The Great Debate: Prohibition or Regulation of Lethal Autonomous Weapon Systems (LAWS)

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Abstract

The development of new technology is proliferating within the realm of military weaponry. Lethal autonomous weapon systems (LAWS) select and engage targets without human intervention once activated (i.e. armed drones, vehicles, submersibles, etc.). Various forms of automation have been present in military technology for decades, however the introduction and widespread use of artificial intelligence has raised concerns over how it will alter the field. There is a major ongoing global debate pertaining to whether LAWS should be prohibited or regulated. Those calling for prohibition claim that LAWS will never be able to comply with international humanitarian law, pose major moral and ethical concerns, create an accountability gap, and are susceptible to failure. Those who support regulation highlight the advantages of LAWS including operational advantages, economic efficiency, and humanitarian benefits. This research paper aims to explore both sides of the debate as well as potential policy options for both prohibition and regulation.

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Abbreviations

AI	Artificial Intelligence
AWS	Autonomous Weapon Systems
CCW	Convention on Certain Conventional Weapons
HRW	Human Rights Watch
ICRC	International Committee of the Red Cross
IHL	International Humanitarian Law
LAWS	Lethal Autonomous Weapon Systems
NATO	North Atlantic Treaty Organization
NGO	Nongovernmental Organization
UAS	Unmanned Aerial Systems
UN GGE	United Nations Group of Governmental Experts

Introduction

For over a decade, there has been growing concern over the development of Lethal Autonomous Weapon Systems (LAWS) and what has been coined as the "third revolution in warfare," (Noor, 2023). These weapon systems select and engage targets without human intervention once activated and include the likes of armed drones, vehicles, submersibles, sentry turrets, missile systems in addition to other applications of artificial intelligence (AI) (Longpre et. al, 2022). States, international nongovernmental organizations (NGOs), experts in the field and civil society have partaken in the great debate on whether LAWS should be regulated or prohibited entirely. As AI continues to infiltrate various sectors of society, there is major cause for concern pertaining to its implications on military technology. This paper will examine both sides of the debate, considering if the prohibition or regulation of LAWS will be detrimental or beneficial to the way in which states conduct warfare.

The first chapter will provide background information on what LAWS are and how they currently work. In addition, a brief history and explanation of the current landscape in terms of the development of these systems will offer important context to be able to understand the later sections of the essay. The second chapter will detail arguments supporting prohibition of LAWS and highlighting the potential negative consequences and impacts on warfare should they become widely adopted by various actors. This includes an analysis of LAWS' compatibility with international humanitarian law, ethical and moral concerns, the lack of accountability, and failure along with other potential vulnerabilities. The third chapter will discuss the arguments in favour of regulating LAWS and illustrate the benefits of implementing them in warfare environments. Specifically, this section will discuss the operational, economic, and humanitarian

benefits the implementation of LAWS would introduce. The fourth and final chapter will consider the future of LAWS based on ongoing international discussions. It will provide potential recommendations (i.e. policy, laws, non-binding agreements) outlined by supporters of prohibition and regulation in addition to highlighting possible challenges with each option. It will also briefly touch upon varying states perceive these recommendations and how they have attempted to formulate their own guidelines.

For the intent of this research paper, LAWS will be considered a subset category of the broader "Autonomous Weapon Systems" (AWS). LAWS are designed with a specific objective, such as using lethal force to terminate a target, whereas AWS maintain a wider set of uses such as anti-material, damage, and destruction (Taddeo & Blanchard, 2022). Additionally, while LAWS are being developed by a variety of nations, this paper will focus primarily on American development.

Chapter 1: The Evolution of Lethal Autonomous Weapon Systems

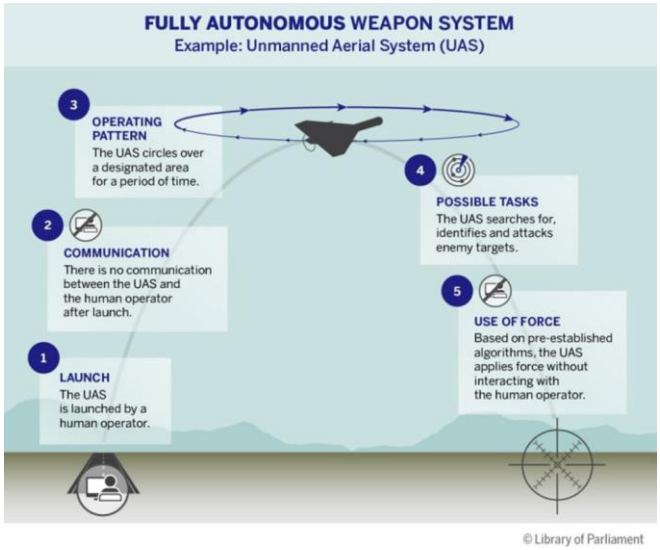
What Are LAWS and How Do They Work?

There is no existing universal international definition of LAWS, however there is a general consensus that they are military weapons which rely on AI to autonomously identify, select, and destroy a target in the absence of human control ("Educating About Lethal Autonomous Weapons," 2023). Autonomy is "the ability of a machine to execute a task, or tasks, without human input, using interaction of computer programming with the environment" (Boulanin, 2016, p.3). AI can be defined as a culmination of computer science and a variety of datasets that are used to solve problems, mimicking the intellectual processes of humans (Copeland, 2024). Not all autonomous weapons rely on AI, however the incorporation of it can further enable their capabilities. In terms of LAWS, AI is used to set pre-defined tasks or sequences of actions established by certain parameters ("Lethal Autonomous Weapon Systems, n.d.). Through analyzing a large amount of data, the AI component within LAWS creates its own algorithms which it then relies on to make independent decisions or behavioural adjustments based on evolving circumstances ("Lethal Autonomous Weapon Systems, n.d.).

While there are a wide variety of LAWS, the most common type are defensive systems such as antivehicle and antipersonnel mines which operate autonomously once triggered ("Lethal Autonomous Weapon Systems, n.d.). More recently, examples have been focused on unmanned aerial systems (UAS), more commonly referred to as drones. Figure 1 depicts a simplified process of how a fully autonomous weapon functions without a human operator after being launched.

Figure 1

Fully Autonomous Weapon System Process



Note: Figure 1 was created by the Canadian Library of Parliament based on information obtained from Paul Scharre, *Army of None: Autonomous Weapons and the Future of War*, W.W. Norton and Company, New York, 2018. Illustration of the fully autonomous weapon system based on Israel Aerospace Industries (IAI) HARPY.

LAWS can be identified as a sub-category under the larger umbrella term "Automated Weapon Systems" (AWS), for which the definition has been greatly contested as well. A comparative analysis conducted on the varying definitions of AWS identified 12 different interpretations put forward by States or major international actors such as the International Committee of the Red Cross (ICRC) and the North Atlantic Treaty Organization (NATO) (Taddeo & Blanchard, 2022). The primary issue with defining AWS is that actors focus on

different elements, such as mechanical structure, capabilities, AI algorithm construction and more, rather than the system as a whole. This results in varying perspectives on how to address the ethical and legal implications of AWS as well as the inability to create a uniformed understanding of AWS and agreements on conditions of deployment and regulations of use (Taddeo & Blanchard, 2022).

Throughout the evolution of these systems, there has been changing levels of autonomy at each stage of development. The levels of autonomy describe a transfer of control from one area of the system, such as on the ground control by humans, to another area, such as the system performing operational tasks itself (Williams, 2015). The purpose of the degrees of autonomy is to assist defence leadership and system designers record the progress of defence technology programs and ascertain if intentions to increase autonomy in specific systems had been achieved (Williams, 2015). Table 1 depicts the varying degrees of autonomy that apply to AWS/LAWS.

