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The Interpretation and Application of International Humanitarian Law in Relation to Lethal Autonomous Weapon Systems

Background paper on the views of States, scholars and other experts

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Acronyms & Abbreviations

AI	Artificial intelligence
API	Additional Protocol I to the 1949 Geneva Convention
CIHL	Customary IHL
DPH	Directly participating in hostilities
GGE	Group of Governmental Experts on emerging technologies in the area of lethal autonomous weapon systems
IHL	International humanitarian law
LAWS	Lethal autonomous weapon systems
UNIDIR	United Nations Institute for Disarmament Research

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1. Introduction

1.1. Background

Discussions of the legal frameworks relevant to the development and use of autonomous weapon systems began in 2010 when Philip Alston, then Special Rapporteur on extrajudicial, summary or arbitrary executions, submitted a report on the relevance of new technologies in areas such as robotics in relation to extrajudicial executions.¹ The discussion progressed in 2012 when Human Rights Watch released a report advocating for a pre-emptive ban on fully autonomous weapon systems, citing potential violations of IHL.² What followed is more than a decade of deliberations on the topic, much of which has been grounded in consideration of how IHL applies to the development and use of LAWS, whether existing rules sufficiently address concerns raised about this technology and what revisions might be necessary. What, if any, limits do the rules of IHL place on the use of LAWS? What kinds of practical measures or limits might be or are used to ensure that LAWS are used in compliance with these rules? Many contributions have grappled with these questions.

In both formal and informal groups of experts convened by the High Contracting Parties to the Convention on Certain Conventional Weapons, in meetings of the First Committee of the United Nations General Assembly and in other expert discussions convened by the International Committee of the Red Cross and the Stockholm International Peace Research Institute among others, States, scholars and other experts have elaborated their views on

the interpretation and application of IHL and other relevant legal frameworks.

As these discussions deepen, UNIDIR commenced a series of regional consultations aimed at identifying areas of common understanding on the applicability of IHL to LAWS, as part of the project ‘Towards a Common Understanding of the Application of IHL to Emerging Technologies in the Area of LAWS’. The aim of the paper is to provide context for UNIDIR consultations on this topic. This background paper summaries publicly available views expressed by States, scholars and other experts participating in multilateral discussions on the applicability and interpretation of IHL with respect to the development and use of LAWS.

1.2. Key findings

All participants in the multilateral discussion of LAWS consider that IHL is relevant to the development and use of LAWS. This position was formally endorsed by the GGE in 2018.³ This paper synthesises the evolving discourse on the applicability and interpretation of IHL with respect to LAWS with the aim of elucidating points of convergence and divergence and identifying themes on which future discussions could usefully focus.

While participants’ views stem from a common starting point (the applicability of IHL), substantive discrepancies persist in how discussion participants conceptualise specific IHL obligations in the context of LAWS. These discrepancies are made more difficult

¹ Interim Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions, Philip Alston, UN Doc. A/65/321, August 23, 2010, <http://documents.un.org/mother.asp> (accessed September 30, 2012).

² Human Rights Watch *Losing Humanity: The Case Against Killer Robots*, <https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots>, 2012.

³ Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, Report of the 2018 session, CCW/GGE.1/2018/3, 23 October 2018.

to parse by differences in the language that participants use to express their views – the terms used to describe IHL rules, the level of granularity and precision with which IHL rules are described and the way in which policy positions are linked to IHL obligations – and the way in which participants characterise LAWS – which is outside the scope of the background paper but remains a key and unresolved point of discussion.

The paper also records a disconnect between the breadth and depth of academic literature as compared with the scope of themes addressed in States' public comments. Also, in all sectors of the literature, few commenters have referred to the requirement (in API article 57(1)) to take constant care in the conduct of military operations involving LAWS to spare the civilian population, civilians and civilian objects, or the requirement (in API article 58) to take precautions against the effects of an attack involving LAWS. A further example is the requirement (in AP I article 82) that Parties make legal advisers available, when

necessary, to advise military commanders.

Finally, public statements about the applicability and interpretation of IHL include measures that States can, do or should take with respect to the development and use of LAWS (including to avoid or minimise the effects of the use of LAWS on civilian populations, civilians and civilian objects). Such measures often reflect regulatory proposals made in the context of a broader policy discussion on whether and how to address perceived risks from the development and use of these technologies. However, when proposing or explaining such measures, few States specify whether they derive from a legal obligation, nor the IHL principles or rules from which such measures derive or could derive. Similarly, with a few exceptions, statements that refer to the human factors relevant to IHL compliance (e.g. 'meaningful human control', 'human involvement', 'human judgement' and similar or derivative concepts) do not specify the specific IHL principles or rules from which such a requirement derives or could derive.

2. Methodology and scope

Contributions to the discussion of IHL as it applies to LAWS canvas obligations relevant to the planning and conduct of attacks involving LAWS but also those that are relevant before an attack is contemplated and after it concludes. This background paper addresses these statements thematically, starting with an examination of obligations relevant before an attack commences, then turning to obligations relevant in the planning and conduct of attacks, before turning to obligations relevant to responsibility and accountability for IHL violations.

This paper is structured with reference to IHL rules as derived from customary and treaty law. Without wishing to limit the scope of the discussion on IHL and LAWS, the scope of this paper is limited to those IHL issues on which States and other selected actors have expressed views in the context of LAWS. This may exclude relevant IHL issues that may arise from the development and use of LAWS. Moreover, this paper does not address the compatibility of LAWS with other fields of international law,⁴ nor does it engage with the

⁴ For the analysis of LAWS from the perspective of human rights law, see A.M. Eklund, *Meaningful Human Control of Autonomous Weapon Systems: Definitions and Key Elements in the Light of International Humanitarian Law and International Human Rights Law* (Stockholm: Publisher, 2020), pp. 32–46; United Nations, General Assembly, Human Rights Council, Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, A/HRC/23/47, 2013, paras 57–62. On *jus ad bellum*, see A. Deeks, "Will Cyber Autonomy Undercut Democratic Accountability?", in *Autonomous*

ethical⁵ or strategic aspects of the development and deployment of LAWS.⁶

As this report does not aim to advance or counter any of the existing approaches – this research relies mainly on inductive content analysis to identify emerging patterns. It is presented without prejudice to States’ interpretations of their obligations under IHL as they view them. The paper focuses on how actors consider IHL is to be interpreted and applied with respect to LAWS; it does not analyse positions on general matters of interpretation or application of the relevant rules of IHL.

Relevant information was collected from two types of sources: (a) States’ written statements submitted to the United Nations, and (b) academic and grey legal literature on LAWS and IHL. This paper has not drawn from any other public statements on IHL that may be relevant to the development and use of LAWS (e.g., statements on IHL issues in the context of other weapons, means or methods of warfare). This paper remains limited to the application to LAWS of *lex lata* IHL (i.e., IHL

as it exists) as explained in the sources (the authors have not taken a view on the state of *lex lata*). The paper does not aspire to capture the breadth of propositions on *lex ferenda* (i.e., what IHL should be) set forth in diplomatic or academic commentaries. Since the debate constantly develops, the most recent interpretations are prioritized in this analysis, encompassing outputs published up to and including August 2024.

This paper does not assess States’ views on whether IHL could or should be developed, nor on the appropriate forum, process or aim for such a discussion. It draws only on statements that have been made public in English (whether as the original language or as a formal or informal translation).

To aid readability, the content of public statements as well as the academic and grey literature have been collated according to the structure of the paper (i.e. ‘before’, ‘during’ and ‘after’ an attack involving LAWS). This was done without any intention to alter the meaning of the content of the cited material.

Cyber Capabilities under International Law, ed. R. Liivoja and A. Väljataga (Tallinn: NATO CCD COE, 2021), pp. 67–105; I.S. Henderson, P. Keane and J. Liddy, “Remote and Autonomous Warfare Systems: Precautions in Attack and Individual Accountability”, in *Research Handbook on Remote Warfare*, ed. J.D. Ohlin (Cheltenham: Edward Elgar, 2017), pp. 335, 366–67; Agata Kleczkowska, “Autonomous Weapons and the Right to Self-defence”, *Israel Law Review*, vol. 56 (2023):24.

⁵ For an overview of the main ethical arguments, see G. Tamburrini, “On Banning Autonomous Weapons Systems: From Deontological to Wide Consequentialist Reasons”, in *Autonomous Weapons Systems*, ed. N. Bhuta et al. (Cambridge: Cambridge University Press, 2016), pp. 122–142; Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, “Ethics and Autonomous Weapon Systems: An Ethical Basis for Human Control?”, Working paper by the ICRC, CCW/GGE1/2018/WP, 2018; Eklund, *Meaningful Human Control*, pp. 32–34.

⁶ E.g. R. Moyes “Target Profiles: An Initial Consideration of ‘Target Profiles’ as a Basis for Rule-Making in the Context of Discussions on Autonomy in Weapons Systems”, Article 36 Discussion Paper no. 2, 2019; M.D.O. Fornasier, “The Regulation of the Use of Artificial Intelligence (AI) in Warfare: Between International Humanitarian Law (IHL) and Meaningful Human Control”, *Revista Jurídica da Presidência*, vol. 23, no. 129 (2021):67, 80–83.

3. Differing starting points: Characterization of LAWS and scope of “attack” under IHL

Building on the GGE’s adoption of guiding principles in 2018, States and others have shared views on the specific IHL principles that they view as relevant to the development and use of LAWS, as well as the other fields of international law that are relevant. However, there are differences in how they characterize LAWS and the scope of the term “attack” under IHL – the very starting point of the discussion.

3.1. Characterization of LAWS

This paper does not canvass the various views of States and others on what constitutes a LAWS.⁷ States and others have not framed their views on the issue of “characterization” in terms of IHL obligations. However, IHL does include rules that may apply to LAWS based on their characteristics, such as the user’s type and level of control over the system, the system’s adaptability, and the functions to which the system is applied.

Differences in actors’ definitions or characterizations of LAWS limit the comparability of publicly available views on the applicability and interpretation of IHL.

3.2. Concept of “attack” under IHL

“Attack” is a foundational concept in IHL. The general IHL rule in the conduct of hostilities (in

API Article 48 and Rule 1 of the Study on CIHL⁸) requires that parties to conflict at all times distinguish between the civilian population and combatants and between civilian objects and military objectives. Accordingly (in the words of Article 48), the parties “shall direct their operations only against military objectives”. The subsequent rules on the conduct of hostilities, however, largely refer to attacks specifically.

The temporal (and, indeed, spatial) scope of the notion of “attack” under IHL is relevant to commanders’ IHL judgements when planning and deciding on attacks involving the use of LAWS. In order to make the judgements required by IHL rules on the conduct of hostilities, commanders must anticipate with reasonable certainty how the LAWS will function and interact with its environment over the course of the entire attack. The concept of “attack” therefore provides a relevant frame of reference for IHL decisions and must be examined closely.

The term “attack” has been said to be a term of art; it is given different meanings in different contexts.⁹ In the IHL context, the definition of the term in API Article 49 is often used as a starting point:

1. “Attacks” means acts of violence against the adversary, whether in offence or in defence.
2. The provisions of this Protocol with respect to attacks apply to all attacks in whatever

⁷ For discussion of this see Alisha Anand & Ioana Puscas, *Proposals Related to Emerging Technologies in the Area of Lethal Autonomous Weapons Systems: A Resource Paper* (Geneva: UNIDIR, 2023).

⁸ International Committee of the Red Cross, *Customary International Humanitarian Law* (Volume I: Rules) (Cambridge University Press, 2005) (CIHL Study) at p.3.

⁹ M.N. Schmitt, “‘Attack’ as a Term of Art in International Law: The Cyber Operations Context”, *2012 4th International Conference on Cyber Conflict, CYCON 2012 – Proceedings*, 2010 (Tallinn: NATO CCD COE Publications, 2012), pp. 283–293. The commentary to API Article 49 notes (at para. 1879) that military instruction manuals in many countries define an attack differently.

territory conducted, including the national territory belonging to a Party to the conflict but under the control of an adverse Party.

3. The provisions of this Section apply to any land, air or sea warfare which may affect the civilian population, individual civilians or civilian objects on land. They further apply to all attacks from the sea or from the air against objectives on land but do not otherwise affect the rules of international law applicable in armed conflict at sea or in the air.
4. The provisions of this Section are additional to the rules concerning humanitarian protection contained in the Fourth Convention, particularly in Part II thereof, and in other international agreements binding upon the High Contracting Parties, as well as to other rules of international law relating to the protection of civilians and civilian objects on land, at sea or in the air against the effects of hostilities.

The precise temporal and spatial scope of an attack is not resolved in the literature. However, three related and relevant issues have been discussed, and are relevant to this question:

- ▶ What constitutes an act of violence for the purposes of characterizing an “attack”
- ▶ Whether an attack can comprise more than one incident

- ▶ Whether an attack must be directed against the adversary

State commentary on the interpretation and application of IHL in relation to LAWS does not appear to address questions relating to the notion of “attack”. While there is no doubt in expert commentary that it is immaterial under IHL whether the intended use of a LAWS is offensive or defensive,¹⁰ the scope of an attack when a LAWS is involved remains subject to controversy. While past debates suggest that an attack may consist of multiple strikes on one or more targets,¹¹ this consensus does not appear to be widely reflected in the debates on LAWS compliance with IHL. Divergent stances on what constitutes an attack, or more precisely when an attack involving the use of LAWS begins and ends under IHL, while rarely acknowledged explicitly, lead to disparate conclusions on the compatibility of LAWS with IHL.¹²

The imprecision on the scope of LAWS attacks feeds into many more specific and contentious aspects of the debate at hand. Divergent interpretations of the possibility of using LAWS in compliance with IHL can be partly attributed to commentators’ varying conceptions of not only which weapon system can be characterized as LAWS,¹³ but also where the attack starts and ends.

¹⁰ This does not mean that there were no attempts in the literature to distinguish between defensive, less objectionable systems versus the offensive, more controversial ones. See, e.g., Future of Life Institute, “Autonomous Weapons: An Open Letter from AI & Robotics Researchers”, 2015.

