

Lethal Autonomous Weapon Systems: Ethical Dilemmas and Legal Compliance in the Era of Military Disruptive Technologies

Marco Marsili*

Research Institute for International Studies, Department of Philosophy and Cultural Heritage, Cà Foscari University of Venice, Italy

Abstract: Lethal Autonomous Weapon Systems (LAWS) have emerged as one of the most significant advancements in military technology, leveraging artificial intelligence (AI) and machine learning to execute missions without direct human control. As these systems become central to modern warfare, they raise critical questions about their compliance with International Humanitarian Law (IHL) and International Human Rights Law (IHRL). This paper delves into the legal and ethical debates surrounding LAWS with particular attention to the discussions within the Group of Governmental Experts on LAWS (GGE on LAWS). We analyze whether these technologies can adhere to fundamental human rights while maintaining their operational efficacy. Through the application of the Autonomy Spectrum Framework to real-world scenarios, the study highlights both the strategic advantages of LAWS and the risks of dehumanizing warfare. The need for robust legal frameworks to ensure accountability and human oversight remains paramount.

Keywords: Lethal Autonomous Weapon Systems (LAWS), Artificial Intelligence (AI), International Humanitarian Law (IHL), Emerging and Disruptive Technologies (EDTs), Autonomous Weapons, Human Oversight, Autonomous Systems.

1. INTRODUCTION

The rise of Lethal Autonomous Weapon Systems (LAWS) marks a paradigm shift in military strategy, where advanced algorithms and artificial intelligence enable machines to execute complex tasks without human intervention. These systems, often termed "killer robots," have the potential to revolutionize warfare by increasing precision and reducing risks to human soldiers. However, their deployment has sparked intense debates on the ethical and legal implications of allowing machines to make life-and-death decisions. This paper explores the intersection of these emerging technologies with international law, particularly the challenges they pose to International Humanitarian Law (IHL) and ethical standards.

2. THE RISE OF LAWS AND MILITARY DISRUPTIVE TECHNOLOGIES

Military disruptive technologies, including LAWS, are increasingly being integrated into defense systems, leading to what many experts call the third revolution in warfare—after gunpowder and nuclear weapons. Lethal autonomous systems utilize AI, robotics, and machine learning to conduct combat operations. The ability to identify, track, and engage targets autonomously has positioned LAWS as key tools for

military powers such as the United States, China, and Russia [1].

However, the technological advancements that enable LAWS, such as deep learning and computer vision, also introduce significant legal and ethical risks [1]. As LAWS evolve, the capacity for "intelligent warfare" grows, raising concerns over whether these systems can be trusted to adhere to the rules of engagement dictated by IHL and other legal frameworks [2].

3. APPLICATION OF THE AUTONOMY SPECTRUM FRAMEWORK TO REAL-WORLD SCENARIOS

The Autonomy Spectrum Framework provides a useful lens for understanding different levels of machine autonomy in weapon systems, ranging from fully manual operations to full autonomy. To assess its practical effectiveness, this framework is applied to real-world scenarios involving autonomous drones currently deployed in military operations.

For instance, the use of the MQ-9 Reaper drone by the United States military demonstrates an intermediate level of autonomy. In this system, while the drone operates autonomously in flight and surveillance, it still requires human intervention for critical decisions, such as engaging a target. This combination of human control and machine autonomy provides a balance between operational efficiency and ethical considerations, aligning with the "meaningful human control" principle advocated by the United

*Address correspondence to this author at the Department of Philosophy and Cultural Heritage, Cà Foscari University of Venice, Malcantone Marcorà, Dorsoduro 3484/D, Calle Contarini, 30123 Venezia (VE), Italy; E-mail: info@marcomarsili.it; marco.marsili@unive.it.



Figure 1: Boeing ATX High-Speed Taxi, Boeing (2024).

Nations' Group of Governmental Experts on LAWS (GGE on LAWS) [3].

On the other end of the spectrum, the Israeli Harpy system operates with much higher autonomy. It is designed to detect, attack, and destroy radar emitters autonomously, without human input. While this enhances its speed and effectiveness, it also raises serious ethical concerns about the lack of human oversight, especially in distinguishing between combatants and civilians [4].