Table 1

US Navy Office of Naval Research Levels of Autonomy

Level	Name	Description
1	Human Operated	All the activity in the system is a direct result of human-initiated environment, although it may have information-only responses to sensed data.
2	Human Assisted	The system can perform activity in parallel with human input, acting to augment the human's ability to perform the desired activity, but has no ability to act without accompanying human input. An example is automobile automatic transmission and anti-skid brakes.
3	Human Delegated	The system can perform limited control activity on a delegated basis. The level encompasses automatic flight controls, engine controls, and other low-level automation that must be activated or deactivated by a human input and act in mutual exclusion with human operation.

4	Human Supervised	The system can perform a wide variety of activities given top-level permissions or direction by a human. The system provides sufficient insight into its internal operations and behaviours that it can be easily understood by its human supervisor and appropriately redirected. The system does not have the capability to self-initiate behaviours that are not within the scope of its current directed tasks.
5	Mixed Initiative	Both the human and the system can initiate behaviours based on sensed data. The system can coordinate its behaviour both explicitly and implicitly. The human can understand the behaviours of the system in the same way that he or she understands his or her own behaviours. A variety of means are provided to regulate the authority of the system with respect to human operators.
6	Fully Autonomous	The system requires no human intervention to perform any of its designed activities across all planned ranges of environmental conditions.

(Williams, 2008)

Beyond the varying levels of autonomy, there are different types of AWS employed based on air, marine, and land domains. The air domain is where interest and development of autonomy has been the strongest (Boulanin, 2016). UAS systems are most prevalent, having the ability to take off and land autonomously, flying to predetermined destinations relying on the Global Positioning System (GPS), and returning to base in the event of a loss of communication (Boulanin, 2016). Currently, the largest challenge with autonomous UAS systems is flight capabilities in low-lying and unknown environments and contested airspace (Boulanin, 2016). To overcome this, research has been focused on developing vision-based guidance for UAS that would allow the system to construct representations of their surroundings and identify obstacles (Boulanin, 2016).

Within the maritime domain, the development of AWS is easily achievable due to the lack of obstacles in the environment. Majority of existing systems in the marine domain are

operated via remote control, however some are already able to navigate and carry out pre-programmed tasks autonomously through GPS and sensor-based obstacle avoidance systems (Boulanin, 2016). Autonomous underwater unmanned systems have existed for decades and have the capacity to operate for extended periods of time (Boulanin, 2016).

Developing AWS for land use, in terms of military operations, has faced significant challenges due to the aforementioned issues with obstacle identification. There have not yet been systems manufactured with adequate perception and decision-making capabilities to respond effectively to the complex nature of a battlefield (Boulanin, 2016). It is for this same reason that existing mobile ground robots utilized by military and security forces are almost exclusively remoted operated (Boulanin, 2016).

In terms of *how* AWS/LAWS are deployed, the most common tactic that would be used is known as "swarming." This mechanism or concept of "swarm intelligence," can be defined as "the collective behaviour of decentralized, self-organized systems, natural or artificial," (Jenks, 2017, p.352). While swarming has been used throughout history as a military tactic, increases in autonomous technology is enabling this imitation of nature to machine systems. It is anticipated that autonomous swarming systems will be used for civilian functions such as agriculture, search and rescue, mining, and more, however the focus has been on the military technology that will use it for defensive purposes (Jenks, 2017). In 2014, the U.S. Navy tested autonomous boat patrols in Virginia on the James River. The task was for the patrol boats to act as escorts and protect a manned vessel (Jenks, 2017). The patrol boats were not remote controlled but were guided by a system used by NASA for its Mars rover program (Jenks, 2017). When faced with

an intruder boat, the autonomous boat patrols assembled themselves into a protective line to protect the manned vessel (Jenks, 2017). This indicates a future where military forces could rely on autonomous swarming technology as an additional layer of defensive or attacking mechanisms when in battle, highlighting the importance of discussions regarding their prohibition or regulation.

A Short History of LAWS

The concept of autonomy in weapon systems has existed for over 150 years, going as far back as the American Civil War in 1861 when the Gatling gun was first introduced. This model inaugurated automation for loading and firing, meaning more bullets could be fired in a shorter amount of time, acting as a predecessor for the modern-day machine gun (Scharre, 2019). While the Gatling gun itself was not an autonomous weapon, it marked the beginning of the evolution of autonomy within weapon systems.

The first "smart" weapon system was precision-guided munitions (PGMs) in 1943 after militaries began to search for methods of precision guidance that would allow for accurate striking from far distances (Scharre, 2019). The first successful PGM was the German G7e/T4 *Falke* ("Falcon"). It employed the use of an acoustic homing seeker which accounted for aiming errors and used acoustic sensors to listen for nearby ships which it would then steer towards and detonate (Scharre, 2019). Since then, autonomy has permeated a wide variety of military weapon systems such as rifles, land, and naval mines, UAS, and more. Currently, a wide variety of countries use AWS with varying levels of autonomy. One of the most notable systems is the American Phalanx Close In Weapon System which detects, evaluates, tracks, engages and

executes kill assessments on anti-ship missiles in addition to high speed aircraft threats ("MK 15 – Phalanx Close In," 2021). Equally as renowned is the Israeli HARPY loitering munition system which is programmed to autonomously fly to a pre-determined loitering area in which it searches for and attacks targets with high hit accuracy ("HARPY – Autonomous Weapon," n.d.). The HARPY has been sold to several countries including Chile, China, India, South Korea, and Turkey, with the Chinese reportedly having reversed engineered their own version (Scharre, 2019).

In terms of AWS/LAWS specifically, the most widely developed type is that of military drones or UAS for remote surveillance and strike operations. Contemporary drones are now able to detect and attack independent of human operators as a result of target identification technology (Noor, 2023). The first recorded use of an autonomous drone occurred in March 2020 in Libya, when a Turkish designed Kargu-2 drone hunted down members of the Libyan National Army (United Nations Security Council, 2021). The United Nations Security Council report documenting the incident stated that the "LAWS were programmed to attack targets without requiring data connectivity between the operator and the munition: in effect, a true 'fire, forget, and find' capability" (United Nations Security Council, 2021, p.17). The demonstration of the drone's autonomous capabilities through machine learning poses this technology as an attractive choice of attack for military forces in the future.

The Current Landscape

While there is no existing international definition of LAWS, there are ongoing debates regarding factors such as moral acceptability, potential negative influences on international relations and stability, along with their compliance under international humanitarian law (IHL)

and international human rights law (Boulanin, 2016a). Countries that are developing weapon systems with varying degrees of autonomy include China, France, Germany, India, Israel, Italy, Japan, Russia, South Korea, Sweden, the United Kingdom, and the United States (U.S.) (Boulanin & Verbruggen, 2017). Currently, the U.S. has been the leading nation in terms of visible, articulated, and progressive research and development of autonomy in weapon systems (Boulanin & Verbruggen, 2017). This has incited other powerhouse countries to follow suit and allocate resources towards AI and robotics, while other nations are more hesitant to do so.

International conversations first began in 2013 and were designated to occur under the framework of the United Nations Convention on Certain Conventional Weapons (CCW). The CCW exists as an international body to "ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately." It was assigned to this forum because LAWS are weapons that may be deemed to cause "excessively injurious or indiscriminate effects," specifically under principles of proportionality, distinction, and precaution when attacking (Boulanin, 2016a). In 2017, the discussions transitioned from a meeting of experts to an official forum titled the United Nations Group of Governmental Experts (UN GGE) (Sayler, 2023). The UN GGE is exclusively responsible for considering the technological, military, ethical, and legal implications of LAWS (Sayler, 2023). In 2019, member nations agreed to a set of "guiding principles" for the use of LAWS. These included the application of IHL to LAWS, human responsibility for use of force via LAWS, and considerations of their risks of acquisition by or proliferation to terrorists (Sayler, 2023a).

