Framework to Assess the Military Ethics of Human Enhancement Technologies," (2020) 18.2 The Canadian Army Journal 53, online (pdf): <http://www.army-armee.forces.gc.ca/assets/ARMY_Internet/docs/en/canadian-army-journal/caj-18.2-en-sp.pdf>

Pursuant to its obligations to implement IHL domestically, Canada established the Canadian National Committee for Humanitarian Law (CNCHL) in 1998. [190] The Committee, with several government departments and organizations, has major functions, namely recommending the ratification of IHL-related legal instruments, coordinating the implementation of IHL obligations, advising on IHL dissemination and training in Canada, stimulating the actions of governmental and other relevant organizations to strengthen compliance with IHL, suggesting measures to promote the national implementation of IHL in domestic legislation in other countries, based on Canada's resources or expertise, and so forth.[191]

In accordance with IHL, Canada same as other governments, is required to ensure respect for IHL, educate its armed forces and the general public, and enact laws punishing violations of the Geneva Conventions and Additional Protocols.[192] To the Canadian Red Cross, disseminating the principles of IHL to the armed forces, lawmakers, politicians, and the general public raises awareness which frequently means more respect from militaries as they would receive training on IHL, know the rules and follow them. Respecting IHL is of utmost importance in the Canadian perspective to the extent that even on a domestic level breaching IHL principles would be punishable by Canadian Criminal Law. Basically,

---

[190] The Canadian National Committee for Humanitarian Law, online: <https://www.cnchl-cncdh.ca/articlebd07.html?id=009190>.

[191] *Ibid*.

[192] The Canadian Red Cross is the Canadian leading humanitarian organization serves as the Secretariat for the CNCHL. It aims to improve the lives of vulnerable people, and several fundamental principles such as humanity, respect, dignity, transparency and so forth. The Canadian Red Cross has mentioned to these obligations, see Canadian Red Cross, *What is International Humanitarian Law?* online: <https://www.redcross.ca/how-we-help/international-humanitarian-law/what-is-international-humanitarian-law>. See also *Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field.* 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950), *supra* note 66, art 1: Respect for the Convention. See *Geneva Convention (III) relative to the treatment of prisoners of war,* 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950), *supra* note 59, art 127: Dissemination of the Convention, and Commentary of 2020 (ICRC).

as long as AI is applied in autonomous weapons, the military application of this technology could pave the way for widespread violations of IHL. As such, governments must bear responsibility for any potential violations of IHL to ensure respect. States must pass legislation to punish breaches of IHL including the GCs and APs.[193]

Moreover, Canada has evidently been active on the national front on AI regulation, leading the way in the responsible use of AI[194] with its initiatives through national strategies and guidelines to ensure the safe adoption, secure military AI applications, and promote the responsible use of this technology by states based on IHL principles and common values. The consequences of domestic strategies applied and taken by Canada on an international level cannot be overestimated. Canada has focused on AI technology and innovation, and it is taking steps in harnessing the potential of AI, as well as examining the legal and ethical implications of AI. As IHL lies at the core of Canada's commitment to a peaceful world,[195] becoming an international leader as well as applying the most clarified national perspective can be the measures toward "peaceful use of AI"[196] which can be taken by Canada on both national and international fronts.

Another measure taken by Canada in its national policy is the Government of Canada's Defence Policy Document entitled: *Strong, Secure, Engaged*. In this document, Canada declared its "commitment to maintaining appropriate human involvement in the use of

---

[193] Canadian Red Cross, *What is International Humanitarian Law, Ibid*.

[194] Canada strives to ensure AI is governed by clear values, ethics, and laws. See Canada, Digital government innovations, *Responsible use of artificial intelligence (AI)*, online: < Responsible use of artificial intelligence (AI) - Canada.ca>.

[195] Canada, *Canadian Statement at the UN Security Council Open Debate on Upholding International Law (2018)*, online: < Canadian Statement at the UN Security Council Open Debate on Upholding International Law>

[196] The principle of peaceful use of AI systems is a cornerstone of international law. AI must be developed for peace and the common good, from an ethical, legal, and human-centered perspective. See: Eugenio V. Garcia, "The peaceful uses of AI: an emerging principle of international law" (2021), online: <https://thegoodai.co/2021/06/15/the-peaceful-uses-of-ai-an-emerging-principle-of-international-law/>.

military capabilities that can exert lethal force"[197] while pointing out that technological

developments are the future of defense. Additionally, this document indicates "Canada is

committed to employing new technological capabilities in a manner that rigorously

respects all applicable domestic and international law, is subject to proven checks and

balances, and ensures full oversight and accountability."[198] This new Canadian approach

to defence is comprised of three requirements:

> 1- Anticipate: understanding potential threats to Canada and Canadian interests so as to enhance the military's ability and Canadian Armed Forces [199] (CAF) to succeed on operations, to prevent or prepare for, and respond to a wide range of contingencies;
> 2- Adapt: proactively to emerging challenges by harnessing new technologies;
> 3- Act: with the decisive military capability to defend Canada, protect Canadian interests and values contributing to global stability.[200]

Elaborating these requirements reveals the Canadian perspective on the importance of

the challenges emanating from technologies with dual-use, including AI military in the

near future. It can be argued that the absence of any mention of AI in *Strong, Secure,*

Engaged is the failure of the Canadian Armed Forces to exploit Canada's advanced AI

capabilities. However, there is no doubt that AI is a part of this document, if only obliquely.

Authors note that Canada lacks sufficient investment in military technology.[201] If this

is the case, it may be part of the reason why AI is not being directly addressed in our laws

---

[197] Canada, Department of National Defence, Canadian Armed Forces, *Strong, Secure, Engaged*, Canada's Defence Policy, (Ottawa: National Defence, 2017). online: <https://publications.gc.ca/site/eng/9.835971/publication.html>

[198] Canada, Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy,* Global context, online: <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/canada-defence-policy/global-context.html>

[199] Under the National Defence Act, RSC 1985, c N-5, there is an entity or unified armed forces separate and distinct from the Department of National Defence which is called the Canadian Forces which contributes to the conduct of Canadian defence diplomacy. Part II of the National Defence Act sets out the structure of Canada's armed forces (military, reserve, special units, etc,) see online: https://laws-lois.justice.gc.ca/eng/acts/N-5/page-3.html#h-374679

[200] *Strong, Secure, Engaged, supra* note 197.

[201] Shaan Mahal, Sydney Martin, Liisa Plitz, Canadian Armed Forces and AI: Ahead of the Game or Lagging Behind? (Global Advantage,2019), online: *Global Advantage*

and policies yet. However, a lack of investment in the technology should not preclude adopting a comprehensive legal and policy approach. But the question is how can it be done? I will return to this question after examining international and national strategies in the next chapter in order to inform possible recommendations.

There is no doubt that Canada has recognized that new means of technology could bring fundamental challenges. These challenges should be addressed head-on in the proactive development of new measures and policies. Critics have pointed out the urgent need of "taking a strong and leading position against AWS on the international stage addressing the challenge of LAWS."[202] Taking a strong position is a high priority especially when the rapid evolution of military AI technology leads to increasing levels of AWS. While *Strong, Secure, Engaged* deliberately identifies the possibility of lethal operation of military technologies,[203] the importance of civilian protection and providing a framework to select any target has been regarded in several subjects of Canadian directives such as the targeting process.[204]

Given the increase in the development of new methods of military AI, Canada has aspired to respond to resulting threats to national and international law. The CAF, as an example, is aiming to ensure that the use of military capabilities is consistent with domestic

<https://globaladvantageconsulting.com/canadian-armed-forces-and-ai-ahead-of-the-game-or-lagging-behind/>.

[202] Kerr, *supra* note 173.

[203] See Christopher Kilford, "Canada's New Defence Policy: A Huge Step in the Right Direction" (CDA Institute Analysis, 2017), online (pdf):< https://cdainstitute.ca/wp-content/uploads/2016/07/KilfordAnalysisFinal.pdf>.

[204] Targeting process defined as a formal, deliberate process used by military commanders to determine courses of action during operations governs military action by providing a framework for selecting and prioritizing targets and determining the most effective way to deal with them, whether through lethal or non-lethal means. It seeks to minimize civilian casualties through enabling operational decision-making, optimizing the use of military capabilities, and ensuring the use of the right military tool against a specific target. See; Canada, Department of National Defence, *A new Canadian approach to defence: Anticipate. Adapt. Act in Strong, Secure, Engaged: Canada's Defence Policy*, online (pdf): <http://dgpaapp.forces.gc.ca/en/canada-defence-policy/docs/canada-defence-policy-report.pdf>.

and international legal principles. The CAF is committed to maintaining appropriate human involvement in the use of military capabilities that can exert lethal force.[205] To maintain the lead, however, the growing military applications of AI developments, in particular, the autonomy of weapons systems, needs additional attention in Canadian policy making. In Canada's defence policy, military capabilities with lethal force are referred to as autonomous weapons systems but mentioned only once in this document. When this document raises the idea of maintaining appropriate human involvement in the use of military capabilities, the strength is that as humans are ultimately responsible or accountable for lethal decisions, human involvement has been considered critical to that process by Canada. Additionally, in the use of force, Canada ensures the appropriate human involvement through its national legal review of all weapons systems, which ensures the weapons systems are compliant with Canada's international legal obligations.[206] As such, it is clarified in which cases human involvement is necessary. However, the absence of a definition of human involvement can be considered a weakness. Canada needs to define such expression, or state to what extent human involvement is necessary.

Specific areas of concern such as discussions on LAWS at CCW need to be conducted consistently, and maintaining appropriate human involvement on LAWS should be explicitly clarified.

Canada supports a prohibition of weapon systems based on innovative technologies that are not consistent with IHL and ensuring accountability for their use. Considering

---

[205] *Ibid*. see also *Strong, Secure, Engaged, supra* note 197.

[206] Group of Governmental Experts on Lethal Autonomous Weapons Systems (GGE LAWS), *Canadian response to the Chair's request for input on potential consensus recommendations,* online: UNODA: <https://documents.unoda.org/wp-content/uploads/2021/06/Canada_Commentary-on-potential-consensus-recommendations.pdf>.

Canada's response to potential consensus recommendations on emerging technologies in the area of LAWS, [207] it is supportive of exploring the potential challenges posed by emerging technologies in the area of LAWS to IHL. But as mentioned earlier, it is not supportive of a ban on LAWS. Rather it has stated that appropriate human involvement must be maintained on LAWS in the use of force.

There may be some reasons why Canada has not been able to adequately address militarized AI employing AWS and LAWS. In part, Canada's inability to adequately address military deployments of AWS and LAWS is caused by the fact that it has not distinguished their use across different fields.

When the Canadian Armed Forces explicitly accept that it is committed to maintaining appropriate human involvement in the use of military capabilities that can exert lethal force, it somehow implies that these weapons might be used in contexts such as defence and security but with appropriate human involvement. Attempting to implicitly separate security and defence concerns from other AI concerns might ignore the dual and multi-use nature of AI technology and the reality that certain risks are involved with its use in different contexts. The major reason why Canada has not distinguished between the use of AI in the military across different fields is the lack of definition on AWS and LAWS, nationally and internationally, which can result in a range of possible working definitions. For example, in some cases, drones (as remote-controlled weapons systems) may be considered autonomous lethal weapon systems, while in other cases, semi-autonomous weapons may fall under this category. As a result, by offering a component definition or a more thorough classification to prevent possible risks that are difficult to regulate under

---

[207] *Ibid*.

current IHL rules, Canada should address the usage of AI technology in areas of concern in a sufficient manner.

Last but not least, given the impressive and productive AI strategies of Canada on the national stage, taking an internationally leading position could transform the Canadian perspective into the practicable and transparent example that can be borrowed emerging countries on military AI nationally and internationally. This step can be taken through sufficiently addressing the grey areas. This would reinforce the reputation of Canada as an international leader in advanced AI, one considering the broader legal, ethical, and social implications.

In the next section, I will discuss some activities of the U.S. as this country has followed distinct strategies on the national stage regarding military technology and its compliance with IHL. Taking a comparative outlook to Canada's policies may highlight strengths and weaknesses and suggest an appropriate course of action for others. National implementation -the process of implementing international obligations at the domestic level- is critical to ensure full compliance with IHL. As such it is important to review some measures of the U.S. on the international stage first.

An American Perspective on the International Stage

The United States has developed military AI technology by investing heavily in the field of intelligent autonomous weapons. Such ambitions could ensure the continued centrality of AI in the future of military cutting-edge technologies.

As noted earlier, IHL treaties including the four GCs of 1949 have been widely accepted by states around the world. The United States has signed and ratified the four

1949 GCs in 1955 and Protocol III of 2005 in 2007.[208] The U.S. has signed AP I and AP II of 1977, though it has yet to ratify and become a State Party to those additional protocols. As a non-party to AP I, it is not strictly speaking bound by the obligation of Article 36.

