The law in the face of autonomous weapons: A reading of Article 36 of Additional Protocol I of 1977

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Received: 01/01/2026 *Accepted: 08/04/2026* *Published:22 /04/2026*

Abstract:

This study focuses on testing the applicability of Article 36 of Additional Protocol I to autonomous weapons as a preventive mechanism for reviewing the legality of new weapons before their deployment. It demonstrates that the obligation to review extends to AI-enhanced systems, including software, operational doctrines, and substantive modifications. The study reveals that the complexity of algorithms and the difficulty in predicting behavior pose particular challenges to applying the principles of distinction, proportionality, and precaution. This necessitates sufficient levels of purposeful human control and predictability to ensure compliance and legal accountability. The study also examines national models of multidisciplinary review structures and the role of combined technical and legal expertise in evaluating autonomous systems. It concludes that the technical and testing challenges make effective review contingent upon broader international cooperation and the development of guidelines and practical tools to strengthen the preventive nature of Article 36 in the face of the rapid development of autonomous weapons.

Keywords: Article 36 of Additional Protocol I, Autonomous Weapons, International Humanitarian Law, Purposeful Human Control, Military Artificial Intelligence.

1. INTRODUCTION

Today, autonomous weapons are advancing into the heart of the battlefield, driven by developments in artificial intelligence. Algorithms are becoming key players in target selection and engagement, and this forces international humanitarian law to develop existing mechanisms to regulate the legitimacy of this technological leap. In this context, Article 36 of Additional Protocol I of 1977 stands out as the most important treaty instrument for reviewing the legitimacy of new weapons. However, the complexity and functional independence of autonomous systems test the limits of this classic mechanism and reveal conceptual and institutional gaps in how it is applied.

The importance of this topic stems from the convergence of three main paths: First, the structural shift in weapons technology towards systems capable of learning and making decisions in uncertain environments, which threatens to create gaps in human control and legal accountability; Second, the central preventive role of Article 36 reviews in preventing the introduction of weapons or methods of warfare that, by their nature or in their usual use, are incompatible with the rules of armed conflict; and Third, the escalating dynamics of international and jurisprudential debates on autonomous weapons, which reveal a divergence in national positions and practices regarding the extent and scope of the review due to these systems.

Accordingly, the study's main problem revolves around the following question: To what extent does the commitment to legal review of new weapons, as stipulated in Article 36, enable an effective review of autonomous weapons that ensures their compliance with the provisions of international humanitarian law and the requirements of international responsibility, given their technical and functional complexity? Several sub-questions stem from this problem, including: What is the objective and temporal scope of applying Article 36 to AI-enhanced systems? What are the essential criteria that should guide the review of these systems, particularly with regard to the principles of distinction, proportionality, precaution, purposeful human control, and predictability? How do current national practices, through multidisciplinary review structures, reflect the strengths and weaknesses in the practical implementation of this commitment, and what prospects exist for strengthening it through international cooperation and the development of common guiding principles?

This study aims to achieve four interrelated objectives: First, to establish the theoretical framework of Article 36 and explain the content of the obligation to conduct legal review and its preventive nature, adapting it to the case of autonomous weapons; Second, to analyze the legal review standards relevant to these systems, particularly the application of the principles of distinction, proportionality, precaution, human control requirements, predictability, and accountability; Third, to review selected models of national practices in establishing and activating weapons review mechanisms, highlighting the role of multidisciplinary expertise in evaluating AI-enhanced systems; and Fourth, to identify the practical challenges facing the technical evaluation and operational testing of these systems, and to propose practical and normative directions to enhance the effectiveness of the review and develop frameworks for international cooperation and exchange of experiences.

Methodologically, the study employs an analytical-descriptive approach based on the analysis of relevant legal texts, primarily the Geneva Conventions and Additional Protocol I, as well as an examination of official comments from the International Committee of the Red Cross and specialized legal interpretations, with the aim of deriving the rules and standards governing weapons review in the case of autonomous

systems. It also adopts a comparative approach to examine several national models for weapons review under Article 36.

