

# INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES

[ISSN 2581-5369]

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Volume 6 | Issue 5

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2023

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# Autonomous Weapon Systems in International Humanitarian Law

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MOHIT MITTAL<sup>1</sup>

## ABSTRACT

*This article presents the main mechanisms and principles for the use of autonomous weapon systems in future combat operations. There is a decline in adequate human forces and a lack of civil society support from the push to introduce mixed robotic/human units. The main limitations of using them are keeping them under control and investing enough to keep them strong enough. This only mentions some of the characteristics, divided into tactical, operational, and strategic levels, that will be affected by the introduction of autonomous weapons systems in our armed forces or allies.*

*Furthermore, these weapon systems cause more complex operations, and the remaining soldiers and their commanders will have to acquire technical skills and know the differences to emerge victorious in battles. Future wars will demand not human resources, but any suitable material to create new robotic weapons units. This will create new training exercises, doctrines, and even new sources of strategic value.*

**Keywords:** *Autonomous Weapons System, Operating Conditions, Limitations.*

## I. INTRODUCTION

Since time immemorial, new and advanced technologies have played an integral role in promoting war. One can easily remember the appearance of a car, a crossbow, gunpowder, an airplane, or a nuclear bomb. History has shown us how quickly new weapons technologies spread. Advanced technology meets the needs of a specific period, giving an advantage on the battlefield to the side that is deployed. The armed conflicts of the 21st century can be characterized by two aspects. The first aspect of contemporary armed conflict is the changing layout of the battlefield. Targets are more mobile and more difficult to identify, especially among civilians in urban areas, requiring new solutions for hostile states. At the same time, the population of states involved in armed conflict is less tolerant of military losses.

But there is also a legal and political desire to protect civilians and property as the pace of armed conflict increases.<sup>2</sup>

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<sup>1</sup> Author is a student at UPES, India.

<sup>2</sup> Examples are missile and rocket defence weapons; vehicle “active protection” weapons; certain missiles, loitering munitions and torpedoes; and some “sentry” weapons. See ICRC, *Autonomous Weapon Systems: Implications of*

The second aspect is technological development and the evolution of artificial intelligence. Autonomy is gradually increasing with the improvement of sensors and computer programming. Thus, civil robotics is evolving from autonomous vacuum cleaners and underwater robots that map the sea floor, to unmanned vehicles and quick trading programs in financial markets. technological advantage as well. This thesis aims to explore the issues that arise with the possible deployment of autonomous weapons systems (AWS) about targeting requirements under international humanitarian law (IHL). The work does not intend to exhaustively test this military technology. The AWS discussion covers several different legal, ethical, and political issues that are beyond the scope of this dissertation. The work begins with an introductory part, where the reader is given an idea of the development of this technology. Terminology commonly used when discussing this technology is explained as it is regularly used in the following legal studies. The introduction also includes examples of military technology to connect the science fiction discussion with reality and the expected development of this technology. Relevant examples of military devices are also used in the following legal studies to provide insight into battlefield practice and to illustrate the possible compliance of these devices with a particular rule of IHL when applied in practice. The next chapter then discusses the legal rules associated with this process. orientation and interaction on the battlefield with a special focus on AWS and its compliance with these rules. This chapter focuses on the basic principles of IHL, namely distinction, proportionality, military necessity, and the requirement to take possible precautions. The chapter discusses hypotheses, proposals, and suggestions for programming AWS for legal compliance. The thesis concludes with final comments on the legality of AMS and specific legal issues that remain problematic for AMS and its compliance with IHL. Also, prospects for this technology are included in the conclusion.<sup>3</sup>

## **II. EVOLUTION OF AUTONOMY IN MILITARY WEAPON SYSTEMS**

The world has witnessed the rise of remotely controlled drones, and it is expected that completely independent machines will be deployed on battlefields using lethal force in the future. As Dinstein points out, AWS "We are currently at the forefront of armaments." The development can be seen in unmanned weapon systems, which are of great importance in the armed forces of various states. It is estimated that more than 70 states currently have drones. and more than 40 states have already implemented military robotics programs. Robotic systems

