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To my mother, Sandra Cachide, whose wisdom, unwavering belief in me, and unyielding encouragement have been invaluable in shaping my aspirations.

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Abstract

The growing integration of autonomous technologies into modern warfare raises complex legal uncertainties under International Humanitarian Law (IHL), particularly in the absence of explicit treaty provisions governing Autonomous Weapon Systems (AWS). This dissertation explores the Martens Clause as a central interpretative and normative tool, assessing its potential to guide the legal evaluation and regulation of these weapons through the principles of humanity and the dictates of public conscience.

Structured around a conceptual clarification of AWS and the Martens Clause, the study proceeds to assess their interaction within IHL, paying particular attention to the Clause's application in weapon reviews and its relevance in evaluating compliance with foundational humanitarian principles. By engaging with international legal instruments, relevant jurisprudence, reports, precedents, and selected case studies, the research examines the extent to which the Clause can fill regulatory gaps and offer a substantive legal basis for limiting or guiding the use of autonomous technologies in warfare. While the Clause may not constitute a standalone prohibition mechanism, it nonetheless provides a significative normative grounding, especially where new technologies challenge the boundaries of existing law. Ultimately, the research argues that the Martens Clause is not a historical relic, but a living legal principle capable of responding to technological advances in warfare and preserving the humanitarian foundations of international law where codified rules fall short.

Keywords: Martens Clause; Autonomous Weapon Systems; International Humanitarian Law; International Humanitarian Principles; Laws of Humanity; Dictates of Public Conscience; Precedents; Contemporary Conflicts; International Regulatory Debate.

Resumo

A crescente integração de tecnologias autónomas em conflitos armados contemporâneos levanta incertezas jurídicas complexas no âmbito do Direito Internacional Humanitário (DIH), particularmente na ausência de normas jurídicas explícitas que regulem os Sistemas de Armas Autónomas (SAA). Esta dissertação explora a Cláusula de Martens como uma ferramenta interpretativa e normativa central, avaliando o seu potencial para orientar a avaliação jurídica e a regulação destas armas através dos princípios da humanidade e dos ditames da consciência pública.

Estruturado em torno de uma clarificação conceptual dos SAA e da Cláusula de Martens, o estudo procede à análise da sua interação dentro do DIH, prestando especial atenção à aplicação da Cláusula nas revisões de armas e à sua relevância na avaliação do cumprimento dos princípios humanitários fundamentais. Através da análise de instrumentos jurídicos internacionais, jurisprudência relevante, relatórios, precedentes e estudos de caso selecionados, a pesquisa examina até que ponto a Cláusula pode preencher lacunas regulatórias e oferecer uma base legal substancial para limitar ou orientar o uso de tecnologias autónomas na guerra. Embora a Cláusula não constitua um mecanismo de proibição por si só, ela oferece, ainda assim, uma fundamentação normativa significativa, especialmente quando novas tecnologias desafiam os limites do direito existente. Em última análise, a pesquisa sustenta que a Cláusula de Martens não é uma relíquia histórica, mas um princípio jurídico vivo, capaz de responder aos avanços tecnológicos na guerra e de preservar as bases humanitárias do direito internacional, onde as regras codificadas falham.

Palavras-chave: Cláusula de Martens; Sistemas de Armas Autónomas; Direito Internacional Humanitário; Princípios Humanitários Internacionais; Leis da Humanidade; Ditames da Consciência Pública; Precedentes; Conflitos Contemporâneos; Debate Regulatório Internacional.

Abbreviations

AI – Artificial Intelligence

AP I - Additional Protocol I

AWS - Autonomous Weapons Systems

CCW Convention - 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

ECHR – European Convention on Human Rights

EU – European Union

GGE – Group of Governmental Experts

GNA-AF – Government of National Accord Armed Forces

HAF – Haftar Armed Forces

HRW – Human Rights Watch

ICJ - International Court of Justice

ICRC - International Committee of the Red Cross

IHL - International Humanitarian Law

IHRC – International Human Rights Clinic

LAWS – Lethal Autonomous.Weapons Systems

NATO – North Atlantic Treaty Organization

NGO – Non-Governmental Organisations

STM – Savunma Teknolojileri Mühendislik

TPNW - Treaty on the Prohibition of Nuclear Weapons

UAV – Unmanned Aerial Vehicle

UN – United Nations

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Introduction

The growing integration of artificial intelligence (AI) and autonomous capabilities into modern weapon systems raises significant legal uncertainty concerning their compatibility with existing international obligations, namely, with International Humanitarian Law (IHL). In this regard, the Martens Clause emerges as a potentially central legal standard, serving as an interpretative safeguard in legal *lacunae* and providing a normative framework to assess the permissibility of novel means and methods of warfare, such as Autonomous Weapons Systems (AWS) – the objective is to determine whether, and to what extent, the Martens Clause may serve as a legal basis or guiding principle for the regulation and potential limitation of AWS.

Given that this study will undertake an analysis of the Martens Clause in conjunction with AWS, it is essential to begin by providing a preliminary conceptual clarification of both terms, in order to delineate the analytical structure underpinning this research.

The International Committee of the Red Cross (ICRC) (2016, p.1) defines AWS as:

> *"Any weapon system with autonomy in its critical functions. That is, a weapon system that can select (i.e. search for or detect, identify, track, select) and attack (i.e. use force against, neutralize, damage or destroy) targets without human intervention".*

Following the ICRC´s "broad definition" of AWS, it allows for a more practical assessment of how current weapon technologies might be evaluated from both a legal and ethical perspective since this definition helps identify emerging technologies that could pose "concerns under" IHL, as well as with regard to "the principles of humanity and the dictates of the public conscience". This definition, Davidson (2018, p.5-6) notes, includes "any weapon system" capable of "independently select and attack targets", whether those systems are already in use or are being developed for the future.

A key element of the definition of AWS is its capacity for autonomy. This means that once activated by a person, the system itself, using its detectors and programmed algorithms, takes over the processes of selecting a target and carrying out an attack. The level of autonomy in a "robotic system" depends on the extent of "human intervention in its operation", both in how much control humans retain and what occasions they intervene (*ibid*). Despite this, AWS can function effectively by executing tasks assigned to them by persons through programming, without requiring cognizance or sentient reasoning. In addition to autonomy, the concept of predictability is central to AWS. This refers to how the "technical characteristics and performance" capabilities of these systems, along with the conditions under which they are

used, enable a “certain degree of predictability of the outcomes of using” them. (ICRC, 2016, p. 1-3).

Moreover, one of the core components of the definition to consider is “the ability of the system to “select and engage´ targets”, which could refer to several aspects: system activation, operational target selection, or attack. However, the meaning for most seems to rely on the last point, *i.e*., “when the system is applying the instrument designed to kill, injure, or destroy its selected target” (*ibid*)(Davidson, 2018). Lastly, one significant characteristic of the concept is the notion of “without human intervention”, which demands that “the actions of the system” don’t involve human participation. This implies that once developed, the machine possesses the capability to autonomously identify and select its targets, as well as to decide to engage them, without requiring direct human intervention. The entire process, which traditionally involves human oversight, is rendered unnecessary, allowing the machine to independently execute the operation from initiation to completion (Ford, 2017, p. 420-421).

The Martens Clause is a fundamental principle of IHL that ensures individuals affected by armed conflicts remain protected, even in situations not explicitly covered by existing treaties, with its main objective to ensure “the ongoing humanization of warfare”. It was first introduced by Fyodor Martens, in the Preamble of the 1899 Hague Convention and the 1907 Hague Convention, and since its establishment, the clause has evolved into an international “customary rule”, recognized in multiple treaties and reaffirmed in modern legal instruments (ICRC, *s.d*). The clause states:

> *“Until a more complete code of the laws of war has been issued, the High Contracting Parties deem it expedient to declare that, in cases not included in the Regulations adopted by them, the inhabitants and the belligerents remain under the protection and the rule of the law of nations, as they result from the usages established among civilized peoples, from the laws of humanity and the dictates of public conscience”.*

At its core, the Martens Clause establishes that in cases not specifically addressed by international treaties, "populations and belligerents remain under the protection and empire of the principles of international law" derived from "established custom, from the laws of humanity and from the dictates of public conscience" (Hague Convention, 1899). This formulation underscores the enduring application of moral and humanitarian considerations in warfare, ensuring that fundamental protections extend beyond codified rules (ICRC, *s.d*.).

While the interpretation of the Martens Clause remains a subject of legal debate (Ivanenko, 2022, p.1723), this analysis adopts the moderate perspective advocated by Cassese

(2000, p.212-213). According to this view, despite the clause's "ambiguous wording and undefinable" scope, it holds legal significance as it reflects a widely recognized principle within the "international community: that the requirements of humanity and the pressure of public opinion be duly taken into account when regulating armed conflict". Furthermore, the frequent invocation of the clause by "international law makers, by national and international courts, and by diplomats" further underscores its relevance. Lastly, its legal value is reinforced by the principle – "the general principle of construction" – that "international instruments should not be presumed to" lack legal validity or practical applicability.

Consequently, the significance of the Martens Clause lies in its ability to fill *lacunae* in situations where no explicit rules exist, making it particularly relevant in emerging technological and military developments, such as AWS – it embodies the principle that the evolution of warfare does not negate the fundamental rights and protections owed to individuals, reinforcing humanitarian imperatives even as military capabilities advance. Over time, the Martens Clause has been included in subsequent IHL treaties, often with slight modifications. This shift reflects its strengthened legal standing, ensuring that fundamental humanitarian principles remain applicable regardless of advancements in military technology (Ivanenko, 2022, p.1709).

AWS and the Limits of Legality: The Martens Clause and Core IHL Principles

The Martens Clause provides a normative framework for evaluating new technological developments in weaponry, while alone it may not serve as the primary legal basis for prohibiting AWS, it remains fully applicable and plays a crucial role in ensuring the "protection of persons who become targets of those systems". As a legal safeguard, the Clause functions alongside other principles and rules of IHL, collectively forming the foundation for the regulation of the threat and use of AWS (Perišić, & Tomljenović, 2024, p.537). Consequently, it is essential to consider, besides what is enshrined in the Martens Clause, additional IHL principles that play a lead role in the legal assessment of new weapons.

Beyond Treaty Law: The Martens Clause as a Legal Safeguard

The Martens Clause establishes its applicability "in cases not included in the Regulations," meaning it plays a pivotal role in addressing gaps within IHL by ensuring its applicability in situations where existing treaties or regulations do not explicitly govern a

particular issue. According to the United Nations (UN) Group of Governmental Experts (GGE)(2024), p.2-4), the Clause guarantees that both "civilians and combatants" remain protected, even in the absence of specific treaty provisions, reinforcing the idea that the humanitarian imperatives of armed conflict extend beyond codified rules, in such cases, the fundamental principles of humanity and the dictates of public conscience continue to provide legal guidance.

Beyond its interpretative function, the Martens Clause operates as a universal standard, requiring states to assess whether the development and use of new weapons align with humanitarian principles. It serves as a mechanism to evaluate the legality of emerging military technologies, ensuring that the absence of explicit prohibitions does not lead to the circumvention of fundamental IHL obligations. This perspective is strongly supported by Human Rights Watch (HRW) & the International Human Rights Clinic (IHRC) (2018, p.13-16), which argue that no single legal instrument, no matter how comprehensive, can foresee or regulate all potential circumstances. Consequently, the Martens Clause functions as a safeguard, preventing unforeseen situations or rapidly evolving technologies from undermining the overarching humanitarian objectives of international law.

The relevance of the Clause is particularly evident in the context of AWS – these systems represent an unprecedented technological advancement in warfare, one that international law has yet to fully address in specific legal terms. While core IHL principles apply to all weapons systems, including autonomous ones, no existing treaty contains explicit rules governing their development, deployment, and use. As a result, these weapons constitute a prime example of a subject that falls under the scope of the Martens Clause. The Clause thus provides an essential legal framework for assessing their compliance and ensuring that their use is scrutinized through the lens of humanity and public conscience rather than being permitted by default due to regulatory gaps (*ibid*).

This understanding aligns with the view expressed by Cassese (2000, p.212), who affirms that the Martens Clause serves as "fundamental guidance in the interpretation of international customary or treaty rules". By requiring that IHL be construed in accordance with overarching standards of humanity and the collective moral conscience, the Clause acts as a defense against arbitrary legal interpretations or the exploitation of legal loopholes. In this way, it reinforces the fundamental underpinnings of IHL, ensuring that emerging issues, such as the rise of AWS, do not erode established humanitarian protections simply because they were not anticipated in earlier legal frameworks.