Most recently, the 2023 Meeting of the High Contracting Parties to the Convention (CCW) occurred in Geneva, Switzerland from November 15-17. At this meeting the forum concluded that the UN GGE must continue to strengthen the Convention in relation to emerging technologies in the area of LAWS ("United Nations Office," 2023). The report cites next steps for the UN GGE as considering proposals and possible measures, including examination of existing protocols under the Convention, along with other options in the normative and operational framework on emerging technologies relating specifically to LAWS ("United Nations Office," 2023). This will be conducted through building upon recommendations and conclusions offered by the UN GGE and inclusion of their expertise on legal, military, and technological aspects ("United Nations Office," 2023).

Chapter 2: The Prohibition of Lethal Autonomous Weapon Systems

Those who are in opposition to the development and implementation of LAWS express concerns relating to the legal, ethical, and moral implications they generate. The call for new international law on LAWS first came to light following the "Stop Killer Robots" campaign which began in 2013 and is co-founded by Human Rights Watch (HRW). This initiative calls for the implementation of a pre-emptive ban on the development, production, and use of LAWS, citing the importance of human control when employing force (Boulanin, 2016a). This position has been supported by humanitarian figures including the UN Secretary-General, Amnesty International, and the ICRC. As of October 25, 2019, 30 countries support the prohibition of fully autonomous weapon systems, as shown in Table 2.

Table 2

Positions of States on Pre-emptive LAWS Ban

Support		Oppose
Algeria	Guatemala	Australia
Argentina	Holy See	France
Austria	Iraq	Israel
Bolivia	Jordan	Republic of Korea
Brazil	Mexico	Russia
Chile	Morocco	Turkey
China*	Namibia	United States
Colombia	Nicaragua	United Kingdom
Costa Rica	Pakistan	
Cuba	Panama	
Djibouti	Peru	
Ecuador	State of Palestine	
Egypt	Uganda	
El Salvador	Venezuela	
Ghana	Zimbabwe	

(Campaign to Stop Killer Robots, 2019)

* China's support is only to ban the use of fully autonomous weapons, but not their development or production.

As discussions continue on how to move forward, supporters of opposition have demonstrated how the risks of LAWS outweigh the benefits they may offer, citing inability to comply under IHL standards, ethical and moral concerns, lack of accountability, and system failure, as explored in the following sub-sections.

Incompatibility with International Humanitarian Law

In the context of warfare, the actions carried out by states are regulated by IHL. States comply with these legal obligations through national documents that provide guidance on rules of engagement prior to applying military force (Christie et al., 2023). It can be argued that if a

pre-emptive ban is to be implemented, the most crucial component to consider is the ability or inability of LAWS to conform under IHL – ethical and moral concerns alone are not enough. Under IHL, there are core principles that must be followed regardless of the means of warfare, meaning they are applicable to LAWS, as established by the UN GGE (Christie et al., 2023). There are two principles which directly apply to the use of LAWS. The first is the *principle of distinction*, which states that militaries "must distinguish between enemy combatants and civilians on the battlefield; they cannot deliberately target civilians," (Scharre, 2019, p.251). IHL recognizes that civilians may be killed incidentally during combat and identifies this as "collateral damage." Second, under the *principle of proportionality* any "collateral civilian casualties cannot be disproportionate to the military necessity of attacking that target," (Scharre, 2019, p.251).

Under the *principle of distinction*, LAWS must be able to accurately identify military and civilian targets, in addition to identifying them apart from objects in the environment. New machine learning relies on methods such as deep neural networks, which is a form of representation learning, for object recognition (Scharre, 2019). The issue with neural networks is their vulnerability to "fooling image" attacks, which could essentially trick the machine into mis-identifying enemy targets and targeting wrong ones without human intervention (Scharre, 2019). For a machine to be able to accurately identify targets, it would need advanced skills in observation and recognition along with intricate decision-making capabilities, similar to a human (Winter, 2022). This is especially important in complex battle environments, such as urban areas where there may be civilians walking alongside armed combatants. The ability to judge in the context of distinction is crucial, considering a person can change between being an enemy target

and a non-targetable civilian without altering their physical appearance (Winter, 2022). If a person is dressed in military attire and wielding a weapon, the system would undoubtedly identify it as a target. If the individual then becomes *hors de combat* because of capture, surrender, or incapacitation, they would no longer be a target (Winter, 2022). Despite this, the system would not be able to recognize the change in status due to its inability to perceive and judge the way a human does. This is indicative of LAWS operating within a margin of error, thus making them noncompliant under IHL and unable to operate in a military environment.

As outlined in the *principle of proportionality*, the military necessity of any LAWS attack must outweigh the civilian collateral damage it may cause. This is embodied in IHL under Article 51(5)(b) of the Additional Protocol I rule which states that an attack is indiscriminate and disproportionate if it "may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated." When conducting a military attack, the last step before the operation is executed is ensuring that it is in fact proportional, which is usually determined by a military commander (van den Boogaard, 2015). For proportionality to be assessed, various factors including military advantages and objectives, civilians and civilian objects and the gravity attributed to each one must be considered (van den Boogaard, 2015). In conjunction with distinction, military advantage is a major factor when calculating the proportionality of a situation. Specifically, military advantage must be 'concrete,' 'direct,' and 'military,' and cannot be based on hope or speculation (van den Boogaard, 2015). For LAWS to be able to conduct this assessment, the system must be able to identify a military target and then consider the expected collateral damage (van den Boogaard, 2015). Direct examples of military

advantage may include damage to enemy stronghold, headquarters, or barracks (van den Boogaard, 2015). These concrete examples of military advantages do not include others such as political, psychological, economic, financial, or social advantages, thus indicating that the concept itself is rather broad and does not only derive from the destruction of a material object (van den Boogaard, 2015). The fact of the matter is that the ultimate decision of proportionality is entirely subjective based on the current environment and circumstances. Even if the military advantage and expected collateral damage are evident, the judgement on whether the attack is proportional or not is typically made by a human. It is not yet possible for LAWS to mimic qualitative human judgement and make reasonable decisions based on the information provided, highlighting their technical limitations in relation to determining proportionality under IHL.

Ethical and Moral Concerns

The ethical and moral concerns of using LAWS are rooted in the concept of "dehumanizing warfare." Arguments include that LAWS cannot understand the value of human life, the significance of its loss, and would subsequently disregard the humanitarian fundamental responsibility of not harming one another unnecessarily (Zacharias & Schmidt, 2021). Fundamental human rights include the rights to life, bodily integrity, and dignity which humans have a moral duty to respect and protect, all of which LAWS could inhibit. Deontological ethics require that there be a valid justification for taking a human life and IHL permits unintentional killing of civilians if there is reasonable military necessity (Asaro, 2020). The line between "intentional" and "unintentional" becomes blurred when considering LAWS as they may carry out certain actions not considered by their programmers or kill unintended targets (Asaro, 2020). If LAWS are to intentionally take a human life, the killing must be legally and morally justified

(Asaro, 2020). The issue is that weapon systems programmed by AI do not have the legal or moral agency or deliberation to understand what denotes a justifiable killing, nor can they be held accountable (Asaro, 2020).

Beyond fundamental human rights, the notion of human dignity is important when conducting warfare and is recognized by humans, not by autonomous machines. These rights are not "lost" in war, but are superseded by rights of others, such as the right to defend oneself (Asaro, 2020). They key component here is the *relation* between those involved. For example, soldiers can kill other soldiers and not be charged with murder on the grounds that they were targeting an enemy combatant (Asaro, 2020). To recognize human dignity and make a moral judgment to kill, Asaro describes the minimal requirements as (1) "recognize a human being as a human, […] as a being with rights that deserve respect; (2) understand the value of life and significance of its loss; and (3) reflect upon the reasons for taking life and reach a rational conclusion that killing is justified in a particular situation" (2021, p.229). Furthermore, the ICRC states that when applying force, 'meaningful,' 'effective,' or 'appropriate' human control is required to maintain moral responsibility (Verdiesen et al., 2020). In their current states, LAWS are incapable of meeting the minimum criteria to make the decision to take a human life. With that being said, humans must continue to partake in the decision to apply force, as is morally and legally just (Asaro, 2020).