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Increasing Autonomy in the Critical Functions of Weapons, footnote 1, pp. 10-14

<sup>3</sup> The "principles of humanity and the dictates of public conscience" are mentioned notably in article 1(2) of Additional Protocol I and in the preamble of Additional Protocol II to the Geneva Conventions, referred to as the Martens Clause.

are used for intelligence gathering, surveillance, and reconnaissance, as well as operations to detect, designate, and defeat targets. Several states directly support and fund activities related to AWS research and development. Two states have published their national AWS policies, while other states have not yet developed these policies or discussed them publicly. As per UK policy, AWS will not be allowed and weapon systems will always be human-controlled.

The US policy is less restrictive and allows AWS to select and attack targets in a controlled manner, except for individuals in local defensive operations. Any further authorization, such as the development of controlled offensive AWSs and AWSs capable of targeting humans in a defensive mode, will require further review of US policy. The policy emphasizes that "autonomous and semi-autonomous weapon systems must be designed in such a way that commanders and operators can exercise an appropriate level of human judgment regarding the use of force." Some argue that this policy is outdated and will have no real impact for the current arms race. The current pace of weapons development is gradually shifting towards greater autonomy. This amounts to a radical change in the role of people who make war, who delegate their functions to robots. People are moving further and further away from the battlefield.

A human operator can already control multiple UAVs, greatly increasing the effectiveness of military operations. Commentary of the International Committee of the Red Cross (ICRC) on the Additional Protocols (AP) of 1977, published in the late 1980s.

He already points out that "the use of long-range weapons, remote-controlled weapons or weapons connected to sensors located in the field, leads to the automation of the battlefield, in which the soldier plays an increasingly less important role. Thus, with the ever-increasing pace of operations and the increasing ability of machines to make decisions, the role of people in the military will gradually diminish as people withdraw from the process. On the contrary, modern technologies, commonly used in modern conflicts, can be classified as devices with a goal, and only after that, the car continues to move. For example, the MQ-I Predator unmanned aerial vehicle is remotely controlled by a human operator who, based on incoming data, can decide to remotely attack a target previously selected by the human operator. Known as fire and forget or fire and follow, this mode follows the pilot's target selection.

For example, this category includes AGM-130 and AGM-65 missiles used to destroy ground targets. Devices with "man on the loop" work in semi-autonomous mode. The machine selects and hits the target with the possible intervention of a human operator. The machine can also autonomously hit a target previously selected by a human operator. Known as fire and forget or

fire and follow, this mode follows the pilot's target selection. For example, the AGM-130 and AGM-65 missiles used to

Attacking ground targets falls into this category. With "man-out-of-the-loop" devices and their complete autonomy, permanent human control is eliminated. Therefore, the degree of autonomy of the robots is related to the independence of the machine and the level of human control over the operation of the machine. The most important is the autonomous element in the selection and selection of targets with deadly force. The ICRC also focused the discussion on critical functions, namely detecting, tracking, selecting, and attacking targets.

There seems to be controversy as to whether this obligation is also part of customary law. However, in contrast to the obligation to review methods of warfare, there seems to be a general rule that obliges all states to carry out legal reviews of means of warfare, that is, new weapons, including autonomous systems. Rather, deploying a swarm of autistic robots However, AWS poses challenges for IHL, and one of the challenges is compliance with IHL's targeting rules.<sup>4</sup>

### **III. THE PROBLEM WITH AUTONOMY IN WEAPON SYSTEMS**

In the civilian arena, the use of highly automated robotic systems is already quite common, as seen in the manufacturing sector. However, what is generally accepted in the civilian community can be a serious problem when applied to combat weapon systems. A fully automated or "autonomous" production robot that does not make life-or-death decisions over humans is unlikely to pose the same legal issues, if any, as a military weapons system.

Any use of military force in armed conflict is often governed by international humanitarian law (IHL), which in turn derives from and reflects the ethical means and customs of warfare. However, IHL has undergone changes and modifications over time, taking into account both the development of human ethics and the development of weapons. For example, IHL has been amended to condemn the use of certain weapons and methods of warfare.