By applying the Autonomy Spectrum Framework to these real-world systems, it becomes evident that different levels of autonomy have distinct operational benefits and risks. In environments where rapid decision-making is essential, increased autonomy can be advantageous. However, in complex combat zones, where civilian presence is high, greater human oversight is critical to minimize unintended harm. This practical application highlights the need for flexible frameworks that can adapt to the varying demands of different combat situations.

4. LEGAL COMPLIANCE OF LAWS

The deployment of LAWS presents a challenge to the established norms of IHL, particularly the principles

of distinction, proportionality, and necessity. These principles are critical to ensuring that military actions avoid excessive harm to civilians and non-combatants. However, as LAWS operate with limited or no human oversight, questions arise as to whether they can adequately distinguish between combatants and civilians [3].

The United Nations' Group of Governmental Experts on LAWS (GGE on LAWS) has been at the forefront of the international debate on how to regulate these systems. The GGE has repeatedly emphasized the need for "meaningful human control" over autonomous systems to ensure that they comply with international legal obligations. Furthermore, the GGE has discussed the possibility of introducing legally binding treaties to regulate LAWS, but consensus has yet to be reached [4].

4.1. The GGE on LAWS: Ethical and Legal Debates

The Group of Governmental Experts on LAWS has highlighted the legal and ethical concerns surrounding these systems, particularly the issue of human control and accountability. During their 2019 and 2020 meetings, the GGE discussed whether autonomous systems could comply with IHL principles, such as

