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Regulating the use and development of Lethal Autonomous Weapons Systems

GA1 (Disarmament and International Security)

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Introduction

Following the rapid scientific progress made in technological fields such as artificial intelligence (AI), robotics, and, to a larger extent, weapon manufacturing, the question of Lethal Autonomous Weapons Systems (LAWS) has increasingly been recognised by the international community as an issue of extreme urgency. LAWS, sometimes colloquially referred to as "killer robots", are defined by the International Committee of the Red Cross (ICRC) as any weapon system which can "select and apply force to a target without human intervention" (International Committee of the Red Cross). While they might sound futuristic, they are currently being developed at an exponential rate, with numerous reports of their use beginning to draw the attention of governments, military leaders, humanitarian organizations, and policymakers worldwide. Essentially, sensors and computer algorithms allow them to independently identify targets and then further engage with said targets without direct human approval, meaning that deployers have no certainty concerning when and where an attack by a LAWS might take place. The United States Department of Defence (DoD) directives further explain the concept of autonomy as having a "human out of the loop", contrasting it with that of human-supervised autonomous weapons systems where operators have the ability to intervene in a weapon's target engagement (Sayler). Examples of autonomous weapons developed historically are certain air defense systems programmed to strike incoming missiles, or, in some cases even developed to destroy military radars, tanks or armoured vehicles. These have, until now, been used in sparsely populated areas with few civilians and civilian possessions, under tight human supervision which retains the ability to interfere with them should a situation change or an unexpected factor arise.

However, LAWS technology has increasingly been focused to the aim of a more efficient militarisation of technology, with defence services aiming to fully integrate the autonomous use of force, be this through a wider variety of weapons, or the reimagination of those currently remote-controlled by human operators, to fulfil the perceived growing need for stronger military mechanisms. Furthermore, a large interest in using such systems to target humans directly has arisen, additionally highlighting the pressing need for international regulation concerning their use, proliferation and potential consequences, along with the heavily contentious debate about whether they should even be legal in the first place. Debate on this issue centers around three main components; their impact on legal frameworks and accountability, their impact on security, at both a national and international level, and the ethics of such developments. Whilst those in favour argue that these systems have the potential to reduce human casualties through the enhancement of military precision, critics inversely warn of the dangers of misuse, loss of accountability and violations of international humanitarian law (all of which will be elaborated upon in the General Overview section of this report). Either way however, both sides agree that strong international guidelines and protocols must be implemented to ensure that such systems are operated in a way that protects human dignity, minimises the risks to civilians, and adheres to the United Nations (UN) principles of proportionality and accountability.

As such, this report aims to explore the issue of the regulation of Lethal Autonomous Weapons Systems to understand exactly why this shift in military technology has infamously been labelled as the "third revolution in warfare, after gunpowder and the atomic bomb" ("Killer Robots "), and how it might shape the future of warfare.

Definition of key terms

Accountability

In terms of warfare, military accountability refers to the acknowledgment of the responsibility of individuals, governments, and organisations, to ensure that their actions are in line with international humanitarian law, and that the use of force remains lawful and ethical. Military accountability also encompasses holding actors having committed war crimes or violations of international humanitarian law responsible, be it through international courts such as the International Court of Justice or the International Criminal Court, national courts, military tribunals, etc.

Algorithmic Bias

Algorithmic bias happens when systematic errors occur in the programming of a machine-learning algorithm, producing unfair and/or discriminatory outcomes. In the context of LAWS, this could mean a system's decision-making processes might selectively target certain groups due to systemically prejudiced programming.

Autonomous

Autonomous, in this case, refers to the ability of a system to perform tasks independently from human control.

Distinction (in warfare)

Distinction is a fundamental principle of international humanitarian law that dictates that combatants must distinguish between military targets and civilians during warfare, such as to ensure that attacks are only ever used against justified military objectives.

Global arms race

A global arms race refers to the competitive escalation, usually between hostile nations, to accumulate and secure resources or develop weapons. This typically occurs when nations wish to conserve or attain military superiority, often leading to rapid advancements in military technology but also escalating tensions between such countries. A famous example of a global arms race is that between the US and Russia during the Cold War.

Proliferation

Proliferation refers to the rapid spread or increase in the amount of something. In this case, it describes the potential of LAWS being developed and distributed at alarming rates beyond traditional military powers, along with the risk of them falling into the hands of terrorist organisations, black markets, etc.

Proportionality (in warfare)

Proportionally is the second fundamental principle of international humanitarian law, dictating that force used in conflict must be less than the military advantage gained from it. Essentially it prohibits any attacks in which the harm caused outweighs the anticipated military benefit.

