

SZTUCZNA INTELIGENCJA JAKO WYZWANIE DLA WSPÓŁCZESNEGO SPOŁECZEŃSTWA

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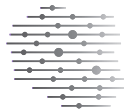
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SPIS TREŚCI/CONTENTS

Wstęp	7
<i>Federico Lombardi, SJ</i> Sztuczna inteligencja – współczesne perspektywy	9
<i>Daniele Amoroso</i> The legality of autonomous weapons systems under international humanitarian law: what the law says and how it could be improved	10
<i>Petrit Dollani</i> The challenges of service sector in the western balkan countries toward their integration with the european union	28
<i>Milka Hadjikotaeva</i> AI for language learning in higher education	38
<i>Ks. Paweł Kiejkowski</i> Obrona godności osoby ludzkiej w obliczu współczesnych wyzwań postępu naukowo-technicznego w encyklice <i>Spe Salvi</i> Benedykta XVI	47
<i>Ks. Mariusz Kuciński</i> Neuroetyka i jej aktualne wyzwania	54
<i>Rūta Meištė, Daiva Beržinskienė-Juozaïnienė</i> Transforming management practices: ai-driven approaches to decision making	64
<i>Karolina Muzyczka</i> Rola sztucznej in teligencji w administracji publicznej	77
<i>Teodora Rizova</i> Artificial intelligence as a challenge for tourism development	89
<i>Marta Wołoszynowska-Fraser, David Hulse</i> Artificial intelligence in higher science education – a two-educator perspective from Keele University	100
<i>o. Paweł Warchol</i> Człowiek pokarmem dla algorytmów czy karmiony miłością i miłosierdziem serca – refleksje o sztucznej inteligencji	111

THE LEGALITY OF AUTONOMOUS WEAPONS SYSTEMS UNDER INTERNATIONAL HUMANITARIAN LAW: WHAT THE LAW SAYS AND HOW IT COULD BE IMPROVED

*Daniele Amoroso*¹

1. Introduction

It is now widely acknowledged that recent advances in robotics and artificial intelligence (AI) have made it technically feasible to design weapon systems capable of selecting and engaging targets autonomously – that is, without requiring further human intervention after activation. Although the full technological potential of these systems has yet to be explored, there already exist concrete operational applications that fall squarely within the category of autonomous weapons systems (AWS).

This development has sparked a vast and multidisciplinary body of scholarly work, turning the issue into one of the most hotly debated topics in contemporary discussions among international law scholars, applied ethicists, and international relations theorists². The debate on the legal and ethical acceptability of these systems – and even more so on their regulation – has quickly transcended the academic domain, becoming the subject of persistent and highly politicized international negotiation.

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2 To get an idea of the size (and unmanageability) of the debate, and to limit oneself to one disciplinary field, it is enough to consider the number of international law monographs that scholars have published on this topic in the last few years: D. Copeland, *A Functional Approach to the Legal Review of Autonomous Weapon Systems*, Brill, Leiden 2025; L. Valdares Fernandes Barbosa, *Autonomous Weapons Systems and the Responsibility of States. Challenges and Possibilities*, Routledge, Abingdon/New York 2025; J. Kwik, *Lawfully Using Autonomous Weapon Technologies*, T.M.C. Asser, The Hague, 2024; B. de Vries, *Individual Criminal Responsibility for Autonomous Weapons Systems in International Criminal Law*, Brill, Leiden 2023; A. Seixas-Nunes, *The Legality and Accountability of Autonomous Weapon Systems. A Humanitarian Law Perspective*, Cambridge University Press, Cambridge 2022; I. Bode, H. Huells, *Autonomous Weapons Systems and International Norms*, McGill-Queen's University Press, Montréal/Kingston 2022; D. Mauri, *Autonomous Weapons Systems and the Protection of the Human Person. An International Law Analysis*, Edward Elgar, Cheltenham/Northampton 2022; D. Saxon, *Fighting Machines: Autonomous Weapons and Human Dignity*, University of Pennsylvania Press, Philadelphia 2021; T. McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict. Compatibility with International Humanitarian Law*, Cambridge University Press, Cambridge 2020; D. Amoroso, *Autonomous Weapons Systems and International Law. A Study on Human-Machine Interactions in Ethically and Legally Sensitive Domains*, ESU/Nomos, Napoli/Baden Baden 2020.

Civil society has played a crucial role in this evolution. Since 2013, the Campaign to Stop Killer Robots (SKR) has been instrumental in placing the issue at the forefront of multilateral agendas. Specifically, the legal and regulatory implications of weapon autonomy have, for nearly a decade, been at the center of the work of a Group of Governmental Experts (GGE) established under the framework of the Convention on Certain Conventional Weapons (CCW), and more recently, have made their way into the debates of the United Nations General Assembly.

A comprehensive review of this debate in its technical, legal, and political dimensions would be unfeasible within the limits of this article – and arguably unnecessary, given the extensive literature already available. This article therefore adopts a narrower focus: first, it aims to portray the existing legal framework applicable to AWS, with particular emphasis on the rules of international humanitarian law (IHL), which for quite obvious reasons constitute the natural regulatory *milieu* for such technologies. Second, it outlines possible directions for the development – or consolidation – of a future international legal regime, assessing their practicability in light of the tensions that currently divide the international community.