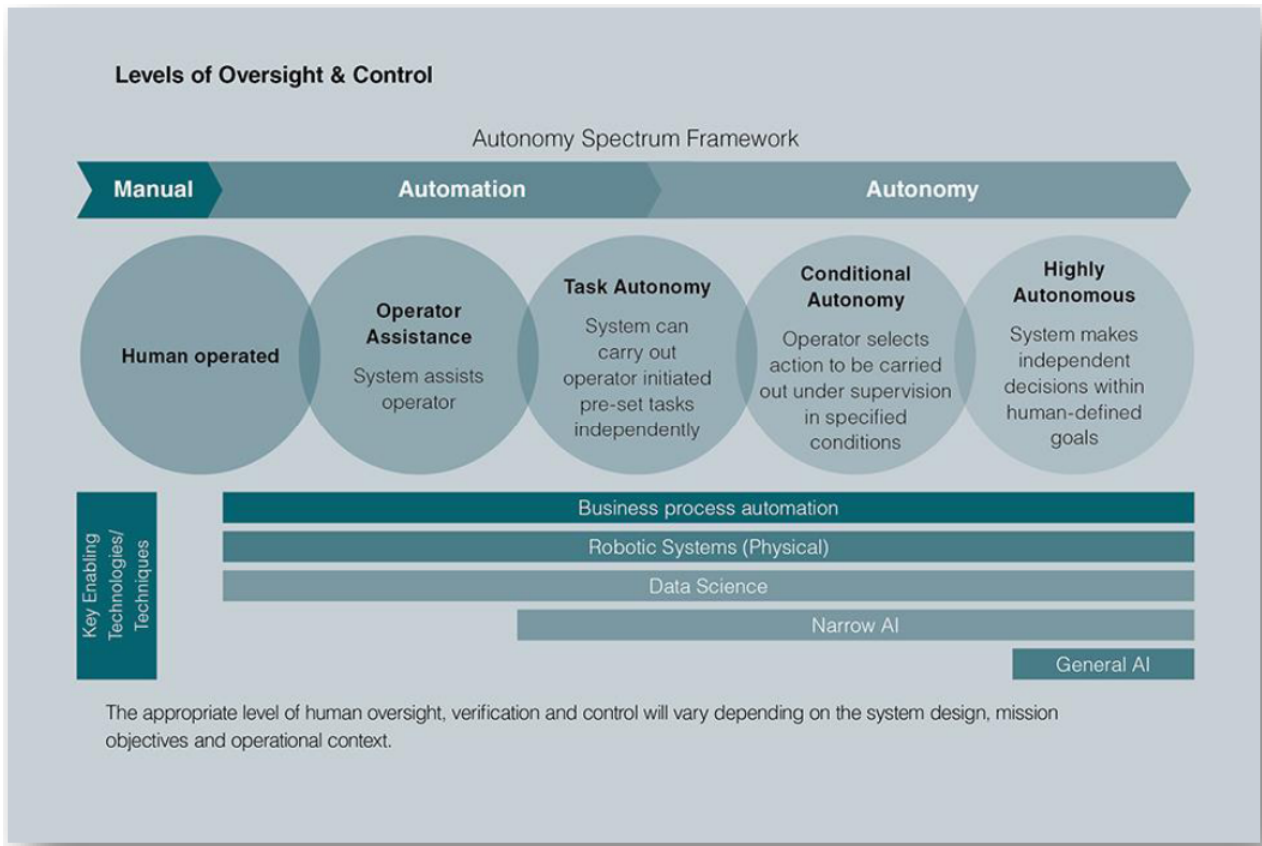


Figure 2: A diagram showing the Autonomy Spectrum Framework represented against a gradient from left to right: from manual, to automation, to autonomy, UK Ministry of Defence (2022).

proportionality and distinction, without human intervention. The GGE reports have stressed the need for international regulations that prevent machines from making unilateral decisions about the use of lethal force [4].

While the GGE has acknowledged that existing international law should apply to LAWS, it remains unclear whether the current legal frameworks are sufficient to address the unique challenges posed by these technologies [4]. As a result, the GGE continues to advocate for stronger legal mechanisms to ensure that LAWS can be used in compliance with ethical standards.

5. OPERATIONAL BENEFITS VS. HUMANITARIAN RISKS

Proponents of LAWS argue that these systems offer significant operational advantages, including increased precision, reduced human risk, and enhanced battlefield efficiency [2]. Autonomous systems can execute missions in environments that would be too dangerous for human soldiers, potentially reducing

casualties and collateral damage [1]. However, these benefits must be weighed against the risks to civilians and non-combatants, who may be unintentionally targeted by autonomous systems [3].

A counterargument often raised is that the removal of human decision-making from the use of lethal force creates a dangerous precedent. The risks of misidentification and unintended civilian casualties could increase without human oversight, raising questions about the proportionality and necessity of military actions [2]. Case studies on drone strikes and other semi-autonomous systems illustrate the potential for error when human control is minimized.

6. ETHICAL DILEMMAS AND PRACTICAL INNOVATIONS OF THE AUTONOMY SPECTRUM FRAMEWORK

LAWS not only challenge legal frameworks but also pose serious ethical dilemmas. One of the primary concerns is the dehumanization of warfare. By removing humans from direct decision-making, LAWS could reduce accountability for military actions,



Figure 3: Control room of autonomous defence systems, 7th U.S. Air Force (2023).

potentially leading to violations of human rights [2]. Additionally, the ethical implications of allowing machines to make autonomous lethal decisions are profound. Can a machine truly adhere to moral principles? Should humans entrust such decisions to an algorithm?

As discussed by Marsili [2], military disruptive technologies, including LAWS, create a significant risk of delegating life-and-death decisions to machines without adequate ethical oversight. Stuart Russell, in his chapter on the ethics of AI and robotics, highlights the difficulty in ensuring that autonomous systems can make decisions in accordance with ethical principles such as proportionality and distinction [5]. The ethical debate over LAWS is further complicated by the fact that major powers such as the United States and China have differing views on the appropriate use of these technologies. While the U.S. Department of Defense argues that autonomous weapons can be developed in accordance with American values and international law, critics argue that no military application of AI can truly align with humanitarian principles [6].

6.1. Practical Innovation Through Dynamic Autonomy

To address the critique of limited practical innovation, the Autonomy Spectrum Framework can be enhanced by incorporating a dynamic autonomy model. This model would allow for the real-time adjustment of

autonomy levels based on situational complexity and mission requirements. For example, in high-risk environments, such as urban combat zones with dense civilian populations, the system could default to a lower level of autonomy, ensuring higher human involvement. Conversely, in less complex environments, such as enemy-only zones, a higher autonomy level could be activated to maximize operational efficiency.

