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The Legality of Robotic Warfare: Autonomous Weapons and International Humanitarian Norms

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Abstract: *The advent of autonomous weapons systems (AWS) and robotics in modern warfare has sparked pressing legal and ethical debates. While these technologies promise increased efficiency and reduced military casualties, they also raise serious concerns about compliance with International Humanitarian Law (IHL), particularly regarding distinction, proportionality, and accountability. This article critically examines the compatibility of AWS with core IHL principles, analyzing existing treaty frameworks, state practice, and recent doctrinal developments. Through a multidisciplinary lens combining law, ethics, and emerging technologies, the article interrogates whether current legal norms are adequate to regulate autonomous warfare or whether new legal instruments are necessary. Ultimately, it advocates for a hybrid regulatory approach that integrates precautionary legal standards with robust international governance to ensure that technological innovation does not outpace humanitarian protection.*

Keywords: *Autonomous Weapons Systems, International Humanitarian Law, Robotics, Warfare, Accountability, AI, Targeting, Legal Responsibility, Geneva Conventions, Weapon Review.*

1. INTRODUCTION:

The integration of robotics and artificial intelligence (AI) into the battlefield represents one of the most transformative shifts in the history of armed conflict. From intelligent surveillance drones to fully autonomous lethal systems, warfare is no longer confined to traditional human-centric combat paradigms. This evolution raises urgent questions about the adequacy of existing international legal norms, particularly the framework provided by International Humanitarian Law (IHL), to regulate the development and deployment of these emerging technologies. The legal, ethical, and strategic ramifications of allowing machines—guided by complex algorithms and machine learning—to make life-and-death decisions cannot be understated.

Autonomous Weapon Systems (AWS), particularly those capable of selecting and engaging targets without meaningful human intervention, have attracted significant attention in recent years from international legal scholars, technologists, ethicists, and military strategists alike. Their deployment raises foundational issues about accountability, human dignity, the conduct of hostilities, and compliance with core IHL principles such as distinction, proportionality, and precaution. While proponents of AWS argue that such systems could lead to more precise targeting, reduced battlefield casualties, and enhanced operational effectiveness, critics warn of potential violations of humanitarian principles and the erosion of human oversight in warfare.

The rapidly evolving nature of AWS and the lack of consensus among states on regulatory measures further complicate the legal landscape. Currently, there exists no binding multilateral treaty specifically addressing the legality, development, or use of fully autonomous weapons. Although the 1949 Geneva Conventions and their Additional Protocols remain the cornerstone of the laws of armed conflict, their provisions were drafted in an era long before the advent of AI-driven combat technologies. This temporal disjunction creates interpretive challenges regarding how the existing principles of IHL—especially those concerning the identification of lawful targets, proportionality in attacks, and the obligation to take feasible precautions to minimize harm to civilians—apply in the context of autonomous systems.

Moreover, traditional legal doctrines such as state responsibility and individual criminal liability are being tested by the introduction of systems capable of functioning with high degrees of autonomy and unpredictability. If an autonomous

weapon malfunctions or carries out an unlawful attack, questions arise: who bears the legal responsibility—the state that deployed the weapon, the commander who authorized its use, the manufacturer who designed it, or the software engineer who programmed it? These questions do not have easy answers within the current legal framework.

In this context, the Martens Clause, which appeals to the "laws of humanity and the dictates of public conscience," has gained renewed significance. It offers a normative anchor for addressing ethical uncertainties in situations not explicitly covered by existing treaty law, especially concerning the dehumanization of warfare and the erosion of moral agency in combat decisions.

This article seeks to critically examine whether International Humanitarian Law, as it currently stands, is capable of effectively regulating the deployment and operation of autonomous weapons. It will explore the legal standards applicable to AWS, analyze the adequacy of Article 36 weapons reviews, and assess potential gaps in accountability and enforcement. It also aims to offer a forward-looking perspective by discussing the merits of emerging proposals—ranging from pre-emptive bans to hybrid regulatory frameworks—and the need for international cooperation in establishing common norms and technical standards.

Ultimately, this inquiry underscores a broader concern: as the tools of war evolve, so too must the legal and ethical architecture that governs them. Ensuring that the use of autonomous systems in warfare remains consistent with the principles of humanity, legal accountability, and international peace is not merely a theoretical aspiration but a pressing imperative for the global community.

2. Literature Review:

The literature on autonomous weapons and their intersection with international law has evolved significantly over the past two decades. Early warnings about the humanitarian risks of AWS were raised by Human Rights Watch in its seminal report *Losing Humanity* (2012), which argued for a pre-emptive ban on fully autonomous weapons. Asaro (2012) examined the dehumanization of lethal decision-making from a human rights standpoint, while Schmitt (2013) defended AWS within the bounds of IHL, sparking critical debate on legal compliance. Boulanin and Verbruggen's (2017) SIPRI report offered a detailed mapping of autonomy in weapon systems, providing empirical grounding to legal discussions. Sassòli (2019) emphasized the strain AWS place on core IHL principles such as distinction and proportionality, while Casey-Maslen (2018) broadened the regulatory lens to include human rights law. More recently, the United Nations Group of Governmental Experts (2021) contributed to the discourse by articulating guiding principles but failed to reach binding consensus. These sources collectively underscore the need for normative recalibration and legal reform, especially in addressing the accountability vacuum that AWS pose.

3. Objectives:

This article is guided by the following objectives:

- **To conceptualize autonomous weapons systems (AWS)** and examine their military applications, technological evolution, and strategic significance in modern warfare.
- **To critically evaluate the compatibility of AWS with the foundational principles of International Humanitarian Law (IHL)**—notably distinction, proportionality, precaution, and humanity—as well as the ethical standards embodied in the Martens Clause.
- **To assess the adequacy of existing legal mechanisms**, including Article 36 weapons reviews and doctrines of state and individual accountability, in regulating autonomous weapon deployment and operations.
- **To analyze emerging international initiatives and state positions** on AWS, with a focus on legal and normative proposals for regulation, prohibition, or control.
- **To propose a forward-looking regulatory framework** that ensures human accountability, safeguards humanitarian principles, and addresses the accountability gaps posed by autonomous systems in warfare.