2. The theoretical framework of Article 36 and its adaptation to autonomous weapons

This study aims to construct a coherent theoretical framework for understanding the function and scope of Article 36 of Additional Protocol I, with a view to adapting it to the case of AI-enhanced autonomous weapons. This requires clarifying the scope of the obligation to legally review and its preventive nature within the framework of international humanitarian law enforcement, and then demonstrating how the criteria of this obligation are incorporated when evaluating complex and functionally autonomous weapons systems. In this context, the study addresses the content of the obligation to review in terms of its applicability to new weapons, means, and methods of warfare, before moving on to analyze the criteria for its application to autonomous weapons, including the principles of distinction, proportionality, and precaution, as well as the requirements of purposeful human control and predictability.

2.1 The content of the commitment to legal review of new weapons

This requirement focuses on defining the substantive obligation stipulated in Article 36, specifically the scope, both temporal and substantive, of the review of new weapons, and the rules that must be applied when conducting such a review. Legal review is not limited to munitions or conventional physical systems, but extends to the means, methods, and operational doctrines associated with the use of armed force, including systems enhanced with software and artificial intelligence. By analyzing the concept of "novelty" and the extension of the review to various stages of a weapon's lifecycle, this requirement aims to highlight how States translate this obligation into structured domestic procedures to ensure that new capabilities comply with the provisions of international humanitarian law.

2.1.1 Scope of application of Article 36 of Additional Protocol I of 1977

Article 36 of Additional Protocol I includes every new weapon, means, or method of warfare that the State intends to study, develop, acquire, or adopt, so that the obligation of legal review extends to the physical and software systems and operational doctrines related to the use of armed force, not just to conventional ammunition[1]. It follows that every substantial development of an existing weapon or significant change in the method of its use must be subject to legal review, whether prior or subsequent, whenever such development or change is likely to affect the expected effects of the

[1] Protocol Additional to the Geneva Conventions of 12 August 1949 (Additional Protocol I), Article 36; see also ICRC, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977, 2006, Part 1, section 1.1.

weapon or the pattern of its operational deployment[1].

The "novelty" standard in the concept of Article 36 is understood in relation to the State concerned, such that a weapon or means of warfare is considered new if it enters its arsenal for the first time or is used by it in a different manner or operational context, even if it is known or used by other States. This justifies subjecting it to an independent national legal review[2]. In this sense, the review mandate extends to the various stages of the weapon's life cycle, from research and experimentation, through development and acquisition, to operational adoption and the doctrine associated with it, allowing for the monitoring of any potential conflict with the provisions of international humanitarian law and with relevant treaty and customary obligations before or during use[3].

This analysis demonstrates that the scope of Article 36 extends beyond the narrow view that limits review to the introduction of a "new weapon" as a separate physical system. It encompasses all aspects of the use of armed force, including means, methods of combat, and operational doctrines that, in their design, development, or deployment, may have a different impact on the battlefield. Thus, "novelty" becomes a dynamic criterion, measured by the context of the capability's introduction into a state's arsenal and its use, not merely by its initial technological emergence. This necessitates that states broaden the scope of review to cover substantial modifications, software updates, and changes in operational modes, ensuring the monitoring of potential conflicts with international humanitarian law throughout the weapon's entire lifecycle, not just at the moment of acquisition.

2.1.2 The preventive nature of the commitment to review

In this part of the research, we highlight the conception of the arms review function as a preventive component in the structure of enforcing international humanitarian law, not merely a technical procedure attached to armament programs. The review is linked to the stage of designing and acquiring military capabilities as a tool to control their compliance with treaty and customary rules before they enter service[4]. This approach is based on two interrelated ideas: preventing the introduction of illegal means of warfare into the arsenal in the first place, and shifting the state's responsibility from the logic of "responding after the violation" to the logic of "preemptive precaution" against the risks of illegality, reflecting a shift towards a preventive model in

[1] ICRC, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare, 2006, paras. on the material scope of review and the inclusion of modified existing weapons.
[2] Erin McClelland, "The Review of Weapons in accordance with Article 36 of Additional Protocol I," International Review of the Red Cross, vol. 85, no. 850, 2003, pp. 404–405.
[3] Stockholm International Peace Research Institute (SIPRI), Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems, SIPRI Insights on Peace and Security, no. 2015/1.
[4] ICRC, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977, 2006, Introduction and Part 1.

compliance with international humanitarian law[1].