The proliferation of unmanned systems, and especially the increasing automation in this area, has already generated much discussion about their use. The deployment of autonomous systems may imply a paradigm shift and a serious qualitative change in the conduct of hostilities. It can also give rise to several fundamental legal and ethical issues that need to be considered before

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<sup>4</sup> See, for example, ICRC (2015) Statement to the Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 13-17 April 2015, Geneva, <https://www.icrc.org/en/document/lethal-autonomous-weapons-systemsLAWS>; Future of Life Institute, Autonomous Weapons: An Open Letter from AI & Robotics Researchers. International Joint Conference on Artificial Intelligence, 28 July 2015, <https://futureoflife.org/open-letterautonomous-weapons>; and Future of Life Institute (2017), An Open Letter to the United Nations Convention on Certain Conventional Weapons, 21 August 2017, <https://futureoflife.org/autonomous-weaponsopen-letter-2017>

developing or implementing such systems.

#### **IV. AUTONOMOUS WEAPON SYSTEMS IN INTERNATIONAL HUMANITARIAN LAW**

International Humanitarian Law, as yet, provides no dedicated principles concerning autonomous weapons. Because of this, some argue that autonomous weapons are to be considered illegal and should be banned for military applications. However, it is a general principle of law that prohibitions have to be clearly stated or otherwise do not apply. Conclusively, the aforementioned argument for banning these particular weapons is inappropriate. Nevertheless, IHL states that if a specific issue is not covered by a dedicated arrangement, then general principles of established customs, such as the principle of humanity and public conscience, apply.<sup>5</sup>

Consequently, there is no loophole in international law regarding the use of autonomous weapons. New technologies have to be judged against established principles before labeling them illegal in principle. Therefore, an autonomous weapon system that meets the requirements of the principles of IHL may be perfectly legal.

#### **V. THE PRINCIPLES OF INTERNATIONAL HUMANITARIAN LAW**

During armed conflicts, the IHL principles of distinction, proportionality, and precaution apply. It also implies the obligation of states to test their weapons to confirm that they comply with these principles. In general, this does not impose a ban on any particular weapon. It accepts any weapon, means, or method of warfare, as long as it does not violate international law, and holds States responsible for determining whether its use is prohibited. Thus, autonomous systems cannot be described as illegal as such. Like any other weapon, means, or method of warfare, it must be reviewed by the norms and principles enshrined in international law.

Forbidden weapon. First of all, any weapon must meet the requirements of the Geneva Conventions, which state: “The use of weapons, projectiles, materials and methods of warfare capable of causing superfluous injury or unnecessary suffering...[and]. has intended to cause, or can be expected to cause, widespread, long-term and serious damage to the environment”. Some examples of internationally agreed weapons bans include high-explosive projectiles, whose fragments cannot be detected by X-rays, and incendiary weapons. use in populated areas. Autonomous weapons that respect these prohibitions would fit well with this article.

The difference principle. The protection of civilians from the effects of war is one of the

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<sup>5</sup> ICRC (2006), A Guide to the Legal Review of New Weapons, Means and Methods of Warfare: Measures to Implement Article 36 of Additional Protocol I of 1977, Geneva, January 2006, [www.icrc.org/eng/assets/files/other/icrc\\_002\\_0902.pdf](http://www.icrc.org/eng/assets/files/other/icrc_002_0902.pdf).

fundamental principles of IHL and has been an agreed state practice dating back centuries. In 1977, this principle was formally codified as follows Parties to a conflict must at all times distinguish between civilians and combatants, and between civilian and military objectives, and accordingly must direct their operations only against civilian targets. military”. However, the application of this principle became increasingly difficult as methods of warfare developed. Today's conflicts are no longer between two opposing armies on a specific battlefield. Participants in modern armed conflicts may not wear uniforms or any distinctive markings, making them almost indistinguishable from the civilian population. Therefore, the distinction between civilians and combatants can no longer be made solely by visual means. The most important distinguishing factor was also the behavior and actions of a person on the battlefield. Therefore, autonomous weapons must be able to recognize and analyze human behavior and determine if it is participating in hostilities. However, it is not always so clear whether a person is directly involved in the hostilities or not. Autonomous weapons will need to undergo extensive testing and prove that they can reliably distinguish combatants from civilians. However, even humans are not infallible, and it is necessary to further assess how tolerable the probability of error, if any.