4. Methodology:

This study adopts a doctrinal and normative-analytical methodology, integrating legal research with ethical inquiry and policy analysis. The paper undertakes a comprehensive examination of international legal instruments, particularly the Geneva Conventions, Additional Protocols, and customary principles of International Humanitarian Law (IHL), alongside thematic commentaries and reports by the United Nations, International Committee of the Red Cross (ICRC), and civil society organizations. Comparative analysis of state practices and Article 36 weapon review procedures is employed to assess legal preparedness for regulating Autonomous Weapons Systems (AWS). Ethical evaluation is grounded in jus in bello principles, the Martens Clause, and theories of moral responsibility. Interdisciplinary sources—ranging from AI ethics and robotics literature to international criminal law and disarmament studies—inform the critique

and recommendations for regulatory reform. The study is qualitative, interpretive, and grounded in legal normativity rather than empirical testing.

5. Discussion:

5.1 Defining Autonomous Weapons and Their Military Applications

The concept of autonomous weapons systems (AWS) is not monolithic but exists along a spectrum of automation and decision-making capabilities. While there is no universally accepted legal definition of AWS, the term generally refers to weapons that can select and engage targets without direct human intervention once activated. This autonomy may vary in degree—from systems that operate under strict programming parameters to those that incorporate adaptive machine learning algorithms capable of responding to dynamic environments.

5.1.1 Conceptual Clarifications

The lack of a standardized definition poses a significant challenge for legal regulation and international governance. However, one of the most cited definitions is offered by the United Nations Office for Disarmament Affairs, which describes AWS as "weapon systems that, once activated, can select and engage targets without further intervention by a human operator." This definition is also reflected in discussions within the framework of the Convention on Certain Conventional Weapons (CCW), particularly through the Group of Governmental Experts (GGE) on Lethal Autonomous Weapons Systems.

A useful way to classify these systems is by reference to their level of autonomy:

- **Automated Systems** follow pre-programmed instructions in response to specific stimuli but lack the capacity to adapt or learn.
- **Semi-Autonomous Systems** require human input for critical functions such as target selection or engagement but may autonomously perform navigation or surveillance.
- **Fully Autonomous Systems** are capable of making targeting decisions and executing attacks without any human intervention post-activation.

This classification, however, is often complicated by the integration of AI components that enable continuous learning, thereby making the system's future behavior difficult to predict or constrain. The opacity of machine learning—often termed the "black box" problem—raises concerns about transparency, accountability, and legal compliance.

5.1.2 Current Technological Landscape

AWS are not merely theoretical constructs but are increasingly present in military arsenals across technologically advanced states. Numerous prototypes and semi-operational systems have already demonstrated significant levels of autonomy. These developments span across aerial, terrestrial, and maritime domains, and serve a variety of military functions, from surveillance to offensive operations.

Aerial Systems

Unmanned Aerial Vehicles (UAVs) such as the MQ-9 Reaper, though currently requiring human authorization for strike decisions, already perform complex autonomous functions in navigation and surveillance. Loitering munitions—like Israel's Harpy and Harop drones—are examples of systems that can independently search for and destroy radar-emitting targets based on pre-programmed criteria, blurring the line between automated and autonomous engagement.

Land-Based Systems

Ground robots such as Russia's Uran-9, South Korea's Samsung SGR-A1 sentry gun (deployed in the Korean Demilitarized Zone), and the U.S. Army's Robotic Combat Vehicle (RCV) exhibit varying degrees of autonomy. While many require human oversight for lethal force decisions, their sensory systems and response capabilities are increasingly automated.

Maritime and Subsurface Systems

Autonomous underwater vehicles (AUVs) and surface vessels are being tested for roles in mine detection, anti-submarine warfare, and coastal defense. The U.S. Navy's Sea Hunter, an autonomous vessel capable of anti-submarine missions, illustrates how naval forces are integrating robotics into strategic operations with minimal human direction.

Software-Based Targeting Systems

Beyond physical platforms, AI-based targeting systems are being developed to aid or potentially replace human decision-making in identifying and evaluating targets. Project Maven, a U.S. Department of Defense initiative, uses AI to analyze drone footage to detect patterns and potential threats. Though ostensibly advisory, such systems are likely to evolve toward autonomous applications.

5.1.3 Strategic Motivations and State Practice

States are investing in AWS for multiple reasons. These include:

- **Force Multiplication**: AWS can supplement human troops, allowing militaries to project force more efficiently with fewer personnel.

- **Operational Speed and Precision**: Autonomy can reduce decision-making time in fast-paced environments like missile defense or aerial combat.
- **Reduced Casualties**: By removing human soldiers from dangerous scenarios, AWS can minimize friendly casualties.
- **Strategic Superiority**: In an arms race dynamic, the first-mover advantage in AWS may confer disproportionate military power.

However, this strategic momentum is met with growing concern over the erosion of human control, particularly in targeting decisions. While some states, such as the United States, Israel, and Russia, maintain robust AWS development programs, others, including Germany, Austria, and many Latin American countries, advocate for strict controls or outright bans, citing humanitarian and ethical considerations.

5.1.4 Ethical and Legal Concerns Embedded in Design

The process of designing AWS raises a host of ethical and legal dilemmas even before deployment. Key concerns include:

- **Bias in Algorithmic Targeting**: AI systems trained on flawed or limited datasets may perpetuate or amplify discriminatory outcomes.
- **Inability to Understand Context**: Machines cannot comprehend complex human behaviors, cultural nuances, or surrender signals in the way humans can.
- **Absence of Moral Judgment**: Unlike human combatants, machines cannot make qualitative moral decisions, raising questions about their capacity to comply with the spirit, if not the letter, of IHL.

These concerns feed into the broader debate over "meaningful human control," a concept gaining traction as a potential normative standard for the lawful use of AWS. Yet what constitutes “meaningful” remains contentious and ill-defined.

In sum, the military applications of robotics are no longer speculative but constitute a present and expanding feature of modern warfare. As AWS grow more autonomous and sophisticated, the urgency of establishing clear legal norms becomes increasingly apparent. Without precise definitions and regulatory clarity, the international community risks entering a new era of conflict marked by automated violence and diminished human accountability.

5.2. International Humanitarian Law and Its Core Principles

International Humanitarian Law (IHL), also referred to as the Law of Armed Conflict (LOAC), governs the conduct of hostilities during armed conflicts with the aim of minimizing human suffering and protecting those not participating in hostilities, such as civilians, medical personnel, and prisoners of war. Rooted in the Geneva Conventions of 1949 and their Additional Protocols, as well as in customary international law, IHL embodies the principles of humanity, military necessity, distinction, proportionality, and precaution. As new means and methods of warfare emerge—most notably through the development and deployment of autonomous weapons systems (AWS)—the central question is whether these principles remain adequate and enforceable in regulating technologically mediated combat.