First, linking the obligation to review to the prevention of the introduction of illicit weapons is consistent with what the literature of the International Committee of the Red Cross and SEPRI stipulates that Article 36 reviews are a tool for achieving ex ante compliance, i.e., before actual use, which makes them closer to a mechanism for prior regulatory control of armament policies rather than a mere formal test[2]. This perception places the burden on the State to prove that its design and acquisition of new capabilities have been subjected to systematic legal scrutiny, including an assessment of the expected effects on civilians and verification that no excessive suffering or indiscriminate damage has been caused, in connection with the principles of distinction, proportionality and precautions in attack[3].

Second, highlighting the shift from "reaction" to "proactive examination" places the review system in an integrated position with subsequent accountability mechanisms (such as criminal investigations or fact-finding committees), without replacing them. Preventive review contributes to reducing the risks of systematic violations, but it does not eliminate the possibility of misuse or unlawful employment in actual practice[4]. Hence, it can be said that the preventive nature of the review redefines the duty of due diligence of the state in the field of armaments, so that the failure to conduct a serious review in itself becomes an indicator of a normative shortcoming that may establish international or domestic responsibility for adopting combat capabilities that are inconsistent with the law[5].

Based on the foregoing, it can be argued that the preventive nature of arms review repositions this obligation from the periphery of the arms cycle to its core, as a preemptive tool for filtering out technical options before they translate into operational capabilities on the ground. In this sense, the seriousness of the review is not measured merely by the existence of a formal procedure, but rather by its ability to halt or restrict arms projects that show early signs of illegality or pose a high risk to civilians. Failure to activate this preventive role constitutes a dereliction of due diligence, potentially opening the door to state responsibility for the introduction of weapons that are inconsistent with the requirements of international humanitarian law.

[1] Ibid., emphasizing the preventive rationale of Article 36 reviews as part of states' obligations to ensure respect for IHL.
[2] Stockholm International Peace Research Institute (SIPRI), Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems, SIPRI Insights on Peace and Security, no. 2015/1.
[3] Erin McClelland, "The Review of Weapons in accordance with Article 36 of Additional Protocol I," International Review of the Red Cross, vol. 85, no. 850, 2003, pp. 404–410.
[4] Rain Liivoja et al., "The Utility of Weapons Reviews in Addressing Concerns Raised by Autonomous Weapon Systems," discussing ex ante reviews as complementary to ex post accountability mechanisms.
[5] See also International Review of the Red Cross, "Prevention Policy" (ICRC Prevention Policy), highlighting weapons reviews as part of the broader due diligence framework for preventing IHL violations.

2.2 Legal Review Standards for Autonomous Weapons

This requirement focuses on the qualitative dimension of weapons review when it comes to autonomous systems. It is insufficient to merely verify that a weapon does not violate prohibitions; its practical ability to respect the fundamental principles of armed conflict in complex operational environments must also be tested. Therefore, the requirement examines how the principles of distinction, proportionality, and precaution are applied in the design and operation of autonomous systems, and how certain levels of purposeful human control and predictability are required as crucial elements for ensuring compliance and assigning responsibility. In this way, the requirement demonstrates that reviewing Article 36 in the context of autonomous weapons necessitates enhanced standards that go beyond the traditional model, taking into account the specificities of algorithms, technical uncertainties, and the risks of gaps in legal accountability.

2.2.1 Applying the principles of distinction, proportionality, and precaution to autonomous systems

Evaluating autonomous weapons requires verifying the system's ability to distinguish military targets from civilian objects and civilians in complex operational conditions, particularly in changing urban environments where it is difficult to visually and behaviorally separate combatants from non-combatants[1], It also requires assessing the extent to which the principle of proportionality can be ensured, which imposes a balance between expected collateral damage and the desired military interest, and the obligation to take all possible practical precautions to minimize such damage, despite the system's reliance on algorithms and automated sensing and the accompanying technical and operational uncertainties[2].