The Laws of Humanity

The Laws of Humanity, enshrined in the Martens Clause**,** ensure that individuals affected by armed conflict are treated with dignity and respect, regardless of whether explicit legal provisions apply to a given situation. They are interpreted as legal obligations that guide the conduct of warfare, establishing "that human beings must be treated humanely" and functioning as a legal standard against which new technologies are evaluated (HRW & IHRC, 2018, p.19-27).

The debate surrounding the legality of AWS centers on whether these systems can adhere to the fundamental principles of humanity enshrined in IHL – critics argue that AWS inherently lacks the essential human qualities required for the three components within the principles of Humanity: "humane treatment", "respect for human life", and "human dignity". Without human empathy or moral reasoning, AWS would be incapable of understanding the suffering of others, a key factor in ensuring humane treatment on the battlefield, especially when it comes to avoiding "inflicting unnecessary suffering on others" (*ibid*).

Likewise, these Non-Governmental Organisations (NGOs) emphasize that compassion and ethical judgment are uniquely human traits cultivated through shared experiences of "pain and suffering." Robots, being devoid of emotions, would not possess the capacity to exercise moral restraint or to interpret complex, rapidly evolving combat scenarios in a manner consistent with humanitarian principles, they simply would lack or have limited "ability to treat others humanely". Agreeing with Kumaraguru (2020, P.55-56), "the notion of delegating crucial components of the targeting cycle to a weapon further distances humans from the gravity of the decision to exercise force and engage in violence" which in turn "reduces the threshold for violence and warfare".

Another major concern is that LAWS would struggle to comply with the principle of "respect for human life", which requires minimizing unnecessary killings and ensuring that lethal force is used judiciously[1]. Critics highlight that humans possess an innate resistance to killing, which acts as a natural barrier against excessive violence, whereas these weapons lack such a safeguard – without the ability to morally evaluate the consequences of lethal force, AWS may engage in acts that violate IHL, either by failing to distinguish between legitimate military targets and civilians or by applying force in a disproportionate manner. Since AWS cannot truly comprehend the value of human life, their actions could erode the foundational

[1] Also, "fully autonomous weapons would have limited ability to interpret the nuances of human behavior, understand the political, socioeconomic, and environmental dynamics of the situation, and comprehend the humanitarian risks of the use of force in a particular context" (HRW & IHRC, 2018, p.19-27).

humanitarian principles that guide armed conflict (HRW & IHRC, 2018, p.19-27).

Nevertheless, some scholars believe in the development and use of AWS and argue that the principles enshrined in the Martens Clause do not pose a threat to the value of such weapons. Proponents of AWS contend that the questions previously analyzed are based on an overly "pessimistic view of technological progress." AWS could, in fact, be programmed to enhance compliance with IHL rather than undermine it since, unlike human soldiers, AWS could be designed to operate with greater precision and impartiality. By reducing "misidentification of military targets, better detect or calculate collateral damage, or allow for using smaller quanta of force compared to human decision-making", these weapons might limit unnecessary harm more effectively than human combatants. Moreover, their ability to function without emotional impulses could mitigate the risks associated with battlefield misconduct, making them potentially more reliable than human soldiers in adhering to the laws of war (Hickleton, 2019, p.38-40)(Jenks, 2016, p.52).

Supporters further challenge the assumption that respect for human life requires direct human contemplation at every stage of combat – Hickleton (2019, p.54-55) draws a comparison between AWS and traditional methods of warfare, such as artillery strikes, where combatants may not have direct visual contact with their targets. Following this example, the absence of immediate human involvement does not inherently violate IHL, as long as military actions comply with the principles of distinction and proportionality. Additionally, the deployment of AWS would still be overseen by human commanders, ensuring that decisions regarding their use align with legal standards. This perspective suggests that AWS should not be deemed unlawful, on the grounds of the principles of humanity, simply because they lack human consciousness, especially if their actions remain within the framework of IHL.

The Dictates of Public Conscience

The Dictates of Public Conscience operate as an additional legal benchmark within the Martens Clause, emphasizing that the legitimacy of a weapon or military practice is not determined solely by treaty law but also by the broader international consensus regarding its acceptability, *i.e.*, the legitimacy is also done through the broader moral rejection it may elicit from the public, experts, and governments as well. In assessing the term "dictates of public conscience"´s framework, its interpretation and scope play a central role since it necessitates a comprehensive analysis of its underlying components, namely, "two factors: public opinion, and *opinio juris*". (Hickleton, 2019, p. 41-42).

HRW & IHRC (2018, p.3, 28-43) defines this principle as "moral guidelines (…) based on a sense of morality, a knowledge of what is right and wrong". Historically, weapons that have been deemed "abhorrent" or "unacceptable in the modern world" by widespread public sentiment have been subjected to preemptive bans. The Dictates of Public Conscience, in consequence, serve as an interpretative tool in assessing whether a weapon or method of warfare aligns with fundamental legal and humanitarian principles, reinforcing the necessity of state compliance with evolving standards of international law. The increasing global opposition to AWS, argued by proponents of a ban, serves as a substantial legal foundation for their prohibition under international law, and, as it was noted, "while public opposition to fully [AWS] is not universal, collectively, these voices show that it is both widespread and growing". Hence, public opinion surveys, "open letters", and official statements reflect a widespread and growing consensus against the development, production, and deployment of such weapons, more specifically, they share "concerns and spoken in favor of imposing limits" to them.

Furthermore, extensive advocacy from NGOs, experts in disarmament and human rights, as well as "leaders" in "peace and religion, science and technology, and industry" underscores the urgency of regulatory measures. With "Governments from around the world" sharing "the views of experts and the broader public that the development, production, and use of weapons without meaningful human control is unacceptable". On top of that, "as of April 2018, 26 nations" have formally endorsed a preemptive ban on AWS, while more than 100 states have advocated for the establishment of a legally binding international instrument. This substantial diplomatic and legislative progression indicates the crystallization of an emerging norm under *opinion juris*, reinforcing the argument that AWS contravenes fundamental principles of international law, particularly the dictates of public conscience, and should be subject to strict legal constraints (*ibid*).

On the other hand, the reliance on public opinion as a legal determinant has been widely criticized for its lack of consistency and objectivity. Hickleton (2019, p.55-57) challenges the use of surveys and public sentiment as measures of public conscience, arguing that they are highly susceptible to external influence, media narratives, insufficient information, and temporary fluctuations. From a legal standpoint, public opposition alone does not create binding international law unless it is accompanied by consistent state practice and widespread acceptance as *opinio juris*.

Nevertheless, the argument that strong public objections to AWS constitute a legal basis for their prohibition is weakened by methodological apprehensions regarding opinion polls – for instance, research by Horowitz (2016, p.7) demonstrates that public attitudes toward AWS

are context-dependent: when respondents are informed that AWS could enhance military effectiveness and reduce casualties, support for their development increases significantly. This raises serious questions about whether opposition to AWS is deeply rooted in legal principles or merely a reflection of transient public sentiment[2].

Ultimately, the legal debate fundamentally revolves around the question of whether public conscience can serve as a sufficiently robust legal standard to justify the prohibition of AWS under international law. Opponents of this approach argue that public sentiment is ultimately too subjective to form the basis of binding legal norms. They maintain that reliance on public opinion alone risks undermining the stability and predictability of international legal frameworks. Conversely, proponents assert that the sustained and widespread opposition to AWS, demonstrates a discernible and evolving customary norm that supports the restriction or outright prohibition of these weapons (HRW & IHRC, 2018)(Hickleton, 2019).

Accordingly, any analysis of the role of public conscience in the legal regulation of AWS must necessarily be situated within the broader framework established by the Martens Clause. While it may be argued that public conscience alone does not constitute a self-sufficient legal basis for declaring AWS unlawful, its significance cannot be disregarded. Rather, within the wider normative structure of the Clause, public conscience functions as a fundamental element in evaluating whether a weapon aligns with the overarching legal principles governing armed conflict.

Principle of Distinction

Article 48 of Additional Protocol I (AP I) to the Geneva Conventions (1977) defines the principle of distinction as – "(…) *the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives."* – moreover, in articles 51(2) and 52(2) of AP I[3], it is clarified that military operations must focus solely on objectives that serve a direct military purpose, ensuring civilians and their property are not intentionally targeted. Hence, military targets are "limited" to those that, due to their

[2] As stated by Horowitz (2016), "Some NGOs have argued for a ban on autonomous weapons in part due to widespread public opposition. But the bar for claiming to speak for humanity should be high. The evidence presented above demonstrates that support (…) varies based on the scenario and context. (…) More directly, from a policy perspective, these results suggest that it is too early to argue that AWS violate the public conscience provision of the Martens Clause because of public opposition."

[3] Analogously, 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 (CCW Convention, 1980) determines, in its foreword, that the principle of distinction is a foundational aspect of the convention.

"nature, location, purpose, or use", provide a clear advantage to "military action and (…) offers a definite military advantage" (Henckaerts & Doswald-Beck, 2009, p.29-36).Taulbee & Glahn (2022, p.577) highlight that "civilian immunity is based on a very simple principle: Civilians may not be directly targeted because they pose no immediate threat to the adversary."

When examining AWS under this framework, a significant question emerges: can these systems reliably differentiate between combatants and non-combatants? The reliance on algorithms for decision-making in such systems raises doubts about biases and the accuracy of the information used. In discussing the impact of AI in military operations, Rosen (2023) points to the increasing civilian casualties in Gaza as an example, arguing that AI technologies, such as the system known as Gospel, have expedited the generation of target lists, potentially contributing to the rise in civilian deaths. Thus, AI is accelerating the pace of operations and broadening the scope of potential targets, making it more difficult to fulfill "precautionary obligations", which increases the risk of misidentifying and mistakenly targeting civilians.

Algorithmic biases[4] further compound the issue, with research indicating that "facial recognition software is less accurate (…) for people of color, particularly darker-skinned women". Additionally, AI systems may fabricate information or become corrupted, while human errors, such as "confirmation bias or misidentification", can also distort the data. Ultimately, the accuracy of AI-based systems depends on the quality of their algorithms and the data that underpins them. As a consequence, the international community bears the responsibility of establishing standards to ensure that integrating AI into military operations minimizes civilian harm rather than exacerbating it (*ibid*).

Likewise, we must consider Article 50(1) of AP I[5] where it is determined that "(…) In case of doubt whether a person is a civilian, that person shall be considered to be a civilian.". The question becomes whether machines can be programmed to handle uncertainty, particularly in complex environments like battlefields. According to Ford (2017, p.441-443), machines can be equipped with an "ethical governor," a set of programmed rules that restrict their actions within certain boundaries, which might also account for uncertainty, allowing the machine to make decisions based on how confident it is about a situation – if the "system is 100% certain and attacks, or it is less than 100% certain and refrains from attacking".

Still, the legal standard does not require an absolute conviction. Instead, it demands

[4] This bias can be defined as "the application of an algorithm that compounds existing inequities in socioeconomic status, race, ethnic background, religion, gender, disability, or sexual orientation, as explained by Bode (2024), and that can be pondered in three major steps (data, design and development, and use).
[5] Article 52(3) AP I pertains to the same rule when it comes to doubt regarding civilian objects.

"reasonable certainty," a subjective threshold that is much harder to quantify and program into machines. This creates significant problems for AWS operating in “dynamic”, complex environments. These systems work well in clear, predictable settings where targets are easy to identify, although, in disorderly and fast-changing battlefields, distinguishing between civilians and combatants or civilian objects and military targets becomes far more difficult. In such situations, an AWS could fail to comply with legal standards, and if the system cannot reliably distinguish between targets in these contexts, its use would likely be considered “unlawful” (*ibid*)(Schmitt & Widmar, 2014, p.398).

Principle of Proportionality

The principle of proportionality determines the prohibition of “*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*”, *per* articles 51(5)(b) and 57 of AP I[6].

Many States interpret “military advantage” as referring to the overall benefit expected from a “military attack (…) as a whole”, rather than from its individual components. The Commentary on the Additional Protocols clarifies that the term “´concrete and direct´ military advantage” emphasizes that the benefit must be “substantial” and immediate. Correspondingly, it is widely acknowledged that those planning or carrying out attacks must base their decisions on a meticulous assessment of the information available to them at the “relevant time”, a principle commonly associated with Articles 51 to 58 of AP I but also relevant to customary law (Henckaerts & Doswald-Beck, 2009, p.46-50).