5.2.1 The Principle of Distinction

The principle of distinction is one of the cardinal tenets of IHL. It obligates parties to an armed conflict to distinguish at all times between combatants and civilians, as well as between military objectives and civilian objects (Articles 48, 51, and 52 of Additional Protocol I). Attacks may only be directed against legitimate military targets, and intentional attacks against civilians or civilian infrastructure are categorically prohibited.

For autonomous weapons, compliance with the principle of distinction presents profound challenges. The ability of AWS to independently and reliably identify combatants—especially in environments where adversaries may not wear uniforms or where civilian and military populations are intermixed—is questionable. Unlike human soldiers, who can assess contextual cues, surrender gestures, and cultural subtleties, AWS rely on sensor inputs, pre-programmed rules, and machine learning models that may lack the capacity for nuanced interpretation.

The use of facial recognition technologies, behavioral pattern recognition, and infrared imaging in AWS is fraught with the risk of error, especially when data inputs are incomplete, biased, or manipulated. A misidentification of a civilian as a combatant, or a civilian object as a military one, would constitute a breach of IHL, potentially amounting to a war crime under Article 8 of the Rome Statute of the International Criminal Court (ICC). This raises a critical legal and ethical dilemma: can AWS be trusted to make lawful distinctions in the fog of war?

5.2.2 The Principle of Proportionality

Codified in Article 51(5)(b) and Article 57(2)(a)(iii) of Additional Protocol I, the principle of proportionality prohibits attacks which may be expected to cause incidental civilian harm that would be excessive in relation to the concrete and direct military advantage anticipated. This assessment requires a balancing of competing values—military gain versus human cost—a calculus that is inherently subjective and context-dependent.

For AWS, this proportionality analysis is especially problematic. Even if an AWS is programmed to follow certain rules regarding thresholds of acceptable collateral damage, it remains unclear whether such systems can make proportionality judgments with the same ethical and moral reasoning as a trained human operator. Proportionality assessments often require dynamic decision-making in fluid combat environments, which may involve unpredictable civilian presence, changing tactical considerations, and shifting rules of engagement. Delegating such decisions to an algorithm risks disproportionate harm, especially if the system lacks real-time contextual awareness or the ability to override pre-programmed logic based on humanitarian concerns.

Moreover, the black-box nature of many AI-driven systems limits transparency and hinders post-incident review. If a system carries out a disproportionate attack, the absence of a clear decision-making trail obstructs the ability to attribute legal responsibility and ensure accountability.

5.2.3 The Principle of Precaution

The principle of precaution requires that parties to a conflict take all feasible measures to avoid, or at least minimize, incidental loss of civilian life, injury to civilians, and damage to civilian objects (Article 57 of Additional Protocol I). This includes obligations to verify that targets are legitimate, to choose means and methods of warfare that minimize harm, and to cancel or suspend attacks if it becomes apparent that the target is unlawful or the anticipated harm is excessive.

The precautionary obligation is forward-looking and places a continuing duty on commanders to adapt their actions based on evolving information. In the context of AWS, it is unclear how such obligations can be operationalized. Once deployed, many autonomous systems operate beyond the real-time control of human operators, especially in GPS-denied environments or under electronic warfare conditions. This raises concerns about whether commanders can intervene effectively if new information emerges that renders a target invalid or the anticipated effects disproportionate.

Further, AWS might lack the capacity to re-evaluate an attack sequence mid-execution or cancel a mission upon detecting the presence of civilians. For example, an autonomous drone programmed to engage radar installations may be unable to determine whether the radar is now being used for civilian air traffic control or whether a school has been constructed nearby since the last reconnaissance. In such cases, precautionary obligations may be violated not due to malice but due to a lack of human-in-the-loop oversight.

5.2.4 The Principle of Humanity and the Martens Clause

While not a codified rule like distinction or proportionality, the principle of humanity, reinforced by the Martens Clause, forms a vital interpretive foundation of IHL. Originating in the 1899 Hague Convention II, the Martens Clause affirms that "in cases not covered by international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, the principles of humanity and the dictates of public conscience."

The application of this clause to AWS is particularly compelling. Even if a system could, in theory, comply with distinction and proportionality, its deployment might still violate the principle of humanity if it entails dehumanizing warfare or undermining the moral agency of decision-making in lethal operations. There is growing concern among scholars, civil society groups, and international organizations that delegating lethal decisions to machines crosses a moral threshold, eroding the ethical framework that underpins the laws of war.

The public conscience, as reflected in global movements such as the Campaign to Stop Killer Robots and declarations by UN Special Rapporteurs, suggests that fully autonomous lethal systems are ethically problematic, even if technically compliant with the formal rules of IHL. These perspectives reinforce the idea that legal compliance is necessary but not sufficient; legitimacy in warfare also depends on broader humanitarian values.

The central principles of IHL were crafted with human judgment, moral reasoning, and accountability in mind. As autonomous weapons emerge as participants in warfare, serious doubts arise about whether such systems can comply with the letter and spirit of IHL. Distinction, proportionality, and precaution are not merely operational guidelines but ethical mandates rooted in human dignity and responsibility. The inability of machines to replicate contextual reasoning, empathic judgment, or moral accountability necessitates a rigorous reconsideration of how—and whether—autonomous systems should be integrated into armed conflict.

5.3. Weapon Reviews Under Article 36 of Additional Protocol I

Article 36 of Additional Protocol I to the 1949 Geneva Conventions introduces a critical mechanism for the legal regulation of new weapons, means, and methods of warfare. It obligates States Parties to assess, prior to their deployment, whether the use of a new weapon would, in any circumstance, be prohibited by international law. In the context of emerging military technologies—particularly Autonomous Weapons Systems (AWS)—this obligation

assumes renewed importance. Given the complexity, unpredictability, and ethical controversy surrounding AWS, Article 36 serves not only as a gatekeeping mechanism but as a cornerstone for preemptive humanitarian governance.

5.3.1 The Legal Foundation of Article 36

Article 36 provides that:

"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."

This provision establishes a **preventive legal review obligation** that precedes the weapon's field deployment. Its scope is expansive, encompassing traditional kinetic weapons, cyber tools, space-based systems, and critically, AWS. The review is not limited to IHL but extends to all rules of international law applicable to the state, including human rights law, arms control treaties, and customary international norms.