After clarifying, in Section 2, the notion of autonomous weapons systems and the main typologies of AWS currently deployed or under development, Sections 3 and 4 analyze the provisions of IHL that shape the existing legal framework. Section 3 focuses on the legal reviews of new weapons under Article 36 of Additional Protocol I to the Geneva Conventions, emphasizing how the decision-making autonomy of AWS presents a novel conceptual challenge: it requires assessing not only the intrinsic legality of the weapon system, but also its actual capacity to operate in compliance with the core targeting principles of distinction and proportionality. Section 4 explores the obligations derived from the principle of precaution, and its implications for the design of AWS and for the interaction between human operators and machines. Section 5 provides a synthesis of the obligations that can be derived from the existing legal framework, with particular attention to the conditions under which the lawful use of AWS may be possible. Future regulatory perspectives are addressed in Section 6, which outlines the main proposals currently under international discussion, with specific focus on the “two-tier” approach advocated by the International Committee of the Red Cross (Section 6.1), and on the most recent developments within the GGE and the UN General Assembly (Section 6.2). Section 7 concludes with some reflections on the future of multilateral regulation in this domain.

2. Operational Definition and Typologies of Autonomous Weapons Systems

An autonomous weapons system (AWS) can be defined as a weapons system capable of selecting and engaging a target without requiring further human intervention after activation. While not without its shortcomings – chief among them its potential over-inclusiveness – this definition represents a widely accepted starting

point in current discussions, having been endorsed by a range of institutional and non-governmental actors³. It appears, with only minor variations, in official documents and statements not only from the Campaign to Stop Killer Robots⁴, but also from actors with partially or wholly divergent views, such as the US Department of Defense⁵ and the International Committee of the Red Cross (ICRC)⁶.

It is important to note that the use of artificial intelligence (AI) is not a necessary condition under this definition. AI is not a constitutive element of autonomous weapon systems, but rather a technological enabler of their operational autonomy – particularly in the case of more sophisticated and adaptive systems⁷. From this perspective, the distinction between AWS “with” or “without” AI may be functionally relevant but does not affect the legal classification of a system as autonomous.

As noted, the operational definition adopted here is quite broad. Several systems that fall within its scope are already in use today, albeit in specific operational contexts⁸. Examples include air defense systems such as Israel’s Iron Dome, designed to respond automatically to incoming threats⁹, or more advanced forms of “fire and forget” munitions, like the British Brimstone missile¹⁰. Another frequently cited case is that of South Korea’s SGR-A1 and Super aEgis II sentry robots¹¹: while technically capable of autonomously identifying and engaging targets, these systems are, as far as is known, currently operated in semi-autonomous mode – where the target is identified by the machine, but the decision to fire remains with a human operator¹². Particularly noteworthy, moreover, are loitering munitions such as the Israeli Harpy NG, a “suicide drone” capable of patrolling an area for several hours in search of radiofrequency emissions to strike, without any human input beyond initial activation¹³.

Other systems, currently under development, appear likely to further enhance decision-making autonomy in military operations. These include AI-controlled fighter jet prototypes that have successfully outperformed human pilots in simulated dogfights¹⁴, as well as research in swarm robotics aimed at developing armed drone swarms – small, low-cost systems deployed in large numbers (potentially hundreds

3 For a more granular, and scientifically accurate, definition, see M.R. Taddeo, A. Blanchard, *A Comparative Analysis of the Definitions of Autonomous Weapons Systems*, “Science and Engineering Ethics” 2022, p. 37 ff.

4 Human Rights Watch, *Losing Humanity. The Case against Killer Robots*, 2012, p. 1.

5 Department of Defense, Directive 3000.09, “Autonomy in Weapons Systems”, 2012, revised in 2023.

6 International Committee of the Red Cross, *Position on Autonomous Weapon Systems*, 2021.

7 P. Asaro, *What is an ‘Artificial Intelligence Arms Race’ Anyway?*, “I/S: A Journal of Law and Policy for the Information Society” 2019, p. 45 ff., p. 60.

8 V. Boulanin, M. Verbruggen, *Mapping the Development of Autonomy in Weapon Systems*, SIPRI, Stockholm 2017.

9 Ibidem, p. 37 ff.

10 Ibidem, p. 47 ff.

11 Ibidem, p. 44 ff.

12 S. Parkin, *Killer robots: The soldiers that never sleep*, “BBC news”, 16 July 2015.

13 Boulanin, Verbruggen, op. cit., p. 60 ff.

14 S. Losey, *US Air Force stages dogfights with AI-flown fighter jet*, “DefenseNews”, 19 April 2024.

or thousands) to overwhelm enemy air defenses through sudden, coordinated saturation attacks¹⁵.

3. What the Law Says: Article 36 of the First Additional Protocol to the Geneva Conventions

Any analysis of the international legal norms applicable to autonomous weapons systems, *qua* emerging technologies, cannot but begin with Article 36 of the First Additional Protocol to the Geneva Conventions of 1977. This provision – significantly titled “New Weapons” – establishes the obligation for each High Contracting Party to determine, “[i]n the study, development, acquisition or adoption of a new weapon,” whether its use “would, in some or all circumstances, be prohibited by [the] Protocol or by any other [applicable] rule of international law.”

As a treaty-based norm, Article 36 is binding only on those States that have ratified the First Additional Protocol. However, it is noteworthy that militarily significant States not party to the Protocol – such as the United States¹⁶ and Israel¹⁷ – nonetheless conduct regular legal reviews of new weapons systems¹⁸. The relevance of this obligation to autonomous weapons systems has also been explicitly recognized in the Guiding Principles adopted by consensus within the GGE on Lethal Autonomous Weapon Systems, which reproduce – almost verbatim – the wording of Article 36¹⁹.