Therefore, the application of the principles of distinction, proportionality and precaution is not limited to the field use stage only, but extends to the design and operation of autonomous systems, by requiring technical and operational limits that ensure that critical decisions regarding the targeting of persons and objects remain under effective and accountable human control[3], In this context, recent research indicates that realistic compliance with these principles requires, at a minimum, maintaining a substantial level of human control over target selection and engagement functions, and

[1] ICRC, Autonomous Weapon Systems under International Humanitarian Law, outlining the requirement that autonomy in targeting must remain compatible with the principle of distinction in complex operational environments.

[2] William Boothby & others, "Autonomous Weapons Systems and Proportionality," analysing the difficulty of encoding proportionality assessments in algorithmic decision-making and the implications for incidental harm.

[3] ICRC, "ICRC Position on Autonomous Weapon Systems," emphasizing the need for meaningful human control over critical functions related to the use of force, including target selection and engagement.

not being satisfied with formal or subsequent oversight of the performance of autonomous systems, so that compliance with international humanitarian law does not become a technical assumption that is difficult to verify in practice[1].

Based on this, some contemporary jurisprudence tends to say that the current deficiency in the ability of algorithms to accommodate the contextual and normative nature of discrimination, proportionality and precaution assessments does not necessarily mean the illegitimacy of autonomous systems in principle, but it imposes on states an enhanced burden in Article 36 revisions to define the limits of the operating environment, types of objectives and the level of human supervision that makes respecting these principles practically possible and not just a theoretical obligation in texts[2].

Consequently, it is clear that the main challenge lies not in the difficulty of reconciling the principles of distinction, proportionality, and precaution with the concept of autonomous systems per se, but rather in the actual ability to translate these principles into design, operational, and human oversight parameters that make their respect possible in real-world combat environments. Therefore, the legitimacy of using autonomous weapons is measured by the extent to which states, through revisions of Article 36, successfully regulate their operational scope, the types of targets permitted, and the levels of human oversight in a way that prevents the principles of international humanitarian law from becoming mere textual standards, unverifiable in the complex and ever-changing landscape of warfare.

2.2.2 Purposeful human control, predictability, and accountability.

Evaluating autonomous weapons requires determining the level of purposeful human control that ensures combat decisions remain attributable to a legally accountable individual or entity. This human actor must be capable of understanding the operational situation, assessing the legitimacy of the use of force, and intervening effectively to prevent or modify an attack when necessary. Furthermore, recent studies highlight the need for the system to possess a sufficient degree of predictability in changing environments[3]. Otherwise, its functional autonomy will lead to decisions that cannot be anticipated or assessed in advance under international humanitarian law, potentially creating gaps in accountability that make it difficult to assign blame or intent

[1] B. Hamad, "Ethical and Legal Implications of Autonomous Weapons Systems: Rethinking Accountability and Meaningful Human Control," European Journal of Politics and Technology, 2025, pp. 1–3.

[2] E. Winter, "The Compatibility of Autonomous Weapons with the Principles of International Humanitarian Law," Journal of Conflict & Security Law, vol. 27, no. 1, 2022, pp. 1–20, arguing for enhanced Article 36 reviews that operationalize distinction, proportionality and precautions in the design and deployment of autonomous systems.

[3] Daniele Amoroso and Guglielmo Tamburrini, "Toward a Normative Model of Meaningful Human Control over Weapons Systems," Ethics & International Affairs 35, no. 2 (2021): pp 247–250.

to a specific actor[1].

From this standpoint, purposeful human control and predictability are seen as two inseparable conditions for the legitimacy of autonomous systems: the narrower the State's understanding of the system's behavior in different operational contexts, and the less capable leaders and operators are of following the logic of its decisions and influencing them, the more practically the possibility of applying the principles of distinction, proportionality, and precaution, and assigning responsibility for their violation to specific individuals or authorities, is reduced[2]. For this reason, recent institutional reports and positions call for prohibiting systems with effects that are not sufficiently predictable, and limiting permitted systems to specific operational areas in terms of time, place, and type, while ensuring a substantial level of effective human oversight that makes compliance with international humanitarian law a practical reality rather than a technical assumption that is difficult to verify or challenge[3].