Lethal Autonomous Weapons Systems (LAWS)

LAWS are any weapon systems which can independently identify, target and engage an object/subject without requiring any human intervention. These use AI, sensors and pre-programmed algorithms to collect data, engage with their environment and ultimately conduct military operations autonomously.

General Overview

The following section will seek to introduce the main elements required to understand the practicalities behind the regulation of Lethal Autonomous Weapons Systems (LAWS). As such, it will mainly focus on the differing perspectives of states, institutions, international organisations and other key stakeholders, to outline the most relevant security benefits and dangers of LAWS , the ethical dilemmas they introduce and finally, the concerns regarding accountability and responsibility. Before these impacts can be analysed, however, it is imperative to have a deeper understanding of the exact technology which has made this advancement possible, what limitations naturally occur in them, and which ones we could orchestrate ourselves to guarantee a safer and more controlled deployment of such systems.

Technological foundation of LAWS

The fundamental idea behind a LAWS lies in its ability to perform tasks autonomously which would have previously required manual operation. Such tasks might include target identification, decision making, and the eventual execution of attacks. Relying on combinations of sensors such as infrared cameras, radars, motion sensors, acoustic sensors, etc., these work together to allow them to have a better understanding of their environment and ultimately interact with it. They then feed data into an AI software which then makes an informed decision based on pre-encoded characteristics and programming, again minimising the necessity for human input. In recent years, LAWS technology has expanded to no longer just encompass singular systems but rather collaborative ones which can connect to 5G and satellite networks to improve real-time communication and the transmission of data, both to other LAWS and to their human deployers. Relevant examples of this could include swarm technology. Involving the deployment of large numbers of smaller autonomous drones, these work together to achieve a common goal through decentralised decision-making where they communicate with each other independently without direct human supervision. As such, it allows them to adapt to changes in their environment and overwhelm enemy defenses, conduct coordinated surveillance and orchestrate singular attacks, marking them as key elements of hybrid warfare.

        A broader example of a LAWS is the Phalanx Close-In Weapon System (Phalanx CIWS). As one of the only actively deployed autonomous weapons, it can automatically "detect, evaluate, track, engage, and perform kill assessments" on aircraft and littoral warfare threats having penetrated other defenses ("MK 15 - Phalanx Close-in Weapon System (CIWS)"). Another example of such technology which garnered large amounts of media attention was the use of the Turkish Kargu-2 swarm drone, which was first introduced in 2020 and deployed in the Libyan civil war. It was used during combat to autonomously seek out and attack retreating soldiers of the Libyan National Army (LNA), and is one of the first recorded uses of a LAWS with an offensive intent.

Security risks and rewards of LAWS

The development of LAWS has become necessary for countries that wish to remain in the global arms race, with powers such as the United States (US), China, Russia, the United Kingdom (UK) and Turkey leading the charge. These countries recognise the immense military advantages brought by such technological progress, with LAWS guaranteeing increased precision, and therefore less collateral damage, due to their abilities to accurately identify and engage threats greatly surpassing that of a human soldier. They also ensure faster decision-making, enabling rapid responses and therefore further enhancing a military's efficiency and effectiveness with drones that do not tire out and are not affected by harsh weather conditions, limited supplies, etc. Furthermore, they do not require human personnel, allowing them optimal adaptability and cost effectiveness, along with retaining a large potential for non-lethal applications such as search-and-rescue missions, mine clearing, disaster relief, the enforcement of ceasefires, etc.

Despite these numerous benefits in favour of the use of LAWS, they nonetheless raise many security risks and could potentially be highly destabilising. Critics argue that they could facilitate violence on an even larger scale due to their lack of dependence on the people available to man them, and potentially escalate already fraught conflicts, according to The United Nations Institute for Disarmament Research (UNIDIR), and RAND. Furthermore, they have been engineered to be highly unpredictable in order to stay ahead of enemy systems, a design which suits their purpose as military weapons, but make them harder for deployers to control and to anticipate their reactions to changes in their environments. LAWS, due to their hugely flexible nature, are therefore also extremely scalable. Instead of needing to rely on other factors such as personnel to operate them as is the case for traditional military weaponry, their scalability means that they have little limitations in terms of proliferation. Due to them being highly cost efficient and made from rudimentary materials, they can easily be mass produced, leading to the risk of finding them on the black market, in the hands of terrorists wishing to destabilise nations, dictators wanting to oppress their people, etc. The risk of proliferation coupled with the properties of lack of human control and mass harm, has led many critics to label them as the future weapons of mass destruction (Dresp-Langley). Furthermore, proliferation could inevitably lead to an AI arms race, wherein nations wishing to stay at the top of the military power hierarchy may foster an environment of competition where nations feel the need to develop their own LAWS in order to "keep up" with other global powers. Additionally, experts have also underscored the potential danger of using LAWS for ethnic cleansing, whereby, due to their reliance on sensor data alone, increasingly through facial recognition, LAWS might be deployed by people wishing to selectively target groups based on discriminatory characteristics. This further raises the threats of genocide and an overall lowered barrier to conflict whereby autonomous systems could enable certain actors to carry out targeted violence campaigns with minimal difficult or human oversight. Last of all, threats of hacking and malfunction are all the more prevalent, whereby cyberattacks and mistakes in hardware programming could lead to disastrous consequences on both military operations and civilian safety, largely threatening global security as a whole.