Evidently, Article 36 imposes a procedural obligation aimed at ensuring that the integration of new weapons technologies into a State’s arsenal occurs in compliance with existing international law. Traditionally, such legal reviews assess a system’s conformity with IHL norms that prohibit or regulate the use of specific categories of weapons – such as the ban on blinding lasers or the prohibition of weapons that cause superfluous injury or unnecessary suffering. In the case of autonomous weapons systems, however, the situation is conceptually more complex. As noted by the Swiss delegation during the informal debates leading up to the creation of the GGE, these systems are designed to complete the entire targeting cycle without human intervention²⁰. This significantly expands the scope of the legal review: it is not enough to assess whether the weapon is lawful *per se*; one must also evaluate whether, and under what conditions, it is capable of operating in compliance with the rules governing targeting under IHL²¹.

15 M. Ekelhof, G. Persi Paoli, *Swarm Robotics. Technical and Operational Overview of the Next Generation of Autonomous Systems*, UNIDIR, Geneva 2020.

16 US Army regulation 27-53 (1979), last revised in 2019.

17 N. Jevglevskaia, *Weapons Review Obligation under Customary International Law*, “International Law Studies”, 2019, p. 186 ff., p. 209.

18 This led some authors to suggest that a similar obligation is enshrined in customary international law. See Jevglevskaia, *cit.*

19 Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, 25 September 2019, CCW/GGE.1/2019/3, Annex IV, Guiding Principles, Principle (e).

20 Switzerland, *Towards a “compliance-based” approach to LAWS*, Working Paper, CCW Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), Geneva, 30 March 2016.

21 Copeland, *op. cit.*, p. 152.

This results in a substantial enrichment of the review criteria. In particular, it must be assessed whether the system can, in practice, comply with the core principles of the law of armed conflict: the principle of distinction and the principle of proportionality²². The third cornerstone of targeting law – the principle of precaution – will be examined later, as it raises issues warranting separate consideration.

Before turning to the specific challenges posed by autonomy with respect to the above principles, it is important to highlight another crucial element of the legal review obligation. Both Article 36 and the Guiding Principles clarify that a new weapon (and, by extension, an autonomous weapons system) may be deemed unlawful “in some or all circumstances.” This formulation enables a nuanced assessment that goes beyond the weapon’s intrinsic features and takes into account the concrete conditions of its use. As a result, the deployment of an autonomous weapon system may be considered lawful under certain circumstances, yet inadmissible under others.

3.1. The principle of distinction

The principle of distinction stands as one of the cornerstones of international humanitarian law. It requires belligerents to distinguish, at all times, between civilians and combatants, and between civilian objects and military objectives. Article 48 of the First Additional Protocol to the Geneva Conventions of 1977 sets out the general rule: “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.” This principle is further elaborated in Articles 51(2) and 52(1) of the same Protocol, which regulate the protection of civilians and civilian objects, respectively.

Additional provisions, though not directly aimed at the protection of civilians, also raise issues of distinction. For instance, Article 41(2) of the Protocol prohibits attacks on persons who are *hors de combat* – that is, enemy combatants who have expressed an intent to surrender or are incapacitated due to wounds, shipwreck, or sickness, provided they abstain from hostile acts and do not attempt escape²³.

While the normative content of the principle appears clear in the abstract, its practical application remains fraught with complexity, particularly in urban warfare scenarios. In such environments, combatants often blend into the civilian population, and civilian objects are frequently used for military purposes. Consider, for instance, civilians who directly participate in hostilities (Article 51(3))²⁴, thus temporarily losing their protection, or dual-use objects, which qualify as legitimate military objectives by virtue of their intended use or actual deployment, as defined by Article 52(2)²⁵.

22 Ibidem, p. 245.

23 For a more complete overview of IHL norms raising issues of distinction, see Amoroso, op. cit., p. 56 ff.

24 E. Crawford, *Identifying the Enemy: Civilian Participation in Armed Conflict*, Oxford University Press, New York 2015.

25 F. Capone, *Dual-use Objects under International Humanitarian Law: Towards a Paradigm Shift*, T.M.C. Asser Press, The Hague 2025.

This complexity inevitably affects the ability of autonomous weapons systems to comply with the principle of distinction. There is little doubt that some identification tasks required by this principle can already be performed reliably by current technologies. This is clearly the case with “cooperative” objects – those emitting detectable signals such as radar or transponders. A well-known example is the Israeli Harpy NG, which can locate and strike its targets based solely on emitted radio frequencies²⁶. The same holds for identifying military objectives *by nature*, such as tanks, helicopters, or missiles. Advanced air defense systems and sophisticated “fire-and-forget” munitions like the UK’s Brimstone can autonomously identify such targets²⁷.

It is worth noting that various IHL provisions are designed to facilitate the identification of legitimate targets as well as protected persons and objects. Some promote the “cooperation” by protected objects through identifiable signals. Annex I to the First Protocol, for example, outlines specific light, radio, and electronic signals to be used by medical aircraft, ships, and vehicles to enhance visibility²⁸. Other norms require distinctive emblems or markings to signal protected status – such as the Red Cross for medical services, the Blue Shield for cultural property, and three orange circles for installations containing dangerous forces²⁹. Likewise, combatants are obliged to distinguish themselves from the civilian population (e.g., by wearing uniforms) while engaging in attacks or military operations preparatory to attacks³⁰. Though originally aimed at facilitating human compliance with the principle of distinction, these obligations also simplify perceptual tasks for autonomous systems, which ultimately boil down to recognizing such signals and emblems.