5.3.2 Article 36 and Autonomous Weapons

The application of Article 36 to AWS raises profound challenges in both process and substance. Unlike conventional weapons, AWS are **dynamic**, **adaptive**, and often **non-deterministic**, due to their reliance on algorithms and machine learning. This introduces several layers of complexity:

- **Functionality-Based Assessment**: Unlike traditional arms, AWS cannot be evaluated solely by their physical characteristics. Their legality depends on how they process data, select targets, and make decisions—functions embedded in complex code and machine-learning models.
- **Contextual Use**: The legality of AWS is highly context-dependent. A system may comply with IHL in one environment but fail in another, particularly in densely populated civilian areas or counterinsurgency operations.
- **Human Control and Supervision**: A key factor in review is whether the AWS retains sufficient "meaningful human control" over targeting and engagement decisions. However, international consensus on what constitutes "meaningful" remains elusive.

Due to these factors, a traditional Article 36 review—originally designed for tangible, predictable systems—may prove insufficient unless substantially revised and adapted for the digital age.

5.3.3 State Practice and Review Mechanisms

The implementation of Article 36 reviews varies significantly across jurisdictions. While some states have institutionalized review processes, others lack transparency, consistency, or even formal procedures. Key examples include:

- **United Kingdom**: The UK Ministry of Defence conducts legal weapon reviews through its "Weapons Review Committee," which includes legal and technical experts. It has published a detailed **Weapons Review Policy**, emphasizing compliance with IHL principles and the importance of human oversight.
- **Netherlands**: The Dutch government has advocated for **comprehensive Article 36 reviews** and transparency in AWS evaluations. It emphasizes "meaningful human control" as a standard for lawful use and has called for **international cooperation** to harmonize review practices.
- **Sweden**: Through its independent **Delegation for International Law Monitoring of Weapons Projects**, Sweden provides one of the most transparent Article 36 mechanisms in the world.
- **United States**: Although not a party to Additional Protocol I, the U.S. Department of Defense conducts **Legal and Ethical Reviews** of weapons systems. Its 2012 Directive 3000.09 on "Autonomy in Weapon Systems" imposes internal restrictions, including the requirement for human judgment in the use of lethal force.

Despite these examples of best practice, many states do not publish their review procedures or findings, undermining the principle of accountability. Moreover, existing processes often lack technical capability to evaluate the opaque and adaptive behaviors of AI-driven systems.

5.3.4 Challenges in Conducting Article 36 Reviews of AWS

Technical Opacity (Black Box Problem)

Machine learning models used in AWS, particularly deep neural networks, often lack transparency in their decision-making processes. This technical opacity complicates efforts to assess whether the system can distinguish between lawful and unlawful targets, comply with proportionality, or adapt to unforeseen circumstances.

Predictability and Verification

Traditional reviews assume predictable behavior based on testing and simulations. However, AWS may behave differently in real-world conditions due to new data inputs, adversarial attacks (e.g., spoofing), or learning-induced divergence. This challenges the **verifiability and reproducibility** of review outcomes.

Temporal Scope

AWS are often capable of **continuous evolution** through software updates or real-time learning. A one-time review may become obsolete as the system evolves. This calls for **iterative and dynamic review frameworks** that include post-deployment monitoring, update assessments, and real-time override mechanisms.

Dual-Use Nature and Civilian Applications

Many AWS components, such as computer vision or natural language processing, have **dual-use potential**—meaning they are used in both civilian and military sectors. This complicates the identification of what exactly should be subjected to an Article 36 review, and whether software modules not explicitly designed for combat must be scrutinized.

5.3.5 Need for a Standardized International Review Framework

The absence of binding international guidelines on how Article 36 should be implemented for AWS has resulted in inconsistent practices and regulatory gaps. A number of proposals have emerged to standardize or enhance the review process:

- **UN GGE Recommendations**: The Group of Governmental Experts under the CCW has acknowledged the importance of Article 36 and urged states to share national procedures and best practices. However, its recommendations remain non-binding.
- **ICRC Guidelines**: The International Committee of the Red Cross has called for stricter interpretations of Article 36 when applied to AWS, stressing the need for "predictability, reliability, and compliance with IHL."
- **Scholarly Proposals**: Some legal scholars advocate for an **International Review Authority** under the auspices of the UN or the CCW, which could provide peer-reviewed assessments or even certifications for high-risk technologies such as AWS.

A **Model Protocol** on Article 36 for AWS could include:

- Mandatory human-in-the-loop oversight for all lethal decisions.
- Clear metrics for target verification accuracy.
- Required "fail-safe" and "abort" mechanisms.
- Publicly disclosed testing data and decision-logic parameters.
- Ongoing audit mechanisms for learning or adaptive systems.

Article 36 serves as the legal vanguard against the premature or unethical deployment of new weapons, including autonomous systems. However, the transformative nature of AWS demands a rethinking of both the substantive criteria and procedural mechanisms used in legal weapon reviews. To uphold the integrity of IHL and avoid humanitarian risks, states must not only rigorously apply Article 36 but also collaborate in developing a standardized, transparent, and future-proof framework for assessing the legality of AWS. In doing so, the international community can balance military innovation with legal responsibility and ethical foresight.

5.4. Accountability and Legal Responsibility

The deployment of Autonomous Weapons Systems (AWS) presents not only technical and ethical challenges but also unprecedented legal questions about responsibility for wrongful acts committed during armed conflict. Traditional accountability mechanisms in International Humanitarian Law (IHL) are grounded in well-defined doctrines such as **state responsibility**, **individual criminal liability**, and **command responsibility**. However, when machines—not humans—make operational decisions in war, these frameworks are stretched to their limits. The central legal concern becomes: *Who is accountable when an autonomous weapon causes unlawful harm?* This section analyzes the fragmentation of responsibility across multiple actors and explores the adequacy of existing accountability regimes in the age of autonomous warfare.