Ethical dilemmas concerning LAWS

On top of the security considerations which must be taken into account before adequate guidelines and regulations can be established, LAWS also raise the issue of certain ethical dilemmas. Firstly there's the argument that since algorithms are incapable of conceptualising or even understanding human life and its value, they should never be given the power to decide which people should live and who should die. This could lead to a dehumanising process in which shared humanity is undermined and the detachment of human operators from direct combat leads to a mindset where it becomes easier to justify or even normalise death and violence, thus reducing overall empathy for the suffering of civilians and soldiers alike. Furthermore, as briefly touched upon above, there's the risk that such programs could, deliberately or not, have an inherent bias towards certain groups of people. As such, once released into extreme conflict, LAWS could target certain people based on flawed data or discriminatory algorithms, as such leading to wrongful killings, perpetuating violence against already marginalised and vulnerable populations. In 2019, the UN Secretary General António Guterres himself also agreed that "machines with the power and discretion to take lives without human involvement are politically unacceptable, morally repugnant and should be prohibited by international law" ("Autonomous Weapons That Kill Must Be Banned, Insists UN Chief").

While much of the discussion concerning the ethical consequences of LAWS concentrate on the risks and dilemmas they raise, there are some theoretical benefits to using these over human soldiers. First and foremost, they would almost guarantee a reduction in human casualties if used correctly without falling into the wrong hands. By automating dangerous military tasks, they would reduce the amount of soldiers present on an actual battlefield, minimising the risk to them physically along with the reduction of psychological trauma from violent situations. LAWS could also potentially show a certain consistency in decision-making. Whilst the fear of programming biases and discrimination is very prevalent, if these could be eliminated, we would find ourselves left with machines unaffected by personal biases, external pressures, or even human emotions such as fear, fatigue, anxiety, etc. These could therefore also be programmed with strict adherence to international humanitarian law, theoretically reducing the likelihood of war crimes being committed and as such potentially even enhancing human dignity as a whole.

Accountability and responsibility concerning LAWS

The final big factor critics raise when discussing lethal autonomous weapons systems, is the concept of accountability. Due to such weapons being completely autonomous and therefore having no need for human intervention, it begs the question of who would be ultimately responsible for their actions. If they were to, for instance, commit a war crime or violate international humanitarian law, who would be held accountable? As such, due to this lack of clear liability, it can minimise the consequences for these actions and rather foster an environment where states or non-state actors can deflect responsibility onto the system itself, undermining both the principles of justice and deterrence. With no concrete consequences and no adapted legal system to address such war crimes committed by LAWS, violence may become increasingly normalised without the same ethical and legal considerations humans and states might have once reflected upon, due to these no longer having the power to be enforced. This creates an accountability gap which is arguably illegal

according to the Human Rights Watch, as "international humanitarian law requires that individuals be held legally responsible for war crimes and grave breaches of the Geneva conventions." (Docherty) Despite this, they note that "it would, however, be legally challenging and arguably unfair to hold an operator responsible for the unforeseeable actions of an autonomous robot." (Docherty). For instance, if an autonomous weapon were to accidentally strike a civilian bus, who, if anyone, would be held accountable? Such questions highlight the need of clear regulations and international law to be put in place to address such dilemmas and ensure that accountability and justice remain at the forefront of our approach to modern warfare.

Finally, it has been noted that LAWS might struggle to comply with the principles of distinction and proportionality, key principles set out by international humanitarian law. Distinction refers to the obligation of parties to distinguish between civilian and military targets, whilst proportionality prohibits any attacks in which the harm caused outweighs the anticipated military advantage gained. Due to these machines lacking human judgement, it would be impossible for them to decide whether an action's benefit is greater than the civilian harm it might entail, thus raising the question of the legality of such autonomous weapons. Other international standards such as the Geneva Conventions or the Convention on Certain Conventional Weapons (CCW) also have clauses concerning human involvement which LAWS violate, once again highlighting the need for a revised legal framework in light of such technological advancements.