Somewhat more complex tasks – if clearly coded through visual or behavioral markers – might also be within reach. For instance, identifying a combatant who is surrendering, provided the gesture is unambiguous (e.g., raised hands). According to some reports, the SGR-A1 robotic sentry system is capable of recognizing surrender signals³¹. However, it operates in the demilitarized zone between the two Koreas, an environment largely devoid of confounding variables.

Far more challenging are tasks involving contextual assessments and dynamic interpretation. These include identifying civilians directly participating in hostilities, classifying an object as a military target by use or function (e.g., a school used as a weapons depot), or generally applying the principle of distinction in urban guerrilla warfare, where legitimate targets and protected persons or objects coexist. In such scenarios, compliance with the principle of distinction requires not only the perception of physical features but also an understanding of

26 P. Scharre, *Army of None. Autonomous Weapons and the Future of War*, W.W. Norton & Company, New York 2018, p. 84.

27 Boulanin and Verbruggen, cit., respectively at pp. 37-39 and 49-50.

28 Arts. 6-8, 10-11.

29 See, respectively, art. 44 of the First Geneva Convention of 1949, arts. 16-17 of the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict, and art. 56(7) of the First Additional Protocol to the Geneva Conventions.

30 Art. 44(3) of the First Additional Protocol to the Geneva Conventions.

31 Boulanin and Verbruggen, op. cit., p. 45.

function, operational context, and situational dynamics – capacities that remain beyond the reach of AI³².

None of this rules out the possibility that future technological developments could expand the evaluative capacity of autonomous systems to scenarios currently deemed beyond reach. Deep learning architectures and training on extensive, realistic datasets may enable increasingly sophisticated perception and inference. Still, the qualitative leap required to bridge the gap between algorithmic cognition and human judgment in these contexts is considerable – and, at present, there is no concrete evidence that such a breakthrough is imminent.

3.2. The principle of proportionality

The principle of proportionality, codified in Article 51(5)(b) and reaffirmed in Article 57(2)(a)(iii) of the First Additional Protocol, prohibits attacks that are expected to cause incidental civilian harm (so-called “collateral damage”) that would be excessive in relation to the concrete and direct military advantage anticipated. An attack does not become unlawful merely because it causes collateral damage; rather, under the proportionality principle, its lawfulness hinges on an *ex ante* assessment based on three logical steps:

- estimating the expected collateral damage (to civilians and civilian objects);
- evaluating the anticipated military advantage;
- determining whether the former is excessive in relation to the latter.

Of these three steps, only the first is relatively amenable to autonomous processing. Armed forces – particularly the US military – already make extensive use of software tools to estimate, during the planning phase, the impact of an attack on civilians, buildings, and infrastructure³³. These tools can reliably calculate explosion radii, shrapnel dispersal, structural damage to nearby buildings, and risk to persons in adjacent areas.

Evaluating military advantage is a more complex task. Unlike the principle of distinction – where identifying a person or object as a legitimate military target can suffice – proportionality requires assigning a value to the expected military advantage so that it can be weighed against estimated harm³⁴. This involves variables that are difficult to quantify and context-dependent: the strategic or tactical importance of the target, the phase of the conflict, and the level of certainty regarding mission success.

32 Human Rights Watch, *A Hazard to Human Rights. Autonomous Weapons Systems and Digital Decision-Making*, 28 April 2025, p. 19; International Committee of the Red Cross, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts. Building a Culture of Compliance for IHL to Protect Humanity in Today’s and Future Conflicts*, 2024, p. 65.

33 J.S. Thurnher, *Examining Autonomous Weapon Systems from a Law of Armed Conflict Perspective*, [in:] H. Nasu, R. McLaughlin (eds.), *New Technologies and the Law of Armed Conflict*, T.M.C. Asser Press, The Hague 2014, p. 213 ff., p. 222.

34 J. Holland, *Military Objective and Collateral Damage: Their Relationship and Dynamics*, “Yearbook of International Humanitarian Law” 2004, p. 35 ff., p. 54.

The most resistant step to algorithmic codification, however, is the core of the principle itself: assessing whether the expected collateral damage would be excessive. This judgment requires balancing fundamentally unlike values – such as the number of civilians potentially harmed versus the tactical value of a military installation³⁵. As a result, proportionality does not lend itself to a “binary” application in the same way that distinction might³⁶.

The standard developed in practice to guide the application of the proportionality principle is that of the “reasonable military commander”³⁷. However, this standard merely delineates a zone of acceptable discretion, encompassing a range of proportionality judgments – from those that prioritize civilian protection to those favoring military gain – all of which may be considered lawful³⁸.

The difficulty of translating such a vague and context-sensitive standard into programmable code is self-evident. It is therefore unsurprising that even proponents of robust autonomous weapons deployment concede that the proportionality assessment must remain in human hands – typically performed during the planning phase of an attack³⁹.

4. What the Law Says II: The principle of precaution

Alongside Article 36 of the First Additional Protocol, another fundamental rule – still from a *lex lata* perspective – is the principle of precaution, which requires parties to a conflict to take all feasible precautions to ensure compliance with the principles of distinction and proportionality.

Codified in Article 57 of the First Additional Protocol, the principle of precaution essentially translates into a series of positive obligations aimed at preventing violations of humanitarian law. Among the most relevant are:

- the obligation to do everything feasible to ensure that targets are correctly identified as military objectives⁴⁰;

35 W.J. Fenrick, *The Rule of Proportionality and Protocol I on Conventional Warfare*, “Military Law Review”, 1986, pp. 91 ff., p. 94.