Proportionality, as outlined in the U.S. Department of Defense Law of War Manual (2015, p.51), emphasizes that even when an action is justified, it must not be carried out in an “unreasonable or excessive” manner. This principle weighs military necessity against the anticipated harm, requiring that any incidental damage from an attack not be disproportionate to the “military advantage (…) gained”, *i.e.,* proportionality does not demand the complete avoidance of harm but requires restraint where the damage would be excessive. Moreover, “judgments of proportionality often involve difficult and subjective comparisons”, and, beyond its application to “persons conducting attacks”, proportionality assesses whether specific weapons cause “unnecessary suffering” and are prohibited and whether a state's use of force, under *jus ad bellum*, aligns with the “threat it seeks to address”.

[6] Article 3(8)(c) of Additional Protocol II (ICRC, 2010) of the CCW Convention reiterates the principle as well.

On necessity[7] and proportionality, Taulbee & Glahn (2022, p.589) highlight their complexity, which rely on the metric of "reasonableness in context", describing it as an "empty set of scales" on which factors are weighed, warning against inflating the value of military objectives to justify excessive costs. To this extent, the US Law of War Manual (2015, p.371), emphasises a "comparative judgment" which evaluates whether any rational military commander[8], given the same circumstances and available information, would make the same decision – proportionality is described as governing "the means in cases where commanders" deem an action "justified".

Kruply (2024) pertains to this principle in the context of the Russian airstrikes on Kyiv and Kharkiv "on the 23rd of January 2024", suggesting that proportionality assessments hinge on the judgment of a "reasonable" commander. However, questioning arises on whether AI can effectively aid or even replicate this decision-making process and if it can aid in the judgment of "to what degree the conduct of a particular military operation deviates" from that standard. The potential application of AI in such assessments, presents both opportunities and challenges, since AI can assist by alerting commanders to the presence of civilians or by analyzing evidence to assess compliance with IHL – such as identifying the use of prohibited weapons through synthetic data – these capabilities could, in theory, enhance compliance and accountability.

Even so, the author underscores the limitations of AI, particularly its inability to fully encapsulate the subjective and discretionary aspects of proportionality analysis. While AI outputs might indicate how a military operation deviates from a "reasonable" standard, such outputs are approximations that must be interpreted cautiously. This reinforces the view that proportionality remains a fundamentally human judgment, reliant on interdisciplinary expertise from military professionals, lawyers, and investigators.

When considering the integration of AI into the decision-making process of AWS, the issues become even more pronounced since, by design, these weapons function with minimal human oversight, raising questions about how proportionality can be effectively embedded into

[7] Regarding necessity, "the constraint entailed by the principle of necessity introduces the requirement of minimal force, which states that combatants are obliged to use the minimal amount of force to attain a military end. This requirement is crucial for thinking about the use of AWS" (Blanchard & Taddeo, 2022, p.289).

[8] The Final Report to the Prosecutor by the Committee Established to Review the North Atlantic Treaty Organization (NATO) Bombing Campaign Against the Federal Republic of Yugoslavia (2000)(§48 to 50), declared that: "*It is much easier to formulate the principle of proportionality in general terms than it is to apply it to a particular set of circumstances because the comparison is often between unlike quantities and values.*", and that this issue must be resolved "*on a case by case basis, and the answers may differ depending on the background and values of the decision maker. (...) It is suggested that the determination of relative values must be that of the "reasonable military commander".*

their programming. Unlike AI tools used to assist human commanders, AWS might lack the capacity for dynamic judgment and the ability to incorporate evolving contextual information. Kruply´s (2024) analysis suggests that reliance on AI in this domain risks eroding the key human component of proportionality assessments. Thus, while AI can support decision-making, its role should remain auxiliary, ensuring that legal responsibilities are preserved within human control.

Principle of Precaution

The principle of precaution is a fundamental rule that requires all parties to a conflict to exercise "constant care" in their military operations "to spare civilian" life and property. This obligation entails taking all feasible precautions to "avoid" or "minimize incidental loss of civilian life, injury to civilians, and damage to civilian objects". Feasibility, in this context, means precautions that are practical and possible under the circumstances "ruling at the time", taking into account both "military and humanitarian considerations".

This principle is enshrined in Article 57(1) of AP I[9] – Commanders are expected to base their decisions on the best available intelligence "at the relevant time", ensuring attacks are directed only at legitimate military objectives while avoiding harm to civilians as much as possible. In cases where the risk to civilians outweighs the military advantage, commanders must suspend or cancel attacks, reinforcing the principle's emphasis on proportionality and humanity (ICRC, *s.d.*). Considering the ICRC rules to respect this principle, considerations about target verification, choice of means and methods of warfare, assessment of the effects of attacks, control during the execution of attacks, and target selection must be made[10] (Henckaerts & Doswald-Beck, 2009, p.51-67).

When it comes to the potential of AWS to meet or exceed human capabilities, it is important to consider their potential to fulfill the obligations of the principle of precaution. Regarding the mitigation of means, it "is largely about timing and angles", as a consequence, AWS could excel due to their ability to carry and deploy a wide range of weaponry tailored to specific scenarios. Unlike combatants, machines can analyze complex weapon specifications such as "penetrative proficiency, blast radius, duration of effect and surface impact modelling" with precision, enabling better decision-making to minimize collateral damage. This capacity stems from their computational skills and ability to retain intricate data, allowing them to choose less destructive methods when feasible (Winter, 2022, p.18-20).

[9] Protocols II and III also establish this principle (ICRC, 2010) and Amended Protocol II to the CCW.
[10] *See* Article 57, nºs (2) and (3) of AP I.

Considering the role of warnings in precaution[11], AWS could issue more effective and safer warnings to civilians, equipped with technologies like "broadcast systems or loudspeakers", these machines could provide detailed, timely alerts without risking human lives. Moreover, their deployment could make warnings more feasible, as there is no concern about endangering the "attackers" since "there is usually a direct relationship between the level of warning they give to their targets and the level of risk to which they subject themselves". (*ibid*). Similarly, Ford (2017, p.450), explained that "autonomy then raises the possibility that a system could be sophisticated enough to take continual precautions in attack". However, the author did question the time at which precaution should be considered regarding AWS, since it is "continuous in nature" and has relevancy "from the activation of the system to the engagement".

Furthermore, West (2024, p. 6-8) presents that the focus should be on the expression "everything feasible", which means that adequate identification and verification processes must be conducted in a "timely manner to spare the civilian population to the furthest extent possible". The effectiveness of the precautionary principle relies heavily on the ability of parties to gather and analyse information regarding potential targets. To this extent, the availability of advanced "decision-support systems" can enhance this capability, enabling more accurate assessments of "the nature of a target, the military advantage (…) or the anticipated collateral damage". The principle, therefore, obligates states to utilise such technology "where feasible". Likewise, this obligation can encompass the use of AWS in military operations depending on the capabilities of the specific weapon, *i.e.*, if it proves to be more effective "than a human operator", their use is lawful; but, if it is less capable than human decision-makers in making "these assessments", it is unlawful.

In sum, AWS may only be used if they achieve military objectives in a way that minimises collateral damage more effectively than alternative methods. To the author, the responsibility falls to the military commanders, specifically to determine whether an AWS can be lawfully deployed in a given combat situation. Their decision must be based on an "assessment of the complexity of the battlefield, the capabilities and limitations of that particular system; and their obligations under IHL". If an AI system cannot reliably differentiate between combatants and civilians or assess collateral damage and military advantage at least as effectively as human operators, it cannot be used. If a commander deploys

[11] Article 57(2)(c) AP I.

an AI system in violation of these principles, they are responsible for breaching "the core principles of IHL, regardless of whether it results in civilian casualties".

Legal Review of Weapons

The legal review of new weapons, means, and methods of warfare is a decisive mechanism to ensure compliance with international law[12], particularly in light of evolving military technologies. When discussing new methods and means of warfare, we must consider the fundamental rule present in Article 36 of AP I. It 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."*

Thus, the rule establishes a requirement for States to assess the legality of weapons before they are developed, acquired, or deployed. This obligation extends beyond States party to AP I, as it aligns with the fundamental principle that States must not use weapons or methods of warfare that are inherently unlawful or used in a manner that breaches international law. Furthermore, "legal reviews should also be guided by the principles of humanity and the dictates of public conscience, as set out in the Martens Clause" (Geneva Academy, 2014, p. 18).

Article 36 of AP I functions alongside Article 82 of AP I, which requires the presence of legal advisers to guide military commanders on IHL. Together, these provisions aim to guarantee that armed forces conduct hostilities in strict compliance with IHL by systematically reviewing new weaponry and warfare methods. Farther, "it is commonly accepted that the scope (…) is broad and could cover weapons of all types, regardless of lethality". Nonetheless, the review process does not require States to anticipate or assess every possible misuse of a weapon but instead focuses on determining whether its normal or expected use would be prohibited under all or certain conditions. (Boulanin *et al*., 2021, p.9)(ICRC Geneva, 2006, p.933).

After determining the existence of a new weapon, means, and methods of warfare, the reviewprocess involves a two-step approach[13]: first, verifying whether the weapon or method

[12] Article 35(1) of AP I states that "in any armed conflict, the right os the Parties to the conflict to choose methods or means of warfare is not unlimited".

[13] In some States, the last step of the weapons review process is not purely legal but also incorporates national policy considerations. This step, which draws "on the *Martens Clause",* takes into account "domestic policy" that

of warfare is explicitly prohibited or restricted by any treaty or customary rule applicable to the State; and second, if no such prohibition exists, assessing its compliance with general IHL principles applicable to all means and methods of warfare (ICRC Geneva, 2006, p.942-945). When it comes to the weaponary at hand, from the outset there is currently no explicit prohibition on AWS, nor any specific international regulations governing their use in armed conflict (Liu, 2012, p.637).

So, if no clear legal framework is governing the weapon in question, the review must consider overarching humanitarian principles, particularly the Martens Clause**.** The Clause serves, consequently, as a safeguard against legal gaps, a weapon that is not explicitly prohibited but is found to violate fundamental IHL principles may be deemed unlawful under it. In cases where no explicit prohibition exists under treaty or customary law, the Martens Clause provides an overarching legal principle that requires compliance with the principles of humanity and the dictates of public conscience.

Additionally, the review under Article 36 AP I is not merely a procedural formality but a substantive legal requirement aimed at preventing the use of inherently unlawful weapons and imposing restrictions on weapons that, while not *per se* prohibited, may raise problems under certain conditions (ICRC Geneva, 2006, p.934-935) – even so, AWS pose novel obstacles that extend beyond the traditional framework of weapon reviews.

A primary legal criterion under Article 36 of AP I is whether a weapon is inherently indiscriminate. A weapon is considered indiscriminate if it cannot distinguish between lawful military targets and civilians, either due to its design or the nature of its effects, AWS must demonstrate a high level of accuracy and target discrimination to pass legal review. While some AWS may be used effectively in controlled environments, their deployment in complex urban settings where civilians and combatants are intermingled poses significant complications (Geneva Academy, 2014, p. 15). Current AWS rely on pattern recognition, machine learning, and sensor data to identify targets, but the reliability of these systems is not absolute. Algorithmic bias, sensor limitations, and unpredictable battlefield conditions can lead to erroneous targeting decisions, which raises uncertainty about whether AWS can meet the threshold of lawful distinction, moreover, "even in instances where humans ultimately make the final decision to strike", there are still doubts on whether these weapons possess the capabilities to "fulfill the discrimination requirement" – if an AWS is inherently incapable of

reflect the *"principles of humanity* and *the dictates of public conscience*" *(*Copeland *et al*., 2022).

complying with distinction, it would be considered unlawful under Article 36 of AP I (Anderson *et al*., 2014. P.398-406) (Liu, H-Y, 2012, p.640).

Another fundamental aspect is whether a weapon's harmful effects can be controlled. AWS do not inherently fall into this category, but their autonomous nature introduces risks regarding predictability and control, they operate based on predefined programming and adaptive learning models, which can sometimes result in unexpected or unintended actions. Unlike human combatants, who can adapt their judgments to dynamic situations, AWS rely on fixed decision-making frameworks.