¹¹ Note that much of that debate took place in reference to the military advantage for the purposes of assessing the attack’s proportionality. For academic accounts, see D. Fleck (ed), *The Handbook of International Humanitarian Law*, 3rd edn (Oxford: Oxford University Press, 2013), para. 445; M. Bothe, K.J. Partsch, W.A. Solf (ed.), *New Rules for Victims of Armed Conflict: Commentary on the Two 1977 Protocols Additional to the Geneva Conventions of 1949*, 2nd edn (The Hague: Martinus Nijhoff, 2013), P. 366; A. Jachec-Nealie, *The Concept of Military Objectives in International Law and Targeting Practice* (London: Routledge, 2015), pp. 121–122.

¹² For an in-depth argument on uncertainty on the scope of LAWS attack being a major explanatory factor of the international disagreements regarding LAWS compatibility with IHL, see J. Kwik, “The Scope of an Autonomous Attack”, in *CyCon 2024: Over the Horizon*, ed. C. Kwan et al. (Tallinn: NATO CCD COE, 2024), pp. 191–206.

¹³ The precise definition of LAWS is subject to endless debate. For an overview, see Mariarosaria Taddeo & Alexander Blanchard, “A Comparative Analysis of the definitions of Autonomous Weapons Systems”, *Science and Engineering Ethics*, vol. 28, no. 37 (2022)

4. Obligations under IHL relevant in advance of an attack

4.1. Legal reviews of LAWS

Determining whether the use of a new weapon, means or method of warfare would be prohibited by IHL is an obligation for States Parties to API, and of interest to States that seek to ensure their armed forces conduct hostilities in accordance with IHL. Several States¹⁴ and other commentators¹⁵ have acknowledged the relevance of such legal assessments prior to the employment of LAWS.

It is frequently pointed out in the literature that the presence of autonomy in LAWS complicates the legal review in two key ways.¹⁶

The first relates to what needs to be reviewed and when. State practice remains fragmented and inconsistent, with commentators pointing out the discrepancy of some States reviewing “weapons” while others review “weapon systems”.¹⁷ Furthermore, it is unclear which

modifications to a weapon system necessitate further legal review¹⁸ – many commentators consider this to be especially pertinent with regard to adaptive LAWS that rely on machine learning.¹⁹ Accordingly, as noted by some commentators, “momentum is building behind the idea that periodic post-deployment legal reviews would be required, extending across the entire lifecycle of the LAWS, to ensure that a [L]AWS has not learned to behave in a manner which would violate the operating state’s legal obligations”.²⁰

The second key challenge concerns the scope of the legal review of LAWS. Traditionally, legal reviews were limited to assessing compliance of a given weapon against a category of rules commonly referred to as weapons law. These rules include the prohibition of indiscriminate weapons, means or methods causing unnecessary suffering, as well as various

¹⁴ See, for example, the views of Australia, Austria, Italy, New Zealand, the Russian Federation and Sweden.

¹⁵ Vincent Boulanin and Maaïke Verbruggen, *Article 36 Reviews: Dealing with the Challenges Posed by Emerging Technologies* (Stockholm: Stockholm International Peace Research Institute, 2017), p. 1; Damian Copeland, Rain Liivoja and Lauren Sanders, “The Utility of Weapons Reviews in Addressing Concerns Raised by Autonomous Weapon Systems”, *Journal of Conflict and Security Law*, vol. 28 (2023):285, 290.

¹⁶ Netta Goussac et al., *Enhancing the Legal Review of Autonomous Weapon Systems: Report of an Expert Meeting* (Sydney, 28–30 March 2023) (Brisbane: Law and the Future of War Research Group, TC Beirne School of Law, University of Queensland, May 2023), pp. vii–viii.

¹⁷ For a discussion on different state approaches, see Klaudia Klonowska, “Article 36: Review of AI Decision-Support Systems and Other Emerging Technologies of Warfare”, *Yearbook of International Humanitarian Law*, vol. 23 (2020):123, 133–134. On the distinction between weapons and weapon systems, see Magdalena Pacholska, “Autonomous Weapons”, in *Research Handbook on Law and Technology*, ed. B. Brozek, O. Kanevskaia and P. Palka (London: Edward Elgar, 2024), p. 394.

¹⁸ Copeland et al., “The Utility of Weapons Reviews”, pp. 285, 294; Goussac et al., *Enhancing the Legal Review*, pp. 11–12; Vincent Boulanin, “Implementing Article 36 Weapon Reviews in the Light of Increasing Autonomy in Weapon Systems”, SIPRI Insights on Peace and Security no. 2015/1, 2015, p. 5.

¹⁹ Natalia Jevglevskaia, “Same but Different: Legal Review of Autonomous Weapons Systems”, *Articles of War*, 12 January 2024; Alfonso Seixas-Nunes, *The Legality and Accountability of Autonomous Weapon Systems: A Humanitarian Law Perspective* (Oxford: Oxford University Press, 2022), p. 159; Tim McFarland and Zena Assaad, “Legal Reviews of In Situ Learning in Autonomous Weapons”, *Ethics and Information Technology*, vol. 25 (2023):1.

²⁰ McFarland and Assaad, “Legal Reviews of In Situ Learning”, p. 9. Similarly, see Copeland et al., “The Utility of Weapons Reviews”, p. 294; Tobias Vestner and Altea Rossi, “Legal Reviews of War Algorithms”, *International Law Studies*, vol. 97 (2021):509, 544–545; James Farrant and Christopher M. Ford, “Autonomous Weapons and Weapon Reviews: The UK Second International Weapon Review Forum”, *International Law Studies*, vol. 93 (2017):389, 406.

treaty-based restrictions.²¹ A consensus appears to be emerging that long-established approaches to the legal review of weapons will be insufficient to determine the legality of LAWS.²² Many submit that, when LAWS perform, at least in part, functions traditionally performed by humans, then their legal review should also encompass compliance with the rules on conduct of hostilities (often referred to as “targeting law”).²³

The need to assess LAWS against targeting rules raises two intertwined issues: the acceptable standard of machine compliance with IHL obligations; and the degree of human input to targeting decisions required under IHL.²⁴

Even though LAWS are likely to outperform humans in certain tasks performed on the

battlefield,²⁵ the standard for LAWS compliance with IHL provisions should not exceed that which is applied to humans.²⁶ There is a broad agreement that perfection is not a required legal standard.²⁷ It appears that many of the disputes on the possibility of using LAWS in a manner compliant with IHL provisions, especially those incorporating a value judgment,²⁸ stem from a misconception that LAWS are legally required to be 100 per cent reliable and accurate, rather than perform just as well as human soldiers.²⁹

Responding to these issues, some States have specified what such legal reviews of LAWS should address. These include “technical aspects such as machine learning and any datasets upon which system functions are

²¹ For an overview of weapons regulated by various IHL treaties, see International Committee of the Red Cross (ICRC), “Weapons”, 30 November 2011, <https://www.icrc.org/en/document/weapons>.

²² Natalia Jevglevskaia, *International Law and Weapons Review: Emerging Military Technology under the Law of Armed Conflict* (Cambridge: Cambridge University Press, 2021), pp. 239–270; Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict: Compatibility with International Humanitarian Law* (Cambridge: Cambridge University Press, 2020), pp. 57–87; Marco Sassòli and Yvette Issar, “Challenges to International Humanitarian Law”, in *100 Years of Peace Through Law: Past and Future*, ed. Andreas von Arnould, Nele Matz-Lück and Kerstin Odendahl (Berlin: Duncker & Humblot, 2015), pp. 22–25.

²³ W.H. Boothby, “Dehumanization: Is There a Legal Problem Under Article 36?”, in *Dehumanization of Warfare*, ed. W.H. von Heinegg et al. (Cham: Springer International, 2018), pp. 21–52; L. Sanders and D. Copeland “Developing an Approach to the Legal Review of Autonomous Weapon Systems”, *ILA Reporter*, 27 November 2020.

²⁴ Sanders and Copeland, “Developing an Approach”.

²⁵ LAWS are widely expected to offer relative performance advantages compared to remotely controlled or manned alternatives due to their not being affected by the psychological and cognitive limitations that impact human beings. W.H. Boothby, “Highly Automated and Autonomous Technologies”, in *New Technologies and the Law in War and Peace*, ed. W.H. Boothby (Cambridge: Cambridge University Press, 2018), pp. 137–181, 159 (“decisions of robotic technologies will not be distorted by fear, anger, vengeance, amnesia, panic, tiredness or other peculiarly human fallibilities”).

²⁶ Kevin Jon Heller, “The Concept of ‘the Human’ in the Critique of Autonomous Weapons”, *Harvard National Security Journal*, vol. 15 (2023):17–18; Michael N Schmitt & Jeffrey S Thurnher (2013) “‘Out of the Loop’: Autonomous Weapon Systems and the Law of Armed Conflict”, *Harvard Law School National Security Journal*, vol. 4 (2013): 231–281, 257; Geoffrey S. Corn, “Autonomous Weapons Systems: Managing the Inevitability of ‘Taking the Man out of the Loop’”, in *Autonomous Weapons Systems*, ed. Bhuta et al., pp. 231–232; Daniele Amoroso and Guglielmo Tamburrini, “The Ethical and Legal Case Against Autonomy in Weapons Systems”, *Global Jurist*, vol. 3, no. 10 (2017); Robert Sparrow, “Twenty Seconds to Comply: Autonomous Weapon Systems and the Recognition of Surrender”, *International Law Studies*, vol. 699, no. 711 (2015).

²⁷ Schmitt and Thurnher, *Out of the Loop*, 257; C. McDougall, “Autonomous Weapon Systems and Accountability: Putting the Cart before the Horse”, *Melbourne Journal of International Law*, vol. 20, no. 1 (2019):1–30, 18.

²⁸ Sparrow, “Twenty Seconds to Comply”, p. 710. See, in particular, the discussion below regarding the denial of quarter and direct participation in hostilities.

²⁹ Marco Sassòli, “Autonomous Weapons and International Humanitarian Law: Advantages, Open Technical Questions and Legal Issues to Be Clarified”, *International Law Studies*, vol. 308, no. 319 (2014):90; 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*, vol. 483, no. 492 (2012):94.

based”,³⁰ “attributes and effects” of weapons,³¹ and “aspects of human–machine interaction and the ways in which they are addressed in manuals and training programmes”.³²

4.2. Prohibited weapons, means and methods of warfare

4.2.1. Relevant prohibitions

Some States have noted that IHL does not expressly prohibit the use of autonomy in weapon systems.³³ In determining the legality of a new weapon, States will need to have regard to, at a minimum, the general prohibitions in IHL that apply to all weapons, as well as rules prohibiting the use of specific weapons and means of warfare that are relevant to LAWS. In this regard, published views have addressed:

- ▶ prohibition of indiscriminate attacks, including those that use a means of combat that cannot be directed at a specific military objective or which has effects that cannot be limited as required and is of a nature to strike military objectives and civilians or civilian objects without distinction (API Article 51(4), CIHL Study Rule 12)
- ▶ prohibition of employment of weapons, projectiles, and material and methods of warfare that cause superfluous injury or

unnecessary suffering (Hague Regulations Article 23(e), API Article 35(2), CIHL Study Rule 70)

- ▶ prohibition on the use of means and methods of warfare that are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment (API Articles 35(3) and 55(1), CIHL Study Rule 45), and
- ▶ prohibition on ordering that no quarter be given or threatening an adversary with such an order or conducting hostilities on this basis (API Article 40, CIHL Study Rule 46).

Many States have noted that LAWS that cannot be used in accordance with IHL are prohibited.³⁴ In their public statements, some States have also reiterated such prohibitions with express reference to LAWS. For example:

- ▶ prohibition of LAWS that do not have a mechanism to cancel or suspend an attack if it is clear that the target is not a military target or is subject to special protection³⁵
- ▶ prohibition of LAWS that do not distinguish between military targets and civilian objects, between combatants and civilians, or between active combatants and those *hors de combat* (i.e., inactive due to injury)³⁶
- ▶ prohibition of LAWS that do not permit a determination of whether an attack might cause incidental civilian casualties or damage to civilian objects that would be

³⁰ Views of Austria submitted to the United Nations Secretary-General, as set out in *Lethal autonomous weapon systems: Report of the Secretary-General (A/79/88)*, 1 July 2024 (UNSG Report).

³¹ Chile and Mexico, ‘[Elements For A Legally Binding Instrument To Address The Challenges Posed By Autonomy In Weapon Systems](#)’, 2022 at p.6.

³² Views of Sweden, UNSG Report.

³³ See, for example, the views of the United States, UNSG Report.

³⁴ See, for example, the views of Bulgaria, Canada, Cuba, Ireland, Italy, the Netherlands, Norway, Pakistan and the Republic of Korea, UNSG Report.

³⁵ See, for example, the views of Mexico, UNSG Report.

³⁶ Japan, ‘[Working paper](#)’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at pp.2-3. See also, for example, the views of Bulgaria, Denmark, France, Germany, Italy, Luxembourg, Mexico, the Netherlands, Norway and the Philippines, UNSG Report.

excessive in relation to the concrete and direct military advantage anticipated³⁷

- ▶ prohibition of LAWS that cause superfluous injury or unnecessary suffering,³⁸ and
- ▶ inadmissibility of indiscriminate, disproportionate use of LAWS, their use against civilians, as well as without precautions taken to protect civilians.³⁹

4.2.2. Discussion of interpretation and application with respect to LAWS

These statements by States do not reflect questions of how these prohibitions are to be interpreted and applied with respect to LAWS. Here the academic literature provides more detail.

In relation to the prohibitions on means and methods of warfare that cause superfluous injury, unnecessary suffering, or widespread, long-term and severe damage to the natural environment, there is a general agreement in

scholarship that it is unlikely for a weapon to cause either unnecessary suffering⁴⁰ (in the sense of the prohibition) or severe damage to the natural environment due to its autonomous functionality.⁴¹

In relation to the prohibition on denial of quarter (API Article 40, CIHL Study Rule 46), a debate continues as to whether LAWS can be used in compliance with the prohibition of denial of quarter, which makes it illegal “to deliberately refuse or render impossible an enemy’s surrender or to put to death those which are *hors de combat*”.⁴² Some assert that LAWS will never be able to reliably recognize surrender because such recognition requires an intrinsically human ability to recognize intentions.⁴³ Such an assertion is countered from both legal and technological perspectives by commentators who underline that IHL awards protection to those who “clearly express an intention to surrender”,⁴⁴ not to a person who intends to surrender.⁴⁵ LAWS can be, or arguably already

³⁷ See, for example, the views of Mexico, UNSG Report.