Lack of Accountability

In relation to LAWS, HRW claims that there is inadequate guidance on how to ascribe accountability when a life is taken. LAWS alters human agency through challenging the long-

prescribed norms on how to attribute moral responsibility (Asaro, 2020). Experts have established that LAWS cannot take on the liability on behalf of their creators, however, in the case of errors there is no clear path on who should take responsibility (Longpre et al., 2022). While there are numerous players (i.e. engineers, product designers, military leaders) partaking in the design, implementation and execution of LAWS, there lacks a definitively culpable person responsible for the actions of these weapons. It would be unjust and unreasonable to place the blame on programmers or manufacturers who may not have intended or anticipated the potential catastrophic actions of the LAWS (Docherty, 2015).

The increased presence of automated decision-making systems contributes to diminishing moral agency and responsibility, thus expanding the accountability gap. Normally, humans control weapon systems and use judgment and intent to terminate a target after recognizing it as legal, militarily necessary, and morally justified (Asaro, 2020). In the case of LAWS, the targeting mechanism and decision-making process is guided by algorithms applied to data it has been fed (Asaro, 2020). The concern then becomes that these weapon systems can commit criminal acts but cannot be found criminally accountable due to the lack of intentionality (Docherty, 2015). In the event of an error, it would be classified as a mistake or technical issue, despite a culpable crime being present (Asaro, 2020). Additionally, while there is *some* intent in the design of an algorithm, assumptions must be made in terms of the circumstances and environments the LAWS will face when making a decision (Asaro, 2020). Thus, algorithm designers are creating guidelines for the system to follow which they *expect* will inform the judgements of the system given the assumptions made, not based on actual situations (Asaro, 2020). With this information, scholars have claimed that it is immoral to allow LAWS to

maintain the authority to kill and that the accountability gap it creates undermines the moral and legal responsibility of actors in armed conflict (Asaro, 2020).

Failure and Other Vulnerabilities

With the advancement and increased implementation of AI in military technology, system processes will continue to become increasingly complex. The difference between existing military technology and developing ones such as LAWS can be explained by linear and non-linear processes. In linear systems the outcome is directly related to the input, meaning interactions are planned, visible, and allow the user to anticipate the system's future actions (Carvin, 2017). Non-linear systems are not governed and often result in irregular patterns, meaning the actions carried out by the machine can be more or less than what was expected based on the given input (Carvin, 2017). Former national security analyst Stephanie Carvin explains that managing failure in autonomy and AI is extremely challenging for four primary reasons: (1) The system may not always be able to accurately communicate what the issue is; (2) The system may provide misleading information, further hindering its operator; (3) Inability of knowing that all functions of the system are operating correctly due to complex nature; and (4) Inability to adapt and operate outside of pre-determined parameters (Carvin, 2017). Considering LAWS are expected to operate in complex environments where they must adapt to obstacles, accurately identify targets, and ensure proportionality in decision making, these potential failures are major causes of concern.

Beyond problems of failure, there is fear of these deadly weapons' susceptibility to hacking and cyberattacks by adversaries. While LAWS are advertised as being technologically

advanced enough that it would be impossible for non-state actors to overtake them, this is not entirely the case (Security and Technology Programme, 2017). Since LAWS are programmed and operated through computer technologies, they are vulnerable to the same attacks as computer systems, most notably hackers launching cyberattacks in an attempt to gain control (Asaro, 2020). These attacks are often used as a means to further ideological or economic motivations of malicious actors (Security and Technology Programme, 2017). If successful, adversaries may "corrupt state information, interrupt communications, or modify the automatic control systems of AWS," (Dresp-Langley, 2023, p.4). This would enable access to local and network-wide information and a multitude of unknown attacks on the system which could lead to unwanted scenarios, such as re-programming to target civilians or turning the machines against their owners (Dresp-Langley, 2023). Since LAWS select their targets based on sensor data, primarily through facial recognition or other biometric information, selective targeting based on elements such as gender, race, ethnicity, or religious dress becomes an issue ("The Risk," 2023). If LAWS are used in warfare, the risk of potential genocides or ethnic cleansing as a result of system hacking greatly increase ("The Risk," 2023) and thus create an even stronger need for prohibition.

In conjunction with risks of hacking, proliferation is another major concern should LAWS be used in modern day warfare. These systems do not require hard to obtain or expensive materials to build, meaning they can proliferate rather quickly beyond military bodies. Additionally, the same level of industrial and technological sophistication used in the development of nuclear weapons is not necessary for LAWS and can be created with "off-the-shelf" technology (Asaro, 2020). This has already been demonstrated with the proliferation of

drones, which have increasingly been developed and used by non-state actors and terrorists (Asaro, 2020). As the resources required to construct LAWS are widely accessible and relatively inexpensive compared to other military technologies, it can be assumed that they will become widespread and used maliciously. This can further lead to conflict between different states as well as with non-state actors as the dynamic of how warfare and the rules that govern it become convoluted. Proliferation of LAWS would essentially enable a large amount of people to become involved in conflicts and use the systems as they see fit. Dictators may use them to control civilian populations, terrorists could use them to attack innocent individuals or to gain influence over governments, or they could simply be used to wreak havoc. This widespread accessibility is a primary concern considering it significantly expands who the players are on the military field and complicates the environment, thus prompting the need for prohibition of LAWS.

With all factors considered, it is apparent that this technological development poses serious risks and concerns for the wellbeing of civilians in warfare situations. In addition, LAWS are not yet completely compliant with necessary legal requirements to be able to operate in a battlefield. Further research and testing needs to be conducted prior to their widespread implementation, however it is important to recognize that both states and non-state actors are likely to continue development despite growing concerns and a lack of regulations.

Chapter 3: The Regulation of Lethal Autonomous Weapon Systems

While there is concern over the negative impacts LAWS may have on how warfare is conducted, many see this technological development as a revolution in military affairs. Those in

support of regulation often claim that the fear and concerns pertaining to LAWS is a result of exaggerated headlines in the media, as they are often compared to the Terminator and labelled as "slaughterbots." Retired United States Marine Corps Lieutenant General Michael Groen stated that the role of AI in military affairs is more diverse and less dramatic than the public tends to believe (Nasu & Korpela, 2022). He continued to explain that the arguments calling for a ban are "based on erroneous assumptions and speculations that are devoid of practical and operational considerations," (Nasu & Korpela, 2022, para. 2). Those in favour of regulating LAWS focus on the benefits that implementation of these systems will offer and argue that a complete ban will be ineffective and adversely affect law-abiding nations (Nasu & Korpela, 2022). The analysis below includes the potential benefits of LAWS and how they will progress warfare, ranging from operational advantages, economic benefits, and humanitarian benefits.

Operational Advantages

With the introduction of AI into military technology, the capabilities LAWS possess on a battlefield offer significant benefits from an operational standpoint. Military planners perceive LAWS as being able to foster greater "speed, accuracy, persistence, reach and coordination on the battlefield" (Boulanin & Verbruggen, 2017, p.4). Scholars have argued that the main purpose of autonomy in weapon systems is to limit dependence on human and external resources in the context of military operations in addition to strengthening versatility in changing environments and survivability on the battlefields (Puscas & Anand, 2023). This, in turn, will allow for greater rates of success and offers invaluable support to military personnel on the ground.

LAWS maintain the capacity to better assess a target's legitimacy, make decisions with more accuracy, and act at a much faster pace compared to a human (Hiebert, 2022). In addition, LAWS can be programmed to carry out actions in unpredictable ways that could confuse enemies and generate a stronger offensive stance (Etzioni & Etzioni, 2017). Using LAWS allows for desired goals to be obtained at a much faster rate and more efficiently compared to using human soldiers. For example, a single UAS programmed with AI maneuvering that had substantial ammunition and fuel reserves could eliminate an entire aircraft fleet with only one pilot (Etzioni & Etzioni, 2017). Contrastingly, it would take a lot more manpower, time, and resources to achieve the same feat using only human soldiers and existing human-operated military weapons. The enhanced capabilities of LAWS programmed with AI allow for a more efficient use of lethal force in warfare.