If an AWS operates outside of human expectations, resulting in unintended escalation or unintended civilian harm, questions arise about whether its effects can be sufficiently controlled to meet legal standards. In addition, if a weapon system's decision-making processes change during deployment, it becomes increasingly difficult for military commanders to predict its behavior, this raises pressing uncertainty about who is legally responsible if an AWS commits an unlawful attack, complicating the legal review of AWS under Article 36 AP I, in which, if responsibility for AWS actions cannot be clearly attributed, their deployment may contradict fundamental legal principles governing armed conflict (*ibid*).

Despite the absence of directly applicable regulations, legal problems still exist regarding the inherent characteristics of these weapons and the conditions under which they may be used – "the lack of directly applicable regulation does not absolve legal considerations" (Liu, 2012, p.638). Likewise, the ICRC Geneva (2006, p.938) emphasizes that a weapon's legality is not determined "solely" by its "design or intended purpose" but also by how "it is expected" to be deployed in combat. Therefore, even if a weapon is initially deemed lawful or has previously undergone a legal review, its subsequent use could be considered unlawful under certain circumstances.

Unlike conventional weapons, these advanced systems primarily function as intermediary platforms for deploying "existing" weaponry, "which have previously passed legal review". Nonetheless, their introduction fundamentally changes how these weapons are used on the battlefield, and as a result, a new legal review is necessary – one that evaluates these systems comprehensively, considering their impact on the conduct of hostilities and the evolving nature of warfare "from a holistic prespective" (Liu, 2012, p.636).

Lastly, concurring with Copeland *et al.* (2022, p.298-300) and Chavannes *et al.* (2020, p.19), the conventional weapons review process is well-suited for traditional arms, where human operators are legally accountable for their use, still, this metholodogy is insufficient for AWS, which require continuous legal evaluation "throughout their life cycles". Given the

evolving nature of algorithmic decision-making, a one-time assessment before deployment is inadequate. Instead, the review process must be integrated into the "entire design and procurement" phase, ensuring that AWS development aligns with a state's legal obligations, which necessitates an "iterative," "multidisciplinary" review that extends beyond initial approval to ongoing assessments.

Building upon the necessity for continuous legal evaluation, the authors argue that "small operational" modifications to AWS should be assessed through "operational or field legal review that builds upon" prior evaluations conducted before deployment. These reviews must be communicated to the "original reviewing authority" to determine whether a more extensive reassessment is warranted. At last, the review process must account for changes in the AWS's "operating environment" – unlike traditional weapons, where human operators evaluate battlefield conditions, AWS must function autonomously in "complex" and unpredictable settings. It is further asserted that legal reviews should assess both modifications to the system itself and shifts in the conditions under which it operates. Hence, the decision-making processes of AWS must be legally scrutinized to ensure that the programmed assumptions "made by the AWS" adhere to fundamental principles of IHL (*ibid*).

The Martens Clause Precedents in Weapons Regulation and its Implications for AWS

In order to establish a precedent for the application of the Martens Clause to the emergence of new weapons, specifically AWS, it is essential to examine instances where its invocation played a decisive role in legal reasoning. A foundational example is the International Court of Justice's (ICJ) advisory opinion in the Legality of the Threat or Use of Nuclear Weapons case (1996). The decision of the Court, although "not legally binding" universally, in this case is based on the fact that "the authority of precedents is used to convince and compel others, by way of past-based and future-determinative contraints, to follow the same legal reasoning" (Ynfanzón, 2023). Complementing this precedent, the Protocol on Blinding Laser Weapons (1995), constitutes an important normative event in the regulation of inhumane weaponry, wherein the Martens Clause played a central part in framing the legal and humanitarian justifications for a preemptive ban.

ICJ Decision in the Legality of the Threat or Use of Nuclear Weapons Case

As we have seen the Martens Clause plays a paramount role in IHL by ensuring that the protection and the applicability of fundamental legal principles is not limited to what is explicitly codified in treaties. As reaffirmed by the ICJ (1996), this clause has been a fundamental principle since its introduction and it remained relevant in the context of nuclear weapons, specifically in addressing "the rapid evolution of military technology", and ensuring that new and emerging weapons remain subject to humanitarian constraints (§76).

The significance of the Martens Clause lies in its function as a legal safeguard, preventing gaps in the law that might otherwise allow states to justify inhumane methods of warfare – it reinforces the idea that fundamental humanitarian principles apply universally, irrespective of whether a specific treaty explicitly prohibits a certain weapon (§79). In the context of nuclear weapons, the ICJ emphasised that their indiscriminate effects and capacity to cause unnecessary suffering place them within the scope of IHL, despite the absence of an outright prohibition. By invoking the Clause, the Court affirmed that the legality of nuclear weapons cannot be determined only by written treaties but must be assessed through customary international law and fundamental humanitarian principles too**.**

Moreover, as determined in paragraph 85, although "doubts in this respect have sometimes been voiced on the ground that these principles and rules had evolved prior to the invention of nuclear weapons", the ICJ determined that "such views (…) are only held by a small minority. (…) there can be no doubt as to the applicability of humanitarian law to nuclear weapons". The Court's reliance on the Martens Clause reinforces its status as a binding customary norm, applicable to all states regardless of their treaty obligations This is particularly important because nuclear-armed states have often resisted specific legal constraints on their arsenals – in this contexto, the Clause ensures that nuclear weapons cannot escape legal scrutiny simply because they were developed after the foundational laws of war were established**.**

Furthermore, the Clause serves as a bridge between customary law and the advancing nature of warfare, ensuring that the "cardinal principles" of distinction and proportionality continue to apply, even as military technology advances. The ICJ explicitly referred to the Clause in concluding that any weapon that fails to distinguish between civilians and combatants or that causes superfluous suffering violates international law – "if an envisaged use of weapons would not meet the requirements of humanitarian law, a threat to engage in such use would also be contrary to that law" (§78).

Ultimately, the Martens Clause embodies the fundamental legal foundation, emphasising that the laws of war are not static but evolve to meet contemporary needs. By reaffirming this principle, the ICJ underscored that nuclear weapons, despite their unique characteristics, must still be evaluated within the framework of IHL, humanitarian principles, and the expectations of the international community – "the Court points to the Martens Clause, whose continuing existence and applicability is not to be doubted, as an affirmation that the principles and rules of humanitarian law apply to nuclear weapons" (§87).

As a result, it can be reasoned that, just as nuclear weapons posed unprecedented dilemmas at the time of their development, analogously, AWS represent a new frontier in military technology, raising profound legal uncertainty. The Court's reasoning in the nuclear weapons case, demonstrates that emerging technologies cannot escape legal scrutiny merely because they were not specifically contemplated by earlier treaties**,** it clarified that these fundamental rules of armed conflict apply universally, extending to all forms of warfare and all categories of weapons, whether historical, contemporary, or future developments in military technology (§86).

The Court's assertion that the fundamental principles of IHL must be observed by all States, whether or not they have ratified relevant treaties, reinforces the notion that AWS, like nuclear weapons, must be evaluated through existing legal frameworks and the broader lens of customary international law and the dictates of public conscience. Furthermore, the ICJ's recognition of the Martens Clause as a safeguard against legal gaps is particularly relevant to AWS – it can be argued that, similarly to the Court´s argument that nuclear weapons, due to their indiscriminate effects and capacity to cause unnecessary suffering, fall within the scope of IHL, the same reasoning applies to AWS, which risk operating without meaningful human oversight and in ways that could violate fundamental IHL principles. The ICJ's reliance on the Clause as a binding customary norm applicable to all states suggests, likewise, that even in the absence of a comprehensive treaty governing AWS, they must still conform to established humanitarian protections**.**

And so, by extending this precedent, the Clause provides a legal foundation for restricting or prohibiting AWS where their deployment would be incompatible with fundamental humanitarian norms, reinforcing that international law must evolve in response to the rapid progression of warfare technologies. In addition, States are increasingly likely to integrate such systems into warfare, highlighting the necessity to develop a dedicated

international legal instrument[14] to regulate both existing and future AWS in compliance with IHL **(**Perišić & Tomljenović, 2024, p.534-535).

Protocol on Blinding Laser Weapons

A notable example of the applicability and legal significance of the Martens Clause in the regulation of weaponry is found in the Protocol on Blinding Laser Weapons (Protocol IV to the 1980 Convention on Certain Conventional Weapons). As emphasized by HRW (1995), the clause is particularly relevant in situations not explicitly regulated by "international agreements," ensuring that "both civilians and combatants remain" protected under the principles of international law – these principles stem from "established custom, from the principles of humanity, and from the dictates of public conscience".

The organization argued that the Martens Clause, recognized as a customary rule and supported by precedent from the 1925 Gas Protocol[15], serves as a fundamental legal framework for assessing the lawfulness of any weapon or method of warfare that may contravene the laws of humanity and public conscience. During discussions on the prohibition of blinding laser weapons, the majority of participating experts concurred that such weapons and "methods of warfare", which "cause" irreversible "blindness," were incompatible with "established custom, humanity, and public conscience" (HRW, 1995).

Building upon this precedent, HRW & IHRC (2015, p.1-18) contended that the ban on blinding lasers serves as a influental reference point for the preemptive prohibition of AWS. Specifically, they highlighted the significance of the Martens Clause in assessing the legality of emerging weapons technologies and ensuring that new means of warfare comply with international legal standards – the Memorandum, in general, argued that "the fact that the blinding lasers discussions led to a legally binding protocol shows that the principles of humanity and dictates of public conscience enshrined in the Martens Clause can be used as a justification for a preemptive ban of a new weapon".

[14] The Treaty on the Prohibition of Nuclear Weapons (TPNW)**,** adopted in July 2017, establishes a comprehensive ban on nuclear weapons, prohibiting their development, transfer, acquisition, and use, as set forth in Article 1. This treaty exemplifies the relevance of the Martens Clause in the regulation of weapons, as its Preamble repeatedly references this principle. Notably, it underscores that any deployment of such weapons would be fundamentally incompatible with **"**the principles of humanity and the dictates of public conscience". The treaty serves as evidence of the impact of the Martens Clause**,** illustrating how it has influenced the legal framework governing nuclear weapons, it reflects a process in which the Clause was applied prior to the establishment of specific regulations, guiding the formulation of legal prohibitions and contributing to the normative foundation upon which the treaty was developed.

[15] The reference to the Clause in this Protocol can be found in §1 and §3 of the Preamble.

In their work, the organisations provided a detailed legal analysis advocating for a preemptive ban on fully AWS, arguing that the application of IHL, particularly through the Martens Clause, provides a strong legal foundation for banning new categories of weaponry – the memorandum asserts that just as blinding lasers were prohibited before their widespread deployment due to their inherent inhumanity and indiscriminate nature, AWS should likewise be preemptively banned before they become operational and embedded in military arsenals.

A key aspect of the legal argument presented is that the Martens Clause establishes a standard whereby new weapons systems must be evaluated based on their compatibility with the principles of distinction, proportionality, and the avoidance of unnecessary suffering. These weapons, by their very nature, lack the human judgment necessary to comply with these foundational principles - such weapons would select and engage targets without meaningful human control, raising queries about compliance with IHL norms. The absence of human oversight in decision-making during armed conflict creates a fundamental legal quandary, particularly regarding the ability of AWS to assess complex battlefield situations, distinguish between combatants and civilians, and determine proportional responses to military threats.

The memorandum draws a direct comparison between the legal arguments used to prohibit blinding lasers and those now being made against AWS by examining the legal and diplomatic process that led to the adoption of the Protocol, which prohibited the use of laser weapons designed to cause permanent blindness. At that time, "states, international organisations, and civil society" argued that blinding lasers were inhumane and posed unacceptable risks to both combatants and civilians saying it "raised concerns under the principles of humanity and dictates of public conscience".

Lastly, it was noted that the prohibition was based on both humanitarian and legal considerations, particularly referring that the use of blinding lasers would violate the prohibition on weapons that cause unnecessary suffering. The preemptive nature of the ban is particularly relevant, as it demonstrates that states have previously acted to prohibit a weapon before it became widely used, based on legal principles rather than battlefield necessity. Importantly, while the problems of the two weapons may differ,[16] the Protocol on Blinding Lasers reveals, firstly, "the importance of the clause in addressing emerging weapons, but also that "tensions with the principles of humanity and dictates of public conscience (…) can help drive the adoption of a preemptive ban" (*ibid*).