5.4.1 Attribution of Responsibility in Autonomous Warfare

Attribution is a fundamental precondition for legal accountability. Under IHL and general international law, responsibility must be traceable to an actor with legal personality, such as a state or an individual. However, AWS operate at a level of functional independence that can create **gaps in attribution**:

- **Distributed Responsibility**: AWS development and deployment involve numerous stakeholders—programmers, manufacturers, software vendors, military commanders, and political authorities. This **diffusion of responsibility** complicates the assignment of liability for violations of IHL.
- **Opacity in Decision-Making**: AWS often rely on machine learning algorithms that generate non-linear and unpredictable outputs. This "black-box" nature makes it difficult to reconstruct how a specific decision to engage a target was made, undermining both accountability and legal scrutiny.
- **Autonomy vs. Delegation**: A key legal debate concerns whether AWS are tools that reflect delegated human intent or whether they act with a degree of independent agency. While international law does not currently

recognize machines as bearers of legal responsibility, increased autonomy challenges this anthropocentric assumption.

The inability to attribute unlawful outcomes with confidence may result in a legal vacuum—what some scholars call the **"accountability gap"**—where no party is held responsible, even when violations of IHL occur.

5.4.2 Command Responsibility and AWS

The doctrine of **command responsibility** is central to IHL and International Criminal Law (ICL), particularly under Article 28 of the **Rome Statute of the International Criminal Court**. It holds military commanders and superiors criminally liable for crimes committed by subordinates if they knew or should have known of the unlawful conduct and failed to prevent or punish it.

When applied to AWS, the command responsibility framework becomes highly complex:

- **Loss of Predictability**: If an autonomous system's behavior is unpredictable or evolves through machine learning, it becomes questionable whether a commander could have foreseen the system's unlawful actions.
- **Control and Oversight**: Command responsibility presupposes that the superior has *effective control* over the subordinate. In AWS operations, this control may be nominal or severely limited, especially in fully autonomous deployments.
- **Due Diligence Standards**: The Rome Statute imposes a duty to "exercise control properly." Determining whether a commander exercised due diligence in authorizing AWS deployment requires new benchmarks—perhaps tied to pre-deployment testing, mission-specific programming, or adherence to weapon review protocols.

Given these complexities, some scholars advocate for establishing a **strict liability regime** for commanders who deploy AWS, ensuring accountability regardless of intent or foreseeability. Others argue for a **reconceptualization of command responsibility** that accounts for the system's autonomy and the commander's role in configuring its operational parameters.

5.4.3 State Responsibility

Under the **Articles on the Responsibility of States for Internationally Wrongful Acts (ARSIWA)**, states are internationally responsible for violations of IHL committed by their armed forces or agents. This includes acts committed by AWS if those systems are deployed as instruments of the state.

However, state responsibility for AWS raises several complications:

- **Attribution of Acts**: If an autonomous system acts in a way not foreseen or intended by the deploying state, questions arise about whether such acts can still be attributed to the state. Under ARSIWA Article 8, attribution requires that a person or entity act "on the instructions of, or under the direction or control of" the state.
- **Foreseeability and Risk Management**: Even if the harmful act is not directly ordered, a state may still bear responsibility if it failed to take adequate precautions, such as conducting thorough Article 36 reviews or ensuring sufficient human oversight.
- **Chain of Procurement and Delegation**: Many AWS involve contractors or third-party technology suppliers. If these entities introduce flaws or hidden functions that cause IHL violations, the state may still be held responsible under **the principle of non-delegation of obligations**, particularly when lethal force is involved.

Moreover, state responsibility is essential not just for reparation but also for preserving **systemic deterrence**. Without clear attribution and consequences, states may externalize liability to machines, undermining the normative force of IHL.

5.4.4 Accountability of Developers, Engineers, and Manufacturers

In recent years, there has been growing discourse around the **responsibility of non-state actors**, particularly software engineers, AI developers, and defense contractors involved in designing AWS. Although IHL traditionally focuses on state and individual combatant responsibility, technological development raises new concerns:

- **Direct Participation in Hostilities (DPH)**: If civilian contractors engage in designing targeting algorithms or mission-specific programming, they may be considered as directly participating in hostilities, potentially exposing them to legal liability or loss of civilian immunity under IHL.
- **Product Liability and Civil Law Claims**: In domestic law contexts, AWS malfunctions may give rise to product liability claims under tort or contract law. However, these mechanisms provide inadequate remedies for violations of international law or war crimes.
- **Ethical and Professional Obligations**: Initiatives like the **Asilomar AI Principles** and **IEEE's Ethically Aligned Design** urge developers to embed human rights and ethical considerations into AI development. Yet these guidelines remain non-binding and lack enforcement power.

Some legal scholars argue for a new international regime akin to the **"due diligence" obligations in environmental law**, which would require developers and companies to proactively ensure compliance with IHL when designing and marketing autonomous weapons.

5.4.5 The Role of Human Control in Preserving Accountability

Across all levels of responsibility—state, individual, and corporate—the concept of **"meaningful human control"** has emerged as a potential linchpin for accountability. It refers to ensuring that a human remains meaningfully involved in decisions over the use of lethal force.

Key aspects of this doctrine include:

- **Contextual Judgment**: A human operator should be able to interpret battlefield circumstances and apply ethical reasoning.
- **Intervention Capacity**: Humans must have the ability to override or abort missions in real-time.
- **Legal Awareness**: Operators and commanders must understand and apply IHL principles during deployment.

Absent meaningful human control, legal responsibility becomes difficult to assign, and the accountability framework of IHL risks becoming obsolete. The challenge lies in operationalizing this standard in a technologically feasible and legally robust manner.

The diffusion of agency in AWS systems fundamentally challenges the traditional architecture of accountability in armed conflict. While existing legal frameworks offer starting points—through state responsibility, command responsibility, and individual criminal liability—they require reinterpretation and possibly augmentation to accommodate the realities of machine autonomy. Without a clear and enforceable model of attribution and accountability, the use of AWS threatens to create a moral and legal vacuum in warfare, one in which violations of humanitarian principles may occur without consequence. Addressing this accountability gap is therefore not just a legal necessity but an ethical imperative for the future of armed conflict.

5.5. The Martens Clause and Ethical Boundaries

The increasing deployment of Autonomous Weapons Systems (AWS) in armed conflict invites not only legal scrutiny but also profound ethical reflection. One of the most enduring normative tools in International Humanitarian Law (IHL) for such reflection is the **Martens Clause**, first introduced in the preamble to the 1899 Hague Convention II and subsequently incorporated into several key instruments of IHL, including Additional Protocol I to the Geneva Conventions (1977). The clause serves as a moral compass when the letter of the law falls silent, affirming that in cases not covered by specific legal provisions, "civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, the principles of humanity and the dictates of public conscience."