³⁸ See, for example, the views of Bulgaria, Denmark, France, Germany, Italy, Luxembourg, Mexico, Norway and the Philippines, UNSG Report.

³⁹ Russia, ‘Approaches of the Russian Federation to the issue of emerging technologies in the area of lethal autonomous weapons systems’ 14 May 2024 (CCW/GGE.1/2024/WP.2) at p.2.

⁴⁰ William H. Boothby, *Weapons and the Law of Armed Conflict*, 2nd edn (Oxford: Oxford University Press, 2016), p. 51; R. Crootoof, “The Killer Robots Are Here: Legal and Policy Implications”, *Cardozo Law Review*, vol. 36 (2015):1837–1915, 1892; Schmitt and Thurnher, *Out of the Loop*, 244; Kjølsv Egeland, “Lethal Autonomous Weapon Systems under International Humanitarian Law”, *Nordic Journal of International Law*, vol. 89, nos 106–107 (2016):85; Matthias Brenneke, “Lethal Autonomous Weapon Systems and Their Compatibility with International Humanitarian Law: A Primer on the Debate”, in *Yearbook of International Humanitarian Law*, ed. Terry D. Gill et al. (The Hague: Asser Press, 2020), p. 87; Jeffrey S. Thurnher, “The Law That Applies to Autonomous Weapon Systems”, ASIL Insights, 2013.

⁴¹ Jevglevskaia, *International Law and Weapons Review*, p. 221.

⁴² Gloria Gaggioli and Nilz Melzer, “Methods of Warfare”, in *The Oxford Guide to International Humanitarian Law*, ed. Ben Saul and Dapo Akande (Oxford: Oxford University Press, 2020), p. 245.

⁴³ Human Rights Watch (HRW), *Losing Humanity: The Case against Killer Robots* (New York: HRW, 2012), p. 31; Sparrow, “Twenty Seconds to Comply”, p. 707. As the rule applies across all warfighting domains, some construe it as a legal basis to ban the use of LAWS even in theatres where civilians are absent, such as a battleship in the high seas. Daniele Amoroso et al., *Autonomy in Weapon Systems: The Military Application of Artificial Intelligence as a Litmus Test for Germany’s New Foreign and Security Policy* (Berlin: Heinrich Böll Foundation, 2018), p. 25.

⁴⁴ API, Article 41(b); Yves Sandoz et al. (eds.), *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Geneva: Martinus Nijhoff, 1987), p. 487; Program on Humanitarian Policy and Conflict Research at Harvard University, *Commentary to the HPCR Manual on International Law Applicable to Air and Missile Warfare* (Cambridge: Cambridge University Press) 2013, p. 103.

⁴⁵ Except for shipwrecked combatants on parachute who touch the ground (API, Article 42(2)). See Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 315; Heller, “The Concept of ‘the Human’”, pp. 21–22. See also Paul

have been, programmed to recognize an externally manifested intention to surrender as accurately as human soldiers.⁴⁶ LAWS compliance with the prohibition of denial of quarter, therefore, hinges on the technical capability to preserve a reasonable possibility for adversaries to surrender.⁴⁷

The prohibition of launching indiscriminate attacks has two subcategories. The first forbids the use of weapons referred to as “by nature” or “inherently” indiscriminate, that is, those that “cannot be directed at a specific military objective” and those which have effects that “cannot be limited”.⁴⁸ The second subcategory outlaws employing discriminate weapons in an indiscriminate manner.⁴⁹ The two prongs are often mixed up in academic and grey literature on LAWS and IHL. Some

purport that, because of the autonomous functionalities, LAWS could, by definition, “launch independently and unforeseeably an indiscriminate attack”, without elaborating on the reasoning leading to such a conclusion.⁵⁰

The question of whether LAWS are inherently indiscriminate is usually subject to more substantive analysis. Many commentators tie the classification of “inherently indiscriminate” to the predictability and reliability of LAWS.⁵¹ Under the majority view (which could be called the classic approach),⁵² LAWS that do not reach minimum measures of performance could not be fielded.⁵³ Proponents of the classic approach stress that weapons with a low-but-acceptable rate of error can be lawfully fielded.⁵⁴ Given that IHL provides no clear answers about the required minimum

Scharre, *Army of None: Autonomous Weapons and the Future of War* (New York: WW Norton, 2019), p. 260.

⁴⁶ Nathan Gabriel Wood, “Autonomous Weapon Systems and Responsibility Gaps: A Taxonomy”, *Ethics and Information Technology*, vol. 21, no. 1 (2022):7 fn21 (noting that “currently existing LAWS are fully capable of recognizing hands held high as an indication of surrender”); J. Kwik, *Lawfully Using Autonomous Weapon Technologies* (The Hague: TMC Asser Press, 2024), pp. 159–160 (referring to the Samsung SGR-A1 in the Korean DMZ, which is capable of accepting surrender at p. 214 fn1423).

⁴⁷ Nikolas Stürchler and Michael Siegrist, “A ‘Compliance-Based’ Approach to Autonomous Weapon Systems”, EJIL:Talk!, 1 December 2017; Hin-Yan Liu, “Categorization and Legality of Autonomous and Remote Weapons Systems”, *International Review of the Red Cross*, vol. 94, no. 886 (2012):627, 643.

⁴⁸ API, Article 51(4)(b–c). See discussion of the meaning of this prong in Non-Aligned Movement, ‘[Working paper by the Bolivarian Republic of Venezuela on behalf of the Non-Aligned Movement \(NAM\) and Other States Parties to the Convention on Certain Conventional Weapons \(CCW\)](#)’, 2022, at p.2.

⁴⁹ API, Article 51(4)(a); Schmitt and Thurnher, *Out of the Loop*, 246.

⁵⁰ Human Rights Watch (HRW), *Mind the Gap: The Lack of Accountability for Killer Robots* (New York: HRW, 2015), para. 46.

⁵¹ William Boothby, “Control in Weapons Law”, in *Military Operations and the Notion of Control Under International Law*, ed. R. Bartels et al. (The Hague: TMC Asser Press, 2021), p. 385; International Committee of the Red Cross (ICRC), “Background Paper”, in *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons* (Geneva: ICRC, 2016), p. 81; A.L. Schuller, “Artificial Intelligence Effecting Human Decisions to Kill: The Challenge of Linking Numerically Quantifiable Goals to IHL Compliance”, *Journal of Law and Policy for the Information Society*, vol. 15 (2019):105, 108; M.W. Meier, “Lethal Autonomous Weapons Systems”, in *Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*, ed. W.S. Williams and C.M. Ford (Oxford: Oxford University Press, 2019), pp. 289, 309.

⁵² ed. Sandoz et al., *Commentary*, para. 1410(b–c). (The API Commentary describes indiscriminate weapons as those which, because of “their imprecision, . . . will indiscriminately affect the civilian population.”)

⁵³ Paola Gaeta, “Who Acts When Autonomous Weapon Strike? The Act Requirement for Individual Criminal Responsibility and State Responsibility”, *Journal of International Criminal Justice*, vol. 21 (2023):1033, 1034; Corn, “Autonomous Weapons Systems: Managing the Inevitability”, p. 226; R.J. Slesman and T.C. Huntley, “Lethal Autonomous Weapon Systems: An Overview”, *Army Lawyer*, vol. 1 (2019):32–35, 34; R. Buchan and N. Tsagourias, “Autonomous Cyber Weapons and Command Responsibility”, in *Autonomous Cyber Capabilities*, ed. Liivoja and Väljataga, pp. 321, 339; Kwik, *Lawfully Using Autonomous Weapon Technologies*, pp. 197–200.

⁵⁴ Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 199; McDougall, “Autonomous Weapon Systems and Accountability”, p. 18; R. Poitras, “Article 36 Weapons Reviews & Autonomous Weapons Systems: Supporting

reliability level,⁵⁵ States may disagree in good faith on this question, as they have in the past about other weapons.⁵⁶ A handful of commentators question whether reliability is an appropriate criterion to determine whether LAWS could be qualified as inherently indiscriminate.⁵⁷

4.2.3. LAWS that may be prohibited under existing IHL

States have used these rules as a basis for indicating kinds of LAWS that may be prohibited under IHL. For example, Germany has stated that a LAWS is incompatible with international law, particularly IHL, if, once activated, the following apply: it is able to identify, select, track and apply force to targets, while acting outside human control and a responsible chain of command; it does not allow for further human intervention; and it is capable of setting its own objectives or modifying its initial programme or mission framework, without the possibility of any human validation.⁵⁸ Other States have expressed similar views.⁵⁹

Some States have expressed their views not only on existing IHL prohibitions but on what *should be* prohibited. While this paper does not aspire to capture the breadth of *lex ferenda* propositions in diplomatic or academic commentary, such proposals reveal important information about how States interpret the existing prohibitions under IHL. Without prejudice to the process and form of such normative development, some of the proposals for new IHL rules can be summarized as follows:

- ▶ prohibition of LAWS whose critical functions lack meaningful human control, or systems with functions that cannot be predicted, explained, anticipated, understood or tracked⁶⁰
- ▶ prohibition of LAWS that operate without any form of human involvement and outside a responsible human chain of command (i.e., systems capable of setting their own objectives or modifying or executing those objectives, without any human validation of their initial programme or their mission framework, or that would not be the responsibility of the user of the system)⁶¹

International Review Standard”, *American University International Law Review*, vol. 34, no. 2 (2018):466-495, 489; Corn, “Autonomous Weapons Systems: Managing the Inevitability”, p. 228; L. Righetti, “Emerging Technology and Future Autonomous Weapons”, in *Autonomous Weapon Systems: Implications*, pp. 36–39, 37. The threshold for “inherently indiscriminate” appears to be high. See e.g. J.-M. Henckaerts and L. Doswald-Beck (eds), *Customary International Humanitarian Law*, vol. I, *Rules* (Geneva: ICRC, 2005), p. 247; Henderson et al., “Remote and Autonomous Warfare Systems”, p. 361. See also, for example, China, ‘[Working Paper of the People’s Republic of China on Lethal Autonomous Weapons Systems](#)’, July 2022 at pp.2-3.

⁵⁵ Netta Goussac, “Safety Net or Tangled Web: Legal Reviews of AI in Weapons and War-Fighting”, *Humanitarian Law & Policy*, 18 April 2019; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 198.

⁵⁶ Crotofof, “The Killer Robots Are Here”, pp. 1885–86.

⁵⁷ Marta Bo, “Three Individual Criminal Responsibility Gaps with Autonomous Weapon Systems”, *Opinio Juris*, 29 November 2022.

⁵⁸ See, for example, the views of Germany, UNSG Report.

⁵⁹ See also the views of Austria, Guatemala, Moldova, Norway and Pakistan, UNSG Report.

⁶⁰ State of Palestine, ‘[State of Palestine’s Proposal for the Normative and Operational Framework on Autonomous Weapons Systems’ 3 March 2023 \(CCW/GGE.1/2023/WP.2/Rev.1\)](#) at p.4; Bulgaria, Denmark, France, Germany, Italy, Luxembourg and Norway, ‘[Working paper’ 4 March 2024 \(CCW/GGE.1/2024/WP.3\)](#) at p.2; Pakistan, ‘[Elements of an international legal instrument on Lethal Autonomous Weapons Systems \(LAWS\)’ 14 May 2024 \(CCW/GGE.1/2024/WP.7\)](#) at p.2. See also, for example, the views of Costa Rica, Fiji, Kiribati, Pakistan, the Philippines, Austria, the Netherlands, Norway, Switzerland and the ICRC, UNSG Report.

⁶¹ Japan, ‘[Working paper’ 24 July 2024 \(CCW/GGE.1/2024/WP.8\)](#) at p.3; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, ‘[Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022](#) at p.4; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘[Draft articles on autonomous weapon systems](#)

- ▶ prohibition of LAWS that target people⁶²
- ▶ prohibition of the use of LAWS in connection with, for instance, nuclear, chemical and biological weapons,⁶³
- ▶ prohibition of weapon systems that incorporate artificial intelligence,⁶⁴ and
- ▶ prohibition of LAWS that cannot be used in compliance with the principles of international law or the dictates of public conscience.⁶⁵

5. Obligations under IHL relevant to the planning and conducting of a military operation or an attack

The application of IHL to the use of LAWS in operations is affected by two distinct features of these weapon systems. First, some of the decisions and judgements required by IHL rules on the conduct of hostilities are made longer in advance of an application of force. Second, they are also made without the user or users knowing exactly where, when or against what the force will be applied.

Contributions to the discussion of IHL as it applies to LAWS canvas obligations relevant to the planning and conduct of attacks involving LAWS but also those that are relevant before an attack is contemplated and after it concludes. This background paper addresses these statements thematically, starting with

an examination of obligations relevant before an attack commences (including rules related to prohibited means and methods of warfare, legal reviews), then turning to obligations relevant in the planning and conduct of attacks (rules relating to distinction, proportionality and precautions in attack), before turning to obligations relevant to responsibility and accountability for IHL violations.

5.1. Constant care

The obligation to take constant care attaches to the conduct of all military operations, rather than only in attack. This obligation has thus been interpreted as temporally extending to phases preceding attacks, such as design and

– [prohibitions and other regulatory measures on the basis of international humanitarian law \(“IHL”\)’ 26 August 2024 \(CCW/GGE.1/2024/WP.10\)](#) at p.2. See also, for example, the views of Finland, Italy and Japan, UNSG Report.

⁶² State of Palestine, [‘State of Palestine’s Proposal for the Normative and Operational Framework on Autonomous Weapons Systems’ 3 March 2023 \(CCW/GGE.1/2023/WP.2/Rev.1\)](#) at p.4. See also, for example, the views of Fiji, Kiribati, Malawi and the ICRC, UNSG Report.

⁶³ See, for example, the views of Moldova, UNSG Report.

⁶⁴ Russian Federation, [‘Concept of Activities of the Armed Forces of the Russian Federation in the Development and Use of Weapons Systems with Artificial Intelligence Technologies’ \(no date given\) \(CCW/GGE.1/2023/WP.5\)](#).