[16] As Bruun (2024) defends, in a suggestion of a "two-tiered approach" for prohibitons and restrictions of AWS, States should consider the "history of arms control", even if the various instruments "differ in legal status", in order to better situate the regulation discussion.

AWS in Contemporary Armed Conflicts: Legal Inferences from Libya and Ukraine

The regulation of AWS is a pressing issue, the ongoing debate over these weapons underscores the importance of examining concrete instances of their use to assess how AWS function in real-world scenarios and explore the legal questions they raise[17]. To that end, we will focus on two key examples: the deployment of the Kargu-2 in the Civil War in Libya and the use of Swarmer Drones in the Russia-Ukraine conflict.

Kargu-2 – Loitering Munitions

As explained by Bode & Watts (2023, p.3, 21), loitering munitions are those weapons that "are expendable uncrewed aircraft which can integrate sensor-based analysis to hover over, detect, and crash into targets" and "can vary significantly in their size, weight, and technological sophistication". Loitering munitions, "unlike drones", function as a hybrid between surveillance unmanned aerial vehicles (UAVs) and precision-guided missiles, designed to autonomously "identify, track, and engage" targets "beyond-visual-range." Equipped with "explosive warheads" of varying payloads, they hover or patrol over a designated area before identifying and striking targets upon detection. Many loitering munitions incorporate automated processes, while more advanced models feature increasing levels of autonomy in "navigation, target detection, [and] tracking", some systems even extend autonomy to engagement, enabling them to strike designated targets with minimal human oversight (Ancona, 2024).

Among the most well-known examples is the Turkish Savunma Teknolojileri Mühendislik (STM) Kargu-2, a "small quadcopter, with a range of 10 km" and an operational flight time of 30 minutes, which integrates "GPS guidance, electro-optical and infrared sensors with image processing" capabilities to identify and pursue targets with "varying degrees" of autonomy. In addition, it is reportedly "designed to be an anti-personnel weapon" and equipped

[17] Although this analysis will not explore the Nagorno-Karabakh conflict in detail, the events of the September 2020 war remain particularly relevant for understanding the trajectory of modern warfare and the role of AWS. This 44-day confrontation provided "a view of future warfare" (Rashid, 2021, p. 64), where traditional and conventional military hardware proved vulnerable to "high-altitude", precision-strike "drone technologies". Azerbaijan's strategic use of Turkish Bayraktar TB2 drones, in coordination with electronic warfare systems, allowed for pre-emptive strikes on Armenian positions, often before Armenian forces understood what was targeting them. Additionally, Israel-manufactured HALE-class UCAVs played a singificant part in intelligence gathering and the neutralisation of Armenian defences. As noted "combat has started to create general [AI] automated with the consciousness and realization of war tactics and strategies," raising profound issues about the future deployment of systems capable of making independent targeting decisions with destructive intent.

with an “automatic target recognition system” utilizing “machine learning” for object identification (*ibid*)(Nasu, 2021).

The use of loitering munitions in the Libyan Civil War (2014-2020) marked a significant development in modern conflict, particularly with the deployment of the STM Kargu-2 during Libya’s Operation PEACE STORM in March 2020. From 2019 onwards, with “external military support”, as the war reached its later stages, the Government of National Accord, supported by Turkey, utilized these AWS against the Libyan National Army, which was backed by Russia (Bode & Watts, 2023).

Initiated by the Government of National Accord Armed Forces (GNA-AF), the offensive leveraged cutting-edge military technologies were used to counter the “mid-20th-century” weaponry of the Haftar Armed Forces (HAF). Notably, AWS, such as the STM Kargu-2, were employed to identify and engage targets without direct human control, utilizing a “´fire, forget, and find´ capability”. These AWS, proved to be a “force multiplier”, effectively neutralizing HAF defenses and leading to significant losses (ICRC, *s.d.*)(Vincent, 2021).

The events in Libya illustrate the growing reliance on AWS in contemporary conflicts, since its introduction in the conflict “was a decisive element in the often unseen, and certainly uneven, war of attrition that resulted in the defeat of HAF in western Libya during 2020”. In 2021, a UN Panel of Experts on Libya (UN Security Council, 2021, p.17) published a report highlighting the alleged use of the Kargu-2 in autonomous attacks, categorizing it as AWS, the report described how retreating HAF forces were "hunted down and remotely engaged" by the Kargu-2 and other loitering munitions. The claim that this was the first instance of a loitering munition autonomously targeting military personnel generated widespread debate over the role of AI-driven sensor-based targeting in modern warfare.

The controversy surrounding the Kargu-2 deepened due to conflicting statements from its manufacturer, STM. Prior to the UN report, STM promoted the Kargu-2 as a system equipped with “both autonomous and manual modes,” capable of "real-time image processing" and “deep learning algorithms” for target recognition. After, STM rebranded the Kargu-2 as operating strictly within "human-in-the-loop" principles, stating that "each mission is performed under the complete control of the human operators, limiting the platform’s autonomy to navigational purposes only." Despite this reframing, the Kargu-2 is still marketed as utilizing an "Automatic Target Recognition System," though its “technical specifications” remain vague.

Nevertheless, reports from 2020 indicated that the Kargu-2's “deep learning algorithms” allowed it to "locate, track, and identify targets without human assistance," leading

to questions about whether the shift in STM's language was a response to legal doubts and not a genuine alteration of the system's capabilities (Bode & Watts, 2023, p.43-46).

Thus, the deployment of loitering munitions like the Kargu-2 in Libya raises essential legal issues, particularly due to the lack of clear documentation regarding their operational mode and consequences. The 2021 UN report (p.17) does not explicitly confirm whether the Kargu-2's strikes resulted in human casualties, though it describes "continual harassment from the unmanned combat aerial vehicles and [LAWS]" as a "highly effective combination in defeating" enemy defenses and acknowledges that there were "significant casualties". The report states, as well, that these weapons were "programmed to attack targets without requiring data connectivity between the operator and the munition," suggesting a technical capability for autonomous targeting and attacking. However, whether the Kargu-2 was actually used in full autonomy remains uncertain, as STM, its manufacturer, has publicly denied that it conducted "autonomous" strikes in Libya.

Additionally, the increasing use of loitering munitions underscores apprehension about the potential for indiscriminate effects, particularly as these systems gain greater range and operational flexibility. While the Kargu-2 was not reported to have been used in densely "populated areas", it is designed to engage "an expanding number of targets", including vehicles, aircraft, and radar systems. Its operational and range capabilities suggest that any object or personnel within this radius could be targeted, raising alarms about proportionality and the potential for unintended harm. The system can be equipped with thermobaric warheads, which, while not confirmed to have been used in Libya, present serious concerns due to their capacity for wide-area destruction due to the "blast radius." Finally, the shifting language in STM's marketing of the Kargu-2, from emphasizing autonomy before 2021 to highlighting "human-in-the-loop" control afterward, demonstrates how regulatory scrutiny can influence how AWS capabilities are portrayed rather than how they are actually used (*ibid*)(Bode & Watts, 2023)**.**

Applying the legal framework established in this study reveals significant legal implications in the context of AWS, such as loitering munitions, extending beyond the specific case of the Kargu-2. Although these systems are frequently characterized as an intermediary category between drones and precision-guided munitions, they nonetheless give rise to substantial legal qualms under the principles of IHL and the Martens Clause.

A major issue surrounding loitering munitions is the potential for automation bias – given that certain loitering munitions can identify and attack targets without direct human intervention, there is a real risk that human oversight may become a mere formality rather than

a substantive safeguard against erroneous or unlawful attacks, further, "human operators may lack the sufficient situational awareness to doubt the platforms' suggested targets." The lack of legally binding international rules regulating "autonomy in weapon systems" exacerbates this concern, as states and armed forces may be inclined to exploit these "latent capabilities" to gain tactical advantages. The case of the Kargu-2 exemplifies this issue, as its manufacturer, STM, shifted its characterization of the system's autonomy following the UN report, raising questions about the true extent of human control in its operations[18] (*ibid*).

Another concern is the expanding role of loitering munitions in targeting both objects and personnel, including in urban and "populated areas"[19]. Initially designed to locate and "destroy radar systems", modern loitering munitions have been adapted to target a broader range of military and dual-use objects. More critically, a significant number of these systems now include explicit "anti-personnel target profiles", increasing the risk of unlawful attacks against "civilians and civilian objects" – in the case of the Kargu-2, the UN Security Council (2021) stated that retreating forces were "hunted down and remotely engaged," farther illustrating the risks posed by AWS in dynamic combat situations. Reports, according to Bode & Watts (2023), indicate that a considerable portion of loitering munitions are designed for use in populated environments, which raises serious questions about compliance with the IHL principles, specifically, the principle of distinction and the "principles of humanity". The ability of these systems to autonomously select and attack targets over an extended period complicates efforts to ensure legal adherence.

Consequently, the evolving trajectory of loitering munitions, particularly demonstrated through the Kargu-2 in the Libya Civil War, underlines the "urgent need" for a legally binding international framework to regulate design, deployment, and use of AWS. Without decisive action, the continued proliferation and operational deployment of loitering munitions could lead to significant legal and humanitarian consequences – "as the case of loitering munitions demonstrates, current practices can also show what is problematic about autonomous technologies in warfare and what should, therefore, be expressly prohibited, regulated, governed, or steered" (*ibid*).

[18] The authors explain that "the uncertainty concerning how human control is exercised over these systems extends to what is knowable about loitering munitions based on open-source data. Much of the available information on the technological capabilities of such systems is drawn from a limited array of sources, often associated with the manufacturers of these weapons.

[19]The "spatial and temporal distance" between human decision-makers and "the exercise of deliberative judgment from use of force" is expanding, as well, due to the enhanced range of loitering munitions (Bode & Watts, 2023).

Drone Swarms – Ukraine-Russia Conflict

Swarming, as defined by Álvarez (2024), "is a longstanding military tactic whereby several units converge and attack a specific target in a structured and coordinated manner". When applied to drones, it refers "to large groups of AWS that can share information amongst each other, synchronize, and carry out their shared objectives". Similarly, as described by Ekelhof & Paoli (2020, p.21-29), swarming denotes the use of decentralized, often biologically inspired, algorithms to enable large numbers of autonomous units to act in concert without centralized control.

While most sources agree that AI-enabled networking is a core feature, they diverge in how they describe the extent of autonomy and agency involved – Mozur & Satariano (2024), Volpicelli *et al.* (2024), and Kirichenko (2024) emphasize battlefield functionality and the role of human oversight, often describing human "in-the-loop" models, in contrast, others, such as Álvarez (2024) and Article 36 (2019, p.3-4), consider full autonomy (*i.e.*, "human-off-the-loop") systems as both imminent and conceptually integral to understanding drone swarms as a new category of AWS. Subsequently, the increasing operational role of drone swarms in modern combat is acknowledged, with their uses including reconnaissance, target acquisition, suppression of enemy defenses, and precision strikes.

Following the Drone swarms used and developed in Ukraine[20], Mozur & Satariano (2024), Volpicelli *et al.* (2024), Kirichenko (2024), and the Economic Times (2024) have described how the development and deployment of drone swarms in targeting and striking configurations have given Ukraine an edge in the conflict, with systems like Swarmer´s Styx[21] helping Ukraine gain a tactical advantage, since these swarms confer both offensive and defensive roles, often compensating for conventional resource asymmetries[22].

The deployment of drone swarms, especially with increasing autonomy, has significant implications for compliance with IHL principles, as Álvarez (2024) argues, highly scalable swarms may become inherently "indiscriminate and disproportionate". Once the number of units in a swarm exceeds human cognitive control, any attempt at target verification becomes

[20] "Drones with autonomous capabilities and AI-enabled munitions are already being used on the battlefield, notably in the Russia-Ukraine War" (Rosen, 2023).
[21] As Kirichenko (2024) describes "One company, Swarmer, is building software to network drones, allowing decisions to be executed instantly across a swarm with minimal human input (…) Swarmer's AI system, Styx, coordinates a mix of reconnaissance and strike drones that operate both in the air and on the ground. Each drone can plan its own actions while anticipating the behavior of others in the swarm".
[22] As maintained by Kirichenko, D. (2024), "Ukraine's leaders understand that defeating Russia in a traditional war of attrition is unlikely; instead, they are harnessing agility and technological innovation".

unreliable, raising the risk of unlawful attacks on civilian objects. Swarmer's system[23], although retaining human oversight, illustrates the proximity to "human-off-the-loop" autonomy.