36 Despite the challenges noted in Section 3.1, it is at least theoretically possible to determine whether a person or object is protected or not under IHL. See E. Cannizzaro, *Proportionality in the Law of Armed Conflict*, [in:] A. Clapham, P. Gaeta (eds.), *The Oxford Handbook of International Law in Armed Conflict*, Oxford University Press, New York 2014, p. 332 ff., p. 332.

37 See, also for further references, I. Henderson, K. Reece, *Proportionality under International Humanitarian Law: The “Reasonable Military Commander” Standard and Reverberating Effects*, “Vanderbilt Journal of Transnational Law”, 2018, p. 835 ff., p. 845.

38 Israeli Supreme Court, *Beit Sourik Village Council v. The Government of Israel*, HCJ 2056/04, 30 May 2004, paras. 42 and 46.

39 See e.g. M. Zajac, *AWS compliance with the ethical principle of proportionality: three possible solutions*, “Ethics and Information Technology”, 2023; I. Henderson, P. Keane, J. Liddy, *Remote and Autonomous Warfare Systems: Precautions in Attack and Individual Accountability*, [in:] J.D. Ohlin (ed.), *Research Handbook on Remote Warfare*, Edward Elgar, Cheltenham/Northampton, 2017, p. 335 ff., p. 352; M.N. Schmitt, J.S. Thurnher, “Out of the Loop”: *Autonomous Weapon Systems and the Law of Armed Conflict*, “Harvard National Security Journal”, 2013, p. 231 ff., p. 256.

40 J.-M. Henckaerts, L. Doswald-Beck, *Customary International Humanitarian Law*, Cambridge University Press, Cambridge, 2005, Rule 16.

- the obligation to do everything feasible to maintain control over the execution of the attack, so that it may be cancelled or suspended when necessary to avoid a direct attack on civilians or excessive collateral damage⁴¹.

This has significant implications for the normative model governing the relationship between human operators and weapons systems. The principle of precaution obliges parties to mobilize all available means – where reasonably accessible – to facilitate the correct qualification of a target as legitimate⁴². If human involvement improves the precision of targeting decisions, then their inclusion in the decision-making process becomes a legal requirement under the precautionary principle. Accordingly, these systems must be designed to allow adequately trained operators to control and limit their effects.

The principle of precaution, therefore, demands critical reflection on how machines make decisions – and more importantly, how they fail. Even the most advanced AI systems remain prone to unpredictable and counterintuitive errors, sometimes incomprehensible even to their own developers⁴³. These are not human errors, stemming from fatigue or stress, but perceptual or cognitive failures tied to the so-called “semantic gap”: AI does not understand the meaning of the information it processes, but merely identifies statistical correlations among vast datasets at super-human speed⁴⁴.

This makes AI vulnerable to contextual misinterpretations, perceptual illusions, or intentional manipulations (so-called adversarial attacks)⁴⁵ – vulnerabilities from which human operators are largely immune. In the context of armed conflict, such errors could translate into direct attacks against civilian populations or significant incidental harm, making it evident that fully entrusting the targeting cycle to machines is ill-advised – just as excluding them altogether would be equally irrational. What the precautionary principle demands is a synergistic model of interaction between human operators and systems, where each compensates for the other’s limitations⁴⁶.

Naturally, this does not entail an unrealistic standard of human involvement. In certain scenarios, such as missile defense systems (e.g., Iron Dome), requiring detailed human oversight over each individual targeting decision would introduce unacceptable risks to human safety. But precisely because the obligations stemming

41 Ibidem, Rule 19.

42 M. Mancini, *Air Operations against the Federal Republic of Yugoslavia (1999)*, [in:] N. Ronzitti, G. Venturini (eds.), *The Law of Air Warfare: Contemporary Issues*, Eleven International Publishing, Utrecht, 2006, p. 273 ff., p. 278.

43 M. Liu and others, *Human and AI Perceptual Differences in Image Classification Errors*, “Proceedings of the AAAI Conference on Artificial Intelligence”, 2025, p. 14318 ff.

44 International Committee of the Red Cross, *Autonomy, artificial intelligence and robotics: Technical aspects of human control*, August 2019, p. 20.

45 It should be noted that such manipulations are often imperceptible to humans and, in any case, irrelevant to them. See K. Chowdhury, *Adversarial Machine Learning: Attacking and Safeguarding Image Datasets*, “arXiv”, 31 January 2025.

46 N.E. Sharkey, *Staying the Loop: Human Supervisory Control of Weapons*, [in:] N. Bhuta and others (eds.), *Autonomous Weapons Systems: Law, Ethics, Policy*, Cambridge University Press, Cambridge 2016, p. 23 ff.

from the principle of precaution are contingent on feasibility, international law does not require the impossible.

5. What the Law Says: Conclusions

The analysis conducted thus far makes it sufficiently clear that, although international humanitarian law does not contain norms explicitly dedicated to AWS, it nonetheless offers the legal tools necessary to assess their lawfulness. As noted, Article 36 of the First Additional Protocol is the key entry point: as a clause of pre-deployment review, it obliges States to determine whether the introduction of a new weapon system is compatible with existing international law, either in some or all circumstances. When applied to AWS, this entails evaluating their ability to conduct the targeting cycle in compliance with the principles of distinction and proportionality. Based on currently known and available technologies, the conclusion is that AWS pass this legality test only under certain conditions.