⁶⁵ Austria, [‘Revised working paper’ 2 March 2023 \(CCW/GGE.1/2023/WP.1/Rev.1\)](#) at pp.1-2; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, [‘Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022](#) at p.4; Argentina, Ecuador, Costa Rica, Nigeria, Panama, the Philippines, Sierra Leone and Uruguay, [‘Protocol VI’ \(2022\)](#) at para 1.2; Austria, [‘Revised working paper’ 2 March 2023 \(CCW/GGE.1/2023/WP.1/Rev.1\)](#) at pp.1-2; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, [‘Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022](#) at p.4. Note that the Russian Federation takes the view that the principles of humanity and the dictates of public conscience cannot be used as ‘the absolute and sole sufficient condition to impose restrictive and prohibited regimes on certain types of weapons’, see [‘Approaches of the Russian Federation to the issue of emerging technologies in the area of lethal autonomous weapons systems’ 14 May 2024 \(CCW/GGE.1/2024/WP.2\)](#) at p.3.

manufacture.⁶⁶ It is unclear, at least according to commentators, whether it imposes legal obligations on manufacturers and programmers of LAWS.⁶⁷

What the obligation requires with regard to the use of LAWS appears to hinge on whether a specific weapon system performs worse or better than a human. If worse, the need to constantly reassess the risk to civilians has been interpreted as including “an implicit duty to retain human oversight in the form of a human soldier ‘on the loop’”.⁶⁸ It has been argued that “[i]f a state had the ability to minimize civilian casualties by using an autonomous weapon instead of human soldiers, that provision would require the state to use the LAWS”.⁶⁹

5.2. Precautions in attack

The principle of precautions in attack and the numerous implicit and explicit obligations it gives rise to have been widely commented on in the LAWS and IHL literature.⁷⁰ A line of work explores whether LAWS could perform functions consistent with precautions in attack. These functions include target verification,⁷¹ minimalization of risk to the civilian population⁷² and proportionality calculations required to refrain from launching attacks expected to be disproportionate.⁷³

While views on what is technologically possible differ, a broad consensus holds that IHL imposes obligations not on the weapons, but on the warring parties and their commanders.⁷⁴

⁶⁶ Marta Bo, Laura Bruun and Vincent Boulanin, *Retaining Human Responsibility in the Development and Use of Autonomous Weapon Systems* (SIPRI: Stockholm, 2022), p. 12; Chris Jenks and Rain Liivoja, “Machine Autonomy and the Constant Care Obligation”, *Humanitarian Law & Policy*, 11 December 2018.

⁶⁷ Robin Geiß, “State Control Over the Use of Autonomous Weapon Systems: Risk Management and State Responsibility”, in *Military Operations*, ed. Bartels, pp. 439, 427.

⁶⁸ Geiß, “State Control”, p. 445; Geneva Academy of International Humanitarian Law and Human Rights, “Autonomous Weapons Systems Under International Law”, Academy Briefing no. 8, 2014; Scharre, *Army of None*, p. 258. Compare J. Cherry and D. Johnson, “Maintaining Command and Control (C2) of Lethal Autonomous Weapon Systems: Legal and Policy Considerations”, *Southwestern Journal of International Law*, vol. 27 (2020):19.

⁶⁹ Heller, “The Concept of ‘the Human’”, p. 18 fn85; Eric Talbot Jensen, “The (Erroneous) Requirement for Human Judgment (and Error) in the Law of Armed Conflict”, *International Law Studies*, vol. 96 (2020):56. Similarly, albeit not explicitly with regard to LAWS: Jenks and Liivoja, “Machine Autonomy and the Constant Care Obligation”.

⁷⁰ J.C. van den Boogaard and M.P. Roorda, “‘Autonomous’ Weapons and Human Control”, in *Military Operations*, ed. Bartels, p. 428. See generally G.S. Corn, “War, Law, and the Oft Overlooked Value of the Process as a Precautionary Measure”, *Pepperdine Law Review*, vol. 42 (2015):419–466.

⁷¹ Benjamin Kastan, “Autonomous Weapons Systems: A Coming Legal ‘Singularity’?”, *Journal of Law, Technology & Policy*, vol. 45 (2013):60–61, 59–61; Henderson et al., “Remote and Autonomous Warfare Systems”, 345–47.

⁷² Boothby, “Dehumanization”/“Highly Automated and Autonomous Technologies”, p. 149; E. Winter, “The Compatibility of the Use of Autonomous Weapons with the Principle of Precaution in the Law of Armed Conflict”, *Military Law and the Law of War Review*, vol. 58, no. 2 (2020):240, 265–71.

⁷³ Winter, “The Compatibility of the Use of Autonomous Weapons”, pp. 259–65; M. Kurosaki, “Toward the Special Computer Law of Targeting”, in *Necessity and Proportionality in International Peace and Security Law*, ed. C. Kreß and R. Lawless (Oxford: Oxford University Press, 2020), pp. 409, 415–18.

⁷⁴ Slesman and Huntley, “Lethal Autonomous Weapon Systems: An Overview”, p. 34; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 10; Schmitt and Thurnher, *Out of the Loop*, p. 266; Cherry and Johnson, “Maintaining Command and Control”, pp. 1, 17–19; M. Roorda, “NATO’s Targeting Process: Ensuring Human Control Over (and Lawful Use of) ‘Autonomous’ Weapons”, in *Autonomous Systems: Issues for Defence Policymakers*, ed. A.P. Williams and P.D. Scharre (The Hague: NATO, 2015), pp. 152, 163; Sassóli, “Autonomous Weapons and International Humanitarian Law”. 323.

Consequently, the precautionary obligations remain with “those who plan or decide upon attack”,⁷⁵ as expressly required by IHL,⁷⁶ and “[i]t is they who must do everything feasible to ensure that the targeting functions of a particular LAWS will function adequately in the circumstances of the attack”.⁷⁷

While some delve into more detailed aspects of the precautionary principle,⁷⁸ for most, it is the legal anchor for the requirement of human control over the effects of LAWS.⁷⁹ As discussions progress, it is increasingly emphasized that the central element of such control is the

commander’s decision whether to employ a given LAWS in a particular operational environment, based on the commander’s situational awareness and understanding of the specific LAWS at their disposal.⁸⁰ It is further argued that compliance with the precautionary principle requires that LAWS “be limited to select courses of action with the employing commander’s intent”,⁸¹ as well as restrictions in time⁸² and space⁸³ of LAWS operation.⁸⁴ As the passage of time increases the likelihood of changes in the operational environment for which a LAWS was deployed,⁸⁵ and as increasing the space in which a LAWS can operate

⁷⁵ API, Article 57(2)(a).

⁷⁶ Laura Bruun, Marta Bo and Netta Goussac, *Compliance with International Humanitarian Law in the Development and Use of Autonomous Weapon Systems: What Does IHL Permit, Prohibit and Require?* (Stockholm: Stockholm International Peace Research Institute, 2023), p. 5.

⁷⁷ Tim McFarland, *Autonomous Weapon Systems and the Law of Armed Conflict*, p. 96.

⁷⁸ Such as whether the minimization rule might require commanders to use LAWS at their disposal if they become more precise than humans. See Scharre, *Army of None*, p. 258; similarly, Michael N Schmitt & Michael Schauss, “Uncertainty in the Law of Targeting: Towards a Cognitive Framework”, *Harvard National Security Journal*, vol. 10 (2019):148-194, 180. On how LAWS could alter what is feasible from the force protection perspective, see Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 213; Ohlin, *Research Handbook*, p. 35. On the relationship between the precautionary principle and the transparency and predictability of AI technologies, including LAWS, see A. Coco and T. Dias, “Handle with Care: Due Diligence Obligations in the Employment of AI Technologies”, in *Research Handbook on Warfare and Artificial Intelligence*, ed. Robin Geiß and Henning Lahmann (London: Edward Elgar, 2024), pp. 234–260.

⁷⁹ T. McFarland and J. Galliot, “Understanding AI and Autonomy: Problematizing the Meaningful Human Control Argument against Killer Robots”, in *Lethal Autonomous Weapons*, ed. J. Galliot, J.D. Ohlin and D. MacIntosh (Oxford: Oxford University Press, 2021), pp. 41–56; van den Boogaard and Roorda, “‘Autonomous’ Weapons and Human Control”, p. 432.

⁸⁰ J. Kraska, “Command Accountability for AI Weapon Systems in the Law of Armed Conflict”, *International Law Studies*, vol. 97 (2021):407, 446; Pacholska, “Autonomous Weapons”, pp. 392, 404; van den Boogaard and Roorda, “‘Autonomous’ Weapons and Human Control”, p. 433.

⁸¹ Cherry and Johnson, “Maintaining Command and Control”, p. 19.

⁸² The temporal limitation appears to have two prongs, the first relates to the timespan between the last decision/observation by a human and the execution of force, and the second to the duration of LAWS operation. On the first, see R. Geiß and H. Lahmann, “Autonomous Weapons Systems: A Paradigm Shift for the Law of Armed Conflict?”, in *Research Handbook*, ed. Ohlin, pp. 371, 402; ICRC, “Statement of the International Committee of the Red Cross (ICRC) under Agenda Item 5(B)’, Convention on Certain Conventional Weapons (CCW), Group of Governmental Experts on Lethal Autonomous Weapons Systems, Geneva, 25–29 March 2019, p. 4. For a throughout discussion on both, see Kwik, *Lawfully Using Autonomous Weapon Technologies*, pp. 149–153.

⁸³ The special limitations have been referred to in LAWS and IHL literature in various ways such as “area of operation”, “maximum range” and “search area”. Henderson et al., “Remote and Autonomous Warfare Systems”, p. 351; Buchan and Tsagourias, “Autonomous Cyber Weapons and Command Responsibility”, p. 331; Boothby, “Dehumanization”/“Highly Automated and Autonomous Technologies”, p. 44; van den Boogaard and Roorda, “‘Autonomous’ Weapons and Human Control”, p. 425.

⁸⁴ Article 36, “Structuring Debate on Autonomous Weapons Systems”, in Memorandum for Delegates to the Convention on Certain Conventional Weapons (CCW), Geneva, 14–15 November 2013, p. 2; Boothby, “Dehumanization”/“Highly Automated and Autonomous Technologies”, p. 44; ICRC, “Statement of the International Committee of the Red Cross (ICRC) under Agenda Item 5(B)”, p. 4; Cherry and Johnson, “Maintaining Command and Control”, p. 19; M.N. Schmitt, “Autonomous Weapon Systems and International Humanitarian Law: A Reply to the Critics”, *Harvard National Security Journal*, vol. 1 (2013):13–14.

⁸⁵ Moyes, “Target Profiles”, p. 9; Crootof, “The Killer Robots Are Here”, p. 1878; A. Holland Michel, *The Black Box*,

increases the probability that the system will encounter an operational environment it was not supposed to operate in,⁸⁶ imposing limits on both variables has been frequently proposed in the literature.⁸⁷

The duty to issue effective advanced warnings has been on the sideline of the LAWS debate. Those who touched upon it suggest that LAWS could be designed to issue warnings before engagement in order to give civilians an opportunity to flee.⁸⁸ Others argue that a LAWS-issued warning does not relieve the commander from their duty to warn as “IHL obligations can never be fulfilled ‘by’ [L]AWS”, and when circumstances permit both must be provided.⁸⁹

Divergent interpretations of the scope of attack also resonate in various approaches

to the duty to cancel or suspend an attack,⁹⁰ even if rarely discussed in depth.⁹¹ As there is little doubt that the duty to cancel applies “also and primarily to those executing attacks”,⁹² it is considered “particularly tricky”⁹³ with regard to LAWS. Some interpret it as “an indirect requirement for maintaining the LAWS under some form of direct supervision and maintaining the possibility to intervene to cancel or suspend the system’s operation”.⁹⁴ Others point out that a requirement framed in this way would outlaw many types of weapon that have been used for decades, ranging from traditional artillery to modern GPS-guided bombs, which “are not – in the same manner as a sniper – able to cancel an attack at the last moment based on changing circumstances”.⁹⁵

Unlocked: Predictability and Understandability in Military AI (Geneva: UNIDIR, 2020), p. 14.

⁸⁶ Holland Michel, *The Black Box, Unlocked*, p. 7.

⁸⁷ ICRC, “Statement of the International Committee of the Red Cross (ICRC) under Agenda Item 5(B)”, p. 4; Group of Governmental Experts of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, “Ethics and Autonomous Weapon Systems: An Ethical Basis for Human Control?”, Submitted by the ICRC, CCW/GGE1/2018/WP, 2018, para. 26; N. Davison, *A Legal Perspective: Autonomous Weapon Systems under International Humanitarian Law*, UNODA Occasional Papers no. 30 (Geneva: UNIDIR, 2017), p. 14; Roorda, “NATO’s Targeting Process”, p. 162; J.S. Thurnher, “No One at the Controls: Legal Implications of Fully Autonomous Targeting”, *Joint Force Quarterly*, vol. 67 (2012):77, 83; Schmitt and Thurnher, *Out of the Loop*, p. 250; P. Kalmanovitz, “Judgment, Liability and the Risks of Riskless Warfare”, in *Autonomous Weapons Systems*, ed. Bhuta et al., pp. 145–163, 150; Geiß and Lahmann, “Autonomous Weapons Systems: A Paradigm Shift”, pp. 371–404, 402,

⁸⁸ Thurnher J, “Feasible Precautions in Attack and Autonomous Weapons”, in *Dehumanization of Warfare*, ed. von Heinegg et al., pp. 111–12; Buchan and Tsagourias, “Autonomous Cyber Weapons and Command Responsibility”, p. 33; Winter, “The Compatibility of the Use of Autonomous Weapons”, p. 272.

⁸⁹ Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 215.

⁹⁰ The duty to cancel under API Article 57(2)(b) requires an attack to be cancelled or suspended if it becomes apparent that an objective is not a valid one, or the attack will cause excessive incidental harm.

⁹¹ For a rare exploration of the duty to cancel on both instance and attack level, see Kwik, *Lawfully Using Autonomous Weapon Technologies*, pp. 217–222.

⁹² ed. Sandoz et al., *Commentary*, para. 2220; A.A. Haque, “A Theory of Jus in Bello Proportionality”, in *Weighing Lives in War*, vol. 1, ed. J.D. Ohlin, L. May and C. Finkelstein (Oxford: Oxford University Press, 2017), pp. 188, 213.