As AWS challenge traditional understandings of human agency, responsibility, and the role of moral judgment in war, the Martens Clause gains renewed importance. This section explores the normative significance of the Clause in guiding the legal and ethical evaluation of AWS and argues that it provides a necessary bridge between evolving technologies and enduring humanitarian principles.

5.5.1 Normative Ambiguity and Legal Force of the Martens Clause

Although often described as a moral safeguard, the Martens Clause occupies a contested space between law and ethics. Scholars have debated whether it constitutes a legally binding norm or merely a rhetorical reaffirmation of humanitarian ideals. However, in the absence of comprehensive treaty law on AWS, the Clause has been invoked as a source of **customary international law**, offering interpretative guidance in the development and application of IHL.

Legal scholars such as Rupert Ticehurst and Antonio Cassese have argued that the Martens Clause functions both as a **gap-filling mechanism** and as a normative restraint against morally repugnant practices not yet explicitly prohibited. It thus becomes particularly relevant in the AWS context, where technological innovation outpaces legal regulation.

5.5.2 The Principles of Humanity

The **"principles of humanity"**, referenced in the Martens Clause, are understood to reflect the core humanitarian values embedded in IHL—dignity, compassion, and respect for life. AWS, especially when endowed with the capacity to make life-and-death decisions without human input, raise serious concerns about compliance with these principles:

- **Absence of Empathy**: AWS cannot experience empathy or moral conflict, qualities that often moderate human conduct in war. Their incapacity for moral discernment may lead to inhumane outcomes, particularly in complex civilian-military environments.
- **Desensitization to Violence**: The mechanization of killing risks diminishing the psychological and ethical burdens of lethal force, thereby **eroding the moral restraints** traditionally associated with warfare.

- **Depersonalization of Victims**: When targets are selected and engaged by algorithms, the fundamental recognition of the opponent's humanity may be lost, potentially violating the ethical foundation of IHL rooted in the principle of *human dignity*.

In this light, the Martens Clause serves as a normative warning against delegating lethal decision-making to machines that lack the capacity to respect or even comprehend human suffering.

5.5.3 The Dictates of Public Conscience

The **"dictates of public conscience"**, another pillar of the Martens Clause, are inherently dynamic and culturally contingent, yet they play a crucial role in assessing the legitimacy of emerging weapons technologies. Public conscience is reflected not only through civil society activism and public opinion but also in **multilateral dialogues**, such as those taking place under the auspices of the Convention on Certain Conventional Weapons (CCW).

Several developments underscore that public conscience is increasingly uneasy with AWS:

- **Civil Society Advocacy**: Organizations like the **Campaign to Stop Killer Robots** have mobilized global opinion against AWS, arguing that such systems violate moral principles by removing human judgment from lethal decisions.
- **Ethical Declarations by States**: Countries such as Austria, Brazil, and Chile have called for a ban on fully autonomous weapons, citing ethical concerns alongside legal ambiguity.
- **Faith and Philosophy-Based Objections**: Thought leaders from religious, philosophical, and human rights communities have voiced strong objections to AWS on grounds that they dehumanize war and violate sacred values of life and justice.

The "dictates of public conscience" thus provide an evolving metric of moral acceptability, reflecting collective ethical boundaries even in the absence of formal legal prohibitions.

5.5.4 AWS and the Dehumanization of Warfare

A central ethical critique of AWS concerns the **dehumanization of violence**. Traditionally, IHL assumes that human beings, as moral agents, are capable of ethical judgment even in the chaos of war. AWS fundamentally challenge this assumption:

- **Moral Agency**: Machines cannot take responsibility, feel guilt, or show mercy. The complete outsourcing of moral agency to an algorithm challenges the very premise of **just war theory**, which requires combatants to act with moral proportionality and responsibility.
- **Martens Clause as Ethical Compass**: In such scenarios, the Martens Clause operates as a normative failsafe, reminding policymakers and legal actors that compliance with technical legal rules does not suffice when fundamental moral principles are at stake.

Indeed, the Clause supports the argument that technologies which violate **the moral expectations of global humanity**—even if technically legal—may still be impermissible under the broader framework of IHL.

5.5.5 Beyond Codified Law: The Clause as a Living Instrument

In contemporary legal discourse, the Martens Clause has been likened to a **"living instrument"**, akin to dynamic interpretative principles found in human rights law. It ensures that the law retains normative elasticity in response to new threats to human dignity. This approach has been adopted in several key forums:

- **International Court of Justice (ICJ)**: In its advisory opinion on nuclear weapons (1996), the ICJ acknowledged the Martens Clause as reinforcing the need for weapons to comply with broader humanitarian values.
- **UN Special Rapporteurs and Committees**: Ethical critiques of AWS frequently invoke the Clause to support the proposition that **legality must also align with morality**.

As weapon systems become increasingly complex and autonomous, the Clause can serve as a **moral barometer**, helping to ensure that IHL remains responsive to innovations that may not yet be expressly regulated but are nevertheless ethically indefensible.

The Martens Clause stands as a powerful reminder that legality does not exhaust the spectrum of legitimacy. In an era where machines may soon have the capacity to take human life without human oversight, the Clause affirms the enduring importance of **human-centered values** in the conduct of war. It demands that we evaluate new technologies not only by what the law permits but also by what **humanity requires** and **conscience dictates**. As such, the Clause is not a relic of the past but a beacon for the future—one that can illuminate the moral hazards of delegating warfare to algorithms.

5.6. Current International Efforts and Regulatory Proposals

The rapid advancement of Autonomous Weapons Systems (AWS) has prompted robust discussions within the international community regarding appropriate legal and policy frameworks to govern their development, deployment, and use. While consensus on the legality and ethics of fully autonomous systems remains elusive, multiple forums—

both state-led and civil society-driven—are actively engaging in efforts to ensure that the use of AWS remains consistent with International Humanitarian Law (IHL), human rights principles, and the broader dictates of public conscience.
This section maps the landscape of current international initiatives aimed at addressing the AWS challenge. It evaluates the efficacy of ongoing regulatory efforts, highlights key state positions, and examines emerging legal and normative proposals for the control or prohibition of AWS.

5.6.1 United Nations: Convention on Certain Conventional Weapons (CCW)

The **Convention on Certain Conventional Weapons (CCW)**, a key forum for arms control negotiations, has served as the primary institutional space for international deliberation on lethal autonomous weapons systems (LAWS) since 2013. Under the auspices of the **Group of Governmental Experts (GGE)** on LAWS, state parties have convened annually to explore the legal, technical, and ethical dimensions of AWS.