In particularly complex operational environments – most notably urban settings where legitimate targets and protected objects are in close physical proximity – the use of AWS demands extreme caution. In these scenarios, compliance with the principles of distinction and proportionality depends on context-sensitive assessments that, at present, only human operators can reliably perform. Consequently, the lawful deployment of AWS in such environments can be ensured only if critical decisions are made during the planning phase and remain under the responsibility of a human commander.

The use of dynamic targeting (i.e., non-preplanned) by an AWS can only be considered, in principle, within highly specific operational settings, such as desert or maritime environments, where:

- the absence of civilians can be reasonably ensured; or
- civilians are clearly separated from the military objectives to be engaged.

Regardless of the operational scenario, IHL requires, through the principle of precaution, that some form of human oversight be maintained, at minimum as a fail-safe mechanism – that is, a safeguard capable of blocking or interrupting the system's actions to prevent harm to civilians and civilian objects⁴⁷.

To ensure that human involvement can effectively fulfill this function, two further requirements must be met. First, operators must be trained to preserve their critical judgment, with an emphasis not only on the system's capabilities but also on its limitations, so as to avoid falling prey to the so-called automation bias. Second, AWS must be designed with interfaces that prioritize transparency and explainability, thereby enabling effective human-machine interaction even under conditions of high operational stress.

⁴⁷ P. Scharre, *Centaur Warfighting: The False Choice of Humans vs. Automation*, "Temple International & Comparative Law Journal", 2016, p. 151 ff., p. 154. The US Department of Defense has acknowledged the compatibility between operational autonomy and human supervision in Directive 3000.09, which includes the notion of "operator-supervised autonomous weapons systems" within the broader category of autonomous weapons systems. See Directive 3000.09, op. cit., p. 21.

6. How the Law Could Be Improved

For the time being, the regulation of autonomous weapons systems (AWS) remains dependent on the interpretation of general norms of international humanitarian law – chiefly, Article 36 of the First Additional Protocol and the main principles of targeting law (distinction, proportionality, and precaution). Despite the lack of a dedicated legal instrument, it is nonetheless possible – though not some interpretive effort – to derive from these norms a set of specific obligations governing the use of such technologies, which together appear to form a coherent and, all things considered, reasonably satisfactory regulatory framework.

This raises a fundamental question: why, then, have civil society and an increasing number of States continued to insist on the need for an ad hoc legal instrument, whether in the form of an additional protocol to the CCW or a standalone treaty? This question is all the more pertinent given that such insistence has recently gained institutional traction, notably through the repeated calls by the United Nations Secretary-General to conclude negotiations on such an instrument by 2026⁴⁸.

In the author’s view, at least three considerations support the adoption of a new legally binding instrument.

First, a dedicated instrument could make explicit and operationally clear those obligations which today must be inferred through interpretive reasoning. Military personnel, including those employing AWS, require rules that are readily applicable without recourse to complex legal mediation. Second, a new treaty could introduce rules not derived from existing legal norms but based on shared ethical concerns. This is the space occupied by proposals to prohibit the development and deployment of anti-personnel autonomous systems – proposals grounded in respect for human dignity and the irreplaceable role of moral judgment in the use of lethal force⁴⁹. Finally, a dedicated treaty could establish a stable institutional framework capable of ensuring not only the adoption of shared rules but also their effective implementation through mechanisms for monitoring, transparency, peer review, and confidence-building.

6.1. The “Two-Tier” Approach Proposed by the International Committee of the Red Cross

In 2021, following extensive internal discussions, the International Committee of the Red Cross published a position paper proposing a regulatory framework for AWS that, due to the clarity of its structure and the authority of its source, has significantly influenced the subsequent debate. The ICRC’s proposal is structured on two levels (so-called “two-tier” approach)⁵⁰. On the one hand, it calls for the outright prohibition of two categories of AWS: those designed to target human beings (anti-personnel AWS) and those whose operation is inherently unpredictable.

48 See, e.g., ‘Politically unacceptable, morally repugnant’: UN chief calls for global ban on ‘killer robots’, 13 May 2025, *UN News*.

49 On these issues, see – among others – Mauri, *op. cit.*; Saxon, *cit.*

50 ICRC, *Position*, *op. cit.*

On the other hand, it proposes a set of operational restrictions intended to ensure that AWS not covered by the bans remain subject to contextually appropriate human control.

The restrictions envisaged by the ICRC include: limits on the types of targets that may be autonomously engaged (specifically, only objects that qualify as military objectives by nature); limits on the duration, geographical scope, and scale of AWS operations; and limits related to the operational context, permitting the use of AWS only in environments where civilians are absent or clearly separated from lawful military targets. Furthermore, these systems – despite being autonomous – must remain under human supervision, with a human operator empowered to interrupt the system’s functioning and veto its targeting decisions.

Interestingly, the ICRC’s proposal does not explicitly use the term “meaningful human control,” a concept that had previously shaped (and still partially informs) the discussion on this topic⁵¹. Nevertheless, the two-tier approach is broadly compatible with that concept and may indeed be viewed as its concrete elaboration. It is also worth noting that the operational limits outlined by the ICRC reflect and specify the obligations inferred earlier in this paper from Article 36 of the First Additional Protocol and the precautionary principle. The most notable innovation of the ICRC’s proposal lies in its categorical ban on anti-personnel AWS – a ban grounded in ethical considerations, particularly the need to preserve human dignity and the rejection of delegating life-and-death decisions to artificial agents.