⁹³ Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 339. Similarly Henderson et al., “Remote and Autonomous Warfare Systems”, p. 355.

⁹⁴ Vincent Boulanin, Laura Bruun and Netta Goussac, *Autonomous Weapon Systems and International Humanitarian Law: Identifying Limits and the Required Type and Degree of Human–Machine Interaction* (Stockholm: SIPRI, June 2021), p. 25; ICRC, “Statement of the International Committee of the Red Cross (ICRC) under Agenda Item 5(B)”, p. 1 (“weapon systems must remain under human supervision, and must permit the user to, where feasible, cancel, suspend or modify attacks, up until the execution of the attack (or halting of the attack)”).

⁹⁵ Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 320. Similarly Henderson et al., “Remote and Autonomous Warfare Systems”, p. 355; William H. Boothby, *Weapons and the Law of Armed Conflict*, 1st edn (Oxford: Oxford University Press, 2009), p. 285.

Commentators following this second line of reasoning stress the difference between cancellation of an attack in response to the non-military nature of the target and cancellation in response to excessive incidental harm. While the former appears to be recognized as a mandatory “cancelling function” of any LAWS,⁹⁶ the latter is widely considered impossible to program. The lack of an ability to cancel in response to excessive incidental harm, the argument goes, does not prevent the use of LAWS as “no weapon in history has been able to perform this test internally”.⁹⁷ As the standard for cancellation of attack hinges on excessiveness becoming “apparent”, it is argued that LAWS, just like human soldiers,⁹⁸ would be expected to perform the mission with an assumption that “an appropriate assessment has been made by those who assigned them the mission”.⁹⁹

5.3. Duty to prevent breaches

In the context of LAWS, the discussion on the duty to prevent breaches of the 1949 Geneva Conventions (under their Common Article 1) revolves around error-mitigation efforts.¹⁰⁰ It is frequently pointed out that the possibility of preventing errors is frustrated when LAWS are enabled by opaque or “black box” artificial intelligence (AI) models.¹⁰¹ Some point out that, for advanced LAWS, “some degree of opacity will be inevitable”.¹⁰² The debate on the required levels of explainability or understandability appears more technical than legal.¹⁰³

From an IHL perspective, it seems widely accepted that, in order to comply with the targeting rules, including the duty to prevent breaches, commanders and users need to have an appropriate level of understanding of the system’s functioning.¹⁰⁴ As it is

⁹⁶ Winter, “The Compatibility of the Use of Autonomous Weapons”, pp. 262–263; Henderson et al., “Remote and Autonomous Warfare Systems”, p. 355.

⁹⁷ Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 222.

⁹⁸ General scholarship also recognizes that human soldiers do not have an obligation and, in fact, are often discouraged from second-guessing the proportionality analyses of their superiors in the course of a mission. E. van Sliedregt, *Individual Criminal Responsibility in International Law* (Oxford: Oxford University Press, 2012), p. 304; Haque, “A Theory of Jus in Bello Proportionality”, p. 214.

⁹⁹ Bothe et al., *New Rules for Victims of Armed Conflict*, p. 409.

¹⁰⁰ On LAWS errors specifically, albeit not explicitly from the perspective of the duty at hand, see Abhimanyu George Jain, “Autonomous Weapon Systems, Errors and Breaches of International Humanitarian Law”, *Journal of International Criminal Justice*, vol. 21 (2023):1–28.

¹⁰¹ There is no universal definition of either term; in legal literature, both are used to refer to AI models facilitating systems in which the user knows the inputs and outputs, but the process that turns one into the other is partially or fully obstructed. ICRC, “Autonomy, Artificial Intelligence and Robotics: Technical Aspects of Human Control”, August 2019, p. 3. For a comprehensive discussion on the increasing complexity in weapon systems from a legal perspective, see Vincent Boulanin et al., *Limits on Autonomy in Weapon Systems: Identifying Practical Elements of Human Control* (Stockholm: SIPRI/ICRC, June 2020), p. 20.

¹⁰² Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 79.

¹⁰³ S. Venkatasubramanian, “Structural Disconnects between Algorithmic Decision-Making and the Law”, *Humanitarian Law & Policy*, 25 April 2019; Holland Michel, *The Black Box, Unlocked*, pp. 16–17; B.A. Haugh, D.A. Sparrow and D.M. Tate, *The Status of Test, Evaluation, Verification, and Validation (TEV&V) of Autonomous Systems* (Alexandria: Institute for Defense Analyses, 2018); R.V. Yampolskiy, “Unexplainability and Incomprehensibility of Artificial Intelligence”, *Journal of Artificial Intelligence and Consciousness*, vol. 7, no. 2 (2019):1–15.

¹⁰⁴ ICRC, “Submission on Autonomous Weapon Systems to the United Nations Secretary-General, RE: ODA-2024-00019/LAWS”, 19 March 2024, p. 5; ICRC, “Contribution by the International Committee of the Red Cross submitted to the Chair of the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems as a Proposal for Consensus Recommendations in Relation to the Clarification, Consideration and Development of Aspects of the Normative and Operational Framework”, 11 June 2021; Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 324 (“It is obvious that a commander

unsettled what further measures are required to “respect and ensure respect’ in the development and use of LAWS”, some have called on States to further elaborate their positions on this obligation.¹⁰⁵

5.4. Principle and rules of distinction

Some States have raised questions about the ability of users of LAWS to comply with the requirement to distinguish between, on the one hand, protected persons and objects and, on the other, combatants and military objectives, not least due to the contextual human judgement required to do so. For example, New Zealand points out that a combatant can become *hors de combat* very quickly, which requires the user(s) of a LAWS to have detailed qualitative and contextual judgement abilities.¹⁰⁶

Whether LAWS can be used in compliance with the principle of distinction has been a major point of debate. One line of disagreement concerns the limits¹⁰⁷ and the benefits of technological advances in target recognition.¹⁰⁸ Another relates to the types of targets that LAWS could legally engage; this strand of scholarship is where divergent interpretations of existing IHL obligations are most discernible, and the influence of ethical arguments is the strongest.

Among the two categories of military objectives, objects received less attention. Those who have commented on them point out that LAWS designed to engage military objects by nature are uncontroversial.¹⁰⁹ Military objects by nature “often possess uniquely military signatures”, significantly limiting the risk of misclassification,¹¹⁰ and their destruction is *ipso facto* considered to offer a definite military

deploying autonomous weapons must understand how they function, just as for any other means and method of warfare.”); Edward Hunter Christie et al., “Regulating Lethal Autonomous Weapon Systems: Exploring the Challenges of Explainability and Traceability”, *AI and Ethics*, published online 21 February 2023; Kwik, *Lawfully Using Autonomous Weapon Technologies*, pp. 78–83; US Department of Defense Directive as quoted in Schmitt, “A Reply to the Critics”, p. 242; Cherry and Johnson, “Maintaining Command and Control”, p. 14; Jain, “Autonomous Weapon Systems, Errors and Breaches”, p. 4 fn15.

¹⁰⁵ Boulanin et al., *Autonomous Weapon Systems and International Humanitarian Law*, p. 42. On the duty to ensure respect in the context of military AI, see Coco and Dias, “Handle with Care”, pp. 234–260.

¹⁰⁶ Views of New Zealand, UNSG Report. See also Austria, ‘Working paper’, 5 March 2024 (CCW/GGE.1/2024/WP.4) at p.2; State of Palestine, ‘State of Palestine’s Proposal for the Normative and Operational Framework on Autonomous Weapons Systems’ 3 March 2023 (CCW/GGE.1/2023/WP.2/Rev.1) at p.5; Pakistan, ‘Proposal for an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)’ 8 March 2023 (CCW/GGE.1/2023/WP.3/Rev.1) at p.3; United Kingdom, ‘United Kingdom Proposal For A Gge Document On The Application Of International Humanitarian Law To Emerging Technologies In The Area Of Lethal Autonomous Weapon Systems(Laws)’ 2022. See also, for example, views of New Zealand and Article 36, UNSG Report.

¹⁰⁷ Several scholars contend that technical limitations prevent LAWS from being used lawfully. See, e.g., Noel Sharkey, “The Evitability of Autonomous Robot Warfare”, *International Review of the Red Cross*, vol. 94 (2012):787, 788–789; Thompson Chengeta, “Measuring Autonomous Weapon Systems against International Humanitarian Law Rules”, *Journal of Law and Cyber Warfare*, vol. 5 (2016):66, 100–102; James Foy, “Autonomous Weapons Systems: Taking the Human out of International Humanitarian Law”, *Dalhousie Journal of Legal Studies*, vol. 23 (2014):47, 57, citing Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Surrey: Ashgate Publishing, 2009).

¹⁰⁸ Some commentators highlight the potential that LAWS hold for strengthening military capabilities to conduct attacks with greater precision. See, e.g., Jeroen van den Boogaard, “Proportionality and Autonomous Weapons Systems”, *Journal of International Humanitarian Legal Studies*, vol. 6 (2015):247, 270.

¹⁰⁹ ICRC, “Submission on Autonomous Weapon Systems”, p. 6 (suggesting “restricting targets of the LAWS to only those which are military objectives by nature”); van den Boogaard and Roorda, “‘Autonomous’ Weapons and Human Control”, p. 425; K. Anderson and M. Waxman, “Law and Ethics for Autonomous Weapon Systems: Why a Ban Won’t Work and How the Laws of War Can”, *The Hoover Institution Jean Perkins Task Force on National Security & Law Essay Series*, no. 324, 2013, p. 11; William Boothby, “Some Legal Challenges Posed by Remote Attack”, *International Review of the Red Cross*, vol. 94 (2012):579, 585; Kastan, “Autonomous Weapons Systems: A Coming Legal ‘Singularity’?”, pp. 60–61.

¹¹⁰ Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 158; J. Holland, “Military Objective and Collateral Damage:

advantage.¹¹¹ It is less easy to determine whether a given object makes an effective contribution to military action due to its location, purpose or use and whether its destruction offers a definite military advantage in the circumstances at the time. For some, this lack of stability in legal qualification renders the use of LAWS against them unlawful.¹¹² For others, the use of a LAWS against military objects with fluid characteristics should be conditioned on the LAWS being able to receive updates on elements that determine the object's legal qualification.¹¹³

The use of LAWS directly against human targets is the most contentious aspect of the discourse. Various positions on the topic can be broken down into three main categories. The first group of commentators contends that all anti-personnel LAWS should be prohibited but grounds such contention on ethical rather than purely IHL-based reasons.¹¹⁴ A second group insists that there is nothing in IHL preventing the use of LAWS against members

of the enemy armed forces, as long as the system has the capacity to recognize persons *hors de combat* at least as well as a human soldier would.¹¹⁵ This line of argument essentially applies the “stability in legal qualification” standard equally to both types of military objective while at the same time recognizing that using a LAWS against civilians directly participating in hostilities (DPH) is the most challenging category.¹¹⁶ Commentators in belonging to this second group insist however that – at least in most cases – “a civilian who engages in any of these acts is targetable regardless of the intent behind the act, because the objective qualities of the act itself satisfy the DPH test”,¹¹⁷ and as such can be interpreted by an algorithm.¹¹⁸ A directly opposite interpretation of DPH has been advanced by the commentators belonging to the third category, according to whom the determination of whether a person's conduct qualifies as DPH does require value judgment and assessment of intentions, which machines cannot do.¹¹⁹

Their Relationship and Dynamics”, *Yearbook of International Humanitarian Law*, vol. 7 (2004):35, 40.

¹¹¹ Henderson et al., “Remote and Autonomous Warfare Systems”, p. 341.

¹¹² ICRC, “International Committee of the Red Cross (ICRC) Position on Autonomous Weapon Systems: ICRC Position and Background Paper”, *International Review of the Red Cross*, vol. 102, no. 915 (2022):1335, 1346–1347.

¹¹³ Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 324; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 159.

¹¹⁴ ICRC appears to be the blend of the first and third category. ICRC, “International Committee of the Red Cross (ICRC) position on autonomous weapon systems”, pp. 1335, 1343–1345; Geiß, “State Control”, pp. 445–446.

¹¹⁵ Henderson et al., “Remote and Autonomous Warfare Systems”, pp. 335, 344–346; Heller, “The Concept of ‘the Human’”, pp. 18–26; Corn, “Autonomous Weapons Systems: Managing the Inevitability”; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 159.

¹¹⁶ Heller, “The Concept of ‘the Human’”, pp. 18–26; Sassóli, “Autonomous Weapons and International Humanitarian Law”, pp. 328–330; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 160. For a similar line of reasoning albeit not with regard to LAWS, see T. Krupiy, “A Case against Relying Solely on Intelligence, Surveillance and Reconnaissance Technology to Identify Proposed Targets”, *Journal of Conflict and Security Law*, vol. 20, no. 3 (2015):415, 422–423.

¹¹⁷ Heller, “The Concept of ‘the Human’”, p. 23 (“A civilian who engages in any of these acts is targetable regardless of the intent behind the act, because the objective qualities of the act itself satisfy the DPH test”), also referencing Nils Melzer, “Interpretative Guidance on the Notion of Direct Participation in Hostilities Under International Humanitarian Law”, (Geneva: International Committee of the Red Cross 2009).

¹¹⁸ Sassóli, “Autonomous Weapons and International Humanitarian Law”, p. 315 (“It would be a misconception of existing IHL to claim that the decision to kill someone in an armed conflict must be taken after a value judgment (which a machine is obviously unable to make and must be made by a human being) is made about that person. Whether a person may be targeted in an armed conflict is dependent on their status (combatant/civilian) and/or the objective impression resulting from their conduct (direct participation in hostilities)”).