Major parties involved

China

China is currently at the forefront of the military arms race involving LAWS due to its highly developed AI capabilities. It has therefore heavily invested into AI weaponry and autonomous systems as a component of its Military-Civil fusion strategy, with key projects including autonomous drones, AI controlled submarines, and swarm drones. It has therefore advocated for some level of regulation on LAWS but does not support a complete ban and thus aims to project dominance in the Indo-Pacific region.

European Union (EU)

Comparatively, the EU has instead advocated for strict regulation of LAWS, citing them to be a violation of international humanitarian law. Inside the EU, many member states such as Germany, Austria, and the Netherlands, are calling for an outright ban on LAWS, whereas others such as France believe that more consideration is necessary before such extreme measures are taken.

Human Rights Watch (HRW)

The HRW is a leading advocate for the complete prohibition of LAWS, having established the campaign to "Stop Killer Robots" in collaboration with a coalition of non-governmental organisations (NGOs) working towards a preemptive ban on the machines. They especially emphasise the lack of accountability and the potential for unlawful killings along with extreme violations of international humanitarian law.

Russia

Russia strongly opposes the idea of banning LAWS, and is not as favourable when it comes to creating legally binding agreements to regulate them either. It argues that such measures would end up stifling any technological progression and that legitimate defense developments are a part of a nation's own sovereignty, not to be regulated by an international body. So far, it has developed a few prototypes, namely the Lancet drone which is capable of autonomously finding and attacking a target, and has been further experimenting with other weapons such as autonomous tanks and missile defense systems. It sees LAWS as a way to oppose NATO's military might, and further project its power into regions such as Eastern Europe and the Middle East.

United States (US)

Like Russia, the US opposes a preemptive ban on LAWS, believing them to be imperative in technological development and military innovation. They argue that existing international humanitarian law is already sufficient in its restrictions on military action, and that we should instead focus on non-binding guidelines rather than strict legally binding conventions/treaties. The biggest concern they have about such regulation is that it might

disproportionately affect democratic nations, whereas adversaries might continue developing these systems in secret, potentially causing a security imbalance. The US currently leads the global arms race in terms of existing autonomous systems, such as the Phalanx Close-In Weapon System mentioned above, autonomous drones (such as the MQ-9 Reaper), and missile defense systems (including the aegis Combat System). These therefore serve the US in maintaining military dominance over competitors such as China and Russia.

Timeline of events

[Year] (Month) (Day)   Important Event, written in present tense. This can be a few lines, but it is important that it is concise. Any explanation more than a few lines should be done in the general overview and briefly mentioned here.

2002 March 3rd   Formatting: there must be a year (or decade) and for more specific events a month or day may also be mentioned. The date is in bold Nunito 11, coloured red (hex: #6b1017). Make sure to have whitespace between events. For alignment, use a left tab-stop at 4.00 on the ruler. See example

2007 August 10th   Diplomats from the US, EU and Russia meet Serbian leaders for talks concerning the long-term political status of Kosovo.

1979 September 10th - 28th The Convention on Certain Conventional Weapons (CCW) is negotiated in Geneva to lay the foundations for the regulation of weapons deemed excessively dangerous.

1980 October 10th   The CCW is formally adopted, and, whilst LAWS are not yet part of its agenda, the CCW will later become the largest forum for future regulation concerning these.

2013 May 28th   The Campaign to Stop Killer Robots is officially launched by the Human Rights Watch (HRW) in collaboration with other NGOs.

2014 November 13th - 14th   The CCW holds a meeting with experts worldwide to discuss the consequences and implications of LAWS along with potential regulations for these .

2015 July 28th   Upwards of 1000 experts and robotics researchers sign an open letter warning against the danger of autonomous weapons, including Elon Musk and Stephen Hawking.

2019   UN Secretary General António Guterres calls for a worldwide ban on LAWS, citing them to be "morally repugnant" and "politically unacceptable".

2019 March 15th   Turkey introduces its Kargu-2 drone for the first time in the Libyan civil war.

2020 May 22nd   The first ever documented use of an autonomous weapon happens during the Libyan civil war, where the Kargu-2 drone reportedly attacks targets without human intervention.

2023 October 12th   The first ever resolution concerning LAWS is tabled at the UN General Assembly.

2023 October 30th   Both China and Russia oppose the UN General Assembly resolution, highlighting global division on how these should be regulated.

2024 June 10th   Reports indicate that China has successfully managed to deploy swarm technologies during military training exercises, raising concerns about the potential escalation in the global arms race.