In conjunction with speed and efficiency, the automation of target identification, tracking, selection, and engagement by LAWS strengthen abilities to achieve military goals while prioritizing the protection of civilian lives. LAWS are programmed to hit their targets with extreme accuracy. This is similar to how missiles or bombs are coded with the "lock-on-after-launch" function which navigates itself autonomously after being put in motion by a human operator ("United Nations Office," 2018). The mechanism then relies on sensors that identify its target, followed by input from computers and guidance systems, which allow it to accurately strike ("United Nations Office," 2018). This significantly limits the chances of innocent bystanders being hit and ensures that only the intended targets are harmed. Furthermore, fewer weapons need to be used in order to obtain the same military advantage as a singular LAWS ("United Nations Office," 2018). An example of this is the case of the Thanh Hoa Bridge, which

acted as a supply line during the Vietnam War. For seven years, the U.S. military relied on sorties and bombs to attack and destroy the bridge but were ultimately successful once they used automated laser-guided bombs (Boyne, 2011). Prior to the introduction of this new weapon, the loss from this mission included 871 sorties, 11 aircrafts, countless lives, and a significant amount of expended munitions (Boyne, 2011).

Beyond producing enhanced speed and accuracy, the use of LAWS ensures improved protection and overall capabilities of military personnel in battle. The physical demands and extreme mental concentration required to survive and succeed in a warfare environment make human soldiers prone to fatigue and stress (Etzioni & Etzioni, 2017). This can lead to mistakes that are detrimental to the military efforts of the nation, but more specifically can result in harm to the soldier. LAWS mitigate this problem significantly as they are more efficient than humans and reduce high error probabilities that would otherwise be present (Puscas & Anand, 2023). Furthermore, LAWS are not impacted by mental or physical exhaustion, and do not consider moral, religious, and ethical attitudes when making decisions on the battlefield (Puscas & Anand, 2023). The implementation of LAWS would virtually eliminate the weaknesses that human soldiers have. While soldiers are culpable of acting out on emotions of revenge, panic, exasperation, prejudice, or fear, LAWS are not impacted by such and will stay true to their intended purpose while actively reducing the risk of intentional strikes against innocent civilians (Puscas & Anand, 2023). Computers and algorithms, which would program LAWS, have a smaller margin of error when processing information and calculating next steps (van den Boogaard, 2015). By placing the burden of carrying out missions and terminating targets on LAWS, human soldiers are shielded from physical and mental injuries. Reducing physical and

mental strain, soldiers can redirect their full efforts, skillsets, and knowledge to other areas of military affairs. This benefits the nation and the military's objectives.

Furthermore, LAWS significantly enhance the overall reach and longevity of military operations. Firstly, as these weapons are essentially computers, they do not lose interest, require sleep, or breaks as their concentration dwindles similar to humans when completing a task (van den Boogaard, 2015). For duties that may be repetitive or not challenging (but still critical to military operational success), an autonomous weapon will do a much better job at completing the task efficiently and accurately (van den Boogaard, 2015). Likewise, LAWS are able to function for extended periods of time in environments where human soldiers could not (van den Boogaard, 2015). This includes areas such as the deep sea, arctic climates, and regions contaminated with biological or chemical weapons (van den Boogaard, 2015). This would enable military operations to expand beyond their typical reach and consider new avenues in strategic planning. Lastly, LAWS are able to be programmed at any time and can learn and store new information at an incomparable rate compared to humans. Soldiers require time and resources to obtain new skills and knowledge, while weapon systems simply require a software update (van den Boogaard, 2015). This benefit transfers to the battlefield greatly, as LAWS can all be updated at the same time, meaning there is continuity and uniformity in the actions being taken. With human soldiers, it is more difficult to ensure that all have retained the new skills and information necessary to ensure success on the battlefield, which can lead to potential dangers (van den Boogaard, 2015).

Economic Efficiency

The implementation of LAWS offers attractive benefits in terms of economic efficiency. While initial costs are significant, developing and including LAWS as a part of military cohorts can save money in the long-term. These systems offer the potential of reducing costs through replacing the need for human supervision and participation in certain situations (Van Kralingen, 2016). A commander alone can supervise the initial "take-off" and execution of LAWS, thus saving a significant number of hours that would otherwise be spent tracking a larger number of individual human soldiers and requiring more manpower (Van Kralingen, 2016). Additionally, human soldiers require feeding, medical attention, housing, benefits, and pension, which LAWS require none of. Figures from the American Department of Defence indicated that a single soldier in Afghanistan cost the Pentagon approximately $850,000 USD per year (Etzioni & Etzioni, 2017). Contrastingly, an AWS known as the TALON robot, which is a small rover equipped with weapons is priced at around $230,000 USD (Etzioni & Etzioni, 2017). The development of LAWS is expensive at first, but is significantly less costly, time-consuming and resource prohibitive compared to nuclear weapons development (Toscano, 2015). Additionally, AI research is conducted with minimal resources and does not require extensive resources or infrastructure for development and testing (Toscano, 2015). Once the technological component is created, LAWS are easily mass manufactured and inexpensive to maintain over time compared to human soldiers (Toscano, 2015). It can therefore be expected that both state and non-state actors will increasingly become involved in the development of LAWS due to the easily accessible resources and relatively inexpensive costs to build and maintain them, while offering significant military advantage.

In 2020, the Department of Defence spent approximately 25 percent of its $630 billion budget on salaries and benefits for its service members (Harper, 2021). The current average military compensation exceeds the Pentagon's goal of the 70th percentile of earnings for civilian workers, which is now in the 90th percentile (Harper, 2021). Defence budget analyst, Seamus Daniels, indicated that the high military personnel costs could limit funding for the U.S. military's modernization initiatives and jeopardize the long-term sustainability of the force (Harper, 2021). Beyond maintaining military personnel, there are significant costs incurred from assisting wounded service members in addition to loss of life. As costs continue to increase, militaries are turning to alternatives that will prioritize increasing the distance between its personnel and enemy targets (Toscano, 2015). The result has been an increase in focus on LAWS and the economic benefits they could provide. More specifically, there has been motions to introduce "support robots" that would see the reduction of a military brigade from four thousand to three thousand soldiers without losing effectiveness (Etzioni & Etzioni, 2017). Economic efficiency is becoming a larger priority as costs continue to skyrocket and government budgets continue to be cut down each year. It is evident that the initial costs of developing AWS outweigh the consistently growing costs of maintaining military personnel.

Humanitarian Benefits

The introduction of LAWS into battle environments will provide significant humanitarian benefits. Majority of nations and almost all international forums place the utmost priority on protecting innocent civilians and minimizing loss of life in warfare. As LAWS are force multipliers on a battlefield, there is less need for human soldiers. By having more of a technological presence as opposed to a human one, casualties are significantly reduced through

removing human actors from dangerous missions or environments (Etzioni & Etzioni, 2017). Those in battle are often impacted by the "fog of war" and may lack awareness of civilian presence. "Fog of war" describes the uncertainty faced by those engaging in military operations, in which "confusion and lack of clarity can lead to critical decision-making challenges" (Pollick, 2024). In these instances, information is fragmented, and situational awareness is compromised (Pollick, 2024), thus leading to errors that cause civilian deaths. As previously stated, LAWS are more accurate, efficient, and less emotionally driven than human soldiers and as a result are much less likely to cause unnecessary harm or loss of life to civilians. LAWS are programmed to target certain actors and will not be influenced by external factors, thus protecting customary IHL rule 14 which states that "launching an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, is prohibited."