In light of the foregoing, it is clear that purposeful human control and predictability are not merely complementary technical requirements, but rather cornerstones of the legitimacy of autonomous weapons and the possibility of attributing responsibility for their combat decisions to specific human actors. The weaker the ability to predict a system's behavior or to effectively intervene in its critical decisions, the more the application of the principles of international humanitarian law becomes a theoretical promise difficult to translate into practice. Conversely, the risks of a "gray area" in legal accountability increase, justifying the demand to restrict or prohibit highly uncertain systems and to limit their development and operation to systems that can be subject to clear controls regarding human control, transparency, and predictable behavior.

3. The Applied Dimension of Legal Review of Autonomous Weapons

This study aims to move from the theoretical level of Article 36 to its practical application in the context of autonomous weapons, by examining how states organize and apply legal review mechanisms to AI-enhanced systems. On the one hand, it addresses the institutional and procedural frameworks adopted by some states for reviewing the legality of new weapons, emphasizing the multidisciplinary nature of these mechanisms. On the other hand, it touches upon the most prominent technical and operational challenges facing the evaluation of autonomous systems, and the prospects for developing the review process and strengthening its preventive dimension through

[1] International Committee of the Red Cross, ICRC Position on Autonomous Weapon Systems (Geneva: ICRC, 2022), pp. 3–7.

[2] United Nations General Assembly, Lethal Autonomous Weapons Systems, Report of the Secretary□General, UN Doc. A/79/88 (1 July 2024), pp. 8–12.

[3] "Filling the Legal Vacuum for Autonomous Weapons Systems," Humanitarian Disarmament, 17 July 2021, pp. 4–8, read together with ICRC, ICRC Position on Autonomous Weapon Systems.

international cooperation and the exchange of best practices.

3.1 National Practices in Establishing Review Mechanisms

This requirement focuses on how States have translated the general commitment to legal review of weapons, enshrined in Article 36, into concrete national mechanisms and permanent institutional structures. Comparative studies show that the practical implementation of this commitment varies between a model based on joint inter-ministerial committees and specialized military legal committees, and other models that grant review decisions direct binding force in the arms acquisition process, with a growing trend toward adopting a multidisciplinary approach that brings together legal professionals, engineers, operational experts, and others. By presenting some national examples, this requirement seeks to highlight the elements of a "good institutional structure" for Article 36 reviews, particularly in the face of the complexity of autonomous weapons.

3.1.1 Institutional Review Structures

Several countries adopt different institutional models for reviewing the legality of new weapons. These range from inter-ministerial committees to specialized military legal bodies tasked with examining weapons, means, and methods of warfare according to procedures explicitly or implicitly based on Article 36 of Additional Protocol I[1]. Comparative studies show that Article 36 does not mandate a specific institutional form, but rather obliges states to establish a permanent formal procedure to which every new armament project is subject, while encouraging a multidisciplinary approach that integrates legal, operational, technical, and, where appropriate, medical expertise[2].

Institutional organization varies from country to country, ranging from committees of an advisory nature that submit their recommendations to a higher political or military authority, to committees or bodies whose decisions have a binding nature that directly affects contracting and acquisition procedures, including halting the project or imposing operational restrictions on the use of weapons[3], In some countries, such as the United Kingdom and a number of European countries, official review committees or mechanisms have been established within the Ministries of Defense or under the supervision of military legal bodies, which undertake the legal evaluation at pivotal points in the acquisition cycle, This enhances the practical weight of the review results in armament decisions compared to other arrangements of a purely advisory

[1] International Committee of the Red Cross, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977 (Geneva: ICRC, 2006), pp. 15–22 (Part 2, sections 2.1–2.2).

[2] ICRC, "Legal Review of New Weapons, Means and Methods of Warfare," Expert Meeting, Geneva, 2001 / background paper reissued 2012, pp. 6–10.

[3] Justin McClelland, "The Review of Weapons in accordance with Article 36 of Additional Protocol I," International Review of the Red Cross 85, no. 850 (2003): 397–415, at 400–402.

nature[1].