¹¹⁹ ICRC, “International Committee of the Red Cross (ICRC) position on autonomous weapon systems”, pp. 1335, 1345 (“Effectively protecting combatants/fighters who are placed *hors de combat* and civilians who are not, or no longer,

Aside from discrepancies in the interpretation of DPH, a debate on the compliance of LAWS with the principle of distinction also brought to the fore a lack of clarity on what it means to make the civilian population or individual civilians “the object of an attack”.¹²⁰ The main concern regarding LAWS is not that they will be developed to strike protected objects or persons. Rather, “the main risk is of unintended engagements where the intention of the party to conflict is not translated to the outcome produced by the LAWS”.¹²¹ A major question remains whether unintended engagements¹²² – a term foreign to IHL – are prohibited

by the principle of distinction.¹²³ Framing the problem of selecting and striking targets other than those intended by the operator as “unintended engagements” is unique to the debate on LAWS.¹²⁴ It appears to be causing some confusion among the commentators, with some (often tacitly)¹²⁵ assuming that unintended engagements violate the principle of distinction due to their potential unpredictability.¹²⁶ Such an interpretation appears to run contrary to a well-established interpretation of IHL under which inadvertent attacks would be considered accidents and, in principle, not unlawful under IHL.¹²⁷

taking a direct part in hostilities calls for difficult and highly contextual, conduct-, intent- and causality-related legal assessments by humans in the context of a specific attack”); Human Rights Watch, *Losing Humanity*, p. 4 (“Distinguishing between a fearful civilian and a threatening enemy combatant requires a soldier to understand the intentions behind a human’s actions, something a robot could not do”); Noel Sharkey, “Saying ‘No!’ to Lethal Autonomous Targeting”, *Journal of Military Ethics*, vol. 9 (2010):369, 371–72, 379; Marcello Guarini and Paul Bello, “Robotic Warfare: Some Challenges in Moving from Noncivilian to Civilian Theaters”, in *Robot Ethics: The Ethical and Social Implications of Robotics*, ed. Patrick Lin, Keith Abney and George A. Bekey (Cambridge: MIT Press, 2012), pp. 129, 137–38, 134; United Nations, A/HRC/23/47, pp. 13, 68; Robin Geiß, *The International-Law Dimension of Autonomous Weapons Systems* (Berlin: Friedrich-Ebert-Stiftung, 2015), <http://library.fes.de/pdf-files/id/ipa/11673.pdf>, pp. 13–14; Robert Sparrow, “Robots and Respect: Assessing the Case against Autonomous Weapon Systems”, *Ethics and International Affairs*, vol. 30 (2016):93, 101.

¹²⁰ Tsvetelina van Benthem, “Exploring Changing Battlefields: Autonomous Weapons, Unintended Engagements and the Law of Armed Conflict”, (Tallinn: NATO CCD COE, 2024); Magdalena Pacholska, “Military Artificial Intelligence and the Principle of Distinction: A State Responsibility Perspective”, *Israel Law Review*, vol. 56 (2023):3, 12–17; Tsvetelina van Benthem, “Symposium on Military AI and the Law of Armed Conflict: Responsible Deployments of Militarised AI – The Power of Information to Prevent Unintended Engagements”, *Opinio Juris*, 2 April 2024.

¹²¹ Tsvetelina van Benthem, Written Evidence (AIW0033), AI in Weapon Systems Inquiry, British Parliament, para. 2.3.

¹²² The term was introduced into the international debate through the US Department of Defense Directive 3000.09, “Autonomy in Weapon Systems”, 2012, where it was defined as: “The use of force resulting in damage to persons or objects that human operators did not intend to be the targets of U.S. military operations, including unacceptable levels of collateral damage beyond those consistent with the law of war, ROE, and commander’s intent.” On the risk of unintended engagements with regard to AI-enabled weapons, see Paul Scharre, “Report on Autonomous Weapons and Operational Risk”, Center for a New American Security, 2016.

¹²³ Bo et al., *Retaining Human Responsibility*, pp. 14–16.

¹²⁴ As so is relying on the “intent of the commander” for the analysis of the legality of the weapon’s effects. See Cherry and Johnson, “Maintaining Command and Control”, p. 5.

¹²⁵ That often takes the form of analysing solely the attributability of a given conduct – be it to a state or an individual – without first establishing whether it was contrary to international obligations incumbent on such state or individual. See, for instance, Geiß and Lahmann, “Autonomous Weapons Systems: A Paradigm Shift”, pp. 371–404, 392; Gaeta, “Who Acts When Autonomous Weapons Strike?”.

¹²⁶ Human Rights Watch, *Losing Humanity*, p. 42 (“Given the challenges fully autonomous weapons present to adherence to international humanitarian law and the way they undermine other humanitarian protections, it is inevitable that they will at some point kill or injure civilians”); Daniele Amoroso and Guglielmo Tamburrini, “Toward a Normative Model of Meaningful Human Control over Weapons Systems”, *Ethics and International Affairs*, vol. 35 (2021):245, 255 (“Suppose that an autonomous weapons system commits a material act that would be equivalent to a war crime should this act have been performed by human beings”).

¹²⁷ Schmitt and “Uncertainty in the Law of Targeting, 148–194; Yoram Dinstein, *The Conduct of Hostilities Under the Law of International Armed Conflict*, 3rd edn (Cambridge: Cambridge University Press, 2016), para. 398 (“many things can go wrong in the execution of attacks, and, as a result, civilians are frequently harmed by accident”).

5.5. Principle and rules of proportionality

The principle of proportionality is frequently considered the most problematic in the legal discussion of LAWS.¹²⁸ However, a closer examination of the various positions advanced in the literature shows surprisingly many points of convergence among critics and proponents of LAWS.

First and foremost, there is a broad agreement that assessing the direct military advantage anticipated from an attack and weighing it against incidental civilian harm requires distinctly human context-dependent judgment.¹²⁹ For example, according to New Zealand:

Parties to conflict must ensure that all attacks in pursuit of a military objective are proportional to any incidental civilian casualties or damage and take feasible precautions to avoid and minimise civilian losses. This proportionality assessment is in essence a human decision-making process that depends on the ability to assess both current and likely future events when contemplating the anticipated military advantage of an attack. It requires the technical collection and fusion of various forms

of data but also demands a complex process of judgement drawing on operational experiences, legal frameworks, ethics, and other considerations that require contextual judgement, including of the operation as a whole. Due to the dynamic nature of conflict, it is difficult to break proportionality judgements down to easily replicable or codable instructions.¹³⁰

It is further agreed that, because of this character of the proportionality evaluation, LAWS cannot – and perhaps could never be¹³¹ – programmed to perform them.¹³² In fact, many commentators emphasize that, even if LAWS could be programmed to do so, such a capability would not relieve the commander from their duty to execute the proportionality test, as the obligation to do so explicitly attaches to “those who plan or decide upon attack”.¹³³ Sweden’s views are indicative:

The targeting process requires making a complex assessment of the conflict environment and military objectives to be achieved, in order to verify that an attack is lawful under the norms and principles of IHL. Linked to this, if an appropriate proportionality judgement cannot be made in assessing whether and how to

¹²⁸ Crootof, “The Killer Robots Are Here”, pp. 1876–77; Afonso Seixas-Nunes, *The Legality and Accountability of Autonomous Weapon Systems: A Humanitarian Law Perspective* (Cambridge: Cambridge University Press, 2022), p. 185; Henderson et al., “Remote and Autonomous Warfare Systems”, p. 350.

¹²⁹ van den Boogaard, “Proportionality and Autonomous Weapons Systems”, pp. 247, 261; Noel Sharkey, “Cassandra or False Prophet of Doom: AI Robots and War”, *IEEE Intelligent Systems*, vol. 23 (2008):14, 17.

¹³⁰ Views of New Zealand, UNSG Report. See also United Kingdom, ‘[United Kingdom Proposal For A Gge Document On The Application Of International Humanitarian Law To Emerging Technologies In The Area Of Lethal Autonomous Weapon Systems\(Laws\)’ 2022](#). See also, for example, views of the ICRC, UNSG Report.

¹³¹ Nevertheless, given that the applicable standard is of reasonableness and not “surgical precision”, it has been argued by Schmitt and Thurnher that it is, in theory, possible to develop an algorithm that can determine excessiveness. See Schmitt and Thurnher, *Out of the Loop*, 256.

¹³² van den Boogaard, “Proportionality and Autonomous Weapons Systems”, p. 267; Kenneth Anderson, Daniel Reisner and Matthew Waxman, “Adapting the Law of Armed Conflict to Autonomous Weapon Systems”, *International Law Studies*, vol. 90 (2014):386; Sassóli, “Autonomous Weapons and International Humanitarian Law”, pp. 331–333; Heller, “The Concept of ‘the Human’”, pp. 26–28; Backstrom and Henderson, “New Capabilities in Warfare”, pp. 493–494; Human Rights Watch, *Losing Humanity*, pp. 33–34.

¹³³ Schmitt and Thurnher, *Out of the Loop*, 267; Crootof, “The Killer Robots Are Here”, p. 1878; Kastan, “Autonomous Weapons Systems: A Coming Legal ‘Singularity’?”, pp. 61–62.

launch an attack, this complicates the process of identifying the feasible precautions to take.¹³⁴

Divergent positions on whether or not the proportionality principle constitutes an insurmountable obstacle that preclude any lawful use of LAWS therefore seem to run along two interrelated axes: (a) whether or not LAWS need to make the proportionality evaluation internally, and (b) in respect to what unit of force delivery. Those who argue that the principle of proportionality outlaws LAWS usually assume that a LAWS itself would have to perform the proportionality test internally. Such reasoning seems to hinge on perceiving every engagement or strike delivered by LAWS as a separate attack.¹³⁵ However, several commentators emphasize that IHL does not require LAWS, or any other weapons, to make judgment calls under the proportionality principle; it simply requires that they are used in compliance with that principle.¹³⁶ Under this approach, which implicitly relies on an interpretation that an attack by a LAWS includes multiple strikes at several targets, the proportionality assessment can “effectively be made in advance by the personnel who deployed the system based on the known capabilities of the [L]AWS and the military situation”.¹³⁷

5.6. Precautions against the effects of attacks

The obligations related to the obligation to take feasible precautions to protect the civilian population and civilian objects from the effects of attack are absent from State commentary and the grey literature.¹³⁸ They are rarely analysed in depth in academic commentary on LAWS and IHL.¹³⁹

5.7. Human factors

The degree of human input in targeting decisions required under IHL is perhaps the most controversial aspect of the entire debate on the compatibility of LAWS with IHL in the academic and grey literature. At the nascent stages of the debate, a close association was made in the grey literature between human involvement in targeting decisions and human control over the weapon system.¹⁴⁰ The assertion was that a lack of such involvement translates into lack of control over LAWS. To address this claimed connection, the concept of “meaningful human control” was then proposed by civil society organizations and, for a few years, remained a key frame of reference in international discussions.¹⁴¹

¹³⁴ Views of New Zealand, UNSG Report.

¹³⁵ Human Rights Watch, *Mind the Gap*, p. 8 (“The obstacles presented by the principle of distinction are compounded when it comes to proportionality”); Jarna Petman, “Autonomous Weapon Systems and International humanitarian Law: ‘Out of the Loop’?” (Helsinki: The Eric Castren Institute of International Law and Human Rights, 2017); Kjølsv Egeland, “Lethal Autonomous Weapon Systems under International Humanitarian Law”, *Nordic Journal of International Law*, vol. 85 (2016):89, 104; Peter Asaro, “On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-Making”, *International Review of the Red Cross*, vol. 94 (2012):687, 701.

¹³⁶ Scharre, *Army of None*, p. 255–256; Cherry and Johnson, “Maintaining Command and Control”, p. 17; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 202.

¹³⁷ Henderson et al., “Remote and Autonomous Warfare Systems”, p. 352.

¹³⁸ As pointed out in Bruun et al., *Compliance with International Humanitarian Law*, p. 17 fn68.

¹³⁹ For a rare exception, see Coco and Dias, “Handle with Care”, pp. 234–260.

¹⁴⁰ Human Rights Watch, *Losing Humanity*. Equating human involvement with human control is vehemently criticized: Tim McFarland, “Autonomous Weapons and Human Control”, *Humanitarian Law & Policy*, 18 July 2018.

¹⁴¹ The volume and variety of official statements, grey literature and academic reflections on meaningful human control proliferated so extensively that attempts to find common features among them became a separate topic of analysis, J. Kwik, “A Practicable Operationalisation of Meaningful Human Control”, *LAWS*, vol. 11, no. 3 (2022):1–21.

Nonetheless, after over a decade of debate, “there is no consensus on who should exercise control . . . , over what control is to be exercised . . . , and how control can be achieved in practice”.¹⁴² Many expert commentators underline that effectively controlling weapons in combat, whether autonomous or not, does not require a human being having “hands-on” control of the weapon system when the munition is fired.¹⁴³

Starting from a premise that humans do not necessarily have meaningful control over weapons other than LAWS because exercising such control would reduce the weapons’ functionalities, a number of alternative terms were proposed. Among those who consider that some level of human–machine interaction is essential to compliance with international law, different terms have been used to describe the level or content of interaction required for IHL compliance. These includes “appropriate levels of human involvement”, “human judgement” and “(meaningful) human control”.¹⁴⁴

The contours of each of these terms is not always clear, but the following elements have been put forward among the various

contributions:

- ▶ Context-specific, value-based judgment by humans¹⁴⁵
- ▶ The ability of a human operator to assess the foreseeable effects of an intended use of force on a legal and moral basis¹⁴⁶
- ▶ The dependence of this on the complexity of the operational environment, the intricate characteristics of the weapon system itself, and its capabilities and capacities, as well as on its intended use and the tasks to be performed¹⁴⁷

Setting aside the phrasing, it appears, however, that it is very broadly agreed that humans must exercise control over the effects of the use of weapons,¹⁴⁸ whether or not they have autonomous functionalities.¹⁴⁹ What is truly disputed is whether IHL, as it stands today, requires a human decision for selecting and engaging the targets,¹⁵⁰ especially since most IHL rules primarily address State parties, not humans.¹⁵¹

However, while some States have indicated that some kind of human–machine interaction is essential to compliance with IHL,¹⁵² others

¹⁴² Berenice Boutin and Taylor Woodcock, “Aspects of Realizing (Meaningful) Human Control: A Legal Perspective”, in *Research Handbook*, ed. Geiß and Lahmann, p. 185.

¹⁴³ Boothby, “Control in Weapons Law”, p. 388.

¹⁴⁴ Heller, “The Concept of ‘the Human’”, pp. 53–56; M.L. Cummings, “Lethal Autonomous Weapons: Meaningful Human Control or Meaningful Human Certification?”, *IEEE Technology and Society Magazine*, vol. 20, nos 24–25 (December 2019).