In addition to decreasing the number of lives lost by removing human actors from the situation, LAWS can contribute to the reduction of loss of life caused by immediate use of force in self-defence. Civilians face high risks in warfare environments where military personnel are in battle and may respond to enemy attacks in self-defence ("United Nations Office," 2018). In these situations, it is the military's priority to neutralize enemy threats by any means necessary and as efficiently as possible. With this approach, there is limited time to consider consequences and take precautions to reduce the chances of civilian casualties ("United Nations Office," 2018). LAWS can mitigate this issue as they have no inherent need for self-defence and are solely focused on preserving its ability to complete the tasked mission (Toscano, 2015). Relying on the

AI capabilities within LAWS, militaries can use these weapons to identify the direction and location of incoming fire and reduce chances of misidentifying them ("United Nations Office," 2018), thus minimizing the risks of incidentally harming civilians. Furthermore, defensive LAWS can limit the physical distance of soldiers to enemies, reducing the need for self-defence and provide additional time to conjure a deliberate response to incoming enemies by countering incoming rockets, mortars, and artillery ("United Nations Office," 2018).

Beyond minimizing loss of soldier and civilian life, the use of LAWS will limit the collateral damage often caused by wars. Due to the incredibly complex nature of warfare, human soldiers are often faced with stress, exhaustion, vindictiveness, or hate (Hiebert, 2022). A neuroscience study was conducted and indicated that the neural circuits responsible for conscience self-control in a human can shut down when faced with overloaded stress (Etzioni & Etzioni, 2017). As war is a high-stress environment, soldiers' self-control is impacted and can lead them to commit acts they otherwise would not do (Etzioni & Etzioni, 2017). This includes acts such as looting, destruction of property, or sexual violence, which tend to be more common in ethnically driven wars (Hiebert, 2022). These incidents can often result in deep-seated traumas and intergenerational resentment that destabilize the nation, leading to future conflict and challenges to stable international relationships (Hiebert, 2022). With the implementation of LAWS, all of this can be diminished or eliminated. The AI applications embedded in LAWS have the capacity to assist commanders and military personnel in strengthening awareness of civilian presence and objects ("United Nations Office," 2018). Through analyzing the complex data presented and making informed decisions without factors such as preconceived notions or stress impacting them, LAWS can make warfare more humane and protect civilians and civilian

objects from the negative side effects of war. Furthermore, LAWS limit the amount of complex and traumatic experiences that soldiers may encounter when in battle and decrease chances of post-traumatic dress disorder, illnesses, injuries, and mental health struggles.

Another major humanitarian benefit provided by LAWS is the alteration of behaviour on the battlefield in warfare by making it more ethical. Many military experts and roboticists have claimed that implementation of LAWS is ethically preferable to endorsing the continued use of human soldiers (Etzioni & Etzioni, 2017). Renowned roboticist Ronald C. Arkin claims that AWS will eventually be able to act more humane than actual humans. This is based on the notion that these weapon systems will not have a self-preservation instinct, thus eradicating the "shoot-first, ask questions later" mindset (Arkin, 2010). With the help of AI, LAWS will be able to "process much more incoming sensory information than humans without discarding or distorting it to fit preconceived notions" (Etzioni & Etzioni, 2017, p. 74). Additionally, Arkin has suggested that should "support robots" be implemented within the military, AWS could be more dependable than humans in terms of reporting ethical infractions (Etzioni & Etzioni, 2017). This is due the fact that the weapon systems would be programmed to observe and flag certain behaviours, whereas human soldiers may be impacted by personal relationships and close ranks (Etzioni & Etzioni, 2017), thus impacting the disclosure of ethical violations.

It is evident that the introduction of LAWS would offer a multitude of benefits, but still require serious considerations in terms of compliance with IHL. With AI continuing to infiltrate military technology, it is realistic to assume that LAWS will in fact become a part of how states conduct warfare in the future. With that being said, it is important to consider the current approaches being taken to either prohibit or regulate these rapidly developing weapons.

Chapter 4: The Future of Lethal Autonomous Weapon Systems

While the overall discussions pertaining to LAWS are incredibly complex, there are ultimately two paths in which the policy discussions relating to these machines can take: prohibition or regulation. As previously stated, there are ongoing debates within international forums so that countries can come to an agreement on how to move forward. Most discussions between states occur at the CCW in Geneva but they have been unable to advance substantive results. The impediment to progress is caused by the CCW's reliance on a consensus-based approach to decision making, thus enabling a few, or even a single state, to veto the majority vote (Human Rights Watch, 2023). This structural element of the international forum has been repeatedly exploited by major military powers, mainly Russia and the United States, to stop any form of a legally binding instrument from coming to fruition (Human Rights Watch, 2023). The CCW has seen a variety of proposals including political declarations, codes of conduct, and calls for greater transparency, however none of these provide adequate solutions to the threat that LAWS may pose (Human Rights Watch, 2020). The most tangible work that has been accomplished is the formulation of a set of guiding principles agreed to by states in 2018-2019 (Human Rights Watch, 2020). However, these principles only offer guidance for deliberations and are not themselves a sufficient response to the concerns raised by increased autonomy in military weaponry (Human Rights Watch, 2020).

Beyond reaching an international consensus, the primary challenge in developing policy lies within the fact that these weapons do not yet widely exist. There are States and private enterprises becoming involved in the production of LAWS, but the weapons are not going to

abruptly appear one day. There will be a multitude of tactical challenges to work out between humans and machines, as well as maneuvering through legal challenges, all of which will take significant time and practice (Carvin, 2017). In essence, it is difficult to craft policy pre-emptively considering that the varying levels of autonomy in military weaponry are still evolving and unknown. Despite these issues, there are still preliminary recommendations being explored on both ends of the debate, which will be explored in this chapter.

Exploring Prohibition of LAWS

As technology continues to become more elaborate, the fear of evolving capabilities within military weaponry are coming to the forefront of international discussions. Proponents of prohibition maintain the opinion that if there are questions regarding the legalities of LAWS, in addition to moral and ethical concerns, they should be unequivocally banned (Carvin, 2017). This is similar to the grounds in which chemical, biological, and other conventional weapons, such as landmines or cluster munitions were banned in the past (Carvin, 2017).

The policy option for prohibition would be an international legally binding ban on the development, deployment, and/or use of fully autonomous weapon systems adopted under the CCW (Klare, 2019). All CCW meetings in recent years have placed emphasis on the importance of retaining human control over military weapons and use of force (Human Rights Watch, 2020). This is reiterated by one of the CCW GGE agreed upon principles pertaining to LAWS which states that, “human responsibility for decisions of the use of weapons systems must be retained since accountability cannot be transferred to machines” (“United Nations Office,” 2019, p.13). Those supporting prohibition often claim that a complete ban is the only way to prevent and

avoid IHL violations as well as escalation of international conflicts (Klare, 2019). Since 2018, the United Nations Secretary-General, António Guterres, has played a large role in advancing the prohibition of LAWS. He has been vocal in claiming that LAWS are "politically unacceptable" and "morally repugnant," calling for prohibition under international law ("Lethal Autonomous Weapon Systems," n.d.). This was reiterated in his 2023 New Agenda for Peace in which he proposed that by 2026 states should have "a legally binding instrument to prohibit LAWS that function without human control or oversight, and which cannot be used in compliance with IHL, and to regulate all other types of AWS" ("Lethal Autonomous Weapon Systems," n.d.). Guterres elaborated by stating that without definitive multilateral regulations, the design, development, and use of LAWS would provoke humanitarian, legal, ethical, and security concerns, as well as directly endanger human rights and fundamental freedoms ("Lethal Autonomous Weapon Systems," n.d.).