Despite the U.S. not having ratified Additional Protocols I and II, it has implemented the customary legal obligation to review new weapons in a matter which accords with Article 36 of Additional Protocol I. For example, the U.S. DoD has a policy that requires a legal review of weapons and weapon systems to ensure the consistency of development, acquisition, the use of such weapons and weapon systems with all applicable U.S. domestic law, international law, CIL, and the international legal obligations of the U.S., including the law of war and arms control obligations.[209]

The U.S. has also codified many of the provisions contained in APs I and II through domestic legislative action. For instance, the War Crimes Act of 1996[210] as amended[211], imposes criminal penalties for breaches of the 1949 GCs, including violations of Common Article 3.[212] On top of that, to promote respect for IHL and enhance humanitarian protections during armed conflict, the U.S. Government ratified other treaties namely:

---

[208] For law of war treaties to which the US is a party, see: United States, Department of Defence, Office of General Counsel Department of Defence, *Law of War Manual* (June 2015, updated December 2016), at 1149-1155, online: <https://dod.defense.gov/Portals/1/Documents/law_war_manual15.pdf

[209] United States, Department of Defense, *Directive 3000.03E, DoD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy* (2013, Incorporating Change 2, August 31, 2018), at para 4, online: < https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/300003p.pdf?ver=2018-10-24-112944-467>. See also US Department of Defense, *Directive 5000.01, The Defense Acquisition System* (2003 Incorporating Change 2, August 31, 2018), online: <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf

[210] *War Crimes,* 18 U.S. Code § 2441.

[211] The amendment to US War Crimes Act of 1996 extends the jurisdiction of national courts to violations of common article 3 to Geneva Conventions. See i.e., Michael J. Matheson, The Amendment of the War Crimes Act" (2017), 101 American Journal of International Law 48.

[212] *Military Commissions Act of 2006,* Pub. L. No. 109- 366, 120 Stat. 2600 (West 2006) (codified at 10 U.S.C. §§94 8a-950w and other sections of titles 10, 18, 28, and 42).

- The 1954 Hague Convention for the Protection of Cultural Property in the Event of an Armed Conflict [213] (the U.S. is not a State Party to Protocol to this Convention),[214]

- Amendment to Article 1 of the Convention on Conventional Weapons,[215] and;

- Three initial CCW protocols and later additions.[216]

The U.S. is not a party to specific agreements that prohibit the use of certain weapons such as the Ottawa Treaty. This country supported the development process of the treaty, but it did not sign it in 1997. However, IHL has been and remains a vital guide for military operations conducted by the U.S. To fulfill this requirement, the U.S. like Canada has so far taken different measures such as the adoption of manuals to facilitate dissemination of IHL, also to contribute to the awareness of issues relevant to IHL and its rules applicable in armed conflicts.

It can be said that the detail of all IHL rules and treaties cannot be captured in military manuals, but these manuals are able to provide related information in different aspects for implementing IHL such as the U.S. Field Manual in 1956, Air Force Pamphlet (1976), Operational Law Handbook (1993), Manual for Military Commissions (2007) and so forth.[217] To take the DoD Law of War Manual as an example, it provides information to DoD personnel responsible for executing military operations and implementing the law of

---

[213] *Convention on the Protection of Cultural Property in the Event of Armed Conflict (and its Protocols),* 14 May 1954, 249 UNTS 215 (entered into force 7 August 1956)*, supra* note 109.
[214] UNESCO, *Annex II*, *supra* note 160.
[215] *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 (with Protocols I, II, III, IV and V),* 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983), *supra* note 36.
[216] *Ibid*. Protocol I on Non-Detectable Fragments, Protocol II on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices, Amended Protocol II, Protocol III on Incendiary Weapons, Protocol IV on Blinding Laser Weapons, and Protocol V on Explosive Remnants of War.
[217] For more information, see: the US Manuals online: https://ihl-databases.icrc.org/customary-ihl/eng/docs/src_iimima#u

war. The focus of this Manual is on the law governing the conduct of hostilities and the

protection of war victims while noting the IHL (treaties and CIL) that applies to the U.S.[218]

In general, when states are becoming more aware of the relevance of IHL, more explicit

actions on an international level are demanded. In addition to international measures, the

next section discusses several steps in the national AI strategy of the U.S. that have been

taken.

An American Perspective on the National Stage

All states are responsible to develop their national AI policies and laws for military

applications. According to the Stockholm International Peace Research Institute, several

countries known to be developing weapon systems with various autonomous features

include China, Russia, and the United States.[219] The U.S. has already cited autonomous

technologies as a cornerstone of its strategic capabilities and military plans. For instance,

the 2014 U.S Defense Innovation Initiative emphasizes the importance of technological

autonomy advances for the U.S. military to maintain its advantages over adversaries.[220]

Military and Intelligence matters fall under different authorities of the U.S. Code.[221]

Under Title 10 of the U.S Code, the role of armed forces in the United States Code is

outlined providing the legal basis for the roles, missions, and organization of each of the

---

[218] Department of Defence, Office of General Counsel Department of Defence, *Law of War Manual*, *supra* note 208.
[219] Vincent Boulanin & Maaike Verbruggen, *Mapping the Development of Autonomy in Weapon Systems* (Solna, Sweden: Stockholm International Peace Research Institute, 2017), at 2, online: <https://www.sipri.org/publications/2017/other-publications/mapping-development-autonomy-weapon-systems>.
[220] United States, Department of Defense, "Remarks by Deputy Secretary Work on Third Offset Strategy" (2016) Speech, Brussels, online: <https://www.defense.gov/News/Speeches/Speech/Article/753482/remarks-by-d%20eputy-secretary-work-on-third-offset-strategy/>
[221] The Code of Laws of the U.S (abbreviated to United States Code, U.S. Code, U.S.C., or USC) is the compilation and codification of the general and permanent laws of the United States.

services as well as the DoD that is as an executive branch department of the federal government. As AI generates ethical and legal questions, DoD is constrained by its authority under this Code, and the U.S. Constitution, as well as other statutory regulations. Alongside these general provisions, the 2018 "Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity"[222] shows that this country developed its national policy on AWS which can also be found in the DoD Directives described below.

The U.S military has been leading the development of autonomy in a range of applications. In "Recommendations on the Ethical Use of Artificial Intelligence by the Department of Defense", besides the importance of prioritizing AI ethics, existing DoD ethics frameworks, and values, there is an appendix on the law of war that should be taken into account. Appendix III [223] states that existing legal rules apply to the use of new AI technologies in armed conflict.

The DoD provides the military forces needed to "deter war and to protect the national security of the United States."[224] This department has confirmed that "the acquisition and procurement of weapon systems shall be consistent with all applicable domestic law, treaties and international agreements, customary international law, and the law of armed conflict."[225] Moreover, the DoD Directive 3000.09 has recognized the appropriate levels

---

[222] United States, Department of Defense, *Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity* (2018), online: >https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF>.

[223] AI Principles: Recommendations on the Ethical Use of Artificial Intelligence, the Department of Defense, Defense Innovation Board, online (pdf): https://media.defense.gov/2019/Oct/31/2002204459/-1/1/0/DIB_AI_PRINCIPLES_SUPPORTING_DOCUMENT.PDF.

[224] United States Department of Defense, online: <https://www.usa.gov/federal-agencies/u-s-department-of-defense>.

[225] *Directive 5000.01, The Defense Acquisition System*, *supra* note 209.

of human judgment over weapons systems and the use of force. However, in a 2020

Congressional Research Service report:

> This judgment does not require manual human control of the weapon system, but rather broader human involvement in decisions about how, when, where, and why the weapon will be employed. This includes a human determination that the weapon will be used with appropriate care and in accordance with the law of war, applicable treaties, weapon system safety rules, and applicable rules of engagement.[226]

There is an obvious deficiency in this directive which is about a consensus or clarification on how, when, and where human control should be applied, and what exactly human control means. Regarding the role of the human operator, maintaining human involvement is a core concern for actors seeking to regulate AI weapons systems. The U.S. DoD policy indicates the appropriate level of human judgment standard stating: "autonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force."[227]

The directive further establishes that the employment of LAWS must be under appropriate legal rules. It explains that authorizing the use of or operating autonomous and semi-autonomous weapon systems must be done in accordance with the law of war, applicable treaties, applicable rules of engagement (ROE), and weapon system safety rules.[228]

The concern is about ambiguity in U.S. commitments. The way that some legal words have been chosen and the extent they can apply in new circumstances is not clear. Notably, the word "appropriate" is regarded as a flexible term in the 2018 U.S. government white paper submitted to the CCW Group of Governmental Experts:

---

[226] Sayler, *Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems*, *supra* note 41.
[227] *DIRECTIVE No.3000.09*, *supra* note 40.
[228] *Ibid*.

Appropriate is a flexible term that reflects the fact that there is not a fixed, one size-fits-all level of human judgment that should be applied to every context. What is "appropriate" can differ across weapon systems, domains of warfare, types of warfare, operational contexts, and even across different functions in a weapon system. Some functions might be better performed by a computer than a human being, while other functions should be performed by humans.[229]

However, it is suggested that the DoD can be cautious in adopting AI for military applications and inform the U.S. public on the need for military AI capabilities to ensure their employment ethically.[230] In 2017, the DoD began to implement the Third Offset Strategy, and LAWS are an element of this strategy. It involves the active development of next-generation technologies, and their use in future military initiatives. This initiative is aimed at developing cutting-edge technologies by focusing on fields such as robotics, autonomous systems, and so forth.[231]

Military application of AI and its integration into the battlefield has been assessed by other U.S. organizations. For instance, the Joint Artificial Intelligence Center (JAIC) is a subdivision of the United States Armed Forces and the DoD's Artificial Intelligence Center on exploring the usage of Artificial Intelligence and integrating AI technologies into battlefield roles. It is created to help DoD components enhance the ability to execute new AI initiatives.[232] Making transparency a top priority in navigating ethical questions by the

---

[229] Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibition or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, *United States of America, Human-Machine Interaction in the Development, Deployment and Use of Emerging Technologies in the Area of Lethal Autonomous Weapons Systems. Ensuring that Machines Effectuate Human Intent in Using Force,* Provisional Agenda Item 6, (28 August 2018) CCW Doc CCW/GGE.2/2018/WP.4, online: <https://undocs.org/pdf?symbol=en/CCW/GGE.2/2018/WP.4>.

[230] Morgan et al., *supra* note 137.

[231] Chuck Hagel, Secretary of Defense. "Reagan National Defense Forum Keynote Address," (United States Department of Defense, 15 November 2014), online: < https://www.defense.gov/News/Speeches/Speech/Article/606635/>.

[232] Maxwell Paul, "Artificial Intelligence is the Future of Warfare (just not in the way you think)" (2020), online: <https://mwi.usma.edu/artificial-intelligence-future-warfare-just-not-way-think/>. see also United States, Joint Artificial Intelligence Center, *Vision: Transform the DoD Through Artificial Intelligence*, online: <https://dodcio.defense.gov/About-DoD-CIO/Organization/JAIC/>.

JAIC, and following predictable and transparent measures, "will ultimately lead to healthier development programs and the creation of norms and standards around the use of military AI."[233]

Although in other policies of the U.S. it is said that "authorizing a machine to make lethal combat decisions is contingent upon political and military leaders, resolving legal and ethical questions...,"[234] ethical and legal debates about military applications of AI remain in this country. What results from the U.S. national activities is that the development or employment of LAWS is not prohibited in U.S. policy. Therefore, discussions will remain on the topic that the U.S. is developing such weapons. Developing military weapons undoubtedly increases legal and ethical concerns.

In sum, looking at the Canadian and American approaches, it seems the current international legal principles, and national strategies have not sufficiently covered the employment of new military AI in armed conflict.

As mentioned previously, a growing number of states and organizations are appealing for the regulation of new AI military technologies due to ethical and legal repercussions. Frequently, the implication of AI in AWS and the possibility of an AI arms race support understanding of different regulatory regimes, their benefits, and drawbacks.[235] When AI employs in warfare, the negative consequences cannot be overestimated. This is why the importance of understanding different regulatory regimes to achieve comprehensive

[233] Brian Dunn, "Joint Artificial Intelligence Center: An Opportunity for Transparency" (2020) Georgetown Security Studies Review, online: <https://georgetownsecuritystudiesreview.org/2020/11/21/joint-artificial-intelligence-center-an-opportunity-for-transparency/>.
[234] United States Air Force, Unmanned Aircraft Systems Flight Plan 2009-2047, online (pdf): < https://irp.fas.org/program/collect/uas_2009.pdf>.
[235] International Telecommunication Union, *United Nations Activities on Artificial Intelligence (AI)* (2018), can be found online: *ITU* < https://www.itu.int/dms_pub/itu-s/opb/gen/S-GEN-UNACT-2018-1-PDF-E.pdf>.

regulatory frameworks has become more evident than ever. There is an urgent need for the most practicable legal framework to govern the upcoming military AI, as well as a need to clarify definitions of AWS and LAWS or adopt specific definitions considering the new generation of AI.