These diverse institutional models demonstrate that the essence of compliance with Article 36 lies not in adopting a single organizational form, but in having a permanent and effective formal procedure that legally links the review results to armament decisions, and that is supported by multidisciplinary resources and expertise so that its outputs carry real weight in regulating arms acquisition policies. Thus, more advanced experiences, as in some European coun/tries, tend to transform review committees from marginal advisory frameworks into mechanisms integrated into the decision-making chain within defense ministries, thereby strengthening the preventive nature of the review and limiting the introduction of weapons systems incompatible with the provisions of international humanitarian law into the national arsenal.

3.1.2 The Role of Multidisciplinary Expertise in Review

Practical experience demonstrates that effective review of autonomous weapons requires the involvement of experts from multiple disciplines in a single evaluation process. This involves bringing together legal professionals, engineers, artificial intelligence specialists, military operations experts—and sometimes military medicine and psychology—within a coordinated institutional framework for the review[2]. This interdisciplinary approach enables a more nuanced understanding of the system's capabilities, technical limitations, and behavior in diverse operational environments, and how these characteristics translate into potential legal risks during practical use, particularly concerning the system's compliance with the principles of distinction, proportionality, and precaution under realistic field conditions[3].

Specialized literature also confirms that the complexity of AI-enhanced systems increases the need for legal review to have a deep engineering and technical approach, allowing for an understanding of the design of algorithms, the nature of training data, and the mechanisms and limitations imposed on them[4], rather than being satisfied with a general description of the weapon's capabilities, Therefore, recent studies on autonomous weapons review recommend that review teams be built on a multidisciplinary basis, and that this technical-legal cooperation continue throughout the

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1 Stockholm International Peace Research Institute (SIPRI), SIPRI Compendium on Article 36 Reviews (Stockholm: SIPRI, 2017), 7–18 (National Practice Sections in Belgium, Germany, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom); and UK Ministry of Defence, "UK Weapon Reviews", GOV.UK, 2020, pp.02 – 04.

2 Alan Backstrom and Ian Henderson, "New Capabilities in Warfare: An Overview of Contemporary Technological Developments and the Associated Legal and Engineering Issues in Article 36 Weapons Reviews," International Review of the Red Cross 94, no. 886 (2012): pp. 485–488.

3 International Committee of the Red Cross, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977 (Geneva: ICRC, 2006), pp.15–22.

4 Lauren Sanders and Damian Copeland, "Developing an Approach to the Legal Review of Autonomous Weapon Systems," Australian International Law Journal 22 (2015): 133–154, at 139–144.

system's lifecycle, including testing, pilot operation, and subsequent updates, to ensure that legal findings remain consistent with the weapon's technological developments over time[1].

Based on the foregoing, it is clear that multidisciplinary review of autonomous weapons is not merely an organizational choice, but a structural requirement for a state's ability to comprehend technical risks and translate them into credible legal conclusions. The deeper the coordination between legal professionals, engineers, artificial intelligence experts, and military operations specialists, the more accurate the assessment of a system's ability to respect the principles of international humanitarian law will be—in a realistic, rather than hypothetical, manner—and the narrower the gap in understanding between algorithm design and compliance requirements. Therefore, investing in multidisciplinary review teams, operating continuously throughout the system's lifecycle, becomes a crucial element in strengthening the preventive nature of the review and ensuring that legal rulings do not remain abstract, detached from the complexities of modern military technology.

3.2 Practical Challenges and Prospects for Review Development in Light of Technological Advancements

This section addresses the problematic aspect of reviewing autonomous weapons, namely the difficulties posed by complex algorithms and artificial intelligence to technical testing and operational evaluation, and the implications of these difficulties for the reliability of legal review results. It discusses the need for cumulative and dynamic testing models integrated into the system's lifecycle, rather than relying solely on time-limited preliminary reviews, The section also highlights the importance of developing international guidelines and expanding the exchange of experiences and best practices among countries to ensure a minimum level of standard convergence in the review of autonomous weapons.

3.2.1 Challenges in Technical Evaluation and Operational Testing of Autonomous Systems

Experience with autonomous systems demonstrates that the complexity of software and machine learning algorithms presents significant challenges to their technical evaluation and operational testing within Article 36 reviews. The greater the reliance on complex models such as deep neural networks, the less able reviewers are to interpret the system's decision-making processes, and the more difficult it becomes to understand the causes of unexpected behavior or malfunctions[2], This directly impacts

[1] "The Case of Lethal Autonomous Weapon Systems," Centre for European and Comparative Legal Studies (CEAC), 2025, pp. 5–9; see also Rebecca Crootof, "Legal Reviews of War Algorithms: From Cyber Weapons to AI Systems," Lieber Institute (West Point), 2025.