This innovation not only enhances the practical utility of the Autonomy Spectrum Framework but also provides a flexible approach to balancing ethical concerns and military effectiveness.

7. FUTURE OUTLOOK: LEGAL AND ETHICAL SAFEGUARDS

As LAWS continue to develop, there is an urgent need for international regulatory frameworks that ensure these technologies are used ethically and legally. The GGE on LAWS has called for the establishment of global standards that emphasize the importance of maintaining human control over autonomous systems. Furthermore, the United Nations Secretary-General António Guterres has called for a ban on machines capable of taking lives without human intervention, labeling them "morally repugnant" [7].

To prevent the misuse of LAWS, it is essential to develop clear guidelines for their deployment. These guidelines should include strict requirements for human

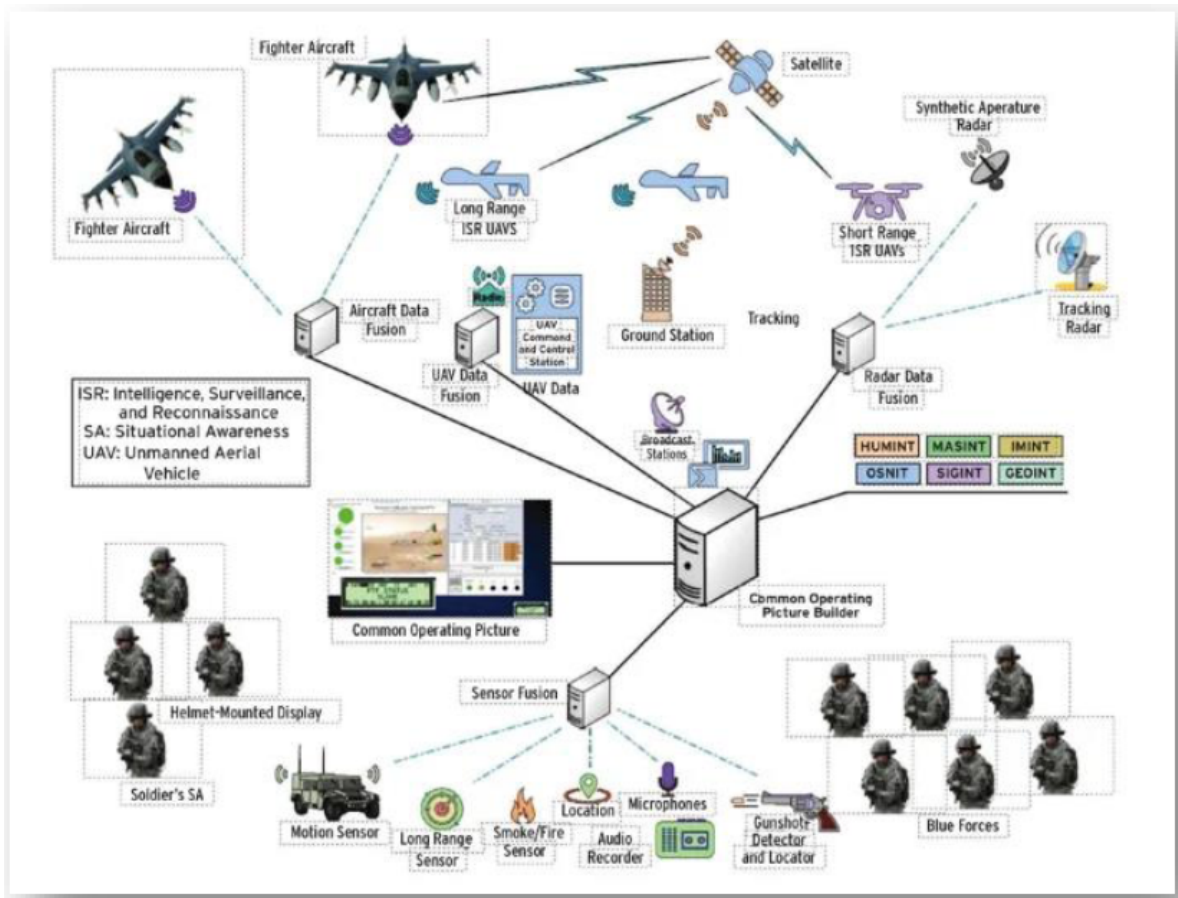


Figure 4: An overview of the type of situational awareness that exists for UAV surveillance, U.S. Army Research Laboratory (2023).