The principle of proportionality. The use of military force must always be proportional to the expected military advantage. This principle evolved along with the technological capabilities of the time. For example, carpet bombing of cities populated by civilians was common military practice during World War II but would be considered completely disproportionate today. Modern guided munitions are capable of hitting targets with so-called "surgical" precision, and advanced strike preparation software can calculate the blast radius and weapon fragments, as well as expected collateral damage. Especially about the latter, it can be argued that autonomous weapons have the potential to use military force more proportionately than humans. This is because they can instantly calculate very complex weapon effects and thus reduce the chance, type, and severity of collateral damage. However, compliance with the principle of proportionality depends entirely on the reliable identification and discrimination of each person and object in the respective target area. And this ultimately refers to the application of the principle of distinction.

The precautionary principle. The obligation of States to take all feasible precautions to avoid and, in any event, minimize incidental loss of civilian life, injury to civilians, and damage to civilian objects, inherently requires respect for the principles of distinction and aforementioned proportionality. Also, at the initial stage of development of the weapon itself, the precautionary principle must be observed. Any type of weapon must demonstrate reliability to remain within

an acceptable failure rate, as no modern technology is error-free. For example, the United States Congress has defined an acceptable failure rate for its cluster munitions as less than one percent. Recent general aviation accident rates in the United States are only a fraction of that, and even nuclear power plants cannot guarantee 100 percent reliability. It is doubtful that any future technology will reach error level zero, which is also true for any autonomous weapon. This again begs the question "How likely is the error to be acceptable?" and "How good is good enough?" Therefore, weapons design and experimentation should provide sufficient evidence to reasonably predict the behavior of autonomous weapons and their consequences on the battlefield.<sup>6</sup>

## **VI. UNLAWFUL USE OF LAWFUL WEAPON SYSTEMS**

As should be obvious, the likelihood of an autonomous weapons system being illegal on its own is very low. This raises the question of whether international humanitarian law provides sufficient guarantees about the use of these weapons systems. It would be illegal to use an autonomous weapons system to directly attack civilians or objects of a civilian nature. In this regard, we note that the same problems that arise with other weapon systems also arise in the case of autonomous weapon systems.

For example, the exception to the prohibition on targeting civilians that exists for those directly involved in hostilities extends to the use of autonomous weapons systems against them. Similarly, the generally accepted definition of military objectives contained in Article 52 of Additional Protocol I applies equally to attacks against objects using autonomous weapon systems, as does the controversy over whether objects of war qualify as military objectives. This prohibition differs from the prohibition on indiscriminate weapons in that, in this case, the weapon can be aimed at a legitimate target, but the attacker cannot. Developing an algorithm that can accurately measure doubt and reliably account for the unique situation in which an autonomous weapons system operates will prove to be a very difficult task.

Because such definitions are highly context-dependent, it will be more problematic to determine the threshold of doubt at which an autonomous weapons system will be programmed to refrain from attacking. An autonomous weapons system that cannot distinguish between legal and illegal targets cannot be used when they are combined. Targeting by autonomous weapon systems does not relieve a person of responsibility for attacks carried out in violation of the proportionality rule. More importantly, a human operator launching an autonomous weapons

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<sup>6</sup> Oxford English Dictionary, third edition, Oxford University Press, 2010, <https://en.oxforddictionaries.com/definition/predictability>



system in a situation where subsequent attacks could cause excessive collateral damage is breaking the rule.<sup>7</sup>

One topic that has received a lot of attention in discussions of autonomous weapon systems is their ability to perform proportionality calculations. Remember that autonomous weapon systems used in the area where civilians and civilian objects are present must have some means of distinguishing them from legitimate targets. If an autonomous weapons system detects a person or object but cannot satisfactorily identify it as a legitimate target, the system must treat that person or object as a civilian. “Collateral Damage Assessment Methodology” is a procedure by which attacking forces take into account factors such as weapon accuracy, blast effect, attack tactics, the likelihood of civilians being present in nearby structures to the target, and the composition of the structures to estimate the number of civilian casualties that can be called during an attack.