[2] International Committee of the Red Cross, Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects (Geneva: ICRC, 2016), pp. 28–33.

the ability to predict weapon behavior in changing operational environments. Furthermore, the wide range of potential behaviors of AI-enhanced systems presents an additional challenge. It is practically impossible to test all scenarios that a system might encounter in reality, making the simulation of a sufficient number of real-world use cases require enormous time, technical, and data resources that may conflict with weapons development schedules and research and testing budgets[1].

In the same context, testing and evaluation studies indicate that dealing with this dilemma requires moving from a "preliminary and time-limited" testing model to a periodic and cumulative model integrated into the system's lifecycle, combining laboratory experiments, advanced simulation, and gradual operational testing, with the aim of monitoring emerging behavior and reducing the uncertainty before acknowledging operational readiness[2], In this regard, some researchers propose the concept of accountability for war algorithms, which assumes that the quality of technical evaluation and operational testing is not a purely technical matter, but rather a prerequisite for the possibility of assigning legal responsibility for decisions made or implemented by these systems[3].

Based on the foregoing, it is clear that the challenges associated with the technical evaluation and operational testing of autonomous systems are not limited to isolated engineering or experimental difficulties. Rather, they directly impact the core of legal review under Article 36, as they limit a state's ability to predict weapon behavior patterns and assess their actual compliance with the principles of international humanitarian law before deployment. Therefore, adapting weapons reviews to the reality of complex algorithms necessitates redesigning testing systems to be cumulative and continuous, and explicitly linking their results to decisions of legality and responsibility. This would make the quality of testing and evaluation a foundational element of legal review, not merely a supporting stage in the acquisition cycle of autonomous systems.

3.2.2 Ways to Enhance the Effectiveness of Review and International Cooperation

Contemporary discussions suggest that enhancing the effectiveness of reviewing autonomous weapons systems is no longer solely a national matter. It requires building a degree of international convergence in standards and procedures through shared

[1] Jelena Davidovic, "The Ethics of AI-Enabled Weapon Systems: Testing and Evaluating," in Artificial Intelligence and the Future of Warfare (Vatican City: Pontifical Academy of Sciences, 2020), pp. 5 –12.

[2] U.S. Department of Defense, Developmental Test and Evaluation of Autonomous Systems (Washington, DC: DoD, 2025), pp. 3–7; See also National Academies of Sciences, Operational Test and Evaluation of Autonomous Systems, chap. 2.

[3] Rebecca Crootof, "Legal Reviews of War Algorithms: From Cyber Weapons to AI Systems," Geneva Centre for Security Policy, GCSP Paper, 2025, pp. 10–16؛ Jack M. Beard, "War-Algorithm Accountability," Harvard Law School Program on International Law and Armed Conflict, 2018.

guiding principles and expanding the exchange of experiences among states[1]. In this context, intellectual and institutional initiatives have been proposed calling for the development of international guidelines for weapons review, including autonomous systems, based on Article 36. These guidelines aim to standardize minimum review requirements while maintaining regulatory flexibility that respects the specificities of national structures[2].

The International Committee of the Red Cross (ICRC) and several intergovernmental forums also encourage the exchange of non-sensitive information and experiences related to national review structures and procedures. This is seen as a practical means of raising compliance levels and improving the quality of assessments without compromising security considerations or industrial confidentiality[3], Some studies even propose involving international organizations and independent experts in developing "best practices" for reviewing autonomous systems. This includes creating model checklists and methodological frameworks for assessing predictability, human control, and compliance with the principles of international humanitarian law, in light of the rapid development of military technology[4].