The use of AI in AWS and LAWS will receive more pushback as more military ethics, safety, and security issues emanate from, and different perspectives are taken on military AI systems and their regulation. The first example is HRW that, as noted earlier, has been calling for banning AWS under an international agreement. The next example is the 2018 resolution by the European Parliament on banning LAWS in which the European Commission, individual member states, and the European Council are urged to "work towards the start of international negotiations on a legally binding instrument prohibiting lethal autonomous weapon systems."[236] One of the arguments is that most countries in favor of banning LAWS are those with less likelihood of attending international disarmament talks or they are most at risk from this technology.[237]

On the contrary, some countries are not seeking to prohibit LAWS completely. To take China as an example, it states that its call is to ban the use of fully autonomous weapons, but not their development or production.[238] China has mentioned the need for a ban on offensive weapons. It, however, inclines toward having a defensive autonomous system, so its position should be clarified. The U.S. is another example where the government neither supports the proposal for a ban on LAWS nor supports negotiating a new treaty on

---

[236] European Parliament, *Resolution on Autonomous Weapon Systems*, *supra* note 76.

[237] Ingvild Bode, "Norm-Making and the Global South: Attempts to Regulate Lethal Autonomous Weapons Systems "(2019) 10(3) Global Policy, 359 DOI: <https://doi.org/10.1111/1758-5899.12684>.

[238] *Report* on *Stopping Killer Robots; Country Positions on Banning Fully Autonomous Weapons and Retaining Human Control, supra* note 142.

fully autonomous weapons or on their prohibition. From the future perspective, this opposition is likely to include new methods and means of military AI.

The U.S. has explicitly pushed back against the call for regulation of these systems through banning. In March 2018, it has addressed ethical concerns in a white paper entitled: "Humanitarian Benefits of Emerging Technologies in the Area of Lethal Autonomous Weapons" that notes the more accurate function of weapons with less risk of civilian damage. The question raised is how accurate function could be guaranteed? Or how the reliance on fully autonomous weapons should be limited? Compounding the divide between the viewpoints by those who argue in favor of this technology and those who warn of an unpredictable future of technology in which humanity has extirpated from war is ongoing ambiguity regarding the nature of autonomy, and specifically, a lack of consensus over the necessary degree of autonomy.[239]

As a consequence, the employment of AWS, LAWS, or any other means or methods of AI technologies that merge into military applications will be accompanied by numerous repercussions. Needless to say, ethical and legal concerns of military AI will draw more attention from the viewpoint of national policies and international regulation as more issues receive national and international discussion, clarification, and exploration:

Apart from definitions of new means or methods of military AI technologies, there are questions regarding the appropriate and preventive legal measures that countries should have taken. The other discussion is that in case of human intervention or control over AI military systems, how can this intervention be guaranteed? This issue needs clarification

---

[239] Neil C. Renic. "Autonomous Weapons Systems: When is the right time to regulate?" (2019), Institute for Peace Research and Security Policy, University of Hamburg, online: <https://blogs.icrc.org/law-and-policy/2019/09/26/autonomous-weapons-systems-right-time-regulation/>

especially when there is an apparent human error or an unintentional act while applying militarized AI on how offenders can be held accountable or responsible for violations of IHL. States can establish new rules on autonomous weapon systems to not only preserve the legal and moral responsibilities of those conducting hostilities but also effectively increase protections for civilians and those harmed by armed conflict.

In this regard, the Group of Governmental Experts adopted 11 guiding principles in 2019. A set of autonomous weapons principles developed by the GGE recognizes IHL application to all new technologies. One of these principles accepts the non-delegation of human responsibility by clarifying that human responsibility for decisions on the use of weapons systems has been retained since accountability cannot be transferred to machines. [240] Putting AI systems in charge of life-or-death decisions throws up the possibility of detrimental outcomes. That is why humans must remain responsible for major decisions. However, the concerns are still there in terms of how countries will guarantee this rule. Human responsibility should be ensured through human-machine interaction, but it needs to be clarified how this should be done. The guiding principles could be operationalized at the national level, by being taken into account in the implementation of national law. The principles may contribute to an IHL compliant development, and use of emerging LAWS technologies. [241]

---

[240] High Contracting Parties to 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 Geneva, *Guiding Principles affirmed by the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System (Annex III, 2019)*, Meeting (13–15 November 2019, Agenda item 15, Consideration and adoption of the final report), CCW/MSP/2019/9, online: <https://undocs.org/CCW/MSP/2019/9>. Some of the normative work has been done under the CCW in this Annex. Canada as well as Mines Action Canada participated in the work of the Meeting.

[241] Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System (2021), CCW/GGE.1/2020/WP.7, online (pdf): *UNODA* <https://documents.unoda.org/wp-content/uploads/2020/07/CCW_GGE1_2020_WP_7-ADVANCE.pdf>.

The ability of AI to advance with multi-use poses a wide range of problems for the body of international law. Ultimately, it seems new means and methods of warfare are not able to meet all the current IHL requirements and rules-and there is a need for developing more comprehensive principles. But under what kind of comprehensive principles military should AI be regulated and how can pragmatic ones be explored?

To respond to these questions, it should be generally said that IHL as an applicable legal framework on situations of armed conflicts needs revision. Studying national and international pathways demonstrates the inadequacy of measures taken to date. Specifically, inadequacies on emerging technologies that might be neglected from countries, where an idea about multilateral approaches comes on the scene. To regulate these technologies adequately, this study proposes multilateral approaches to take in the next chapter.

CHAPTER 5

RECOMMENDED MULTILATERAL APPROACHES

A growing number of military operations are anticipated to be carried out by AW systems in the future. Since 2014, several international discussions have taken place on AWS, but new legal approaches to regulating AI-enabled military applications that support weapon systems have not been devised. What is clear here is that the law on AWS lacks clarity and that there is a need to design a new approach to this and other emerging technologies. Through this, not only will the potential benefits of AI technologies in the military be fostered, but also new military aspects of this technology could be regulated under international principles.

This study proposes multilateral approaches at the international and national levels. Multilateral approaches will help to shape national policy; transparency and confidence-building measures (CBMs) can exert a profound influence in eradicating future legal challenges. Preventing or reducing ambiguities in peaceful activities, as well as strengthening international cooperation are among CBMs goals. It has been stated that CBMs can be unilateral, bilateral or multilateral, depending on the specific context in which they are applied.[242]

At the 2018 GGE meeting, Canada was supportive of developing key Transparency and CBMs and looked forward to exploring these and other such ideas.[243] To take article

---

[242] Giacomo Persi Paoli et al, *Modernizing Arms Control: Exploring Responses To The Use Of AI In Military Decision-Making*, (Geneva, Switzerland: UNIDIR, 2020), at 28, online: < https://www.unidir.org/publication/modernizing-arms-control>.

[243] CCW States Parties Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS), *Opening Statement by Canada,* Second Meeting, Apr. 9–13, 2018, Geneva, Switzerland, online: <https://perma.cc/DG5H-ECAP>.

36 of Additional Protocol I as an example, if states apply the transparent code of conduct through confidence-building measures, other countries will be assured that they are committed to international law compliance as well as peaceful AI use. Peaceful AI use will be a central touchpoint in international relations. States not only need to voice their support for the principle of peaceful uses of AI technology in their policies, but they must commit to this principle unambiguously, at the highest levels. For the benefit of humanity, all states, particularly great powers, need to support the notion that AI in military systems should be developed based on ethical, legal, and humane principles.

On the one hand, CBMs in the field of arms control are voluntary measures designed to prevent hostilities, reduce military tension, build mutual trust between countries or communities, and enhance international cooperation. On the other hand, applying a code of conduct through CBMs could help reduce the risk of militarized AI conflicts. This is mainly because Codes of Conduct, compared to multilateral conventions, are more flexible and more capable of adapting to AI technological advances than binding treaties. Whereas codes of conduct are not internationally binding but rather offer short-term solutions nationally, to reach a multilateral approach and solutions, international principles along with authorized organizations governing the secure military application of AI should be developed.

Secondly, international cooperation and AI powers' assistance to emerging states can limit the future widespread legal concerns of AI military activities under IHL. Contemplating international cooperation, Canada, in its policy is seeking to "exchange views on regional security issues and threats to regional stability by establishing strategic

dialogues with key regional powers."[244] Since this measure increases the international confidence-building in AI weapons, it paves the way for states to determine what is the most effective practice to follow.

Additionally, states should elaborate their views and deepen discussions to secure and enhance respect for IHL in the development and use of AWS. With regard to future military actions, the use of new kinds of AI technological developments in weapons systems raises questions concerning the implementation of IHL. Still, clarification is needed about what or how particular types of human intervention may be warranted under IHL. These discussions should aim more broadly to develop norms by practicing as well as interpreting IHL obligations on new military AI activities of states.

The development of new military AI technologies requires more guidelines, effective national approaches, and constant meaningful international dialogue among states to be capable of meeting international standards. States have much to gain from supporting greater transparency on Article 36 (AP I) review procedures and cooperation on dealing with the challenges posed by emerging technologies. Sharing information enables transparency by creating a transparent environment for states which, in turn, helps enable trust between them. Strategically speaking, however, observers point out that some states are reluctant to share or reveal information about what is or what is not in their toolbox.[245]

Information sharing is even required by IHL to ensure the application of the GCs and AP I.[246] States should share information and their perspectives on practical measures to

---

[244] Kilford, *supra* note 203.
[245] Boulanin & Verbruggen, *supra* note 218.
[246] For example, Article 84 of AP I on Rules of application states: "The High Contracting Parties shall communicate to one another, as soon as possible, through the depositary and, as appropriate, through the Protecting Powers, their official translations of this Protocol, as well as the laws and regulations which they may adopt to ensure its application."

enhance respect for IHL while the development and application of military AI systems are increasing. Forming a clear correlation between international law (the applicable treaties) and national law (codes, judicial decisions, legislation) would be frequently required to ensure respect for and the application of IHL regulations. Legislation might be enacted to incorporate more comprehensive provisions for humanitarian law enforcement and the punishment of offenders. A clear example as mentioned earlier is when breaching IHL principles would be punishable under Canadian criminal law.

Further, legal and technical co-operation and communication between countries has been highlighted as central to building new AI applications.[247] International cooperation is able to provide a wide variety of opportunities for states to exchange information at an international level about their national AI strategies, making discussions and normative frameworks about legal concerns resulting from militarized AI. These frameworks in both domestic and international settings must be collaborative.

The initial point in international cooperation can be mutual trust, which seems achievable through measures like adopting the relevant legal instruments, the commitment to or being a contracting state to treaties such as the Convention on CCW that was adopted in 1980, specific treaties like the Ottawa Convention, the GCs and the APs. Regarding international cooperation, on June 7, 2018, the governments of Canada and France released a joint statement on AI that called for creating an international study group as a global point of reference to understand and share research results on AI issues and best practices. Canada and France "wish to promote a vision of human-centric artificial intelligence

---

[247] Melanie Sisson et al, "The Militarization of Artificial Intelligence" (United Nations Office for Disarmament Affairs, the Stanley Center for Peace and Security, and the Stimson Center, 2019), online: < https://stanleycenter.org/publications/militarization-of-artificial-intelligence>

grounded in human rights, inclusion, diversity, innovation, and economic growth."[248] Canada is also supportive of the sharing of good practices in the area of weapons reviews as well as the sharing of case studies for existing weapons.[249]

Investigating national perspectives focuses on peaceful AI use, which can be reflected in how their practices conform with international legal rules, transparency, and confidence-building measures. Since the technology-specific consequences will be inevitably bound to arise, different regulatory and legislative actions are required. The first revolutionized process should occur in the domestic setting. In this process, the dual-use of AI technology will challenge states to interpret legal norms in regulating military AI innovation. For example, the IHL principle of Humanity that includes protections for the civilian population, assists practitioners in properly interpreting and applying specific IHL rules that are based on humanitarian considerations. Domestic regulators and legislatures will first need to ensure that they effectively prevent the use or development of AI technology in new weapons, especially when new weapons cannot be used or developed complying with the principle of IHL.

Certain uses of revolutionary AI inevitably confront us with unpredictable situations, accelerating conflicts. This issue provides a starting point for more robust discussions on the national and international levels among countries making efforts to mitigate the legal concerns of the misapplication of military AI. At a national level, generating an appropriate legally binding framework and set of principles are primary steps for states to take in

---

[248]   Canada,   *Canada-France   Statement   on   Artificial   Intelligence*   (2018),   online: >http://international.gc.ca/world-monde/international_relations-relations_internationales/europe/2018-06-07-france_ai-ia_france.aspx?lang=eng>, archived at <https://perma.cc/VH9F-LPN6>.

[249] *Canadian response to the Chair's request for input on potential consensus recommendations*, *supra* note 206.

ensuring compliance with the principles of IHL in AI development. Setting up an independent regulatory organization for states, especially for emerging countries where the reliance on military AI is increasing, would guarantee the application of national rules in compliance with international legal rules.

Such regulatory organization(s) could be responsible for IHL and other international legal norms in close cooperation with relevant international organizations, non-governmental organizations, and the United Nations. This organization would be an effective step, especially for emerging countries to take transparent national AI strategies under IHL. One of the main objectives of this organization would be humanitarian disarmament to reduce civilian harm as a result of armed conflict involving AI. Another objective should be to evaluate the risks associated with different AI systems and identify those that require further legal assessment and review. Also, the aforementioned organization can be an authorized entity to regulate and evaluate new means and methods of warfare using AI under the new classification.