Key Developments:

- **Guiding Principles (2019)**: The GGE adopted 11 guiding principles, including the reaffirmation that IHL continues to apply fully to all weapons systems and that human responsibility must be retained in the use of force.
- **Lack of Binding Consensus**: Despite intense deliberations, the CCW has not yet produced a legally binding agreement. The consensus-based decision-making structure allows any state to block proposals, resulting in persistent deadlock.

Limitations:

- **Voluntariness**: The CCW's reliance on soft law tools and voluntary compliance undermines its regulatory capacity.
- **Diverging State Interests**: Technologically advanced states (e.g., the U.S., Russia, and Israel) resist binding prohibitions, while many developing countries and civil society actors advocate for a preventive ban.

5.6.2 State Positions: Polarization and Advocacy for a Ban

Global state positions on AWS reflect a sharp **North–South divide**, rooted in technological asymmetries, security paradigms, and ethical outlooks.

Support for Regulation or Ban:

- **Ban Advocates**: Over 30 states, including **Austria, Brazil, Chile, and Mexico**, have called for a **legally binding treaty prohibiting the development and use of fully autonomous weapons**. Their arguments are grounded in moral accountability, compliance with IHL, and the need to preserve human control over the use of force.
- **African Union's Common Position (2021)**: The AU has collectively supported efforts toward a legally binding instrument prohibiting AWS that operate without meaningful human control.

Resistance to a Ban:

- **Technology Leaders**: Countries such as the **United States**, **Russia**, **China**, and **Israel** have opposed a ban, advocating instead for continued dialogue and voluntary norms. These states emphasize the potential operational advantages of AWS, including force protection, precision targeting, and strategic deterrence.

5.6.3 Civil Society and Norm Entrepreneurship

Civil society organizations have played a pivotal role in shaping the normative discourse on AWS. Notably, the **Campaign to Stop Killer Robots**, a global coalition of NGOs, academics, and technologists, has galvanized public and political attention toward the risks of delegating lethal decision-making to machines.

Achievements:

- **Agenda Setting**: The campaign has successfully placed AWS on the global arms control agenda and pushed states to clarify their positions.
- **Draft Treaty Proposals**: In 2018, civil society experts proposed a model treaty banning fully autonomous weapons while mandating **meaningful human control** as a legal standard.

Ethical Advocacy:

- Organizations such as **Human Rights Watch**, **PAX**, and the **International Committee of the Red Cross (ICRC)** have framed the AWS debate not only in legal but also in **humanitarian, moral, and philosophical** terms, arguing that machines can never meet the moral standards required in life-and-death decisions.

5.6.4 Emerging Proposals for Legal Frameworks

A number of proposals have been advanced in academic, diplomatic, and civil society circles regarding the possible legal regulation of AWS.

Legally Binding Treaty Prohibiting Fully Autonomous Weapons:

- Inspired by the **Ottawa Treaty (landmines)** and the **Convention on Cluster Munitions**, this model envisions a categorical prohibition of AWS that operate without meaningful human intervention.

- Proponents argue that preventive prohibition is the most effective way to avoid irreversible humanitarian and ethical harms.

Positive Obligations Framework:

- This regulatory model would not prohibit AWS outright but would impose **positive legal obligations** on states to:
  - Ensure human supervision,
  - Conduct weapons reviews under **Article 36 of Additional Protocol I**, and
  - Prove compliance with IHL principles of distinction, proportionality, and military necessity.

"Meaningful Human Control" Standard:

- A widely endorsed concept proposing that AWS must operate under human oversight in all critical functions, particularly **target selection and engagement**.
- However, **operationalizing "meaningful" control** remains legally and technically contentious, with debates around thresholds, timing, and context of human involvement.

Moratorium Approach:

- Some states and scholars suggest an **interim moratorium** on the development and deployment of AWS pending greater legal clarity and technological maturity.
- This approach mirrors historical arms control efforts in nuclear, chemical, and biological weapons development.

5.6.5 Regional and Multilateral Initiatives

In addition to global forums, several **regional bodies** have begun to consider regulatory pathways:

- **European Parliament**: Passed resolutions urging the EU and its Member States to advocate for a ban on fully autonomous weapons and support research on ethical AI use in warfare.
- **Latin American Conferences on LAWS**: Platforms such as the **Santiago Conference (2021)** have produced strong regional calls for legal prohibition and ethical accountability.
- **ASEAN Discussions**: Though still nascent, some ASEAN states have initiated national consultations on the legal and ethical dimensions of AWS.

5.6.6 Toward a Normative Regime: The Road Ahead

Despite disagreements on the nature and scope of regulation, international discourse on AWS reveals growing convergence on certain **foundational principles**:

- **Retention of human control** over lethal force is increasingly seen as a **non-negotiable norm**.
- **Legal accountability mechanisms** must remain anchored in state and human agency, even when machines are involved.
- The **Martens Clause**, **jus cogens norms**, and **public conscience** offer normative tools to guide treaty negotiations and ethical evaluations.

However, achieving binding outcomes will require overcoming **geopolitical inertia**, **technological opacity**, and the **absence of enforceable compliance mechanisms**. A piecemeal approach—combining binding norms with soft law instruments and civil society monitoring—may offer the most feasible path forward.

Current international efforts reflect both the urgency and complexity of regulating AWS. While the CCW remains the primary forum for intergovernmental negotiations, civil society, academia, and regional bodies have emerged as vital normative actors. The diversity of regulatory proposals—from outright bans to frameworks for meaningful human control—indicates that the future of AWS governance will likely rest on hybrid legal mechanisms that balance technological realities with humanitarian imperatives. Ensuring that autonomy in warfare does not come at the expense of human dignity, accountability, and the rule of law remains the paramount challenge for the international legal order.

5.7. Accountability Gaps and Responsibility Attribution in AWS Use

One of the most critical and unresolved challenges posed by Autonomous Weapons Systems (AWS) is the attribution of legal and moral responsibility for their actions, particularly in scenarios involving violations of International Humanitarian Law (IHL) or International Human Rights Law (IHRL). The decentralization of control, complexity of machine decision-making, and potential absence of direct human involvement give rise to significant accountability gaps, challenging the fundamental principles of state and individual liability under international law.