oversight, accountability for decision-making, and compliance with IHL principles. In the future, more countries may adopt binding treaties that regulate LAWS, ensuring that technological advancements do not come at the expense of human rights.

A counterargument often raised is that the removal of human decision-making from the use of lethal force creates a dangerous precedent. The risks of misidentification and unintended civilian casualties could increase without human oversight, raising questions about the proportionality and necessity of military actions [2]. Case studies on drone strikes and other semi-autonomous systems illustrate the potential for error when human control is minimized.

8. CONCLUSION

The application of the Autonomy Spectrum Framework to real-world scenarios demonstrates both its utility and its limitations. While the framework provides a useful tool for understanding various levels of machine autonomy, its practical effectiveness

depends on adapting it to dynamic combat environments. By incorporating a dynamic autonomy model, the framework can better balance ethical concerns and operational needs, offering a path forward for the regulation of LAWS. However, the ongoing debates within the GGE on LAWS highlight the need for robust international regulations that ensure LAWS are used in compliance with international law and ethical standards. As autonomous technologies continue to evolve, it is crucial that policymakers, legal experts, and technologists work together to create a future where military innovation does not compromise fundamental human rights.

DECLARATION OF COMPETING INTEREST

The authors declare no conflict of interest.

FUNDING

This study received funding from the European Union Next Generation EU-National Recovery and Resilience Plan (NRRP) – Mission 4 Component 2, Investment No. 1.2 – CUP No. H73C22001290001.

This manuscript reflects only the authors' views and opinions, neither the European Union nor the European Commission can be considered responsible for them.

REFERENCES

- [1] Marsili M. Military Emerging Disruptive Technologies: Compliance with International Law and Ethical Standards. In: Kalpokas I, Kalpokienė J, editors. *Intelligent and Autonomous: Transforming Values in the Face of Technology*. Leiden: Brill; 2023. https://doi.org/10.1163/9789004547261_004
- [2] Jiménez-Segovia R. Autonomous weapon systems in the Convention on certain conventional weapons: Legal and ethical shadows of an autonomy, under human control? *REEI*. 2019; (37):1-33. Available from: <https://www.reei.org/index.php/revista/numero-37>.
- [3] Group of Governmental Experts on LAWS. Report of the 2018 Group of Governmental Experts on Lethal Autonomous Weapons Systems (CCW/GGE.2/2018/3). United Nations; 2018. Available from: <https://undocs.org/en/CCW/GGE.2/2018/3>.
- [4] Russell S. Ethics of Artificial Intelligence and Robotics. In: Frankish K, Ramsey WM, editors. *The Cambridge Handbook of Artificial Intelligence*. Cambridge: Cambridge University Press; 2014. p. 509-528. <https://doi.org/10.1017/CBO9781139046855>.
- [5] Esper MT. Remarks by Secretary Esper at National Security Commission on Artificial Intelligence Public Conference. Department of Defense; 2019 Nov 5. Available from: <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/201960>.
- [6] Guterres A. Machines Capable of Taking Lives without Human Involvement Are Unacceptable, Secretary-General Tells Experts on Autonomous Weapons Systems. United Nations Press Release; 2019 Mar 25. Available from: <https://www.un.org/press/en/2019/sgsm19512.doc.htm>.

Received on 08-09-2024

Accepted on 02-10-2024

Published on 06-10-2024

<https://doi.org/10.31875/2409-9694.2024.11.05>

© 2024 Marco Marsili.

This is an open-access article licensed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the work is properly cited.