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Furthermore, supporters of prohibition have consistently pointed towards the Martens Clause of the 1899 Hague Convention, also documented in the Additional Protocol I of the Geneva Conventions. Under IHL, this provision "establishes a baseline of protection for civilians and combatants when no specific treaty law on a topic exists" (Human Rights Watch, 2018, para. 1). Under the Martens Clause, the two critical elements that impact decision making are the principles of humanity and the dictates of public conscience (Human Rights Watch, 2018, para. 1). It has been articulated that, since LAWS would not employ meaningful human control, it would infringe upon the Martens clause. This clause is frequently referenced in IHL and disarmament treaties, however, there are discrepancies on the exact legal significance of it. It is subject to interpretation in a variety of ways including as a reiteration of customary law, a

separate source of law itself, or as an analytical tool (Human Rights Watch, 2018, para. 1). Regardless of these contradictions, the Martens Clause is effective in establishing a "moral standard" for states to base their decisions from. However, in the case of LAWS, the subjective interpretability may impact the Clause's ability to be applied.

While majority of states have supported a pre-emptive ban[1], there are challenges with doing so. As previously mentioned, it is difficult to create a detailed policy on systems that do not yet widely exist. Although not an impossible task, unknown variables make developing specific guidelines a tedious challenge. Furthermore, it is important to consider that this advancement of technology has moved beyond government resources/industries and into the private sector. It is possible to halt governments from developing LAWS, however it may be challenging to convince private entities to do the same. For example, in the United States, the most advanced AI and robotics initiatives are being conducted in the private sector (Carvin, 2017). Although private entities may not actively be developing this technology for military use, it is entirely possible for them to do so (Carvin, 2017). This may allow for private entities to lead, or at least influence, the direction in which governments decide to take in regulating or banning this emerging technology. Another potential problem incited by a ban would be unexpected side effects that could be worse than imposing strict regulations on LAWS. Advocating strongly for human control could shift the development of military technology in a disconcerting way (Carvin, 2017). For example, neuroweapons which "link the minds of pilots to the machines they are controlling" create the same legal issues regarding accountability,

[1] Refer to p.16 for Table 2: *Positions of States on Pre-emptive LAWS Ban*

however, they could *technically* meet the demands of those calling for prohibition on the grounds of IHL compliance (Carvin, 2017).

Beyond these issues, arguably one of the most significant challenges is obtaining consensus among states. While both superpower and smaller nations hold an equal representation in CCW decisions, the traditional role and influence of larger nations within international security regimes cannot go unnoticed (Antebi, 2019). Historically, in order for a long-lasting international security agreement to be successfully implemented, the support of most, or all, superpower states is imperative (Antebi, 2019). It can be safely assumed that powerhouse nations are not likely to agree to a clause where their ability to harness more global power is limited. The United States specifically has still not ratified multiple integral treaties that govern hostilities internationally, such as the Additional Protocols to the Geneva Conventions, the Convention on Cluster Munitions, and the Mine Ban Treaty (Reeves et al., 2020). The reason for not ratifying these treaties is due to opposition from certain restrictions which the United States perceived as limiting their military capabilities (Reeves et al., 2020). This resistance is also indicative of the differences amongst powerhouse nations in their "approaches to law of armed conflict-related requirements" (Reeves et al., 2020, p.110). Consequently, the balance of power is sustained through states constantly battling to achieve hegemony, which is often obtained through military might. With the mass spreading of AI and other advanced technologies, it is unlikely that nations are going to willfully give up opportunities to advance themselves in the global playing field.

Exploring Regulation of LAWS

Compared to potential prohibition policy on LAWS, regulation of these military machines is much more complex. Many individuals from a variety of fields (i.e. military,

academic, technological, etc.) agree that the development of LAWS is inevitable, and so, regulation is required. An additional component to consider when formulating legal guidelines for these machines is the fact that private companies could design and develop them independently. This signals the need for regulation that extends beyond states and government, into the private sector as well.

Implementing a global ban does not necessarily guarantee that both states and private actors will entirely cease exploring LAWS, especially as technology continues to advance. Proponents of regulation call for strict guidelines and laws that designers, developers, and users will have to follow as opposed to a ban. Additionally, discussions have included relying on existing frameworks for similar weapons (i.e. nuclear, biological, chemical) to inform regulation of LAWS. There are a multitude of approaches that have been put forward with varying degrees of responsibility and restrictions imposed on states, which this section will explore.

Legally Non-Binding Standards

Legally non-binding standards have been arguably the most supported approach by stronger nations including the likes of Australia, Canada, the United Kingdom, and the United States. Under legally non-binding standards, weapons reviews would be the primary approach used in determining the legality of state designed LAWS prior to using them in armed conflict. The United States has been a leader in this approach, having formulated one of the most detailed and thorough weapons reviews processes, which has been endorsed by the UN GGE as a best practice model (Hoffberger-Pippan & Vohs, 2023). Furthermore, the United States was also the first state to release a defence specific AI strategy in 2019. This led to the Department of

Defence adopting five AI principles, in which its application must be: responsible, equitable, traceable, reliable, and governable (Christie et al., 2023). This applies to AI-enabled autonomous weapons, thus providing standards to be met that ensure compliance with IHL, international treaties, and rules of engagement (Christie et al., 2023). This initiative inspired NATO's first AI strategy to be released in 2021, which also encouraged the use of AI in a responsible way. The strategy outlines "Principles of Responsible Use" which apply to all applications of AI that are expected to be deployed. These principles reinforce the Allied Defence Minsters' core tasks including collective defence, crisis management, and cooperative security (Soare, 2021).

Existing international legally non-binding commitments do actively take into consideration IHL compliance and the importance of enforcing human accountability in the realm of LAWS and other military weaponry with AI applications. Despite this, they do have the potential to expand into more concrete legal guidelines. For example, both strategies released by the United States and NATO are expected to evolve into more comprehensive national manuals, processes and standards which will inform international LAWS regulations (Christie et al., 2023). This has already been demonstrated in NATO's Autonomy Implementation Plan and the establishment of the NATO Data and Artificial Intelligence Review Board. These will both prioritize the operationalization of the Principles of Responsible Use in relation to AI applications in weapons such as LAWS (Christie et al., 2023).

It can be safely assumed that states will continue to gradually develop various forms of guiding principles and strategies to inform their legal obligations when developing LAWS. While this is a strong start, soft law and non-binding standards are not nearly sufficient enough

to control the potential threats that the creation and use of LAWS pose. They do act as strong markers for states to reference, but ultimately do not guarantee that developers and users of LAWS will act in good faith and comply with IHL.

Legally Binding Treaty

A legally binding treaty enacted by the UN GGE is another potential option, which has been widely supported by states in the Global South, as well as some European countries. This approach would most likely see the creation of a document in which states are obligated to formulate new or adapt existing laws that would provide rigid and detailed rules for all matters relating to LAWS (Hoffberger-Pippan & Vohs, 2023). This regulation could include a specific clause that the development, deployment, acquisition, and proliferation of such systems cannot be operated without adequate human control or input on decision making (Hoffberger-Pippan & Vohs, 2023). When considering that private enterprises could be involved in the design and development process of LAWS, the legal changes would have to extend beyond state obligations. To guarantee that these legally binding rules are being obeyed, national laws would need to be revised or implemented to administer penal sanctions or options for civil litigation in the event that private companies do not comply (Hoffberger-Pippan & Vohs, 2023).

The challenge with this approach, which has already been mentioned, is the fact that stronger nations, such as the United States and Russia, are highly unlikely to agree to such restrictions. Scholar Hans J. Morgenthau has described “military readiness” as a crucial component that influences state power (Antebi, 2019). Under the umbrella of military readiness, a state’s manufacturing capabilities in relation to military strength are of utmost importance

(Antebi, 2019). Morgenthau claims that [military] “readiness is highly dependent on technological innovation, leadership and the quality of the armed forces” (Antebi, 2019, p. 87). Considering this viewpoint, a legally binding treaty will significantly impact the ability of a state to maintain sufficient military readiness. Thus, it would be feckless to rely on the hope that eventually all states will reach a consensus on restrictive regulations.