The new proposed organization, must closely follow military AI developments and verify their compliance with IHL or other international legal norms and assess their humanitarian impacts. It shall seek to ensure security through diverse perspectives. For example, it could require that new military AI technologies remain under human control while assisting in situations needing decision-making. It would be essential for the organization to determine where, when, how and to what extent human control over military AI activities should be guaranteed or exercised. The organization can likely bear the authority to restrict states in militarized AI activities or prohibit military AI operations if it is proved the operation would endanger IHL principles and transparent national

strategies, especially when "a state fails to protect its population"[250] based on responsibility to protect (R2P) doctrine.[251] Failure to protect the population even can happen when states AI targets kill their own soldiers and civilians, intentional or unintentional while applying militarized AI (so-called "friendly fire").

By regulating the states' activities, the new organization would make them active rather than inactive or reactive.[252] Considering the dual-use nature of AI technologies, this new organization could follow a dual application. If military activities of states lead to intentional or unintentional and expected or unexpected harm to civilians, it should restrict or limit those activities regardless of the international position taken by that state. This organization can also be a platform for developing international accountability mechanisms, and Canada could support its establishment to assist in the restriction of emerging technologies and in the investigation of those responsible for wrongful acts.

Weapons that are not accompanied by either responsibility or accountability of human beings provide a significant challenge in adhering to IHL rules. At the same time, in light of AI's capability to assist in making decisions, for example, by offering guidance for making rational decisions, some advocates hold a view that "military personnel could use it in a battlespace, to help make more informed and more rapid decisions than if the data

---

[250] Waters, *supra* note 11. (This doctrine provides for the international community "to step up to the plate.")
[251] United Nations Office on Genocide Prevention and the Responsibility to Protect, *Responsibility to Protect*, online: <https://www.un.org/en/genocideprevention/about-responsibility-to-protect.shtml#>.
The responsibility to protect is a political commitment endorsed by all member states of the United Nations to end the worst forms of violence prevent genocide, war crimes, ethnic cleansing and crimes against humanity.
[252] Inactive means for example not engaging in activities related to regulating new military AI and taking effective measures. Reactive means having a tendency to react or respond to a situation rather than creating rules for it or controlling it under existing and emerging provisions.

were processed manually."[253] Essentially, given the alarming stakes involved in the military realm, widespread AI's use must be closely scrutinized.

Reliability is connected to transparency as the key component of building trust among countries. Consequently, there is a need for national strategies and policies to keep pace with the scientific developments to regulate this technology for military purposes. The comprehensive regulation and greater adherence to IHL can help mitigate potential issues such as civilian harm when AI warfare occurs, particularly when demands to achieve military AI are increasing among countries. If national approaches could be based on international laws trying to bridge the gaps, it will provide an opportunity for states to create normative rules that are consistent with their national policies and security. IHL can be impacted in part by the development of normative guidelines and nonbinding normative instruments because they can provide legal obligations and may even be considered a form of evidence of state practice or *opinio juris*. This measure could be more effective than a new treaty, as a new treaty might not be able to change the situation regarding vast areas of AI technologies in a timely manner. However, even in a new treaty like the Ottawa Convention, we can learn from this Convention by further clarifying the applicability of IHL to the wide realm of AI technological developments. Last but not least, I would like to go back to the key theme inspiring my contribution: an examination of the Canadian perspective on military uses of AI under IHL to point out that if Canada adopts a more transparent and comprehensive approach, this could be a practicable example for emerging states.

---

[253] Sherry Wasilow & Joelle B. Thorpe, "Artificial Intelligence, Robotics, Ethics, and the Military: A Canadian Perspective" (2019) 40.1 AI Magazine 37, DOI: <https://doi.org/10.1609/aimag.v40i1.2848>.

Engaging in AI policy manifests Canada's commitment to prioritizing transparent military use of AI under IHL principles. The AI approach of Canada is not a self-regulated one but it has introduced AI policies within the framework of IHL. Canada is taking steps toward developing a comprehensive framework to regulate military AI to make it consistent with international legal norms. However, Canada does not adequately address controversial military technologies such as the regulation of LAWS. There has not been much written about the explicit position of Canada on the regulation of new AI military advances. Admittedly, all countries have given inadequate attention to this matter. Accordingly, there is great room for discussions of the law governing new means and methods of warfare under IHL.

When Canada demonstrates its commitment through several measures (including ratifying conventions, engaging in international cooperation, building trust, adopting a transparent national AI strategy, and so on), then it can provide leadership in developing international law in this area. Canada's approach could provide leadership for emerging countries and AI powers alike.

Canada's commitment at UN discussions in maintaining appropriate human involvement in military AI applications underscores the importance of taking a specific strategy on AWS and LAWS. Canada still needs to define what appropriate human involvement is, to what extent it is needed, and how it can be achieved, and not just follow a general strategy on maintaining appropriate human involvement in military AI. That, in turn, may be accompanied by several activities to clarify its international policy sufficiently.

First and foremost, broader implications beyond the national perspective are required. Canada has supported a call to multilateral talks on LAWS, but it should increase its presence in international discussions on fully AWS and new methods of warfare, not just as a participant or supportive of broad-ranging consensus recommendations, but as an actor state to show its leadership. In this regard, a senior researcher at a Canadian peace research institute has suggested that developing the national policy of Canada on military applications of AI could help to guide its normative leadership:

> Canada should be prepared to stake a claim in leading the world to a regulated use of AI in all spheres of activity, including national defence and security. To do so, Canada too needs to develop its own national policy on military applications of AI. Such a policy could also help to guide its normative leadership. [254]

The next activity that Canada should consider is the convening of military AI and IHL workshops or conferences. Inviting researchers and specialists across the globe provides the opportunity to take either current or future legal matters related to new militarized AI systems into account more accurately. The outcome of hosting conferences can lead to initiatives devised by researchers and specialists. These initiatives might be able to promote compliance with IHL and create new legal norms on certain AWS and LAWS (to protect civilians and human security), weapons that cannot be ignored based on their catastrophe humanitarian impacts, threats, and challenges.

One of the examples of these initiatives is such as what has been done with cyber operations in the Tallinn manual.[255] The Tallinn Manuals have provided legal and policy

---

[254] Branka Marijan, *Report On Charting The Way Forward, Examining The Principles Of Responsible Use Of Military AI By Canada's Allies* (Project Ploughshares, 2021), at 28, online: <https://ploughshares.ca/pl_publications/charting-the-way-forward>

[255] Michael N. Schmitt, Tallinn *Manual 2.0 on the International Law Applicable to Cyber Operations*, 2nd ed, (Cambridge, UK: Cambridge University Press, 2017).

experts with a valuable guide on how international law applies to cyber operations. Another example can be the Manual on International Law Applicable to Air and Missile Warfare. This Manual has provided legal advisors and military officers with an interpretation of international law applicable to air and missile warfare operations.[256] These manuals are not hard law per se but have had important normative and practical influence contributing to the awareness of IHL issues

Canada could dedicate a program on new military AI in universities to promote compliance under international legal norms. This would give academics and specialists a platform for information and idea sharing on regulating AWS, LAWS, including with respect to IHL compliance. This idea can evolve Canadian policymaking. Canada, by virtue of a rich history in transparent national and international measures and reputation in education, can welcome more scholars, academics, researchers, scientists, legal experts, and international organizations from all around the world to discuss the future of warfare, militarized AI and humanitarian concerns.

Training militaries and civilians also should be a focus in the educational system.[257] As a result, in addition to understanding the rules from an academic standpoint, legal review

---

[256] *HPCR Manual*, *supra* note 48.

[257] International Committee of the Red Cross, *Practice Relating to Rule 142. Instruction in International Humanitarian Law within Armed Forces*, online: *ICRC* <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule142>.
In this instruction see; Canada's LOAC Manual (2001) which states:
"1. The aim of the Law of Armed Conflict at the Operational and Tactical Levels [LOAC Manual] is to provide a working level publication on the Law of Armed Conflict (LOAC) and a practical guide for the use of commanders, staff officers and LOAC instructors.
2. The Manual is designed to apply to the tactical/operational levels of doctrine related to the LOAC and to be used as the main source for the preparation of lesson plans required for the training of all members of the CF [Canadian Forces] on the LOAC." See also Article 47 of the 1949 Geneva Convention I, Article 48 of the 1949 Geneva Convention II, Article 127 of the 1949 Geneva Convention III and Article 144 of the 1949 Geneva Convention IV. These articles provide:
"The High Contracting Parties undertake, in time of peace as in time of war, to disseminate the text of the present Convention as widely as possible in their respective countries and, in particular, to include the study

of new AI weapon systems and enforcement of IHL rules on military activities can be improved.

Moreover, clarifying grey zones in national legislation on emerging technologies, in order to ensure that institutions and special authorities in charge of humanitarian issues are aware of all requirements would be a practical step. Further, Canada should deploy military lawyers abroad to teach others about new military AI systems and their operations to ensure compliance with IHL in developing countries.

Canada can be open to taking more comprehensive perspectives at both international and domestic levels on specific weapons with full functions (i.e. weapons without any human control) that are unable to guarantee humanitarian legal norms when encountering a new situation. When Canada in the *Strong, Secure, Engaged* defence policy states its position at UN discussions through a commitment to maintaining appropriate human involvement in the use of military capabilities with a lethal force, it proves that it is committed to IHL compliance. Canada has declared, in accordance with Article 36 of Additional Protocol I, that it maintains the necessary element of appropriate human involvement through conducting national legal reviews of new weapons, means, or methods of warfare, to ensure that weapons systems are meeting Canada's international legal obligations in ensuring IHL compliance.

Crucially, if IHL rules are not revisited, the new means and methods of warfare cannot be regulated under the current categories, as there is no definite meaning of "appropriate control". This is even true in individual states where they use the phrase "meaningful" human intervention because the applicability of current law is no longer clarified.

thereof in their programmes of military … instruction, so that the principles thereof may become known to the entire population, in particular the armed fighting forces, the medical personnel and the chaplains."

Therefore, Canada can play an active role by addressing the ambiguities adequately, clarifying its explicit position on grey areas, proposing an interpretation of current legal rules and new types of actions on new militarized AI.

CONCLUSION

Artificial Intelligence will impact the future of warfare dramatically, with the potential to change how military applications and decisions are or should be made on the battlefield. New military AI technologies can have unpredictable applications, which can pose significant challenges to the law. The advancement of technology will create new challenges requiring greater action under applicable rules. There is no doubt that at the time when the first IHL laws were passed, technology was in its infancy, but we can predict an unsafe future of technology as it evolves. International Humanitarian law must evolve and anticipate military technological advancement.

With respect to AI, the inadequate response to military AI might be due to globalization and the competition between great powers that have prevented a fundamental shift towards amending the rigid legal rules in this area. Yet, the international community faces tremendous challenges as a result of the rapid development and use of new weapons and warfare systems that indeed are already changing the nature of warfare. In light of this, it is necessary to acknowledge that advanced military AI technologies have necessitated a revision of IHL.

In attempting to categorize emerging militarized AI under current legal concepts, the law needs to evolve to keep pace and new legal approaches need to be explored. There is a need to ensure that the wheel of law and humanitarian legal principles covers gray and unpredictable areas. Generally, there is no doubt about the applicability of IHL to new weaponry and AI technological developments based on requirements Article 36 (new weapons) of the First Additional Protocol to the Geneva Conventions, which imposes an obligation on states to determine whether the employment of a new weapon, means, or

method of warfare would be prohibited by IHL or any other relevant rules of international law. But there is an ambiguity about whether new automated weapons, drones (remote-controlled weapons systems), unmanned weapons, and other modern weaponry that are already in use in armed conflicts, were created or will be developed in accordance with the requirements of this article.

Evidently, when the use of new types of weapons systems in armed conflicts cannot be properly prohibited or adequately regulated, it violates IHL regulations. While military AI technologies advance with a capability to violate IHL rules, states have a responsibility to ensure adherence to IHL based on Common Article 1 to the four 1949 Geneva Conventions. To ensure compliance with the obligation to respect IHL on the national level, the executive, legislative, and judicial branches, as well as competent military and humanitarian organizations, shall use IHL-compliant pressure levers.

National organizations and other comparable bodies dedicated to IHL should collaborate coherently to ensure the efficacy of IHL and the protection of legal rules in the use of means and methods of warfare. The same is true on the international level, as states must ensure that the IHL provisions and the principles of humanity are respected by other State and non-State Parties while they are conducting military operations or deploying new weapons systems. However, by entering Artificial Intelligence into the battlefield, it is not clear how states will ensure respect in practice or what kind of specific steps need to be

taken. Clearly, IHL rules must be applied to every violation caused by military technology and any means or methods, but unfortunately, this has not always been the case.