This section examines the multifaceted dimensions of the accountability dilemma posed by AWS: from command responsibility and state responsibility to the emergent question of machine liability and systemic impunity. It argues that existing legal frameworks are strained—though not entirely inadequate—in grappling with the diffusion of agency and the opaqueness of algorithmic warfare.

5.7.1 Traditional Accountability Under International Law

International humanitarian and criminal law are built on the premise that **human agents**—either state actors or individuals—make decisions, bear responsibility, and can be held legally accountable for unlawful acts.

Key Mechanisms:

- **State Responsibility**: States are liable under international law for acts attributable to them, including those of military forces using AWS (Articles 2 and 4 of the ILC Draft Articles on State Responsibility).
- **Individual Criminal Responsibility**: Individuals—including commanders, developers, and operators—may be prosecuted for war crimes, crimes against humanity, or genocide under international criminal law (Rome Statute of the International Criminal Court).

Core Doctrines:

- **Command Responsibility**: Military commanders may be held liable for crimes committed by subordinates if they knew or should have known about them and failed to prevent or punish.
- **Mens Rea and Actus Reus**: Criminal accountability requires a guilty mind (intent or recklessness) and a criminal act. These are difficult to establish in cases where AWS operate independently.

5.7.2 Accountability Gaps Unique to AWS

Autonomous weapons challenge these traditional frameworks in several ways, leading to what is often described as an **"accountability vacuum"**.

Dilution of Human Control:

When lethal decisions are delegated to machines, the human operator may not have sufficient control, awareness, or foreseeability over the system's actions. This creates a **causal disconnect** between human intent and machine outcomes.

Opacity and Unpredictability of Algorithms:

Advanced AWS use **machine learning** models that evolve through data training. Their decision-making logic may be **non-transparent**, even to developers—a phenomenon known as the "**black box**" problem. If even the designers cannot predict the system's behavior, how can responsibility be assigned?

Complexity of Attribution Chains:

Responsibility in AWS operations may be spread across multiple actors:

- Developers and programmers,
- Military commanders and procurement agencies,
- Private contractors,
- Political decision-makers,
- End-users or battlefield operators.

This **distributed accountability** blurs lines of legal liability and undermines enforceability.

5.7.3 Legal Accountability: Possible Models

Several models have been proposed to address these gaps and integrate AWS into existing or revised accountability frameworks.

Strict Liability for States:

Under this model, states deploying AWS would bear **absolute responsibility** for all unlawful outcomes, irrespective of fault. This aligns with the principle of **objective state responsibility** and ensures a deterrent effect against reckless deployment.

Functional Attribution:

Responsibility would be assigned based on **actual control and function**, irrespective of formal position. For example, a software engineer who wrote a targeting algorithm could be held liable if it was intentionally or negligently designed to breach IHL.

Presumption of Human Accountability:

This principle holds that **humans must always remain legally responsible** for the use of force. Delegating lethal authority to machines would thus not absolve any actor of liability, and legal systems would be required to trace back each AWS decision to a human overseer or chain of command.

5.7.4 The Prospect and Problem of Machine Accountability

An increasingly controversial proposal is the idea of **granting legal personhood or liability to machines**, especially as their autonomy and decision-making capabilities evolve. While currently speculative, this model draws from analogies to **corporate criminal liability**.

Legal and Philosophical Concerns:

- Machines lack **mens rea**, **moral agency**, and **conscience**, making punishment meaningless and unjust.
- Granting machines personhood may **undermine human accountability**, allowing powerful actors to scapegoat machines for strategic errors or atrocities.

- It risks **moral disengagement** by further dehumanizing warfare.

5.7.5 Ethical and Normative Imperatives

The accountability debate is not solely legal—it is profoundly **moral** and **normative**.

- The use of AWS raises questions about **justice for victims** of unlawful attacks. If no human actor can be held accountable, the victims are left without remedies or recognition.
- AWS can **obfuscate moral responsibility**, making warfare more sterile, untraceable, and bureaucratic—what Zygmunt Bauman called the "**modernity of evil**."

5.7.6 Case Studies and Hypotheticals

Several real-world and hypothetical cases highlight the urgency of the accountability dilemma:

- **Test case: Israel's Harpy and Harop drones**—autonomous loitering munitions with human-off-the-loop capabilities have raised concerns about targeting errors and oversight failures.
- **Hypothetical: AWS kills civilians due to flawed facial recognition or GPS errors**—who is liable: the programmer, the commander, the supplier, or the state?

Each scenario exposes the **inadequacy of current laws** to map fault in a machine-mediated chain of causation.

5.7.7 Proposals for Strengthening Accountability Regimes

- **Article 36 Weapons Review Enhancement**:
  - Require detailed scrutiny of AWS in weapons review processes.
  - Include algorithmic transparency, foreseeability of behavior, and human-machine interaction limits.
- **Meaningful Human Oversight Legislation**:
  - Codify laws that require clear human involvement in target selection and engagement, with command chains documented and traceable.
- **Liability Insurance or Compensation Funds**:
  - Inspired by models in civil aviation or nuclear accidents, AWS deployment could mandate contributions to victim compensation schemes.
- **Command Data Logging Requirements**:
  - Mandate tamper-proof logs of AWS activity and decision chains for later forensic analysis.
- **International Criminal Law Reform**:
  - Expand doctrines of **omission liability**, **negligent design**, or **command-by-neglect** to capture AWS-related war crimes.

The deployment of Autonomous Weapons Systems without robust accountability frameworks represents a fundamental threat to the legal and moral architecture of international law. The shift from human to machine decision-making in warfare risks creating a vacuum where unlawful deaths go unpunished and justice is denied. Closing these accountability gaps requires both legal innovation and ethical commitment. The future of IHL depends not only on regulating weapons but on preserving the core tenet that **someone must always be responsible** when lethal force is used.

6.CONCLUSION:

As robotics and AI continue to reshape the battlefield, International Humanitarian Law must evolve to ensure that its foundational principles remain robust and enforceable. Autonomous weapons pose both unprecedented challenges and opportunities. While they promise precision and operational efficiency, they also threaten to erode legal and moral constraints on warfare. A proactive and precautionary legal approach—grounded in the principles of IHL and informed by emerging technology ethics—is essential. Through international cooperation, rigorous legal review mechanisms, and transparent governance, the international community can navigate the tension between innovation and humanitarian protection.

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