Relevant UN treaties and events

Unfortunately, due to the contemporary nature of this issue, only limited UN treaties and resolutions exist. Below however is a short list which can aid in understanding measures already implemented with varying degrees of effectiveness:

The Convention on Certain Conventional Weapons (CCW): a treaty aimed at banning or restricting the use of specific weapons due to them being considered as too dangerous and causing unjustifiable suffering. 10 October 1980

A/RES/36/100; Declaration on the Prevention of Nuclear Catastrophe: whilst not directly relevant to LAWS, such declaration reaffirms international responsibility to prevent weapons of mass destruction. 9 December 1981.

Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II to the 1980 Convention as amended on 3 May 1996); This protocol establishes restrictions on the use of landmines, booby traps, and other weapons which form the basis for the LAWS we have today, in the sense that they also followed the same engineering of being triggered by a victim rather than a deployer.

A/RES/78/241; General Assembly resolution on autonomous weapons: This resolution urges Member States to further continue discussions on autonomous weapons and their consequences. 28 December 2023

A/C.1/79/L.77; General and complete disarmament: lethal autonomous weapons systems: a further resolution concerning the regulation of LAWS. 18 October 2024.

Previous attempts to solve the issue

The Convention on Certain Conventional Weapons (CCW) - 2014

Whilst the CCW was first established in 1979, discussions pertaining to autonomous weapons only began in 2014, focusing especially on their potential impact on international humanitarian law. At this specific convention, a group of experts also convened to discuss the consequences of these to further improve the understanding each member state had concerning the implications. It was here that key concerns such as indiscriminate harm, lack of accountability, algorithmic bias, ethical dilemmas were first discussed. Despite this however, as with many of the previous attempts to solve the issue, no binding resolution was reached due to the largely differing opinions various member states have on the issue, resulting in very slow progress.

International Committee of the Red Cross (ICRC) - 2019

In 2019, the ICRC significantly increased its efforts and advocacy concerning LAWS, urging member states to adopt regulations or prohibitions on autonomous weapons following the stagnant discussions having taken place until then. They therefore proposed several guidelines for optimal usage, such as the insistence that humans retain "meaningful control" over all weapons systems, and the belief that certain LAWS which could not adhere to international law should indeed be banned. On top of this, they included a requirement for traceability in such machines, where decision-making processes must be documented and justified. They then further emphasised the need for addressing the accountability gaps, and established clear international guidelines concerning who would be responsible if an autonomous system were to violate international humanitarian law. Whilst the ICRC did help in cementing the importance of human control and ultimately played a role in influencing the positions of several key stakeholders such as the UN Secretary General António Guterres, they didn't result in any binding regulations, as such leaving the issue concerning LAWS still open for debate.

The "Killer Robots" Campaign - 2013-present

Lastly, a more extreme attempt to solve the issue came in the form of a coalition of over 180 NGOs aiming to ban the development, production and use of LAWS. Initially coordinated by the Human Rights Watch, it gained support from other organisations such as Amnesty International and the International Committee for Robot Arms Control (ICRAC) and aimed to negotiate a legally binding treaty. They required that human operators approve or veto any lethal military action, and that any designs which relied fully on AI or machine-learning algorithms be banned, to name a few of their restrictions. Whilst it hasn't yet been overly successful, it has garnered the support of several countries in line with its beliefs, and has become the largest opposition to LAWS in current day politics.

Possible solutions

A first solution could be, as initially suggested by the ICRC, a legally binding treaty in which autonomous weapons require "meaningful human control" over some of the more critical functions such as targeting and engagement. If this were to be explored, the idea of meaningful human control would need to be clearly defined, along with a precise designation of what falls under the category of critical functions. Another potential solution could be a temporary (or perhaps even permanent) ban on the development, production and deployment of LAWS. In the case of a temporary one, a clear deadline would need to be established. In both cases, clear-cut consequences for violating the ban along with mechanisms for enforcement would also have to be outlined. This could include the monitoring by an independent international body and perhaps even export bans to prevent proliferation. For both solutions, however, the challenges discussed in the General Overview section would have to be addressed, with a special focus on accountability and the risk of algorithmic bias. Finally, member states might consider the implementation of a semi-ban, prohibiting particularly dangerous weapons such as any LAWS basing their targeting on facial recognition (to avoid programming prejudices), drone swarms, etc. Any machines not respecting the principles of distinction and proportionality might also be included in such a ban.

To summarise, possible solutions might want to address the previously touched upon issues of accountability, distinction, proportionality, proliferation, the dehumanisation of human life, algorithmic bias and the threat of ethnic cleansing, the normalisation of violence, protections against hacking, malfunctions, and unpredictability.

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