As such, on an international level, the lack of legal clarity in international legal rules and the lack of definitions gives rise to debates over the ambiguities of existing written rules. As a result, the revision of IHL treaties and their legal rules is necessary to find more consistency in the advanced world of technology in order to protect people who are not participating in hostilities. In revisiting IHL rules, it is a given that treaties cannot be readily changed, however, there is always the chance of re-examining, amending, and interpreting existing rules in good faith to develop norms. Nevertheless, if it is not possible to revise and amend the current humanitarian legal regulations, then a new complementing set of regulations with the capability of clarifying the future path needs to be created. Comprehensive revision and implementation of IHL rules require coordination and support from all related entities towards universal acceptance (or near-consensus) on revisiting existing or adopting new rules.

To fulfill the humanitarian requirements, and to take a civilian-centered approach in all controversial debates while using advanced military AI technologies, a changing technological world calls for new forms of action to be taken by states at the national and international levels. In taking new forms of action and adopting new rules, states are bound to respect IHL and the Martens Clause. For example, even if treaties do not cover AI technologies, by applying other fundamental humanitarian provisions such as Martens Clause, we ensure that military AI technology will not jeopardize the purposes of humanitarian law.

Additionally, states need to clarify military AI conduct under the principles of IHL, and their flexibility in regulating novel rules. This is vital as international competition leads to countries deploying militarized AI without sufficient attention to humanitarian consequences and addressing weapons systems adequately. As a result, many states do not have explicit restrictions, and they are not explaining transparently how they will mitigate risks. Transparency in national and international law should remain a paramount factor.

All states should be flexible to implement international rules in their domestic legislation - adopting practical measures to be compliant with IHL- and the national law of each state can be considered as evidence of state practice for the purpose of developing customary international law in this area. The development of domestic law in this field can also further transparency and act as a confidence-building measure.

Therefore, to restrict military AI applications that violate IHL, states should take action with respect to the primary proceedings on a national level to mitigate upcoming conflicts and eradicate greater challenges. Due to the interaction between law and technology, it seems likely that adopting and reinforcing non-binding disarmament norms and binding regulations in a national legal system under IHL could be one of the priority steps to take. By systematically integrating CIL and sources of soft law, states would be able to strengthen their domestic legislation. Establishing new classifications containing customized conditions for emerging military AI, in particular before humans are entirely cut off from autonomous technology, can be one of the examples that need to be taken into account on national and international levels.

Furthermore, creating an international regulatory organization to apply accountability mechanisms can be an effective step in ensuring the comprehensive implementation of

IHL. Such a body could develop accountability mechanisms. As a result, all states will view these mechanisms as IHL-compliant pressure mechanisms.

The next step is that new means and methods of warfare before its development need to be more regulated by adopting a specific international convention and protocols. If there cannot be clear explanations of new military AI in AWS and LAWS, then it must be regulated through applying multilateral approaches, perhaps under a new treaty on AI technologies. In essence, the existing and new law would ultimately pave the way for more flexible regulations. So far, states have not come to a conclusive Agreement (such as a complete ban because these technologies are developing and there is no internationally agreed definition of -or approach to- controversial weapons systems, namely AWS and LAWS) regarding using AI in military conduct. Most importantly, with the tendency of militaries to maintain a technological edge, it may cause domestic organizations to oppose new rules that would clarify vague matters and apply new restrictions. There is a concern that this opposition in taking a transparent status on militarized AI would result in a lack of clarity when it comes to international discussions regarding AWS and LAWS.

Since primary legal rules are written in general terms, we cannot anticipate the consequences of militarized AI. Due to inadequacies in the way technology advancement has been covered in these legal rules, there is no consensus over certain details. As a consequence, a consensus or negotiations between a large number of states on a new treaty that can contain substantial provisions on new means and methods of AI warfare is a practical step. In drafting or conceiving of the rules of this new treaty, we can benefit from studying domestic and international law, such as legislation, manuals, state practices, and customary international law, especially because AI technologies are developing faster than

IHL This treaty can codify CIL. In national law, courts can apply the provisions of this treaty where implemented. As mentioned at the beginning of the thesis, the position of international law within national law depends upon a state's domestic legislation, and states may enact domestic legislation taking different approaches to implement international law such as treaty provisions.

This is the interrelationship between domestic and international law. Canada as a dualist country has taken different approaches depending on the source of international law. For example, international law treaties generally are not directly effective without implementing legislation in Canada. By signing and ratifying all the major IHL conventions including ratification of the GCs in 1965, and the APs in 1990, and specific IHL treaties such as Ottawa Treaty, Canada is obligated to take appropriate steps in its domestic law to implement provisions of these conventions. While on the contrary, the U.S. has signed and ratified the four GCs in 1955 and Protocol III in 2007, and it has yet to ratify and become a State Party to AP I and AP II. The U.S. has not signed the Ottawa Treaty and is not a party to this IHL specific IHL treaty. As such, in addition to the formal adoption of a new treaty by the process of ratification or accession, there is a need of implementing domestic compliance measures, such as legislation, regulatory and practical measures so the provisions of a treaty can be fully effective.

In taking practical measures, Canada is a clear example of steady compliance. Beyond signing treaties, Canada has so far taken practical measures such as the adoption of the Joint Doctrine Manual Law of Armed Conflict at the Operational and Tactical Levels. National military manuals govern military operations by establishing the guidelines according to which commanders can conduct operations in compliance with IHL. Canada's

military manuals indicate respect for IHL and binding obligations not only upon the Government or the Canadian Armed Forces but also upon every individual. The U.S., like Canada, has adopted manuals to facilitate the dissemination of IHL, also to contribute to the awareness of issues relevant to IHL and its rules applicable in armed conflicts. Although manuals can help create or develop state practice and can provide related information for implementing IHL, it can be argued that the detail of all IHL rules and treaties cannot be captured in military manuals.

Another strong point in the national policy of Canada and the U.S. is a necessity in the legal review of weapons and weapon systems to ensure compliance with all applicable domestic law, international law, and other international obligations.

Although the call for a ban on the development of LAWS has been put forward by some, [258] I recommend that Canada, given its history of leadership in peace and disarmament, especially on landmines, through the Ottawa process, take steps to regulate emerging AWS and LAWS adequately. Through this way, Canada not only could more adequately clarify its position, but also encourages other developed and developing countries to implement transparent policies on banning or regulating emerging technologies as well. A Canadian perspective at either a national or international level indicates that Canada has generally might be more accurate applied transparency in its policy. The key point is that it can set an example for other countries if it appears as an active state in regulating grey areas, particularly for countries with ambiguous

---

[258] See Lieutenant-Commander Daniel Rice, *Lethal Autonomous Weapon Systems: A Clear and Present Danger (Canadian Forces College, 2019),* online (pdf): < https://www.cfc.forces.gc.ca/259/290/405/305/rice.pdf>.

commitments and those that have not ratified the major IHL conventions like the Ottawa convention.

Canada can respond to legal and ethical concerns by not only adopting but developing a procedure for dealing with vague and grey areas. To that end, both domestic and international initiatives will be required. Such initiatives might apply an effective mechanism for monitoring compliance as well. For example, although there are some countries, including the US, that have not signed the Ottawa Convention, the treaty is broadly considered a major success in terms of reducing the number of landmines and stigmatizing their use. A similar process such as this Convention can be proposed and followed through new initiatives and developing normative guidelines to ensure that the U.S. remains treaty compliant. Given the advancement of military AI technologies, normative guidelines and initiatives would create legal obligation acting as a pressure-lever in taking steps along the lines of the Ottawa Convention. As complementary guidelines, these initiatives might create explicit legal obligations so that non-signatory states do not engage in unethical behavior by claiming that some provisions of this Convention are unclear.

In developing a procedure, a fundamental revision of legal rules may play a pivotal role to ensure that legal rules serve not only the interests of states but also the interests of humanity. As long as Canada starts implementing these kinds of measures by "looking beyond IHL for a thorough examination of the legal framework applicable to new means and methods of warfare,"[259] even in the face of opposition, it can develop more cohesive

---

[259] Marcos Kotlik, *Reviewing Legal Weapons Reviews: is it possible to verify compliance?* (2020), online: https://www.ejiltalk.org/reviewing-legal-weapons-reviews-is-it-possible-to-verify-compliance/

policies on the new military use of AI towards advancing legal norms and covering the challenges of modern warfare posed by artificial intelligence.

On a national level, Canada was the first country to adopt a somewhat transparent AI strategy. Following transparency, Canada could move toward addressing various AI implications, in particular, legal and ethical implications through its national perspective as a thought leader.

Through its international perspective, by addressing the controversial subjects, areas of concern, and ambiguities on appropriate forums such as CCW fora, Canada would be an active thought leader that can contribute to global stability. Nonetheless, Canada should provide adequate clarification regarding its position on military AI ambiguities, especially fully autonomous weapons systems. Canada needs to define appropriate human involvement, or state to what extent human involvement seems necessary. This is true in the U.S. as well. DoD policy states commanders and operators should be able to exercise "appropriate" levels of human judgment when using autonomous and semi-autonomous weapons systems.[260] Choosing such legally ambiguous words cannot clarify to what extent it might be performed by a human or a weapon system.

To conclude, the best model can be offered by Canada for developing countries, if it can sufficiently address the controversial debates on LAWS. By promoting norms in the area, and encouraging the development of an independent regulatory organization, Canada would be more capable to ensure such involvement and guarantee accountability mechanisms to assist in the investigation and prosecution of those responsible for crimes against humanity and war crimes using AI combat systems. In order to influence the rules

---

[260] *DIRECTIVE No.3000.09*, *supra* note 40.

and practices of military AI technologies, Canada could apply special and additional regulations to various applications of AI in military systems, before or after deployment, taking into account the associated risks, without distinguishing any specific sectors.

REFERENCES/BIBLIOGRAPHY

Legislation

Criminal Code, RSC 1985, c C-46.

Anti-Personnel Mines Convention Implementation Act, S.C. 1997, c. 33.

Geneva Conventions Act, R.S.C., 1985, c. G-3.

Crimes Against Humanity and War Crimes Act, S.C. 2000, c. 24

Military Commissions Act of 2006, Pub. L. No. 109- 366, 120 Stat. 2600 (West 2006) (codified at 10 U.S.C. §§94 8a-950w and other sections of titles 10, 18, 28, and 42).

National Defence Act, RSC 1985, c N-5.

War Crimes, 18 U.S. Code § 2441.

Treaties

Additional Protocol to 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 (Protocol IV, entitled Protocol on Blinding Laser Weapons), 30 July 1998, 2024 UNTS 163 (entered into force 30 July 1998).

2. c *Amendment to Article I of 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, 21 December 2001, 2260 UNTS 82 (entered into force 18 May 2004).*

Convention for the Amelioration of the Condition of the Wounded in Armies in the Field, 22 August 1864, 22. Stat 940 (entered into force 22 June 1865).

Convention on Cluster Munitions, 30 May 2008, 2688 UNTS 39 (entered into force 1 August 2010).

Convention Concerning the Laws and Customs of War on Land (Hague IV) with Annex of Regulations, 18 October 1907, 36 Stat 2277 (entered into force 26 January 1910).

Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction, 18 September 1997, 2056 UNTS 211 (adopted in 1997 and entered into force 1 March 1999).

Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, 10 April 1972, 1015 UNTS 163 (entered into force 26 March 1975).

Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, 03 September 1992, 1974 UNTS 45 (entered into force 29 April 1997).

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 (with Protocols I, II, III, IV and V), 10 October 1980, 1342 UNTS 137 (entered into force 2 December 1983).

Convention on the Protection of Cultural Property in the Event of Armed Conflict (and its Protocols), 14 May 1954, 249 UNTS 215 (entered into force 7 August 1956).

Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field. 12 August 1949, 75 UNTS 31 (entered into force 21 October 1950).

Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea. 12 August 1949, 75 UNTS 85 (entered into force Oct. 21, 1950).

Geneva Convention (III) relative to the treatment of prisoners of war, 12 August 1949, 75 UNTS 135 (entered into force 21 October 1950).

Nuclear Test Ban Treaty, Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, 5 August, 1963, 480 UNTS 43 (entered into force 10 October, 1963).

Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (Adopted and opened for signature, ratification and accession by General Assembly Resolution A/RES/54/263 of 25 May 2000, entry into force 12 February 2002).

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, Protocol on Prohibitions or Restrictions on the Use of Mines, Booby Traps and Other Devices (Protocol II), 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15). (entered into force 2 December 1983).

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, Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III), 10 October, 1980, 1342 UNTS 137 (Adopted by the United Nations Conference on 10 October 1980, UN Doc A/Conf.95/15) (entered into force 2 December 1983).

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, Protocol on Blinding Laser Weapons (Protocol IV), 13 October 1995, 1380 UNTS 370 (entered into force 30 July 1998).

Protocol Additional to the Geneva Conventions of August 12, 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, 1125 UNTS 3, arts 48 & 51, (entered into force 7 December, 1978).

Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II), 8 June 1977, 1125 UNTS 609, (entered into force 7 December 1978).