The AI's capacity to process vast volumes of sensor data and coordinate multi-drone missions increases the efficiency of operations and exacerbates the accountability gap – "Absence of human control over the system's decision-making processes to select, engage and use lethal force, challenges the allocation of responsibility since a machine cannot be held liable". If a swarm conducts an unlawful attack, existing doctrines of command responsibility may be ill-suited to determine liability, particularly if no individual directly initiated or authorised the specific conduct. Additionally, as noted by Ekelhof & Paoli (2020, p.57) and Article 36 (2019, p.5), such systems may fail weapons reviews under Article 36 of AP I due to unpredictability, algorithmic opacity, and the potential for misuse.

The Ukrainian battlefield has become the most prominent testing ground for drone swarms. Swarmer's operational trials of the Styx system demonstrate the practical feasibility of AI-enabled swarm behaviour. Ukrainian sources confirm the use of coordinated drone assaults, particularly during engagements in Chasiv Yar and Zaporizhzhia (Kirichenko, 2024), these operations include core drones targeting military infrastructure while secondary units suppress air defence systems, achieving tactical coordination typically unmanageable for human pilots alone.

Other real-world cases reinforce the relevance of the swarm paradigm – Israel's deployment of drone swarms in Gaza in 2021[24], and the earlier U.S. Perdix tests, are often cited as historical precedents (Ekelhof & Paoli, 2020, p.50)(Alvárez, 2024). Still, Ukraine marks the first instance where swarms are used at scale in a high-intensity international armed conflict, with live data feedback loops accelerating both technical development and doctrinal adaptation – "Dubbed the "first full-scale drone war," the Russia-Ukraine War marks an inflection point (…) While autonomous drones reportedly have been used in Libya and Gaza, the war in Ukraine represents an acceleration of the integration of this technology into conventional military operations" (Rosen, 2023).

Drone swarms, in addition, play an important role in reshaping the global arms industry, since the proliferation of dual-use technologies, low production costs, and modular AI software

[23] *See* The Economic Times, 2024; Volpicelli *et al.,* 2024; Kirichenko, 2024.
[24] "Israel became the first country to openly deploy a drone swarm that gathered intelligence on the geographical position of Hamas militants and relayed this information to ground-based missiles to strike targets located miles away" (Alvaréz, 2024).

has enabled rapid innovation. Ukraine's Brave1 initiative, a government-backed accelerator for defence technologies, exemplifies the integration of civilian tech sectors into military development (Volpicelli *et al*., 2024). Companies such as Swarmer are not only field-testing AWS but also attracting foreign investment, thereby accelerating commercial militarisation[25].

While this innovation provides Ukraine with a strategic edge, it simultaneously raises disarmament and non-proliferation problems – Ekelhof & Paoli (2020, p.7) and Article 36 (2019, p.4) warn of a potential arms race driven by swarm technology, exacerbated by the absence of binding regulatory instruments under the CCW Convention and the need of nations to "reaffirm the central values enshrined in existing law and actively seek to clarify the legal and ethical boundaries in swarm development", in order to "to prevent [them] from eroding long-standing legal protections".

The case of the drone swarms in Ukraine illustrates the evolving reality of AWS in modern armed conflict, their deployment implicates core IHL principles, stretches the limits of accountability, and accelerates a global trend toward the commercial militarisation of AI – as such, they exemplify the urgent need for a binding international framework governing AWS, including drone swarms, to ensure compliance with humanitarian norms and prevent the normalization of legally hazardous technologies.

The International Debate on a Regulatory Framework for AWS

When addressing both the role of the Martens Clause in the governance of AWS and the broader regulatory framework applicable to such technologies, it is essential to consider the ongoing discourse within the international community as well. To that end, particular attention must be paid to the positions adopted at the international, regional, and civil levels concerning the regulation or prohibition of AWS.

The European Parliament's 2018 Resolution (2018/2752) is among the few institutional documents to explicitly refer to the Martens Clause, it recalls that the Clause, as enshrined in AP I, must guide the implementation of IHL and International Human Rights Law (IHRL) when it comes to AWS. The Parliament stressed that "compliance with international law is a key requirement" and called attention to the legal vacuum that may arise with AWS – by linking the Martens Clause to the protection of civilian populations and the ethical implications of dehumanized warfare, the resolution reinforced its role as a minimum humanitarian safeguard

[25] In the words of Mozur & Satariano (2024), "The pressure to outthink the enemy, along with huge flows of investment, donations and government contracts, has turned Ukraine into a Silicon Valley for autonomous drones and other weaponry."

in the face of uncertainty (§H. and §I.).

The Guiding Principles affirmed by the GGE (2019), solidify the foundational role of international law, in the evolving regulation of AWS. The GGE reaffirmed that "international humanitarian law continues to apply fully to all weapons systems" (principle (a)), underscoring that technological novelty does not exempt new means of warfare from established legal obligations. Importantly, the principles stress that the continued work of the GGE must be guided not only by IHL and the UN Charter, but also by "relevant ethical perspectives", an implicit recognition of the normative underpinnings of the Martens Clause, which links legality to both the principles of humanity and the dictates of public conscience.

The Guiding Principles introduce key operational dimensions to this normative framework as well. Principle (e) reaffirms the obligation of States to conduct weapons reviews, requiring an *ex ante* legal determination of whether a new weapon or method of warfare would, under any circumstance, "be prohibited by international law". This provision implicitly integrates the Martens Clause by calling for a substantive, good-faith evaluation of weapons' effects against the broader legal framework of IHL. Principle (h) reinforces this view by urging States to consider whether emerging technologies in AWS can be employed in a way that upholds "compliance with IHL and other applicable international legal obligations".

In its report, the European Parliament (2021) goes further in legally anchoring the Martens Clause within the discussion on military AI, declaring that any international framework must "never breach, or permit breaches of, the dictates of public conscience and humanity as stated in the Martens Clause." The report affirms that compliance with IHL is the minimum admissibility standard for AI-enabled systems and explicitly prohibits the design and production of systems that violate this threshold. Accordingly, the Foreign Affairs Committee´s Opinion (2020) underscores the non-derogable nature of the Martens Clause since it calls on the international community to ensure that military AI "must, as provided for in the Martens Clause, abide by the public conscience and humanity," "in particular," and that no authority may lawfully derogate from these principles.

The Council of Europe's Parliamentary Assembly (2022) presents a deeply normative and rights-based critique of LAWS, clearly linking their potential deployment to the erosion of human dignity and legal protection[26]. The report emphasizes that these weapons "raise a fundamental issue of human dignity – allowing machines to 'decide' to kill a human being". In

[26] As §4 of the document presented, the imperative in such a position is based on "`the arms race´logic" which suggests "to see LAWS as the third military revolution in the history of international relations, after the invention of gunpowder and that of nuclear weapons".

legal terms, it reiterates that the conformity of LAWS with both IHL and IHRL hinges on the ability to uphold essential legal principles such as distinction, proportionality, and precaution, and the right to life (Article 2 of the European Convention on Human Rights – ECHR)[27]. Importantly, it invokes the Martens Clause explicitly, asserting that, "even in the absence of an explicit prohibition," the “laws of humanity and the dictates of public conscience” must be respected.

In its 2022 policy summary on autonomy, NATO affiliates itself with the 2019 CCW Guiding Principles, affirming that IHL “continues to apply fully to all weapons systems, including the potential development and use of LAWS”. While NATO does not explicitly reference the Martens Clause, its endorsement of the principles of “lawfulness, responsibility, explainability”, and “bias mitigation” in the development of AWS indirectly supports the Clause’s normative core. NATO’s approach supports a regulatory framework that, while technologically grounded, implicitly draws from the safeguards enshrined in the Martens Clause.

The UN General Assembly (UNGA)(2023) Resolution 78/241, adopted on 22 December, represents a decisive step in the international community’s response to the growing difficulties posed by LAWS. Although the resolution does not explicitly invoke the Martens Clause, its content strongly aligns with the clause’s normative function by reaffirming that “international law, in particular the Charter of the United Nations, [IHL] and [IHRL], applies to [AWS] .” This broad reaffirmation is particularly relevant in the context of the Martens Clause, which serves as a legal safeguard where positive law may be underdeveloped or technologically outpaced.

In the submission to the UN Secretary-General, the European Union’s (EU) (2024) unequivocally stresses that compliance with IHL and ethical principles must be central to any future regulatory instrument on LAWS[28]. It underscores that "those who plan, decide upon and carry out an attack using a [LAWS] must (...) preserve human beings’ ability to make these necessary legal judgments”.

Furthermore, the ICRC’s (2024) submission explicitly affirms the centrality of the Martens Clause in the legal assessment of AWS, calling for the preamble of any legally binding instrument to reaffirm that civilians and combatants remain protected by the principles of humanity and the dictates of public conscience when no specific legal provision applies. The

[27] With the regulation of “development and above all use (…)” being “indispensable”.
[28] “The EU considers it imperative that we collectively address these challenges by establishing principles, international norms and regulations to ensure the responsible use of such technologies” (EU, 2024).

ICRC emphasizes that the Clause "provides a link between ethical considerations and IHL", making it especially relevant for AWS, which test the ethical boundaries of lawful warfare. The ICRC also recommends that Article 36 reviews must incorporate Martens Clause standards as part of a good-faith compliance check with customary and treaty law.

Likewise, the HRW submission (2024) directly invokes the Martens Clause as the legal foundation for a prohibition on AWS. HRW contends that this weaponry "would contravene basic principles of humanity and the dictates of public conscience established by the Martens Clause", noting that machines, as "inanimate object", lack compassion and moral agency necessary for compliance with IHL. The organization views the removal of human control from the decision to use lethal force as a moral red line and argues that such delegation not only erodes human dignity but also violates established customary law.

In its background paper, the Chair of the GGE on Emerging Technologies in the Area of LAWS (2024), reaffirmed that IHL fully applies to the development and deployment of these weapons (§1. and §4.), identifying two primary branches of IHL that are particularly relevant, "weapons law" and "targeting law" (§8). The paper emphasizes the continued relevance of the Martens Clause (§9), grounded in the principles of humanity and the dictates of public conscience, as a normative safeguard for situations not explicitly covered by existing treaties, such as the deployment of LAWS. Accordingly, even in the absence of specific treaty provisions, LAWS must adhere to customary international law, ensuring that "civilians and combatants" are protected under these overarching legal principles[29].

In the Chair's Summary of the Second 2024 Session of the GGE on LAWS, during deliberations on the preliminary considerations and the application of IHL, it was noted a a "significant convergence among views" on the importance of grounding AWS governance within established legal norms. Although discussions featured technical divergences, several "delegations" explicitly called for the incorporation of "a Martens Clause provision" into "the rolling text" (§17). This proposal reflects a growing recognition that the Clause is not a peripheral or symbolic principle, but a normative safeguard essential for addressing legal gaps that arise in the face of rapidly evolving weapons technologies.

Lastly, the Report of the Secretary-General (2024) on LAWS (A/79/88) underscores the importance of the Martens Clause in the international debate on the legal governance of AWS, with the report noting that "several States stressed the importance of the Martens Clause

[29] *See* "the principles of humanity" and the "dictates of the public conscience" and the "Conclusions of the GGE on LAWS regarding how existing IHL applies to LAWS" sections.

and expressed the view that the use of [LAWS] without human control would likely violate it" (§27). This statement illustrates a shared concern that the deployment of AWS, especially those capable of selecting and engaging targets independently, may fall outside the scope of existing treaty law and require recourse to customary international principles grounded in humanity and the dictates of public conscience[30].

The Martens Clause serves, in this context, as a normative anchor when assessing the acceptability of emerging technologies that challenge the traditional paradigms of warfare. In line with this reasoning, States such as Austria (p.24), emphasized that AWS's capability of producing effects that are not "explainable, predictable, or controllable are unacceptable" and unlawful, arguing that AWS which "select and engage persons as targets in a manner that violates the dignity and worth of the human person, as well as the principles of humanity or the dictates of public conscience, are unacceptable and must be prohibited." This position finds additional support in the Chair's Summary of the Vienna Conference on AWS (2024, p.26), which stated that "the Martens Clause in IHL recognizes that the law can develop in relation to societal concerns and the dictates of public conscience and is, thus, of particular relevance to the AWS issue".