¹⁴⁵ See, for example, the views of Ireland, UNSG Report.

¹⁴⁶ Austria, [‘Working paper’, 5 March 2024 \(CCW/GGE.1/2024/WP.4\)](#) at p.3. See also, for example, the views of Austria, UNSG Report.

¹⁴⁷ See, for example, the views of Bulgaria and the Netherlands, UNSG Report.

¹⁴⁸ ICRC, “Submission on Autonomous Weapon Systems”, p. 2; van den Boogaard and Roorda, “‘Autonomous’ Weapons and Human Control”, pp. 421, 427.

¹⁴⁹ Merel Ekelhof, “Autonomous Weapons: Operationalizing Meaningful Human Control”, *Humanitarian Law & Policy*, 15 August 2018.

¹⁵⁰ For an overview of various arguments in favour and against, see Jensen, “The (Erroneous) Requirement”, p. 26. Similarly, Robert O. Work, *Principles for the Combat Employment of Weapons Systems with Autonomous Functionalities* (Washington, DC: Center for a New American Security, 2021), p. 9.

¹⁵¹ Paola Gaeta and Abhimanyu George Jain, “Individualisation of IHL Rules Through Criminal Responsibility for War Crimes and Some (Un)intended Consequences”, in *The Individualisation of War*, ed. D. Akande et al. (Oxford: Oxford University Press, 2024).

¹⁵² Argentina, Austria, Belgium, Chile, Costa Rica, Ecuador, Guatemala, Ireland, Kazakhstan, Liechtenstein, Luxembourg,

consider that, while human factors may be relevant to implementation of IHL obligations, there is no requirement under international law for certain types of human–machine interaction.¹⁵³ At the same time, others have raised questions about whether machine algorithms alone could ensure the application of IHL rules, especially in “complex battlefield environments”.¹⁵⁴

5.8. Regulations

Notwithstanding the lack of clarity regarding human factors necessary for compliance with IHL, several States have proposed that the use of any LAWS that is not prohibited (see above) be regulated to ensure the exercise of certain human factors at various stages of development and use.¹⁵⁵

A range of specific regulatory measures has been proposed, either as elements of the relevant level of human–machine interaction or as measures that can be taken to ensure compliance with existing IHL. These can be broadly divided into measures that relate to the LAWS itself, those that related to the LAWS user, and those that related to the broader national and international system within which the LAWS is being used.

Proposed regulatory measures relating to LAWS include measures to:

- ▶ Maintain an ability to adjust targets depending on the environment¹⁵⁶
- ▶ Limit the number of engagements¹⁵⁷
- ▶ Mandate predictability and/or reliability¹⁵⁸
- ▶ Mandate explainability¹⁵⁹
- ▶ Mandate an intuitive user interface¹⁶⁰

Malta, Mexico, New Zealand, Nigeria, Panama, Peru, the Philippines, Sierra Leone, Sri Lanka, State of Palestine, Switzerland, and Uruguay, ‘[Working Paper submitted to the 2022 Chair of the Group of Governmental Experts \(GGE\) on emerging technologies in the area of lethal autonomous weapons systems \(LAWS\)](#)’ 2022 at p.2; Pakistan, ‘[Proposal for an international legal instrument on Lethal Autonomous Weapons Systems \(LAWS\)](#)’ 8 March 2023 (CCW/GGE.1/2023/WP.3/Rev.1) at p.3; Chile and Mexico, ‘[Elements For A Legally Binding Instrument To Address The Challenges Posed By Autonomy In Weapon Systems](#)’ 2022 at p.3. See also, for example, the views of Bulgaria, Costa Rica, Egypt, Germany, Luxembourg, Mexico, Norway, Switzerland, Sweden and the ICRC, UNSG Report.

¹⁵³ See, for example, the views of Israel, the Republic of Korea and the Russian Federation, UNSG Report. See also Japan, ‘[Working paper](#)’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3.

¹⁵⁴ See, for example, the views of Sri Lanka, UNSG Report.

¹⁵⁵ See, for example, the views of Austria, Fiji and Finland, UNSG Report.

¹⁵⁶ Austria, ‘[Revised working paper](#)’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2. See also, for example, the views of Costa Rica, Ireland, Norway and the Russian Federation, UNSG Report.

¹⁵⁷ Pakistan, ‘[Elements of an international legal instrument on Lethal Autonomous Weapons Systems \(LAWS\)](#)’ 14 May 2024 (CCW/GGE.1/2024/WP.7) at p. 2; Japan, ‘[Working paper](#)’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3; Austria, ‘[Revised working paper](#)’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2. See also, for example, the views of Pakistan and the ICRC, UNSG Report.

¹⁵⁸ Japan, ‘[Working paper](#)’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3; Chile and Mexico, ‘[Elements For A Legally Binding Instrument To Address The Challenges Posed By Autonomy In Weapon Systems](#)’ 2022 at p.5; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘[Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law \(“IHL”\)](#)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.3. See also, for example, the views of the Russian Federation, UNSG Report.

¹⁵⁹ Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, Philippines, Sierra Leone and Uruguay, ‘[Draft Protocol on Autonomous Weapon Systems \(Protocol VI\)](#)’ 11 May 2023 (CCW/GGE.1/2023/WP.6). See also, for example, the views of Costa Rica, UNSG Report.

¹⁶⁰ Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘[Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law \(“IHL”\)](#)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.4. See also, for example, the views of the Netherlands, UNSG Report.

- ▶ Place temporal, geographic and other limits on the use of LAWS¹⁶¹
- ▶ Require the ability to restrict autonomy of LAWS¹⁶²
- ▶ Mandate a technical self-destruction or self-deactivation capability,¹⁶³ and
- ▶ Restrict targets only to objects that are military objectives by nature.¹⁶⁴

Proposed regulatory measures relating to the LAWS user include measures to:

- ▶ Ensure user knowledge of the LAWS¹⁶⁵
- ▶ Ensure that the LAWS users have situational awareness of the conflict environment, including the target (oversight and supervision)¹⁶⁶
- ▶ Limit the circumstances in which LAWS can be used¹⁶⁷

¹⁶¹ See, for example, the views of Bulgaria, France, Germany, Ireland, Japan, Luxembourg, Mexico, the Netherlands, Norway, Pakistan, and the Russian Federation, the ICRC and the Campaign to Stop Killer Robots, UNSG Report. See also Russian Federation, ‘Approaches of the Russian Federation to the issue of emerging technologies in the area of lethal autonomous weapons systems’ 14 May 2024 (CCW/GGE.1/2024/WP.2) at p.3; Pakistan, ‘Elements of an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)’ 14 May 2024 (CCW/GGE.1/2024/WP.7) at p. 2; Japan, ‘Working paper’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3; Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2; Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, Philippines, Sierra Leone and Uruguay, ‘Draft Protocol on Autonomous Weapon Systems (Protocol VI)’ 11 May 2023 (CCW/GGE.1/2023/WP.6); Argentina, Austria, Belgium, Chile, Costa Rica, Ecuador, Guatemala, Ireland, Kazakhstan, Liechtenstein, Luxembourg, Malta, Mexico, New Zealand, Nigeria, Panama, Peru, the Philippines, Sierra Leone, Sri Lanka, State of Palestine, Switzerland, and Uruguay, ‘Working Paper submitted to the 2022 Chair of the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS)’ 2022 at p.2; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, ‘Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022 at p.6; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.2.

¹⁶² Pakistan, ‘Elements of an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)’ 14 May 2024 (CCW/GGE.1/2024/WP.7) at p. 2. See also, for example, the views of Costa Rica, UNSG Report.

¹⁶³ Japan, ‘Working paper’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3; Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, ‘Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022 at p.6. See also, for example, the views of Germany, Japan and the ICRC, UNSG Report.

¹⁶⁴ See, for example, the views of Pakistan, the ICRC and the International Committee for Robot Arms Control, UNSG Report.

¹⁶⁵ Japan, ‘Working paper’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.3; Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.3. See also, for example, the views of Argentina, Bulgaria, Costa Rica, France, Germany, Ireland, Italy, Japan, Luxembourg and Norway, UNSG Report.

¹⁶⁶ Pakistan, ‘Elements of an international legal instrument on Lethal Autonomous Weapons Systems (LAWS)’ 14 May 2024 (CCW/GGE.1/2024/WP.7) at p. 2; Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.3. See also, for example, the views of Bulgaria, Costa Rica, Ireland, Luxembourg, Mexico, the Netherlands, Pakistan, and the Russian Federation and the ICRC, UNSG Report.

¹⁶⁷ Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.4. See also, for example, the views of Bulgaria, Costa Rica, France, Italy, Japan, Luxembourg, Pakistan and Sweden, UNSG Report.

- ▶ Require users of LAWS to approve any substantial modification of the mission's parameters,¹⁶⁸ and
- ▶ Require the ability to deactivate a LAWS when necessary.¹⁶⁹

Proposed regulatory measures relating to the broader system include measures to:

- ▶ Assess whether systems are capable of being used in conformity with applicable international law¹⁷⁰

- ▶ Test, evaluate, validate and verify the functioning of the LAWS¹⁷¹
- ▶ Analyse data underpinning the LAWS, including possible data-related bias¹⁷² and data protection¹⁷³
- ▶ Require States to develop common assessment criteria¹⁷⁴
- ▶ Promote international cooperation and assistance among States “in order to bridge the gaps in countries’ technological capabilities for carrying out assessments”¹⁷⁵

¹⁶⁸ Finland, France, Germany, the Netherlands, Norway, Spain, and Sweden, ‘Working paper submitted by Finland, France, Germany, the Netherlands, Norway, Spain, and Sweden to the 2022 Chair of the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS)’ 13 July 2022 at p. 3; Chile and Mexico, ‘Elements For A Legally Binding Instrument To Address The Challenges Posed By Autonomy In Weapon Systems’ 2022 at p.5. See also, for example, the views of Norway and Pakistan, UNSG Report.

¹⁶⁹ Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2; Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, Philippines, Sierra Leone and Uruguay, ‘Draft Protocol on Autonomous Weapon Systems (Protocol VI)’ 11 May 2023 (CCW/GGE.1/2023/WP.6); Argentina, Austria, Belgium, Chile, Costa Rica, Ecuador, Guatemala, Ireland, Kazakhstan, Liechtenstein, Luxembourg, Malta, Mexico, New Zealand, Nigeria, Panama, Peru, the Philippines, Sierra Leone, Sri Lanka, State of Palestine, Switzerland, and Uruguay, ‘Working Paper submitted to the 2022 Chair of the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS)’ 2022 at p.2; Argentina, Costa Rica, Guatemala, Kazakhstan, Nigeria, Panama, Philippines, Sierra Leone, State of Palestine, Uruguay, ‘Proposal: Roadmap Towards New Protocol on Autonomous Weapons Systems’ 2022 at p.6; Chile and Mexico, ‘Elements For A Legally Binding Instrument To Address The Challenges Posed By Autonomy In Weapon Systems’ 2022 at p.5. See also, for example, the views of Costa Rica, Ireland, Luxembourg, Mexico, Pakistan, the Russian Federation and the ICRC, UNSG Report.

¹⁷⁰ See, for example, the views of Bulgaria, Denmark, France, Germany, Italy, Luxembourg and Norway, UNSG Report.

¹⁷¹ See, for example, the views of Argentina, Germany, the Netherlands and the Russian Federation, UNSG Report. See also Austria, Belgium, Canada, Costa Rica, Germany, Ireland, Luxembourg, Mexico, Panama and Uruguay, ‘Addressing Bias in Autonomous Weapons’ 8 March 2024 (CCW/GGE.1/2024/WP.5) at p.3; Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, Philippines, Sierra Leone and Uruguay, ‘Draft Protocol on Autonomous Weapon Systems (Protocol VI)’ 11 May 2023 (CCW/GGE.1/2023/WP.6); Japan, ‘Statement delivered by Ambassador Ichiro OGASAWARA, Permanent Representative of the Delegation of Japan to the Conference on Disarmament 2023 Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems: 6 - 10 March Agenda 5, Topic 2: Application of International Humanitarian Law - possible prohibitions and regulations’ 9 March 2023 at p.2; Finland, France, Germany, the Netherlands, Norway, Spain, and Sweden, ‘Working paper submitted by Finland, France, Germany, the Netherlands, Norway, Spain, and Sweden to the 2022 Chair of the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS)’ 13 July 2022 at p. 3; Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.2.

¹⁷² See, for example, the views of Argentina and Germany, UNSG Report. See also Austria, Belgium, Canada, Costa Rica, Germany, Ireland, Luxembourg, Mexico, Panama and Uruguay, ‘Addressing Bias in Autonomous Weapons’ 8 March 2024 (CCW/GGE.1/2024/WP.5) at p.3; Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, Philippines, Sierra Leone and Uruguay, ‘Draft Protocol on Autonomous Weapon Systems (Protocol VI)’ 11 May 2023 (CCW/GGE.1/2023/WP.6); Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law (“IHL”)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.2.

¹⁷³ See, for example, the views of the Republic of Korea, UNSG Report.

¹⁷⁴ See, for example, the views of Argentina and Italy, UNSG Report.

¹⁷⁵ See, for example, the views of Argentina. UNSG Report.

- ▶ Require the exchange of best practices¹⁷⁶
- ▶ Require the development of human resources and training¹⁷⁷
- ▶ Regulate technology transfers¹⁷⁸
- ▶ Require States to update national policies, doctrines, directives and processes,¹⁷⁹ including procedures for reporting incidents¹⁸⁰ and oversight, investigative and redress mechanism for suspected violations¹⁸¹
- ▶ Facilitate traceability and attribution to human decision makers.¹⁸²

5.9. Other measures

In addition to the measures above, some States have proposed additional elements of regulation relating to oversight, cooperation and the use of AI.