Protocol Additional to the Geneva Conventions of August 12, 1949, and relating to the Adoption of an Additional Distinctive Emblem (Protocol III), 8 December 2005, 2404 UNTS 261 (entered into force 08 December 2005).

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, Protocol on Explosive Remnants of War (Protocol V), 28 November 2003, 2399 UNTS 1 (entered into force 12 November 2006).

Statute of the International Court of Justice, 26 June 1945, Can TS 1945 No 7 (entered into force 24 October 1945, ratification by Canada 09 November 1945).

Treaty on the Prohibition of Nuclear Weapons, 07 July 2017, 57 ILM 358, UN Doc A/CONF.229/2017/8.

Vienna Convention on the Law of Treaties, 23 May 1969, 1155 UNTS 331 (accession by Canada 27 January 1980).

Jurisprudence

Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion of 8 July 1996, [1996] I.C.J. Reports 226.

Nevsun Resources Ltd. v. Araya, 2020 SCC 5 at para 90.

Nuclear Tests Case (New Zealand v. France), Judgment, [1974] I.C.J. Reports 472 at para 46.

R. v. Hape, 2007 SCC 26.

IGO and Government Documents

32nd International Conference of the Red Cross and Red Crescent, *Report on International Humanitarian Law and The Challenges of Contemporary Armed Conflicts*, 32IC/15/11 (Geneva, Switzerland, International Committee of the Red Cross, 8-10 December 2015), online: <https://www.icrc.org/en/document/international-humanitarian-law-and-challenges-contemporary-armed-conflicts>.

British Ministry of Defence, Development, Concepts and Doctrine Centre (DCDC*). JDP 0-30.2: Unmanned Aircraft Systems: Unmanned Aircraft Systems* (DCDC: Shrivenham, August. 2017), online (pdf): <

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/673940/doctrine_uk_uas_jdp_0_30_2.pdf>.

Canada, Defence Research and Development Canada, *Canadian Safety and Security Program*. Online: < Canadian Safety and Security Program - Canada.ca>.

Canada, Department of National Defence, *Law of Armed Conflict at the Operational and Tactical Levels* (Office of the Judge Advocate General, 2001), Joint doctrine manual, B-GJ-005-104/FP-021, online (pdf): <https://www.fichl.org/fileadmin/_migrated/content_uploads/Canadian_LOAC_Manual_2001_English.pdf>.

Canada, Department of National Defence, Canadian Armed Forces*, Strong, Secure, Engaged*, Canada's Defence Policy, (Ottawa : National Defence, 2017). online: <https://publications.gc.ca/site/eng/9.835971/publication.html>.

Canada, Department of National Defence, *A new Canadian approach to defence: Anticipate. Adapt. Act in Strong, Secure, Engaged: Canada's Defence Policy*, online (pdf): <http://dgpaapp.forces.gc.ca/en/canada-defence-policy/docs/canada-defence-policy-report.pdf>.

Canada, Treasury Board, *on Automated Decision-Making (*took effect on April 1, 2019, with compliance required by no later than April 1, 2020). Online: <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32592>.

CCW States Parties Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS), *Opening Statement by Canada,* Second Meeting, Apr. 9–13, 2018, Geneva, Switzerland, online: <https://perma.cc/DG5H-ECAP>.

Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions on Artificial Intelligence for Europe, Brussels, 25.4.2018 COM (2018) 237 final.

PR China, Department of International Cooperation Ministry of Science and Technology, *Next Generation Artificial Intelligence Development Plan Issued by State Council, China's Strengths Creates Innovation Miracles* (2017) No.17, (MOST, P.R. China), online (pdf): <https://www.mfa.gov.cn/ce/cefi//eng/kxjs/P020171025789108009001.pdf>.

European Parliament, Committee on Legal Affairs. *Draft Report with recommendations to the Commission on Civil Law Rules on Robotics*, 2015/2103(INL), online (pdf): <https://www.europarl.europa.eu/doceo/document/JURI-PR-582443_EN.pdf>.

European Parliament, *Resolution on Autonomous Weapon Systems*, 2018/2752(RSP).

Davison, Neil. "A legal perspective: Autonomous weapon systems under international humanitarian law" in UNODA Occasional Papers No. 30: *Perspectives on Lethal*

Autonomous Weapon Systems, (New York, NY: United Nations, 2017) 5, online (pdf): <https://www.un.org/disarmament/wp-content/uploads/2017/11/op30.pdf>.

Delegation of Canada to the OSCE, *Canadian response to OSCE questionnaire on anti-personnel mines* (2019), FSC.EMI/170/19, online (pdf): <https://www.osce.org/files/f/documents/e/f/422282.pdf>.

Final Document of the Fifth Review Conference, 23 December 2016, UN Doc. CCW/CONF.V/10, Decision 1, which recalls, in turn, *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS),* 10 June 2016, Un Doc. CCW/CONF.V/2.

Girling, Kimberly D. Thorpe, Joelle B. & Auger, Alain. *Ethical Issues and Policy Implications of Human Performance Enhancement in the Military,* Scientific Report DRDC-RDDC-2017-R103 (Canada, Defence Research and Development, October 2017), online: < Microsoft Word - D17-0629-1327 FORMATTED DOCUMENT post QA Formatting.docx (drdc-rddc.gc.ca)>.

Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibition or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, *Draft Report of the 2019 Session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems*, Agenda Item 6, CCW Doc CCW/GGE.1/2019/CRP.1/Rev.2 (report adopted 21 August 2019). Annex IV, 'Guiding principles', para (a), online (pdf): <https://undocs.org/pdf?symbol=en/CCW/GGE.1/2019/CRP.1/REV.2>.

Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibition or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to Have Indiscriminate Effects, *United States of America, Human-Machine Interaction in the Development, Deployment and Use of Emerging Technologies in the Area of Lethal Autonomous Weapons Systems. Ensuring that Machines Effectuate Human Intent in Using Force,* Provisional Agenda Item 6, (28 August 2018) CCW Doc CCW/GGE.2/2018/WP.4, online: <https://undocs.org/pdf?symbol=en/CCW/GGE.2/2018/WP.4>.

Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System (2021), CCW/GGE.1/2020/WP.7, online (pdf): *UNODA* <https://documents.unoda.org/wp-content/uploads/2020/07/CCW_GGE1_2020_WP_7-ADVANCE.pdf>.

Group of Governmental Experts on Lethal Autonomous Weapons Systems (GGE LAWS), *Canadian response to the Chair's request for input on potential consensus recommendations,* online: UNODA: <https://documents.unoda.org/wp-content/uploads/2021/06/Canada_Commentary-on-potential-consensus-recommendations.pdf>.

High Contracting Parties to 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 Geneva, *Guiding Principles affirmed by the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System (Annex III, 2019)*, Meeting (13–15 November 2019, Agenda item 15, Consideration and adoption of the final report), CCW/MSP/2019/9, online: <https://undocs.org/CCW/MSP/2019/9>.

ICAO Cir 328, AN/190, *Unmanned Aircraft Systems (UAS)*, (International Civil Aviation Organization, approved by the Secretary General and published under his authority, Order Number: CIR328, 2011), online (pdf): <https://www.icao.int/meetings/uas/documents/circular%20328_en.pdf>.

Ilachinski, Andrew. "Artificial Intelligence and Autonomy: Opportunities and Challenges" (USA, Arlington, Center for Naval Analysis, 2017), accession number: AD1041749, online (pdf): <https://apps.dtic.mil/sti/pdfs/AD1041749.pdf>.

Informal Meeting of Experts, *Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*, (Geneva, United Nations Office for Disarmament Affairs, 2016) online (pdf): https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-_Informal_Meeting_of_Experts_(2016)/ReportLAWS_2016_AdvancedVersion.pdf.

International Committee of the Red Cross, *A Manual on the Domestic Implementation of International Humanitarian Law* (Geneva, ICRC, 2015), online (pdf): https://www.icrc.org/en/doc/assets/files/publications/icrc-002-4028.pdf.

International Committee of the Red Cross, *Report on the Ethics and Autonomous Weapon Systems: An Ethical Basis for Human Control*? (Geneva, 3 April 2018), online (pdf): <https://www.icrc.org/en/download/file/69961/icrc_ethics_and_autonomous_weapon_systems_report_3_april_2018.pdf>.

National Security Commission on Artificial Intelligence, *Final Report: National Security Commission on Artificial Intelligence* (Arlington, VA: National Security Commission on Artificial Intelligence, 2021) online (pdf): https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf

Ouellette, André. *Report of Canada's System of Justice on Bijuralism and Taxation: International Aspects* (Ottawa, ON: Canada, Department of Justice, 2003), Interpretation of Treaties and Domestic Law (Date modified: 2015-01-07), online: <https://www.justice.gc.ca/eng/rp-pr/csj-sjc/harmonization/ouell/toc_int-tdm_int.html>

Persi Paoli, Giacomo et al,. *Modernizing Arms Control: Exploring Responses To The Use Of AI In Military Decision-Making*, (Geneva, Switzerland: UNIDIR, 2020), online: < https://www.unidir.org/publication/modernizing-arms-control>.

Sayler, Kelley M. *Defense Primer: U.S. Policy on Lethal Autonomous Weapon Systems* (Washington, DC: Congressional Research Service, CRS Rpt IF11150, 2020), Online: <https://crsreports.congress.gov/product/pdf/IF/IF11150>.

---, *Artificial Intelligence and National Security* (Washington, DC: Congressional Research Service, CRS Rpt R45178, 2020), online: https://crsreports.congress.gov/product/details?prodcode=R45178

Shapiro, Ariel. *Autonomous Weapon Systems: Selected Implications for International Security and for Canada*, no. 2019-55-E, (Ottawa, Canada: Library of Parliament, 2019) online (pdf): <https://lop.parl.ca/staticfiles/PublicWebsite/Home/ResearchPublications/InBriefs/PDF/2019-55-e.pdf>.

UNESCO, *Implementation of Standard-Setting Instrument, General Monitoring Comprehensive Report, Annex II- Status of Ratification of Conventions and Agreements Adopted under the Auspices of UNESCO*, (2021) Item 23 of Provisional Agenda, UN Doc 212 Ex/23.I.INF, (2021). Online (pdf): https://unesdoc.unesco.org/ark:/48223/pf0000378425_eng/PDF/378425eng.pdf.multi.page=11.

United States Department of Defense, *Autonomy in Weapon Systems*, *DIRECTIVE No.3000.09* (United States, Department of Defense, 2012 Incorporating Change 1, May 8, 2017), online (pdf): <https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodd/300009p.pdf>.

United States, Department of Defense, *Directive 3000.03E, DoD Executive Agent for Non-Lethal Weapons (NLW), and NLW Policy* (2013, Incorporating Change 2, August 31, 2018), online: < https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/300003p.pdf?ver=2018-10-24-112944-467>.

US Department of Defense, *Directive 5000.01, The Defense Acquisition System* (2003 Incorporating Change 2, August 31, 2018), online: <https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf>.

United States, Department of Defence, Office of General Counsel Department of Defence, *Law of War Manual* (June 2015, updated December 2016), online: <https://dod.defense.gov/Portals/1/Documents/law_war_manual15.pdf>

Secondary Material: Books and Chapters

Bartneck, Christoph et al., "Military Uses of AI" in: *An Introduction to Ethics in Robotics and AI. SpringerBriefs in Ethics*. (UK: Springer International Publishing, 2021), DOI: https://doi.org/10.1007/978-3-030-51110-4_11

Bekey, George A. *Autonomous Robots, From Biological Inspiration to Implementation and Control* (Cambridge, UK: MIT Press Books, 2005).

Besson, Samantha. "Human Rights Adjudication as Transnational Adjudication: A Peripheral Case of Domestic Courts as International Law Adjudicators", in August Reinisch, Mary E Footer, & Christina Binder eds., *International Law and …: Select*

Proceedings of the European Society of International Law, (Oxford: Hart Publishing, 2016).

Cheng, Bin. *General Principles of Law as Applied by International Courts and Tribunals* (1953, reprinted by Cambridge University Press 2006).

Henckaerts, Jean-Marie. & Doswald-Beck, Louise (eds.), *Customary International Humanitarian Law (2005) Vol. I: Rules*, *Vol. II: Practice*, (Cambridge, UK: Cambridge University Press, 2005).

Lagoutte, Stéphanie, Gammeltoft-Hansen, Thomas & Cerone, John. *Tracing the Roles of Soft Law in Human Rights,* (Oxford, UK: Oxford University Press, 2016).

Morgan, Forrest E. et al, (eds.), *Military applications of artificial intelligence* (Santa Monica, CA: RAND corporation, 2020), DOI: https://doi.org/10.7249/RR3139-1

M. Kindred, Hugh et al. *International Law: Chiefly as Interpreted and Applied in Canada*, 8th ed (Toronto, Emond Montgomery Publications, 2014).

Program on Humanitarian Policy and Conflict Research at Harvard University, *HPCR Manual on International Law Applicable to Air and Missile Warfare* (Cambridge, UK: Cambridge University Press, 2013).

Schmitt, Michael N. Tallinn *Manual 2.0 on the International Law Applicable to Cyber Operations*, 2nd ed, (Cambridge, UK: Cambridge University Press, 2017).