6.2. From Geneva to New York (and Back): The Rising Role of the General Assembly and the “Rolling Text”

Thanks to persistent lobbying by civil society, recent years have seen the diplomatic debate on AWS expand beyond the confines of the Geneva-based GGE, reaching the broader and more inclusive forum of the United Nations General Assembly. Although the discussions in New York have yet to produce any major developments, a key step forward came with Resolution 78/241, which tasked the UN Secretary-General with collecting and summarizing States’ positions on the regulation of AWS⁵².

This initiative proved successful: numerous States submitted their observations, including Italy, which for the first time articulated a relatively clear official position⁵³. The Italian stance shows significant convergence with the ICRC’s proposal and largely reproduces a two-tier approach, albeit with some key differences. Notably, it omits any reference to a ban on anti-personnel AWS. However, this absence is somewhat offset by the assertion that an AWS can only be considered lawful if the

⁵¹ This notion was originally introduced in the debate by the UK-based NGO Article36. See Article36, *Killer Robots: UK Government Policy on Fully Autonomous Weapons*, April 2013.

⁵² *Lethal autonomous weapons systems*, 22 December 2023, UN Doc. A/RES/78/241, para. 2.

⁵³ *Lethal autonomous weapons systems. Report of the Secretary-General*, 1 July 2024, UN Doc. A/79/88, p. 63 ff.

“final crucial function” – that is, “the decision of whether or not to apply force to a previously identified and selected target” – remains under human control⁵⁴. Insofar as such a system cannot engage a target without human authorization, it clearly falls outside the scope of autonomous systems proper and may be more accurately classified as semi-autonomous.

The involvement of the General Assembly alongside the GGE has thus served a dual purpose: involving States that are not parties to the CCW in the debate and, thanks to the Secretariat’s compilation efforts, systematizing the positions that have emerged, whether individually or as part of broader coalitions.

There has also been a notable development in Geneva. A “rolling text”, prepared by the current GGE chair, Dutch Ambassador in den Bosch, has been circulated. This evolving document is divided into five thematic boxes: I (Definitions), II (General Principles), III (Prohibitions and Operational Restrictions), IV (Preventive Measures), and V (Accountability)⁵⁵. The chair’s aim is to provide a concrete basis for discussion, encouraging delegations to engage with a specific text – ideally culminating in a new CCW Protocol or other binding instrument – instead of endlessly debating abstract principles⁵⁶.

In its most recent version, the text partially reflects a two-tier approach. In terms of prohibitions, it merely reiterates well-established rules whose applicability to AWS is undisputed (e.g., the prohibition on superfluous injury or unnecessary suffering), without explicitly banning anti-personnel AWS. Far more noteworthy is its call for “contextually appropriate human judgment and control”, clarified through a set of measures intended to ensure such control, including: predictability and traceability of effects; limitations on operational parameters (targets, duration, geographical area); inclusion of automatic deactivation mechanisms; and oversight of self-learning capabilities⁵⁷.

However, ambiguities remain. The text does not specify what makes human control “appropriate” in a given context, nor does it clarify the scope of decision-making authority that must be retained by human operators (planning only? supervision? veto power? approval of each targeting decision?)⁵⁸. To address this, it may be helpful to revisit a proposal made elsewhere⁵⁹, i.e. to calibrate the level of required human control according to three factors:

What the system is expected to do: the nature of its tasks (offensive or defensive) and of its assigned targets (e.g., military objectives by nature vs. members of an armed opposition group);

⁵⁴ Ibidem, p. 64.

⁵⁵ GGE on LAWS, Rolling text, status date: 12 May 2025, available *here*. The boxes’ titles have been added by the author based on their contents.

⁵⁶ This choice proved fruitful, at least in the short term, sparking a lively debate after years of stalemate. See L. Varela, *Editorial: Disarmament is Always the Smartest Choice*, “CCW Report”, 2025, p. 1 ff.

⁵⁷ *Rolling text*, op. cit., III.6.

⁵⁸ See, however, the *Background paper on context-appropriate human judgement and control and the critical functions of LAWS*, submitted on 20 May 2025 by the Chair (UN Doc. CCW/GGE.1/2025/CRP.1).

⁵⁹ D. Amoroso, G. Tamburrini, *Toward a Normative Model of Meaningful Human Control over Weapons Systems*, “Ethics & International Affairs”, 2021, p. 245 ff.

Where it is to be deployed: the characteristics of the operational environment (e.g., presence or absence of civilians);

How the system functions: its sensorimotor capabilities and data-processing techniques (e.g., swarming, loitering, machine learning).

The greater the ethical and legal concerns raised by a system's mission and operational setting, the stricter the level of human control needed for it to be considered contextually appropriate. For instance, an AWS designed to identify civilians directly participating in hostilities in an urban environment must be subject to tighter control than one tasked with intercepting enemy missiles in a desert setting. The same goes for systems with features – like swarming – that may lead to unpredictable “emergent behavior”, thereby justifying stronger oversight by human operators.

7. Concluding Remarks

A broad and sufficiently representative segment of the international community – 127 States, along with the Holy See and Palestine – has now declared support for the adoption of a legally binding instrument on AWS. To put this figure in perspective, it is roughly equivalent to the number of States Parties to the Convention on Certain Conventional Weapons, although the two groups do not entirely overlap. This development is accompanied by other positive signals: the gradual consolidation of a shared language within the GGE, aided by the circulation of the “rolling text,” and, at a more political level, the UN Secretary-General's explicit commitment to facilitate the conclusion of a binding instrument on AWS by 2026. All of this suggests that the adoption of such a treaty, while still difficult, can no longer be dismissed as a pipedream.