Other States similarly echoed this interpretation, for instance, the "Communiqué of the Latin American and Caribbean Conference on the Social and Humanitarian Impact of Autonomous Weapons" (p.20), called for "new prohibitions and regulations" on AWS grounded not only in the principles of distinction, necessity, and proportionality, but also in the "principles of humanity and the dictates of public conscience". In contrast, a minority of States, most notably the Russian Federation (p.94), challenged this approach, asserting that the principles of humanity and public conscience "cannot be used as the absolute and sole sufficient condition for imposing limitations and restrictions on certain types of weapons".

Nonetheless, the widespread invocation of the Martens Clause across diverse legal traditions and regional blocs, coupled with calls from the UN Secretary-General, the ICRC, and various UN Special Rapporteurs to conclude a legally binding instrument by 2026 (§92, p.18), highlights a growing normative consensus: that human control, legal accountability, and the preservation of human dignity must remain central to any future regulatory framework governing AWS. In this light, the Martens Clause emerges not merely as a residual clause of last resort but as a dynamic legal principle guiding the ethical boundaries of permissible

[30] *Per* §69, "several states called for negotiations on a legally binding instrument (…) in order (…) to fill lacunae in international law".

autonomy in warfare. Be that as it may, while the creation of a regulatory framework for these weapons, already deployed in ongoing conflicts and driving significant technological and economic incentives, might appear feasible in theory, it is unlikely to offer a sustainable or comprehensive solution. Although it is possible that a superficial or limited set of rules may be adopted, the rapid pace at which such weapons are being developed and upgraded significantly undermines the prospect of effectively addressing their proliferation or instituting a legally enforceable ban.

Conclusion

This dissertation set out to examine the legal significance of the Martens Clause in the context of AWS, with a view to assessing its normative function within IHL amidst emerging technological developments. The research demonstrates that, although the Clause does not constitute a standalone legal prohibition, it remains a vital interpretative and normative instrument – especially in scenarios not explicitly regulated by treaty law. In particular, the study reinforces the Clause's role in setting legal assessments to the principles of humanity and the dictates of public conscience, thereby safeguarding the integrity of IHL when confronted with unprecedented dilemmas such as autonomous warfare.

An important contribution of this work lies in the systematization of legal arguments that elevate the Martens Clause beyond its traditional symbolic status, placing it at the core of legal reasoning concerning the regulation of AWS. Consequently, the research offers a nuanced evaluation of how this Clause may influence weapons reviews, contributing to a more comprehensive understanding of how legal compliance assessments can be adapted to evolving technological realities. In addition, the analysis brings an exploratory dimension of legal precedents relevant to the application of the Martens Clause, framing them as interpretative footholds. Moreover, the work contributes to the clarification of the fragmented international regulatory debate, providing a structured overview of state practice, positions within the UN framework, and the normative proposals advanced by regional organizations and civil society.

Nevertheless, this study recognizes certain limitations. It does not offer a technical analysis of algorithmic decision-making processes, nor does it fully explore the criminal accountability problems associated with AWS, both of which merit deeper interdisciplinary investigation. Likewise, while the focus on two case studies (Civil War in Libya and Ukraine-Russia Conflict) provided valuable practical insights, further comparative empirical research would strengthen the understanding of AWS deployment under real-world conditions.

Ultimately, this dissertation contributes to the ongoing international legal discourse by

reaffirming the Martens Clause as a dynamic legal safeguard, capable of guiding both interpretation and future regulatory development in the area of AWS. In doing so, it invites a re-evaluation of how foundational humanitarian principles can, and must, continue to shape the legality of technological innovations in warfare.

Bibliography

Books, Journals, News Articles, and Others

Álvarez, J. S. V. (2024). "*Symposium on Military AI and the Law of Armed Conflict: Drone Swarms as Weapons of Mass Destruction*". OpinioJuris. Available at: https://opiniojuris.org/2024/04/05/symposium-on-military-ai-and-the-law-of-armed-conflict-drone-swarms-as-weapons-of-mass-destruction/

Ancona, F. (2024). "*AI in warfare: Loitering Munitions – Current Applications and Legal Challenges*". Mondo Internazionale APS. Available at: https://mondointernazionale.org/focus-allegati/ai-in-warfare-loitering-munitions-current-applications-and-legal-challenges

Anderson, K. *et al.* (2014). "*Adapting the Law of Armed Conflict to Autonomous Weapon Systems*". Stockton Center for the Study of International Law. International Law Studies. U.S. Naval War College. 90. Pages 398-406. Available at: https://digital-commons.usnwc.edu/cgi/viewcontent.cgi?article=1015&context=ils

Article 36. (2019). "*Swarms – Discussion Paper for the Convention on Certain Conventional Weapons (CCW)*". Article 36. Geneva. Pages 3-5. Available at: https://article36.org/wp-content/uploads/2019/06/swarms.pdf

Blanchard, A. & Taddeo, M. (2022). "*Jus in bello Necessity, The Requirement of Minimal Force, and Autonomous Weapons Systems*". Journal of Military Ethics. 21(3-4). Pages 289. Available at: https://www.tandfonline.com/doi/epdf/10.1080/15027570.2022.2157952?needAccess=true

Bode, I. (2024). "*Falling Under the Radar: The Problem of Algorithmic Bias and Military Applications of AI*". Humanitarian Law & Policy. Available at: https://blogs.icrc.org/law-and-policy/2024/03/14/falling-under-the-radar-the-problem-of-algorithmic-bias-and-military-applications-of-ai/

Bode, I. & Watts, T.F.A. (2023). "*Loitering Munitions and Unpredictability: Autonomy in Weapon Systems and Challenges to Human Contro*l". Center for War Studies. University of Southern Denmark. Pages 3, 21, 43-46. Available at: https://www.researchgate.net/publication/371351342_Loitering_Munitions_and_Unpredic

tability_Autonomy_in_Weapon_Systems_and_Challenges_to_Human_Control

Boulanin, V. *et al.* (2021). "*Autonomous Weapon System and International Humanitarian Law – Identifying Limits and the Required Type and Degree of Human-Machine Interaction*". Stockholm International Peace Research Institute. Page 9. Available at: https://www.sipri.org/sites/default/files/2021-06/2106_aws_and_ihl_0.pdf

Bruun, L. (2024). "*Reinventing the Wheel? Three lessons that the AWS debate can learn from existing arms control agréments".* Humanitarian Law & Policy. Available at: *https://blogs.icrc.org/law-and-policy/2024/06/13/reinventing-the-wheel-three-lessons-that-the-aws-debate-can-learn-from-existing-arms-control-agreements/*

Cassese, A. (2000). "*The Martens Clause: Half a Loaf or Simply Pie in the Sky?". EJIL*. 11(1). Pages 212-213. Available at: http://www.ejil.org/pdfs/11/1/511.pdf

Chavannes, E. *et al*. (2020). "*Governing Autonomous Weapon Systems*". Hague Centre for Strategic Studies. Page 19. Available at: https://www.jstor.org/stable/resrep24196.7?seq=1

Copeland, D. *et al.* (2022). "*The Utility of Weapons Reviews in Addressing Concerns Raised by Autonomous Weapon Systems*". Journal of Conflict & Security Law. Oxford University Press. Pages 298-300. Available at: https://academic.oup.com/jcsl/article/28/2/285/6833182

Davidson, N. (2018). "*A legal perspective: Autonomous Weapon Systems under International Humanitarian Law*". ICRC. UNODA Occasional Papers. No. 30. Pages 5-6. Available at: https://www.icrc.org/sites/default/files/document/file_list/autonomous_weapon_systems_under_international_humanitarian_law.pdf

Ekelhof, M. & Paoli, G. P. (2020). "*Swarm Robotics – Techincal and Operational Overview of the Next Generation of Autonomous Systems*". United Nations Institute for Disarmament Research. Pages 5-7, 21-29, 50, 57. Available at: https://unidir.org/files/2020-04/UNIDIR%20Swarm%20Robotics%20-%202020.pdf

Ford, C. M. (2017). "*Autonomous Weapons and International Law".* University of South Carolina Law Review. 69(413). Pages 420-421, 441-443, 450. Available at: https://scholarcommons.sc.edu/cgi/viewcontent.cgi?article=4244&context=sclr

Geneva Academy of International Humanitarian Law and Human Rights. (2014). "*Autonomous weapon systems under international law* (Academy Briefing No. 8)". Geneva Academy of International Humanitarian Law and Human Rights. Pages 15, 18. Available at: https://www.geneva-academy.ch/joomlatools-files/docman-files/Publications/Academy%20Briefings/Autonomous%20Weapon%20Systems%20under%20International%20Law_Academy%20Briefing%20No%208.pdf

Henckaerts, J-M. & Doswald-Beck, L. (2009). "*Customary International Humanitarian Law – Volume I: Rules*". International Committee of the Red Cross. Cambridge University Press. 1. Page 29, 46-50, 51-67. Available at: https://www.icrc.org/sites/default/files/external/doc/en/assets/files/other/customary-international-humanitarian-law-i-icrc-eng.pdf

Hickleton, M. (2019). "*Shaky Foundations: 'Killer Robots' and the Martens Clause*". Perth International Law Journal. Pages 38-42, 54-57. Available at: https://classic.austlii.edu.au/au/journals/PerIntLawJl/2019/7.pdf

Horowitz, M. C. (2016). "*Public Opinion and the Politics of the Killer Robots Debate*". Research and Politics. 3(1). Page 7. Available at: https://journals.sagepub.com/doi/pdf/10.1177/2053168015627183

Human Rights Watch (1995). "*Blinding Laser Weapons – The Need to Ban a Cruel and Inhumane Weapon*". Human Rights Watch. 7(1). Available at: https://www.hrw.org/reports/1995/General1.htm

Human Rights Watch & International Human Rights Clinic (2018). "*Heed the Call – A Moral and Legal Imperative to Ban Killer Robots*". Human Rights Program at Harvard Law School. Pages 3, 13-16, 19-27, 28-43. Available at: https://www.hrw.org/sites/default/files/report_pdf/arms0818_web.pdf

Human Rights Watch & International Human Rights Clinic. (2015). "*Precedent for Preemption: The Ban on Blinding Lasers as a Model for a Killer Robots Prohibition*". Memorandum to Convention on Conventional Weapons Delegates. Human Rights Program at Harvard Law School. Pages 3, 13-16, 19-27, 28-43. Available at: https://www.hrw.org/sites/default/files/supporting_resources/robots_and_lasers_final.pdf

ICRC Geneva. (2006). "*A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977*". Reports and Documents. International Review of the Red Cross. 88(864). Pages 933, 934-935, 938, 942-945. Available at: https://international-review.icrc.org/sites/default/files/irrc_864_11.pdf

ICRC. (2016). "*Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)*". Views of the International Committee of the Red Cross (ICRC) on autonomous weapons systems. Report of an Expert Meeting held 15-16 March. Pages 1-3. Available at: https://unoda-documents-library.s3.amazonaws.com/Convention_on_Certain_Conventional_Weapons_-_Informal_Meeting_of_Experts_(2016)/2016_LAWS%2BMX_CountryPaper_ICRC.pdf

ICRC. (*s.d.). "Customary IHL Principle of Precautions in Attack*". IHL Databases. How does Law Protect in War?. ICRC. Available at: https://ihl-databases.icrc.org/en/customary-ihl/v1/rule15

ICRC. (*s.d*.). "*Libya, The Use of Lethal Autonomous Weapons Systems*". IHL Databases. How does Law Protect in War?. ICRC. Available at: https://casebook.icrc.org/case-study/libya-use-lethal-autonomous-weapon-systems

ICRC. (*s.d*.). "*Martens Clause*". IHL Databases. How does Law Protect in War?. ICRC. Available at: https://casebook.icrc.org/a_to_z/glossary/martens-clause

Ivanenko, V. (2022). "*The origins, causes and enduring significance of the Martens Clause: A view from Russia*". How International Humanitarian Law Develops. International Review of the Red Cross. Published by Cambridge University Press on behalf of the ICRC. 104(920-921). Pages 1723, 1709. Available at: https://international-review.icrc.org/sites/default/files/reviews-pdf/2022-11/the-origins-causes-and-significance-of-the-martens-clause-a-view-from-russia-920.pdf

Jenks, C. (2016). "*False Rubicons, Moral Panic, & Conceptual Cul-De-Sacs: Critiquing & Reframing the Call to Ban Lethal Autonomous Weapons".* Pepperdine Law Review. XLIV(1). Page 52. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2736407

Kirichenko, D. (2024). "*The Rush for AI-Enabled Drones on Ukrainian Battlefields*". Lawfare.