The Technological Solution

A less legitimate, but still frequently mentioned argument by supporters of regulation, is simply the fact that humans are and always will be in control. This technological solution, presented primarily by the United States, claims that LAWS should solely carry out the intent of their operators and commanders (United States, 2021). This approach essentially maintains the status quo and emphasizes the narrative that military weaponry is a neutral tool that is controlled by human operators, and nothing more (Schwarz, 2021). It highlights that a new legal model for meaningful human control is unnecessary, based on the justification that humans are always in control and will always make the final decision (Ferl, 2023). Through designating human operators as the ultimate decision makers in all scenarios where LAWS are involved, there is virtually no need for a ban or exploring the technicalities of implementing meaningful human control laws (Ferl, 2023).

This approach could be further expanded by being as transparent as possible when it comes to varying scenarios and degrees of LAWS. Some states have put forward suggestions to implement risk-mitigation measures as well as a tiered and categorized regulation system (Spazian, 2021). This would see states individually decide their own specific measures and

application based on their own national position and objectives (Spazian, 2021). While these measures would be tailored to each state, all parties would still actively participate in exchanges of information as well as international cooperative risk mitigation operations (Spazian, 2021). This would formulate a network in which states could rely on one another for assistance, guidance, or inspiration on how to move forward with the regulation of LAWS. This open line of communication would take into account various contexts including modern battlefields and complex environments, amongst other factors (Spazian, 2021).

The primary challenge with maintaining the status quo and letting states self-regulate how they design, develop, and use LAWS is the lack of uniformity which could lead to instability. As mentioned, the CCW consensus-based approach has proven impractical, because it is nearly impossible to form an agreement which all member states will agree to. The United States as a leader in military technology is not currently willing to give up the opportunity for further advancement and so, will never agree to any sort of treaties or regulations where their capabilities are hindered. Additionally, this is not a sustainable way forward considering all nations will have different perspectives on matters relating to LAWS (i.e. how they are defined). Since LAWS are a major technological military development that will alter the future of how warfare is conducted by states, there needs to be consistency in terms of laws, regulations, and guidelines to ensure all nations are held to the same standards. This will prevent unruly development and potential power imbalances as states attempt to continuously outpace one another in the realm of military technology.

Next Steps

As of now, deliberations are still ongoing within international forums on how to best deal with LAWS. In 2023, the CCW agreed to convene for up to 20 days in 2024 and 2025 to "consider and formulate, by consensus, a set of elements of an instrument, without prejudging its nature," in relation to LAWS and other emerging technologies (Human Rights Watch, 2023). The agreement to meet and discuss this is not involving the negotiation and ratification of a new CCW protocol, but will provide more guidance on specific elements of LAWS and how they could be defined moving forward.

Many scholars and government officials have offered suggestions on what next steps should be in the field of governing LAWS internationally. Researchers Vincent Boulanin and Maaike Verbruggen of the Stockholm International Peace Research Institute have published a multitude of reports mapping the debate of autonomy in weapon systems over the last few years. They have adequately tracked the global changes and have provided recommendations for future CCW discussions which accurately encapsulate some of the most pressing issues:

1) "Discuss the development of 'autonomy in weapon systems' rather than autonomous weapons or LAWS as a general category" (Boulanin & Verbruggen, 2017, p.118)
    a. This recommendation points out that primarily focusing on autonomy as a general attribute in a weapon system is contentious. A reframing of autonomy in a more functional way by focusing on "autonomy in weapons" instead of LAWS alone may provide a better consensual and constructive discussion at the CCW (Boulanin & Verbruggen, 2017).

2) “Shift the focus away from ‘full’ autonomy and explore instead how autonomy transforms human control” (Boulanin & Verbruggen, 2017, p.119).
    a. Since the LAWS debate has focused primarily on “full autonomy,” the debate has overlooked the way states envision the future of these systems and ignores short-term challenges. As the discourse stands presently, autonomy will not fully remove humans from the equation, but will reshape interactions. Discussions should shift to answering questions related to human control (i.e. How is the progress of autonomy changing the nature, location and timing of human decision making and action in warfare?) (Boulanin & Verbruggen, 2017, p.119).
3) “Open the scope of investigation beyond the issue of targeting to take into consideration the use of autonomy for collaborative operations and intelligence processing” (Boulanin & Verbruggen, 2017, p.119).
    a. Within the CCW debates, other elements of LAWS should be scrutinized. Non-critical autonomous functions have the capability to increase offensive capabilities and highlight concerns over human safety and control. Acknowledging other elements of autonomy progress will benefit future advancements as opposed to focusing on a singular feature (Boulanin & Verbruggen, 2017).
4) “Demystify the current advances and possible implications of machine learning on the control of autonomy” (Boulanin & Verbruggen, 2017, p.119).
    a. Future discussions should surround the role of machine learning advancing autonomy within LAWS. It is important to recognize the potential limitations (i.e. online vs. offline learning) of the algorithms that guide LAWS to better

understand the overall function of autonomy in a military weapon system (Boulanin & Verbruggen, 2017).

5) "Use case studies to reconnect the discussion on legality, ethics and meaningful human control with the reality of weapon systems development and weapon use" (Boulanin & Verbruggen, 2017, p.120).
    a. Relying on case study example scenarios (i.e. loitering weapons or UAS swarms) could assist in clarifying human control parameters in addition to understanding autonomy challenges that may inhibit LAWS, further enhancing CCW discussions (Boulanin & Verbruggen, 2017).
6) "Facilitate an exchange of experience with the civilian sector, especially the aerospace, automotive and civilian robotics industries" (Boulanin & Verbruggen, 2017, p.120).
    a. Enhancing communication with the civilian sector could provide new perspectives to the debate and offer recommendations to certain questions (i.e. How to define and measure autonomy? How to operationalize meaningful human control? How to test the safety and predictability of autonomous technologies?) (Boulanin & Verbruggen, 2017)/
7) "Investigate the options for preventing the risk of weaponization of civilian technologies by non-state actors" (Boulanin & Verbruggen, 2017, p.121)/
    a. Any future regulation on LAWS should prioritize protecting civilian innovation in this field. As a result of technological advancements, access to this weaponry is easily obtainable by non-state actors. CCW discussions on controlling malicious use, such as export controls or technical safeguards, would greatly benefit the regulation of LAWS (Boulanin & Verbruggen, 2017).

This list of recommendation for topics to be discussed at future CCW meetings is not exhaustive, but does offer a general understanding of the issues that states will face in the future. It highlights the immense amount of detail and consideration that must go into regulating these systems, as they impact a wide variety of individuals and sectors.

Conclusion

There is no doubt that the increased design, development, and use of LAWS will become more complex as they proliferate around the globe. This research paper has examined both sides of the debate, highlighting both the benefits and challenges with imposing either prohibition or regulations on such military weapons. Despite these challenges, scholars are confident that predicting the technological feasibility and capabilities of LAWS will become more possible within the next two decades and will evolve into a permanent feature of military tech (Antebi, 2019). It is more likely that regulation will occur, taking into consideration the major operational, economic, and humanitarian benefits that LAWS offer. Despite this, the fears of what the introduction of LAWS could do are equally as important.

The justifications for demanding prohibition are entirely valid, however, regulation with strict guidelines that comply with all necessary laws and guidelines is *more* obtainable, whereas a ban is more idealistic. Even if a ban were to be put in place, there is no way to guarantee that private actors and even states will not continue to produce LAWS covertly. If there are international regulations, it will increase global transparency and enforce biding by the rules for fear of punishment should one state detract from the mandated guidelines. It is imperative that states acknowledge the current infrastructure is not capable of governing LAWS as it stands.

LAWS, in addition to other emerging technologies, will continue to proliferate at an unprecedented speed. The winner of the great LAWS debate will shape the future, and with it the way that we conduct warfare, prepare our militaries, and conceptualize autonomy. Therefore, it is crucial that international forums act now to avoid future conflicts and global instability.

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