However, obstacles remain that cannot be ignored. Among the 54 States that have yet to take a clear position – and especially among the 12 that have expressed explicit opposition – are numerous “militarily significant States”, to borrow from the language of the CCW Preamble, including the US, Russia, the UK, Israel, India, and Australia. Against this backdrop, it is not unlikely that any future treaty may follow the trajectory of the Treaty on the Prohibition of Nuclear Weapons, which, despite initial support from 138 States, has so far been ratified by only about half of them and none of the nuclear powers – severely limiting its normative impact, perhaps even rendering it symbolic at best.

In light of this scenario, and given the deep and ongoing crisis afflicting multilateralism, it is worth exploring alternative paths, at least in the short to medium term. One “second-best” strategy could involve promoting the emergence and clarification of the legal norms discussed in this paper through a gradual convergence on unilateral best practices, formalized in national IHL military manuals. At present, the only national military manual that includes specific provisions on AWS is that of the United States⁶⁰. However, other States – including Italy and the United Kingdom – are currently updating their IHL manuals, and this pro-

60 US Department of Defense, *Law of War Manual*, June 2015 (last update July 2023), para. 6.5.9.

cess may provide a valuable opportunity to include similar provisions, ideally drawing inspiration from the approach proposed by the International Committee of the Red Cross.

If sufficiently harmonized, these practices could provide an important contribution to the formation of new customary norms, partially filling the current regulatory gap and laying the groundwork for a future treaty. International case law has recognized military manuals as a relevant source for identifying the constituent elements of customary law⁶¹. Viewed in this light, they should not be seen merely as internal training tools but, pending the conclusion of a widely supported treaty, as bottom-up normative instruments capable of shaping and guiding future legal developments.

LEGALNOŚĆ AUTONOMICZNYCH SYSTEMÓW UZBROJENIA W ŚWIETLE MIĘDZYNARODOWEGO PRAWA HUMANITARNEGO: CO MÓWI PRAWO I JAK MOŻNA JE POPRAWIĆ

Streszczenie: Niniejszy artykuł ma dwójaki cel: z jednej strony, przedstawienie uzasadnionej rekonstrukcji ram prawnych mających obecnie zastosowanie do autonomicznych systemów uzbrojenia (AWS), ze szczególnym uwzględnieniem zasad międzynarodowego prawa humanitarnego (MPH); z drugiej strony, nakreślenie możliwych trajektorii, wzdłuż których przyszły reżim międzynarodowy może się rozwijać lub konsolidować. Po wyjaśnieniu pojęcia AWS i głównych kategorii systemów obecnie używanych lub opracowywanych, w artykule przeanalizowano przepisy międzynarodowego prawa humanitarnego, które kształtują istniejące ramy regulacyjne. Szczególną uwagę zwrócono na przeglądy prawne nowych rodzajów broni wymagane na mocy art. 36 Protokołu dodatkowego I. Analiza podkreśla, że autonomia decyzyjna takich systemów stanowi nowe wyzwanie koncepcyjne, ponieważ wymaga oceny nie tylko wewnętrznej legalności broni, ale także jej praktycznej zdolności do działania zgodnie z zasadami regulującymi celowanie, w szczególności rozróżnienie i proporcjonalność. W dalszej części artykułu przeanalizowano obowiązki wynikające z zasady ostrożności i ich implikacje dla projektowania systemów oraz interfejsu człowiek-maszyna. W drugiej części omówiono przyszłe perspektywy regulacyjne, przedstawiając główne propozycje będące obecnie przedmiotem dyskusji na szczeblu międzynarodowym, ze szczególnym uwzględnieniem „dwupoziomowego” podejścia opracowanego przez Międzynarodowy Komitet Czerwonego Krzyża oraz ostatnich postępów w negocjacjach zarówno w ramach GGE CCW, jak i w kontekście ONZ.

Słowa kluczowe: autonomiczne systemy uzbrojenia, międzynarodowe prawo humanitarne (MPH), legalność broni, projektowanie systemów, interfejs człowiek-maszyna, Międzynarodowy Komitet Czerwonego Krzyża, GGE CCW, ONZ.

Summary: This article pursues a twofold objective: on the one hand, to provide a reasoned reconstruction of the legal framework currently applicable to autonomous weapon systems

61 See, for instance, International Criminal Tribunal for the former Yugoslavia, *The Prosecutor v. Dusko Tadić*, IT-94-1-AR72, Appeals Chamber, Decision, 2 October 1995, paras. 92, 99, 108, 118, 131, 580.

(AWS), with a particular focus on the rules of international humanitarian law (IHL); on the other, to outline possible trajectories along which a future international regime might develop or consolidate. After clarifying the notion of AWS and the main categories of systems currently in use or under development, the article examines the IHL provisions that shape the existing regulatory framework. Particular attention is paid to the legal reviews of new weapons required under Article 36 of Additional Protocol I. The analysis highlights how the decision-making autonomy of such systems poses a novel conceptual challenge, as it requires assessing not only the intrinsic legality of the weapon, but also its practical capacity to operate in compliance with the principles governing targeting, particularly distinction and proportionality. The article further explores the obligations stemming from the principle of precaution and their implications for system design and for the human-machine interface. The second part turns to future regulatory prospects, presenting the main proposals currently under international discussion, with specific reference to the “two-tier” approach developed by the International Committee of the Red Cross and to recent developments in negotiations within both the CCW’s GGE and the UN context.

Keywords: autonomous weapon systems, international humanitarian law (IHL), weapons legality, systems design, human-machine interface, International Committee of the Red Cross, GGE CCW, UN.

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