Schuller, Alan L., "At the Crossroads of Control: The Intersection of Artificial Intelligence in Autonomous Weapon with International Humanitarian Law" (2017) 8 Harv. Nat'l Sec. J. 379.

Simpson, Gerry J., *Great Powers and Outlaw States: Unequal Sovereigns in the International Legal Order* (Cambridge, UK: Cambridge University Press, 2004), DOI: <10.1017/CBO9780511494185>.

The Impact of Artificial Intelligence on Strategic Stability and Nuclear Risk: Volume I Euro-Atlantic Perspectives, ed by Vincent Boulanin (Sweden: Stockholm International Peace Research Institute, 2019), online (pdf): https://www.sipri.org/sites/default/files/2019-05/sipri1905-ai-strategic-stability-nuclear-risk.pdf.

Waters, Christopher P.M., "War Law and Its Intersections" in *Ethics, Law and Military Operations*, ed by David Whetham (New York, NY: Palgrave Macmillan, 2011) 90.

Secondary Material: Articles

"Article 20. Pacta Sunt Servanda," (1935) 29:S2 AJIL977. DOI: <https://doi.org/10.2307/2213687>.

Atwood, David, "Implementing Ottawa: Continuity and Change in the Roles of NGOs" (1999) No 4 Disarmament Forum 19, UNIDIR/DF/99/3., online: < framework-for-a-mine-free-world-en-367.pdf (unidir.org)>.

Banaszewska, Dorota Marianna. "Lex Specialis" in Oxford University Press, Max Planck Encyclopedia of Public International Law, (Oxford, UK: Oxford University Press, article last updated November 2015).

Bellaby, Ross W, "Can AI Weapons Make Ethical Decisions?" (2021), 40(2) Criminal Justice Ethics 86–107, DOI: <https://doi.org/10.1080/0731129X.2021.1951459>.

Bode, Ingvild. "Norm-Making and the Global South: Attempts to Regulate Lethal Autonomous Weapons Systems "(2019) 10(3) Global Policy, 359 DOI: <https://doi.org/10.1111/1758-5899.12684>.

Boulanin, Vincent & Verbrugge, Maaike. *Article 36 Reviews: Dealing With The Challenges Posed By Emerging Technologies* (Solna, Sweden: Stockholm International Peace Research Institute, 2017), online (pdf): <https://www.sipri.org/sites/default/files/2017-12/article_36_report_1712.pdf>.

---. *Mapping the Development of Autonomy in Weapon Systems* (Solna, Sweden: Stockholm International Peace Research Institute, 2017), online: <https://www.sipri.org/publications/2017/other-publications/mapping-development-autonomy-weapon-systems>.

Boulanin, Vincent. *Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems* (Solna, Sweden: Stockholm International Peace Research Institute, 2015), online (pdf): *SIPRI* <https://www.sipri.org/sites/default/files/files/insight/SIPRIInsight1501.pdf>.

Boulanin, Vincent, Bruun, Laura & Goussac, Netta. *Autonomous Weapon Systems and International Humanitarian Law* (Sweden: Stockholm International Peace Research Institute, 2021), online (pdf): < https://www.sipri.org/sites/default/files/2021-06/2106_aws_and_ihl_0.pdf>

Byers, Michael. "Custom, Power and the Power of Rules: International Relations and Customary International Law" (1995)*, 17:109 Michigan Journal of International Law 110.

Cassese, Antonio. "Modern Constitutions and International Law" (1985) 192 RECUEIL DES COURS 331.

Geist, Edward. "It's Already Too Late to Stop the AI Arms Race-We Must Manage It Instead" (2016), Bulletin of the Atomic Scientists, 72:5, 318-321, DOI: 10.1080/00963402.2016.1216672.

Goldblat, Jozef. "Inhumane conventional weapons: efforts to strengthen the constraints", in SIPRI Yearbook (1995) on Armaments, Disarmament and International Security, online (pdf):<https://www.sipri.org/sites/default/files/SIPRI%20Yearbook%201995.pdf>.

Grut, Chantal. "The Challenge of Autonomous Lethal Robotics to International Humanitarian Law" (2013) 18:1 J Confl & Secur L 5.

Hayashi, Nobuo. *National Military Manuals on the Law of Armed Conflict* (Florence, Italy: Forum for International Criminal and Humanitarian Law, 2010, Second Edition), FICHL Publication Series No. 2, online: <https://www.toaep.org/ps-pdf/2-hayashi-second>

Horowitz, Michael C. "Artificial Intelligence, International Competition, and the Balance of Power" (2018) 1:3 Texas National Security Review can be found online: TNSR < https://tnsr.org/2018/05/artificial-intelligence-international-competition-and-the-balance-of-power/>. Also here https://repositories.lib.utexas.edu/bitstream/handle/2152/65638/TNSR-Vol-1-Iss-3_Horowitz.pdf?sequence=2.

Liu, Hin-Yan. "Categorization and Legality of Autonomous and Remote Weapons Systems" (2012) 94:886 Intl Rev Red Cross 627, online (pdf): <https://www.icrc.org/es/doc/assets/files/review/2012/irrc-886-liu.pdf>.

Marchant, Gary E. et al., "International Governance of Autonomous Military Robots" (2011) 12 Colum Sci & Tech L Rev 272.

Matheson, Michael J. "The Amendment of the War Crimes Act" (2017), 101 American Journal of International Law 48.

Parcasio, Marjun. "The Continuing Relevance of International Law in Canada. Feature: How We Make Our Laws" (2019) 43(5) LawNow 13.

Reinhold, Steven. "Good Faith in International Law" (2013), 2 UCL Journal of Law and Jurisprudence 40, online (pdf): <https://discovery.ucl.ac.uk/id/eprint/1470678/1/2UCLJLJ40%20-%20Good%20Faith.pdf>.

Roff, Heather M. & Danks, David. "Trust but Verify": The Difficulty of Trusting Autonomous Weapons Systems (2018) 17:1 J Mil Ethics 2, DOI: < 10.1080/15027570.2018.1481907 >.

Santoni de Sio, Filippo & Van den Hoven, Jeroen. "Meaningful Human Control over Autonomous Systems: A Philosophical Account" (2018), Front. Robot. AI, doi: 10.3389/frobt.2018.00015.

Saad, Christiane. & Gosal, Ewa. "Autonomous weapons systems: how to work towards a total ban?" (2019), The Canadian Bar Association, online: <http://www.cba.org/Sections/International-Law/Articles/2019/Autonomous-weapons-systems-how-to-work-towards-a>.

Secretary of State Bayard, *Instruction to Mr. Connery, charge to Mexico, Nov. 1, 1887*, II MOORE'S DIGEST 235, online: *Office of the Historian* https://history.state.gov/historicaldocuments/frus1887/d491

Sharkey, Noel. "Saying 'No!' To Lethal Autonomous Targeting" (2010), 9(4) J Mil Ethics 369.

S. McDougal, Myres. "The Impact of International Law upon National Law: A Policy-Oriented Perspective" (1959) 4 S.D. L. Rev. 25, online (pdf): < https://heinonline-org.lawlibrary.laws.uwindsor.ca/HOL/PrintRequest?public=true&handle=hein.journals/sdlr4&div=5&start_page=25&collection=usjournals&set_as_cursor=0&men_tab=srchresults&print=section&format=PDFsearchable&submit=Print%2FDownload>.

Schmitt, Michael. "Autonomous Weapons Systems and International Humanitarian Law: A Reply to the Critics" (2013) 4 HARV. NAT'L SEC. J. 1, 3.

Thorpe, Joelle B. Girling, Kimberly D & Auger, Alain. "A Framework to Assess the Military Ethics of Human Enhancement Technologies," (2020) 18.2 The Canadian Army Journal 53, online (pdf): <http://www.army-armee.forces.gc.ca/assets/ARMY_Internet/docs/en/canadian-army-journal/caj-18.2-en-sp.pdf>.

Uçaryılmaz, Talya. "The Principle of Good Faith in Public International Law" (2020), 68 1 Estudios de Deusto 43. DOI: <https://doi.org/10.18543/ed-68(1)-2020pp43-59>.

Wasilow, Sherry & Thorpe, Joelle B. "Artificial Intelligence, Robotics, Ethics, and the Military: A Canadian Perspective" (2019) 40.1 AI Magazine 37, DOI: <https://doi.org/10.1609/aimag.v40i1.2848>.

Secondary Material: Dissertations

ElMasry, Maj Amir. *Army of the Future: Artificial Intelligence and Its Impact on Army Operations* (Service Paper, Canadian Forces College, 2018), online (pdf): <https://www.cfc.forces.gc.ca/259/290/405/192/elmasry.pdf>.

Lieutenant-Commander Rice, Daniel. *Lethal Autonomous Weapon Systems: A Clear and Present Danger (Canadian Forces College, 2019),* online (pdf): < https://www.cfc.forces.gc.ca/259/290/405/305/rice.pdf>.

McDaniel, Erin A. *Robot Wars: Legal and Ethical Dilemmas of Using Unmanned Robotic Systems in 21st Century Warfare and Beyond* (Masters Thesis, U.S. Army Command and General Staff College, 2008), (Accession Number: ADA502401 P77), online: < https://apps.dtic.mil/sti/citations/ADA502401>.

Secondary Material: Websites, News and Online Reports

IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems, *Reframing Autonomous Weapons Systems*, (IEEE Standards Association) online (pdf): <https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead_reframing_autonomous_weapons_v2.pdf>

Acheson, Ray & Pytlak, Allison. Austria's conference on autonomous weapons offers bold support for a ban (Women's International League for Peace and Freedom - Reaching Critical Will Program, 2021), online: <https://reachingcriticalwill.org/news/latest-news/15402-austria-s-conference-on-autonomous-weapons-offers-bold-support-for-a-ban>.

Allen, Greg & Chan, Taniel. "Artificial Intelligence and National Security" (Belfer Center for Science and International Affairs Harvard Kennedy School, 2017), online (pdf): <https://www.belfercenter.org/sites/default/files/files/publication/AI%20NatSec%20-%20final.pdf>.

Marijan, Branka. *Report On Charting The Way Forward, Examining The Principles Of Responsible Use Of Military AI By Canada's Allies* (Project Ploughshares, 2021), online: <https://ploughshares.ca/pl_publications/charting-the-way-forward>.

---. *Protecting Civilians in Armed Conflict: The Importance of Humanitarian Disarmament* (2019), online: *Humanitarian Disarmament* <https://humanitariandisarmament.org/2019/06/10/protecting-civilians-in-armed-conflict-the-importance-of-humanitarian-disarmament/>.

---. *Canada to support a ban on autonomous weapons* (Project Ploughshares, 2020), online: https://ploughshares.ca/2020/01/canada-to-support-a-ban-on-autonomous-weapons/

---. *Canada's deafening silence on the creation of autonomous weapons* (Toronto Star, 2020), online: https://www.thestar.com/opinion/contributors/2020/10/09/canadas-deafening-silence-on-the-creation-of-autonomous-weapons.html?rf

Canada, Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy,* Global context, online: <https://www.canada.ca/en/department-national-defence/corporate/reports-publications/canada-defence-policy/global-context.html>.

Canada, Digital government innovations, *Responsible use of artificial intelligence (AI)*, online: < Responsible use of artificial intelligence (AI) - Canada.ca>.

Canada, *Canadian Statement at the UN Security Council Open Debate on Upholding International Law (2018)*, online: < Canadian Statement at the UN Security Council Open Debate on Upholding International Law>.

Canada, *Canada-France Statement on Artificial Intelligence* (2018), online: >http://international.gc.ca/world-monde/international_relations-relations_internationales/europe/2018-06-07-france_ai-ia_france.aspx?lang=eng>
, archived at <https://perma.cc/VH9F-LPN6>.

The Canadian National Committee for Humanitarian Law, online: <https://www.cnchl-cncdh.ca/articlebd07.html?id=009190>.

Canadian Red Cross, *What is International Humanitarian Law?* online: <https://www.redcross.ca/how-we-help/international-humanitarian-law/what-is-international-humanitarian-law>.

Cawthorne, Lawrence Hill. *GCIII Commentary: Common Article 1 and State Responsibility* (ICRC, 2021), online: *Humanitarian Law & Policy* <https://blogs.icrc.org/law-and-policy/2021/01/28/gciii-commentary-common-article-1-state-responsibility/>.

Chowdhury, Nabilah et al., *Pan-Canadian AI Strategy Impact Assessment Report* (CIFAR and Accenture, 2020), online (pdf): https://cifar.ca/wp-content/uploads/2020/11/Pan-Canadian-AI-Strategy-Impact-Assessment-Report.pdf>.

CIFAR, "Pan-Canadian Artificial Intelligence Strategy", online: *CIFAR* < https://www.cifar.ca/ai/pan-canadian-artificial-intelligence-strategy>.

Docherty, Bonnie Lynn. *Heed the Call: A Moral and Legal Imperative to Ban Killer Robots* (Human Rights Watch, 2018), online: Human Rights Watch <https://www.hrw.org/report/2018/08/21/heed-call/moral-and-legal-imperative-ban-killer-robots>.