In relation to oversight, Austria has proposed that a monitoring process may be required in order to “ensure that meaningful human control is preserved over autonomous

weapons systems, and that legal rules and ethical principles are protected in their design, development and use”.¹⁸³

In relation to cooperation, France has proposed mechanisms in the framework of the Convention on Certain Conventional Weapons. These would facilitate consultation and cooperation among the parties to the Convention. They would also encourage the parties to exchange, on a voluntary basis, best practices with regard to national measures that they have put in place to implement the requirements contained in the Convention.¹⁸⁴

Proposed regulations related to AI-based systems include ensuring the integrity, quality and veracity of data, preventing algorithmic bias, preventing automation bias and adequately training personnel at all relevant levels of seniority and responsibility. It is also necessary to ensure the safety of such weapon systems, in particular with regard to cybersecurity, AI-specific vulnerabilities and proliferation risks.¹⁸⁵

6. Obligations under IHL relevant after an attack

Under IHL, “State responsibility provides the primary consequence in case of transgressions, while the individual criminal responsibility for war crimes supplements the former

and is only mandatory for the so-called grave breaches”.¹⁸⁶ Individuals bear responsibility for grave breaches that they commit and those that they order. Each State must investigate war

¹⁷⁶ See, for example, the views of Argentina and Canada, UNSG Report.

¹⁷⁷ See, for example, the views of Argentina, Germany, Ireland, Italy, Luxembourg, the Netherlands, the Republic of Korea and Sweden, UNSG Report.

¹⁷⁸ See, for example, the views of Argentina, UNSG Report.

¹⁷⁹ See, for example, the views of Canda, Luxembourg and Sweden, UNSG Report.

¹⁸⁰ See, for example, the views of Germany and Luxembourg, UNSG Report.

¹⁸¹ See, for example, the views of Pakistan, UNSG Report.

¹⁸² Austria, ‘Revised working paper’ 2 March 2023 (CCW/GGE.1/2023/WP.1/Rev.1) at pp.1-2. See also, for example, the views of Costa Rica and Luxembourg, UNSG report.

¹⁸³ See, for example, the views of Austria and the Philippines, UNSG Report.

¹⁸⁴ See, for example, the views of France, UNSG Report.

¹⁸⁵ See, for example, the views of Austria and the Philippines, UNSG Report.

¹⁸⁶ Gaeta and Jain, “Individualisation of IHL Rules”, p. 2.

crimes allegedly committed by their nationals or armed forces or on their territory and, if appropriate, prosecute the suspects (GCI Article 49, CIHL Study Rule 149).

Commentary on the consequences of an attack using LAWS are rarely framed alongside the IHL obligations and tend to focus instead on the so-called “responsibility gap”. This is an elusive concept with no fixed definition that has generated much commentary.¹⁸⁷ While phrased in various ways, the underlying concern in many approaches appears to be that the autonomy of a LAWS increases the separation between the effects of the functioning of the LAWS and any proximate humans to an extent that would make it impossible to hold anyone accountable for those effects.¹⁸⁸

There is little doubt that the standards and institutions of the existing accountability frameworks would be sufficient to capture the purposeful use of LAWS to violate IHL. Thus, the debate, albeit usually implicitly, revolves around the responsibility for the risk-taking¹⁸⁹

that results in unintended outcomes that IHL aims to prevent. Some assume that such outcomes constitute a violation of IHL.¹⁹⁰ For others, unlawfulness under IHL depends on the likelihood of the risk and the commander’s approach to it.¹⁹¹ This is an important, even if rarely expressly addressed, aspect of the debate that is equally applicable to both State and individual responsibility regimes. What is truly contentious is the legal qualification of inadvertent consequences of the use of LAWS.¹⁹² As has been pointed out in scholarship, this concern is not unique to LAWS and applies just as well to conventional weapons, which also malfunction and have an inherent failure rate.¹⁹³

Positions relating to the “responsibility gap” problem pervade various branches of international and domestic law. However, from an IHL perspective, it is useful to distinguish between those pertaining to, on the one hand, the State responsibility of a party to the conflict¹⁹⁴ and, on the other, individual responsibility, especially the command responsibility for failure

¹⁸⁷ Conventional Arms and Ammunition Programme, “Safety Unintentional Risk and Accidents in the Weaponization of Increasingly Autonomous Technologies” (Geneva: UNIDIR, 2016), p. 16; C. Toscano, “‘Friend of Humans’: An Argument for Developing Autonomous Weapons Systems”, *Journal of National Security Law & Policy*, vol. 8 (2015) p. 220; Schmitt and Thurnher, *Out of the Loop*, p. 277; D. Amoroso and B. Giordano, “Who Is to Blame for Autonomous Weapons Systems’ Misdoings?”, in *Use and Misuse of New Technologies*, ed. E. Carpanelli and N. Lazzarini (Cham: Springer International Publishing, 2019), pp. 211–232, 212; Human Rights Watch, *Mind the Gap*.

¹⁸⁸ McDougall, “Autonomous Weapon Systems and Accountability”, p. 4; Pacholska, “Autonomous Weapons”, p. 403; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 252.

¹⁸⁹ D. Amoroso, *Autonomous Weapons Systems and International Law: A Study on Human–Machine Interactions in Ethically and Legally Sensitive Domains* (Baden: Nomos Verlagsgesellschaft, 2020), p. 138; P. Gaeta, “Autonomous Weapon Systems and the Alleged Responsibility Gap”, in *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons*. Expert meeting, Versoix, Switzerland, 15–16 March 2016 (Geneva: ICRC, 2016), p. 44; J.M. Beard, “Autonomous Weapons and Human Responsibilities”, *Georgetown Journal of International Law*, vol. 45 (2014):617, 658; Amoroso and Giordano, “Who is to Blame,” p. 223; McDougall, “Autonomous Weapon Systems and Accountability”, p. 14.

¹⁹⁰ Human Rights Watch, *Mind the Gap*, p. 15; Human Rights Watch, *Losing Humanity*, p. 42; Amoroso and Tamburrini, “Toward a Normative Model”, p. 255; H. Liu, “Refining Responsibility: Differentiating Two Types of Responsibility Issues Raised by Autonomous Weapons Systems”, in *Autonomous Weapons Systems*, ed. Bhuta et al., pp. 325–344.

¹⁹¹ Kwik, *Lawfully Using Autonomous Weapon Technologies*, pp. 288–304; *Autonomous Cyber Capabilities*, ed. Väljataga and Liivoja, p. 9; Henderson et al., “Remote and Autonomous Warfare Systems”, pp. 358–365.

¹⁹² For state responsibility, the question would be whether such outcomes violate the targeting law obligations, while for individual responsibility, whether they were committed “wilfully” and as such constitute grave breaches.

¹⁹³ Henderson et al., “Remote and Autonomous Warfare Systems”, pp. 361, 363, 369; Dan Saxon, “Autonomous Drones and Individual Criminal Responsibility”, in *Drones and Responsibility: Legal, Philosophical, and Sociotechnical Perspectives on Remotely Controlled Weapons*, ed. Ezio Di Nucci and Filippo Santoni de Sio (London: Routledge, 2016), pp. 17, 28–29.

¹⁹⁴ API, Article 91; CIHL Study, Rule 149.

to prevent, repress and report war crimes.¹⁹⁵ Regarding State responsibility, the contentious point relates to whether the law of State responsibility requires a causal link between the conduct of persons and a breach of international law. Those who claim it does argue that attribution of wrongful conduct resulting from the use of LAWS raises particular challenges.¹⁹⁶ For those who maintain causality is not a required element of the law of State responsibility, attribution of conduct involving LAWS is straightforward and does not differ from situations when conventional weapons were used.¹⁹⁷

The debate is arguably more complex in the realm of individual responsibility for IHL violations. Much of it pertains more to international criminal law and its *mens rea* standards (i.e., intentionality) than to the IHL-based duty to repress breaches and grave breaches that should be anchored in domestic jurisdiction of State parties.¹⁹⁸ Within IHL scholarship, a few authors have commented on the fact that the legal classification of unintentional harm resulting from “an ‘acceptance of the risk’ that the machine may take the wrong targeting

decision”¹⁹⁹ might also be difficult under the IHL standard of “wilfulness”. This is generally considered to encompass recklessness but to exclude simple negligence.²⁰⁰ For some authors, potential difficulties in establishing criminal liability – either due to *mens rea* limitations or the diffusion of responsibility associated with the development and use of LAWS (the “many hands” problem) – are the chief reason to ban the use of LAWS.²⁰¹ Others vehemently oppose linking the weapon’s lawfulness with a potential ability or inability to establish criminal responsibility, and insist that “there is no principle in IHL that says there must be an individual to hold accountable for every death on the battlefield”.²⁰²

According to some States, from these duties may flow certain limits on the use of LAWS. For example, accountability requires those authorizing the use of force to be able to explain and predict the foreseeable effects of the use of a LAWS.²⁰³ From a practical perspective, some States have indicated that the task of identifying an IHL violation, attributing the relevant conduct to an individual or State, and holding the individual or State responsible

¹⁹⁵ API, Articles 86 and 87; CIHL Study Rule 153.

¹⁹⁶ B. Boutin, “State Responsibility in Relation to Military Applications of Artificial Intelligence”, *Leiden Journal of International Law*, vol. 36 (2023):133.

¹⁹⁷ Gaeta, “Who Acts When Autonomous Weapons Strike?”, pp. 1049–1053; Geiß, “State Control”, p. 445; Pacholska, “Military Artificial Intelligence and the Principle of Distinction”, pp. 17–21; Rebecca Crootof, “War Torts: Accountability for Autonomous Weapons”, *University of Pennsylvania Law Review*, vol. 164 (2016):1347, 1391.

¹⁹⁸ The problem appears most relevant with regard to the *mens rea* standard under the Rome Statute, ICC only: Boulanin et al., *Autonomous Weapon Systems and International Humanitarian Law*, p. 47; Buchan and Tsagourias, “Autonomous Cyber Weapons and Command Responsibility”; Jens David Ohlin, “The Combatant’s Stance: Autonomous Weapons on the Battlefield”, *International Law Studies*, vol. 92, no. 1 (2016):28–29; Amoroso and Giodano, “Who is to Blame.”

¹⁹⁹ Gaeta, “Autonomous Weapon Systems and the Alleged Responsibility Gap”, p. 26.

²⁰⁰ Boulanin et al., *Autonomous Weapon Systems and International Humanitarian Law*, p. 47; Kwik, *Lawfully Using Autonomous Weapon Technologies*, p. 295; Ohlin, “The Combatant’s Stance”, pp. 28–29; Crootof, “War Torts”, pp. 1384–85; McDougall, “Autonomous Weapon Systems and Accountability”, p. 67.

²⁰¹ Amoroso et al., *Autonomy in Weapon Systems*, p. 28; Human Rights Watch, *Losing Humanity*, p. 20; Darren M. Stewart, “New Technology and the Law of Armed Conflict”, *International Law Studies*, vol. 87 (2011):271, 291; Mary Ellen O’Connell, “Banning Autonomous Killing: The Legal and Ethical Requirement That Humans Make Near-Time Lethal Decisions”, in *The American Way of Bombing: Changing Ethical and Legal Norms, from Flying Fortresses to Drones*, ed. Matthew Evangelista and Henry Shue (Ithaca, NY: Cornell University Press, 2014), pp. 224, 236; Sparrow, “Robots and Respect”.

²⁰² Scharre, *Army of None*, pp. 262–63; similarly Crootof, “The Killer Robots Are Here”, p. 1881.

²⁰³ See views of Austria, UNSG Report.

may be complicated when the use of LAWS is involved.²⁰⁴ In proposed draft articles on autonomous weapon systems, a group of States enumerated ‘regulatory measures’ that should be taken by a State employing LAWS, including ensuring that the LAWS is deployed within the State’s general framework for implementing IHL.²⁰⁵

Against this background, some States have clarified that international law does not allow for accountability for the effects of military action to be transferred to a machine.²⁰⁶ Other States have clarified that States and individuals can be held responsible for unlawful actions

involving the use of autonomous weapons.²⁰⁷

When it comes to individual responsibility for serious IHL violations, including grave breaches, some States have indicated that it would be military commanders who would be accountable for uses of force that occur under their command, including by a machine.²⁰⁸ Some States have indicated that, in addition, other actors may be held individually responsible for serious IHL violations involving LAWS, including developers and manufacturers.²⁰⁹ Under domestic laws, responsibility for IHL transgressions may also be in the form of civil liability.²¹⁰

7. Conclusion

The interpretation of and application of IHL to LAWS remains an area of extensive discussion and debate, with both convergence and divergence in perspectives. While there is broad agreement that IHL governs the development and use of LAWS, discrepancies persist in both the form and content of views shared in public discussions. Core issues in the discussion are the circumstances under which LAWS are permitted to be used in attacks and the measures that are required to be taken to minimise civilian harm due to the use of LAWS in military operations. In addition, the discourse has addressed on the measures that must be taken before and after any attack involving the use of LAWS to prevent violations of IHL and ensure accountability in the

case of any such violations. The complexity of technologies in the area of LAWS challenges traditional understandings of IHL. Despite the breadth of the discussions, a coherent comparison of actors’ views remains difficult to achieve and some IHL rules that govern the development and use of LAWS remain under-examined.

By summarising the publicly available views expressed by States, scholars and other experts participating in multilateral discussions on the applicability and interpretation of IHL with respect to the development and use of LAWS, this background paper aims to lend clarity and structure to continued diplomatic and scholarly engagement on the

²⁰⁴ See views of Cuba, Pakistan, Fiji, New Zealand; and Pakistan, UNSG Report.

²⁰⁵ Australia, Canada, Estonia, Japan, Latvia, Lithuania, Poland, the Republic of Korea, the United Kingdom, and the United States, ‘[Draft articles on autonomous weapon systems – prohibitions and other regulatory measures on the basis of international humanitarian law \(“IHL”\)](#)’ 26 August 2024 (CCW/GGE.1/2024/WP.10) at p.4.

²⁰⁶ See views of the UK, UNSG Report. Japan sees the two issues (system illegality v act illegality) as distinct, see Japan, ‘[Working paper](#)’ 24 July 2024 (CCW/GGE.1/2024/WP.8) at p.4.

²⁰⁷ See views of the Netherlands, Canada, Mexico and the UK, UNSG Report.

²⁰⁸ See views of the Russian Federation, UNSG Report.

²⁰⁹ See views of Ireland and the Russian Federation, UNSG Report.

²¹⁰ See views of the Netherlands, UNSG Report.

interpretation and application of IHL to the development and use of LAWS, and assists participants in the discussions to navigate the IHL aspects of the policy discussions. However, in doing so, this background paper also underscores the challenge of ensuring that LAWS are developed and used only in accordance with IHL and achieving a level of certainty about the interpretation and application of IHL to these technologies.

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