Available at: https://www.lawfaremedia.org/article/the-rush-for-ai-enabled-drones-on-ukrainian-battlefields

Kruply, T. (2024). "*What role artificial intelligence could play in evaluating the compliance of military operations with international humanitarian law: The case study of the conduct of hostilities in Ukraine*". Ejil Talk. Available at: https://www.ejiltalk.org/what-role-artificial-intelligence-could-play-in-evaluating-the-compliance-of-military-operations-with-international-humanitarian-law-the-case-study-of-the-conduct-of-hostilities-in-ukraine/

Kumaraguru, Y. (2020). "*The Impact of Artifical Intelligence on Strategic Stabiloty and Nuclear Risk*". Stockholm International Peace Research Institute. Page 55-56. Available at: https://www.jstor.org/stable/resrep24515.14?seq=1

Liu, H-Y. (2012). "*Categorization and Legality of Autonomous and Remote Weapons Systems*". International Review of the Red Cross. 94(886). Pages 636-638, 640.Available at: https://international-review.icrc.org/sites/default/files/irrc-886-liu.pdf

Mozur, P. & Satariano, A. (2024). "*A.I. Begins Ushering in an Age Killer Robots*". The New York Times. Available at: https://www.nytimes.com/2024/07/02/technology/ukraine-war-ai-weapons.html

Nasu, H. (2021). "*The Kargu-2 Autonomous Attack Drone: Legal & Ethical Dimensions*". Lieber Institute West Point. Articles of War. Available at: https://lieber.westpoint.edu/kargu-2-autonomous-attack-drone-legal-ethical/

Perišić, P. i Tomljenović, M. (2024). "*Legal Permissibility of Autonomous Weapon Systems, with Specific Reference to the Principles of International Humanitarian Law*". Zbornik radova Pravnog fakulteta u Splitu. 61 (4). Page 534-535, 537. Available at: https://www.researchgate.net/publication/387338152_Legal_Permissibility_of_Autonomous_Weapon_Systems_with_Specific_Reference_to_the_Principles_of_International_Humanitarian_Law

Rashid, A. (2021). "*Nagorno-Karabagh Conflict and Role of Major Powers: An International Law Perspective"*. In Artificial Intelligence and the Future of Warfare. Lambert Academic Publishing. Margalla Papers (Issue II). Department of Politics and International Relations.

International Islamic University: Islamabad. Page 64. Available at: https://margallapapers.ndu.edu.pk/site/article/view/73/49

Rosen, B. (2023). "*AI and the Future of Drone Warfare: Risks and Recommendations*". Just Security. Available at: https://www.justsecurity.org/89033/ai-and-the-future-of-drone-warfare-risks-and-recommendations/

Rosen, B. (2023). "*Unhuman Killings: AI and Civilian Harm in Gaza*". Just Security. Available at: https://www.justsecurity.org/90676/unhuman-killings-ai-and-civilian-harm-in-gaza/

Schmitt, M. & Widmar, E., W. (2014). "*On Target: Precision and Balance in the Contemporary Law of Targeting*". Journal of National Security Law & Policy. 7(379). Page 398. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2439345

Taulbee, J. L. & Glahn, G. v. (2022). "*Law Among Nations – An Introduction to Public International Law*". Routledge. Twelfth Edition. Page 577, 589.

The Economic Times (2024). "*Ukraine Rushes to Create AI-enabled War Drones*". The Economic Times. Available at: https://economictimes.indiatimes.com/tech/artificial-intelligence/ukraine-rushes-to-create-ai-enabled-war-drones/articleshow/111831302.cms?from=mdr

United States of America. (2015). "*Department of Defense Law of War Manual*". Office of General Counsel Department of Defense. Updated July 2023. Pages 51, 371, 1126. Available at: https://media.defense.gov/2023/Jul/31/2003271432/-1/-1/0/DOD-LAW-OF-WAR-MANUAL-JUNE-2015-UPDATED-JULY%202023.PDF

Vincent, J. (2021). "*Have Autonomous Robots Started Killing in War? – Reports warned of killer robots – the reality is messie*r". The Verge. Available at: https://www.theverge.com/2021/6/3/22462840/killer-robot-autonomous-drone-attack-libya-un-report-context

Volpicelli, G., *et al.* (2024). "`*Our Oppenheimer moment*` *- In Ukraine, the robot wars have already begun*". Politico. Available at: https://www.politico.eu/article/robots-coming-ukraine-testing-ground-ai-artificial-intelligence-powered-combat-war-russia/

West, L. (2024). "*Moving towards Best Practices in Accountability and Military Use of AI*".

Center for International Governance Innovation. Cigi Papers nº301. Pages 6-8. Available at: https://www.cigionline.org/static/documents/Leah_West-no.301_EhDzqMx.pdf

Winter, E. (2022). "*The Compatibility of Autonomous Weapons with the Principles of International Humanitarian Law*". Journal of Conflict & Security Law. Oxford University Press. 27(1). Pages 18-20. Available at: https://academic.oup.com/jcsl/article/27/1/1/6513626

Ynfanzón, K. (2023). "*The Contribution of the Authority of ICJ Precedents to the Argumentative Methodology in International Law"*. Doctoral Dissertation in International Law. Graduate Institute: Geneva. International Law Association. Pages 1-2. Available at: https://congressos.leading.pt/reports/reports.aspx?ref=resumofinal1&evento=78&formulario=189&render=pagina&cod=14177&chave=0007647C4E

Legal Instruments, Court Decisions, Official Reports, Resolutions, and Submissions

Council of Europe, Parliamentary Assembly. (2022). "*Emergence of lethal autonomous weapons systems (LAWS) and their necessary apprehension through European human rights law"* (Provisional Report). Report Rapporteur: Damien Cottier. Committee on Legal Affairs and Human Rights. Available at: https://assembly.coe.int/LifeRay/JUR/Pdf/TextesProvisoires/2022/20221116-LawsApprehension-EN.pdf

European Court of Human Rights. (1950): "*European Convention on Human Rights*". Article 2. Council of Europe. Available at: https://www.echr.coe.int/documents/d/echr/convention_ENG

European Parliament. (2018). "*European Parliament Resolution on Autonomous Weapon Systems (2018/2752(RSP))"*. (P8_TA(2018)0341). Available at: https://www.europarl.europa.eu/doceo/document/TA-8-2018-0341_EN.pdf

European Parliament. (2021). *"Report on artificial intelligence: questions of interpretation and application of international law in so far as the EU is affected in the areas of civil and military uses and of state authority outside the scope of criminal justice"* (A9-0001/2021). Rapporteur: Gilles Lebreton. Committee on Legal Affairs. Available at: https://www.europarl.europa.eu/doceo/document/A-9-2021-0001_EN.pdf

European Union. (2024). "*Submission to the United Nations Secretary-General on lethal autonomous weapons systems pursuant to General Assembly Resolution 78/241 – Lethal Autonomous Weapons Systems"*. Available at: https://docs-library.unoda.org/General_Assembly_First_Committee_-Seventy-Ninth_session_(2024)/78-241-EU-EN.pdf

Human Rights Watch. (2024). "*Submission to the United Nations Secretary-General on autonomous weapons systems"*. Available at: https://www.hrw.org/sites/default/files/media_2024/05/HRW_UN_AWS_052024_3.pdf

ICRC Database. (1899). Treaties, States Parties and Commentaries. "*Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning*

the Laws and Customs of War on Land". The Hague, 29 July 1899. Preamble. Available at: https://ihl-databases.icrc.org/en/ihl-treaties/hague-conv-ii-1899/preamble?activeTab=

ICRC Database. (1907). Treaties, States Parties and Commentaries. "*Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land*". The Hague, 18 October 1907. Preamble. Available at: https://ihl-databases.icrc.org/en/ihl-treaties/hague-conv-iv-1907/preamble?activeTab=

ICRC Database. (1925). Treaties, States Parties and Commentaries. "*Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare*". Geneva, 17 June 1925. Available at: https://ihl-databases.icrc.org/en/ihl-treaties/geneva-gas-prot-1925/protocol?activeTab=

ICRC Database. (1980). Treaties, States Parties and Commentaries. "*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, 10 October 1980. Available at: https://ihl-databases.icrc.org/assets/treaties/500-IHL-81-EN.pdf

ICRC Database. (1995). Treaties, States Parties and Commentaries. "*Protocol on Blinding Laser Weapons (Protocol IV to the 1980 Convention)*". 13 October 1995. Available at: https://ihl-databases.icrc.org/assets/treaties/570-IHL-91-EN.pdf

ICRC Database. (1997). Treaties, States Parties and Commentaries. "*Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)*". 8 June 1977. Available at: https://ihl-databases.icrc.org/assets/treaties/470-AP-I-EN.pdf

ICRC. (2010). "*Protocols Additional to the Geneva Conventions of 12 August 1949*". Available at: https://www.icrc.org/sites/default/files/external/doc/en/assets/files/other/icrc_002_0321.pdf

ICTY. (2000). "*Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of Yugoslavia*". United Nations: International Criminal Tribunal for the former Yugoslavia. Available at: https://www.icty.org/en/press/final-report-prosecutor-committee-established-review-nato-

bombing-campaign-against-federal

International Committee of the Red Cross. (2024). "*Submission on Autonomous Weapon Systems to the United Nations Secretary-General"* (ODA-2024-00019/LAWS). Available at: https://www.icrc.org/sites/default/files/wysiwyg/war-and-law/icrc_submission_on_autonomous_weapons_to_unsg.pdf

International Court of Justice (1996). "*Legality of the Threat or Use of Nuclear Weapons*". International Court of Justice. Reports of Judgments, Advisory Opinions and Orders. Advisory Opinion of 8 July 1996. Available at: https://www.icj-cij.org/sites/default/files/case-related/95/095-19960708-ADV-01-00-EN.pdf

North Atlantic Treaty Organization (NATO). (2022). "*Summary of NATO's Autonomy – Implementation Plan"*. Available at: https://www.nato.int/cps/ra/natohq/official_texts_208376.htm

United Nations Security Council. (2021). "*Letter dated 8 March 2021 from the Panel of Experts on Libya established pursuant to resolution 1973 (2011) addressed to the President of the Security Council (S/2021/229)*". March 8, 2021. United Nations. Page 17. Available at: https://digitallibrary.un.org/record/3905159?v=pdf

United Nations. (2017). "*Treaty on the Prohibition of Nuclear Weapons (A/CONF.229/2017/8)*". United Nations General Assembly. Available at: https://docs.un.org/en/A/CONF.229/2017/8

United Nations. (2019). "*Annex III: Guiding Principles affirmed by the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems* (CCW/MSP/2019/9)". Meeting of the High Contracting Parties to the Convention on Certain Conventional Weapons. Geneva, 2019. Available at: https://digitallibrary.un.org/record/3856241?v=pdf

United Nations. (2023). "*Resolution adopted by the General Assembly on 22 December 2023: 78/241". Lethal autonomous weapons systems* (A/RES/78/241). General Assembly, Seventy-eighth session, Agenda item 99: General and complete disarmament. United Nations. Available at: https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://docs.u

n.org/A/RES/78/241&ved=2ahUKEwix-sejh56MAxWBVKQEHaaFNUYQFnoECBoQAQ&usg=AOvVaw1_GNPbt5ZgyFyYhzNHHL37

United Nations. (2024). *"Chair's summary – Second 2024 session of the GGE on LAWS: Submitted by the Chairperson* (CCW/GGE.1/2024/WP.11)". Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems. Convention on Certain Conventional Weapons. Geneva: United Nations. Available at: https://documents.un.org/doc/undoc/gen/g24/181/91/pdf/g2418191.pdf

United Nations. (2024). "*Existing International Humanitarian Law Applicable to Lethal Autonomous Weapon Systems" (CCW/GGE.1/2024/CRP.3).* Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System. Convention on Certain Conventional Weapons (CCW). Geneva: United Nations. Available at: https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2024)/CCW_GGE1_2024_CRP.3.pdf

United Nations. (2024). "*Lethal autonomous weapons systems: Report of the Secretary-General* (A/79/88)". General Assembly. Seventy-ninth session. Item 98 (ss). General and complete disarmament: lethal autonomous weapons. Available at: https://docs.un.org/en/a/79/88