Dunn, Brian. "Joint Artificial Intelligence Center: An Opportunity for Transparency" (2020) Georgetown Security Studies Review, online: <https://georgetownsecuritystudiesreview.org/2020/11/21/joint-artificial-intelligence-center-an-opportunity-for-transparency/>.

Epps, Kenneth. The Ottawa Landmines Treaty: A Major Step Toward Human Security (The Ploughshares Monitor, 2008), online: *Project Ploughshares* https://ploughshares.ca/pl_publications/the-ottawa-landmines-treaty-a-major-step-toward-human-security/

Evans, Hayley. *Lethal Autonomous Weapons Systems at the First and Second U.N. GGE Meetings*, LAWFARE (2018), online: *Lawfare* <https://www.lawfareblog.com/lethal-autonomous-weapons-systems-first-and-second-un-gge-meetings>, archived at https://perma.cc/PR4G-YLBS.

---, *Losing Humanity, The Case against Killer Robots* (Human Rights Watch, 2012), online: <https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots#>.

Garcia, Denise. UN Role in Restraining the Dark Side of Emerging Technology (2021), online: *Toda Peace Institute* <https://toda.org/global-outlook/un-role-in-restraining-the-dark-side-of-emerging-technology.html>.

Garcia, Eugenio V. "The peaceful uses of AI: an emerging principle of international law" (2021), online: <https://thegoodai.co/2021/06/15/the-peaceful-uses-of-ai-an-emerging-principle-of-international-law/>.

Government of Canada, Global Affairs Canada, *Conventional weapons*, (Ottawa, ON: Global Affairs Canada, 2021) online: https://www.international.gc.ca/world-monde/issues_development-enjeux_developpement/peace_security-paix_securite/conventional_weapons-armes_conventionnelles.aspx?lang=eng

Group of Governmental Experts, online: *United Nations Office for Disarmament Affairs* <https://www.un.org/disarmament/group-of-governmental-experts/>.

Hagel, Chuck, Secretary of Defense. "Reagan National Defense Forum Keynote Address," (United States Department of Defense, 15 November 2014), online: < https://www.defense.gov/News/Speeches/Speech/Article/606635/>.

Hiznay, Mark. *Landmines* (Human Rights Watch, 2003), online: *Human Rights Watch Report* <https://www.hrw.org/topic/arms/landmines>.

Human Rights Watch, *Report* on *Stopping Killer Robots; Country Positions on Banning Fully Autonomous Weapons and Retaining Human Control* (Human Rights Watch, 2020), online (pdf): <https://www.hrw.org/sites/default/files/media_2021/04/arms0820_web_1.pdf>.

Hunt, Erin & Piotr Dobrzynski, *The Right to Dignity and Autonomous Weapons Systems* (Human Rights Watch, 2018), online: https://www.hrw.org/sites/default/files/report_pdf/arms0818sp_web.pdf

International Committee of the Red Cross, *Banning Anti-Personnel Mines- The Ottawa Treaty Explained* (Geneva, CH; 1998). Online (pdf): http://cidbimena.desastres.hn/pdf/eng/doc13188/doc13188-contenido.pdf

International Committee of the Red Cross, *Customary Law*, online: *ICRC* https://www.icrc.org/en/war-and-law/treaties-customary-law/customary-law#:~:text=Customary%20international%20law%20consists%20of,the%20protection%20offered%20to%20victims

International Committee of the Red Cross, *Customary International Humanitarian Law: Questions & Answers*, 15-08-2005, online: *ICRC*:

https://www.icrc.org/en/doc/resources/documents/misc/customary-law-q-and-a-150805.htm

International Committee of the Red Cross, *IHL Database*, *Customary IHL- Practice Relating to Rule 139. Respect for International Humanitarian Law* (Canada), online: <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_cou_ca_rule139_sectiona>.

International Committee of the Red Cross, *IHL database, Customary IHL-Rule 66. Non-Hostile Contacts between the Parties to Conflict.* Online: https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule66.

International Committee of the Red Cross Opinion Paper. *How is the Term "Armed Conflict" Defined in International Humanitarian Law?* (2008), online: https://www.icrc.org/en/doc/resources/documents/article/other/armed-conflict-article-170308.htm

International Committee of the Red Cross, *International Humanitarian Law in Domestic Law* (January 1, 2015), online: < https://www.icrc.org/en/document/international-humanitarian-law-domestic-law>.

International Committee of the Red Cross, *Jus Ad Bellum and Jus In Bello* (2020), online: https://www.icrc.org/en/document/jus-ad-bellum-jus-in-bello

International Committee of the Red Cross, *Mandate and Mission*, online: ICRC: https://www.icrc.org/en/mandate-and-mission

International Committee of the Red Cross, *Overview of the Convention on the prohibition of anti-personnel mines* (2007), online: *ICRC* https://www.icrc.org/en/doc/resources/documents/legal-fact-sheet/landmines-factsheet-150807.htm

International Committee of the Red Cross, *Practice Relating to Rule 142. Instruction in International Humanitarian Law within Armed Forces*, online: *ICRC* <https://ihl-databases.icrc.org/customary-ihl/eng/docs/v2_rul_rule142>.

International Committee of the Red Cross, *Rule 70. Weapons of a Nature to Cause Superfluous Injury or Unnecessary Suffering states: the use of means and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering is prohibited*. Online: *ICRC*: https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule70

International Committee of the Red Cross*, War and International Humanitarian Law* (2010), online: www.icrc.org/eng/war-and-law/overview-war-and-law.htm.

International Telecommunication Union, *United Nations Activities on Artificial Intelligence (AI)* (2018), can be found online: *ITU* < https://www.itu.int/dms_pub/itu-s/opb/gen/S-GEN-UNACT-2018-1-PDF-E.pdf>.

Kerr, Ian et al, "Call for an International Ban on the Weaponization of Artificial Intelligence" in an open Letter to the Prime Minister of Canada (Canada, University of Ottawa, Centre for Law, Technology and Society, 2017), online: < https://techlaw.uottawa.ca/bankillerai>.

Kilford, Christopher. "Canada's New Defence Policy: A Huge Step in the Right Direction" (CDA Institute Analysis, 2017), online (pdf):< https://cdainstitute.ca/wp-content/uploads/2016/07/KilfordAnalysisFinal.pdf>.

Kotlik, Marcos. *Reviewing Legal Weapons Reviews: is it possible to verify compliance?* (2020), online: https://www.ejiltalk.org/reviewing-legal-weapons-reviews-is-it-possible-to-verify-compliance/

Kung, Johnny. "Building an AI World: Report on National and Regional AI Strategies" 2nd ed, (Toronto, ON: CIFAR, 2020) online (pdf): <https://cifar.ca/wp-content/uploads/2020/10/building-an-ai-world-second-edition.pdf>.

Mahal, Shaan. Martin, Sydney & Plitz, Liisa. Canadian Armed Forces and AI: Ahead of the Game or Lagging Behind? (Global Advantage,2019), online: *Global Advantage* <https://globaladvantageconsulting.com/canadian-armed-forces-and-ai-ahead-of-the-game-or-lagging-behind/>.

Paul, Maxwell. "Artificial Intelligence is the Future of Warfare (just not in the way you think)" (2020), online: <https://mwi.usma.edu/artificial-intelligence-future-warfare-just-not-way-think/>.

Markoff, John. "Fearing Bombs That Can Pick Whom to Kill" (2014), online: *The New York Times* <https://www.nytimes.com/2014/11/12/science/weapons-directed-by-robots-not-humans-raise-ethical-questions.html>.

Pugliese, David. "Campaign to Stop Killer Robots Calls for Canada to Support Ban On Fully Autonomous Weapons" (Ottawa, ON: Ottawa Citizen, 2014), online: *Ottawa Citizen* <https://ottawacitizen.com/news/national/defence-watch/campaign-to-stop-killer-robots-calls-for-canada-to-support-ban-on-fully-autonomous-weapons>.

Renic. Neil C. "Autonomous Weapons Systems: When is the right time to regulate?" (2019), Institute for Peace Research and Security Policy, University of Hamburg, online: <https://blogs.icrc.org/law-and-policy/2019/09/26/autonomous-weapons-systems-right-time-regulation/>

Schmitt, Michael N., Garraway, Charles H.B. & Dinstein, Yoram. *The Manual on the Law of Non-International Armed Conflict with Commentary* (Sanremo, Italy: International Institute of Humanitarian Law, 2006), online (pdf): <https://www.legal-tools.org/doc/ccf497/pdf/>.

Sisson, Melanie et al,. "The Militarization of Artificial Intelligence" (United Nations Office for Disarmament Affairs, the Stanley Center for Peace and Security, and the Stimson Center, 2019), online: < https://stanleycenter.org/publications/militarization-of-artificial-intelligence>.

Stop Killer Robotics Canada, Canada's Campaign to Stop Killer Robots and Fully Autonomous weapons, online: https://stopkillerrobots.ca/media/press-releases/

United States Air Force, *Unmanned Aircraft Systems Flight Plan 2009-2047,* online (pdf): < https://irp.fas.org/program/collect/uas_2009.pdf>.

United States Department of Defense, online: <https://www.usa.gov/federal-agencies/u-s-department-of-defense>.

United States, Department of Defense, *Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance Our Security and Prosperity* (2018), online: >https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF>.

United States, Department of Defense, "Remarks by Deputy Secretary Work on Third Offset Strategy" (2016) Speech, Brussels, online: <https://www.defense.gov/News/Speeches/Speech/Article/753482/remarks-by-d%20eputy-secretary-work-on-third-offset-strategy/>

United States, Joint Artificial Intelligence Center, *Vision: Transform the DoD Through Artificial Intelligence*, online: <https://dodcio.defense.gov/About-DoD-CIO/Organization/JAIC/>.

United Nations Office for Disarmament Affairs. *Background on LAWS in the CCW*, online: <https://www.un.org/disarmament/the-convention-on-certain-conventional-weapons/background-on-laws-in-the-ccw/>.

United Nations Office on Genocide Prevention and the Responsibility to Protect, *Responsibility to Protect*, online: <https://www.un.org/en/genocideprevention/about-responsibility-to-protect.shtml#>.

UNESCO, "Canada First To Adopt Strategy For Artificial Intelligence", online: h<ttp://www.unesco.org/new/en/media-services/single-view/news/canada_first_to_adopt_strategy_for_artificial_intelligence/>.

Vergun, David, *Artificial Intelligence Key to Maintaining Military, Economic Advantages, Leaders Say* (U.S Department of Defence, 2021), online: *DoD news* https://www.defense.gov/News/News-Stories/Article/Article/2567486/artificial-intelligence-key-to-maintaining-military-economic-advantages-leaders/

What is a thought leader?, online: https://thoughtleadershiplab.com/what-is-a-thought-leader/

Women's International League for Peace and Freedom - Reaching Critical Will Program, *Fact Sheet on Fully Autonomous Weapons*, online: https://www.reachingcriticalwill.org/resources/fact-sheets/critical-issues/7972-fully-autonomous-weapons

Zabecki, David T. "Military Developments of World War I" (2015), online: *International Encyclopedia of the First World War* (pdf): https://encyclopedia.1914-1918-online.net/pdf/1914-1918-Online-military_developments_of_world_war_i-2015-05-07.pdf

Zhang, Daniel et al,. *The AI Index 2021 Annual Report* (AI Index Steering Committee, Human-Centered AI Institute, Stanford University, Stanford, CA, March 2021), chapter7: AI Policy and National Strategies (2021), online (pdf): < https://aiindex.stanford.edu/wp-content/uploads/2021/03/2021-AI-Index-Report_Master.pdf>

Mclemore, Connor & Clark, Charles. The Devil You Know: Trust in Military Applications of Artificial Intelligence (Texas National Security Review, AI and National Security, 2019), online: https://warontherocks.com/2019/09/the-devil-you-know-trust-in-military-applications-of-artificial-intelligence/?fbclid=IwAR15Wczbr9uLN0nFhYkIW1QFyQrkA7F9Ql0UqIrhDiAO5LPL0Yku81Jn9ZQ

Chiam, Madelaine. Monism and Dualism in International Law (Oxford Bibliographies, last reviewed: 24 February 2021), online: https://www.oxfordbibliographies.com/view/document/obo-9780199796953/obo-9780199796953-0168.xml

Burns, Ed. Laskowski, Nicole & Tucci, Linda. What is artificial intelligence? (TechTarget, 2021), online: *TechTargets* https://searchenterpriseai.techtarget.com/definition/AI-Artificial-Intelligence

VITA AUCTORIS

NAME:	Mahshid Talebian Kiakalayeh
PLACE OF BIRTH:	Tehran, Iran
YEAR OF BIRTH:	1987
EDUCATION:	Faculty of Law, Tehran North Branch University, LLB, Tehran, Iran, 2008
	Faculty of Law, Tehran North Branch University, LLM, Tehran, Iran, 2012
	Faculty of Law, University of Windsor, LLM Windsor, ON, 2021