Therefore, maximizing the effectiveness of autonomous weapons reviews can no longer be achieved solely through improving national structures in isolation, but rather through integrating these structures into a broader network of normative and technical cooperation among states and international bodies. The move towards common guiding principles, the systematic exchange of information and expertise, and the development of standardized practical tools such as checklists and methodological frameworks for evaluation point to the formation of a nucleus of “cooperative governance” for Article 36 reviews of autonomous weapons. This framework, if it enjoys sufficient political will, is capable of reducing the disparity in national practices and raising the level of preventive compliance with the requirements of international humanitarian law in the face of rapid technological advancements.

4- Conclusion

The application of Article 36 to autonomous weapons represents a true test of the ability of traditional legal review mechanisms to keep pace with the shift towards AI-enhanced combat systems. As algorithms gain increasing autonomy in target selection

[1] Ryan Poitras, “Article 36 Weapons Review & Autonomous Weapons Systems: Supporting an International Review Standard,” American University International Law Review 34, no. 2 (2020): pp. 435–470.

[2] Stockholm International Peace Research Institute (SIPRI), Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems (Stockholm: SIPRI, 2015), pp. 18–24.

[3] Ian Daoust, “Reviewing the Legality of New Weapons, Means and Methods of Warfare,” International Review of the Red Cross 88, no. 864 (2006): pp. 345–366.

[4] ICRC, A Guide to the Legal Review of New Weapons, Means and Methods of Warfare (Geneva: ICRC, 2006), Introduction and Part 3؛ APILS, “Good Practices in the Legal Review of Weapons, Means and Methods of Warfare,” 2024, which proposes tailored good practices for reviews of autonomous weapon systems.

and combat decision-making, the scope of uncertainty and potential liability expands. In this context, this study attempts to bridge the theoretical framework of Article 36 with practical application in weapons review, focusing on the specific characteristics of autonomous systems. Based on this, the most important findings and recommendations can be summarized as follows:

First: Findings

- ✓ Article 36 establishes a broad preventive obligation encompassing new weapons, methods, and modes of warfare, as well as fundamental modifications and operational doctrines, and is not limited to physical weapons in their traditional form.

- ✓ The review of weapons under Article 36 is not a mere formality, but a proactive mechanism aimed at preventing the introduction of illicit weapons or modes of warfare before their use, and redefines the state's duty of due diligence in the field of armaments.
- ✓ Autonomous weapons pose qualitative challenges to the application of the principles of distinction, proportionality, and precaution, due to the complexity of machine learning algorithms, the difficulty in interpreting decision-making processes, and the limited ability to predict behavior in complex operational environments.
- ✓ Ensuring respect for these principles requires translating them into clear design and operational requirements (limitations of the operating environment, types of targets, level of effective human oversight, mechanisms for disabling and intervening, and temporal and geographical boundaries of operation).
- ✓ Purposeful human control and predictability are inseparable conditions for the legitimacy of operating autonomous systems. The less human control and the fewer opportunities there are to understand the logic behind system decisions, the weaker the possibility of compliance and accountability.
- ✓ National weapons review practices vary, but the general trend is toward creating multidisciplinary structures that bring together legal professionals, engineers, AI experts, and military personnel. However, gaps persist in the technical evaluation and operational testing of autonomous systems.
- ✓ Technical challenges (software complexity, the cost of testing and simulations, and emerging behavior) demonstrate that effective review cannot be guaranteed within a closed national framework. Instead, it requires standardization and structured international cooperation in the exchange of expertise.

Second: Recommendations

- Making weapons review a continuous process that accompanies the system's lifecycle (design, development, modernization), not a single step at the time of acquisition.
- Structure internal accountability so that the absence or inadequacy of legal review constitutes a failure of due diligence regarding armament decisions.
- Establish and strengthen permanent, multidisciplinary review committees (legal experts, engineers, AI experts, military personnel, and civil defense experts).
- Adopt standardized models for characterizing autonomous systems and checklists for proposed legal risks and operational constraints.
- Translate the principles of distinction, proportionality, and precaution into clear design and operational criteria (operating environment, target type, time and spatial limits, and safe shutdown mechanisms).
- Consider purposeful human control and predictability as mandatory conditions for assessing the legitimacy of autonomous systems.
- Develop cumulative testing methodologies that combine simulation, progressive field testing, and post-incident review.
- Supporting the development of international guidelines for reviewing autonomous weapons and expanding the exchange of experiences and best practices among countries.

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