There is no doubt that autonomous weapon systems can be programmed to perform an analysis similar to CDEM to determine the probability of harm to civilians in the target area. Furthermore, these weapon systems are generally no less likely to produce a reliable result than CDEM, since the latter relies heavily on scientific algorithms. A more difficult task for an autonomous weapons system will be to assess military advantage. Despite the differing views of the author and Human Rights Watch on military necessity, it is clear that even military necessity in this organization's understanding does not make autonomous weapon systems illegal.

Putting these observations together, it appears that military necessity has no independent meaning in assessing the legitimacy of autonomous weapons systems or their use. Each of these obligations fully applies to the use of autonomous weapon systems. Indeed, an autonomous weapons system could not be used in isolation if additional external means of target identification would significantly improve identification and their use would be advisable under military conditions. For example, such a situation could arise if an unmanned aircraft system could be used to reduce the location of enemy forces before an autonomous weapons system is launched into the area.<sup>8</sup>

The requirement to select among military targets to minimize civilian casualties and damage to civilian objects also applies to autonomous weapons systems. For example, an autonomous weapons system could not be used to attack electrical substations if attacking power lines were

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<sup>7</sup> ICRC, *Autonomous Weapon Systems*, p. 13

<sup>8</sup> United Nations, *Recommendations to the 2016 Review Conference submitted by the Chairperson of the Informal Meeting of Experts*, para. 2 (b); italics added

militarily feasible, would achieve the same military objective, and would expose civilians and civilian objects to less risk. However, the demand to choose means of warfare that can cause the least harm to civilians and civilian objects without sacrificing military advantage is at the heart of the autonomous weapons systems controversy. It is the often-overlooked lynchpin of various other weapons controversies, such as the use of unmanned aerial combat systems.

In other words, the only situation in which an autonomous weapons system can be used legally is when its use will achieve military objectives that cannot be achieved with other available systems that cause less collateral damage. Consider the implications of a complete ban on autonomous weapons systems. What critics miss is that an autonomous weapons system can hit a military target with less collateral damage than a human-controlled system. For example, an autonomous weapons system may be armed with non-lethal weapons that are not available in manned systems, its sensor suite may be more precise or selective than manned systems, or its decision-making capabilities may be better than a human being. in a specific environment.

If the use of the human-controlled system in question complies with the proportionality rule, an attacker can use it in the absence of an autonomous weapons system. Therefore, a ban on autonomous weapon systems would effectively expose the civilian population and civilian property to a greater risk of incidental harm than if an attacker had an autonomous weapon system. Some states are beginning to establish guidelines on autonomous weapons systems designed to promote compliance with international humanitarian law in addition to other objectives such as false collision avoidance. Semi-autonomous weapon systems that are on board or integrated with unmanned platforms must be designed in such a way that, in the event of deterioration or loss of communication, the system cannot autonomously select and engage individual targets or specific groups of targets that have not been previously selected by an authorized human operator.

Autonomous weapon systems can be used to use non-lethal non-kinetic force, such as some form of electronic attack, against material targets according to. The policy recognizes that autonomous or semi-autonomous weapon systems may be intended to be used in ways outside the scope of this policy.<sup>9</sup>

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<sup>9</sup> ICRC, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons*, ICRC, Geneva, September 2016, pp. 10-14

## **VII. LEGAL REVIEW OF WEAPON SYSTEMS**

Since the prospect of autonomous weapon systems is so new, the need to validate their legitimacy is increasingly important. The rule codified in Article 36 of Additional Protocol I establishes that "in the study, development, acquisition or adoption of a new weapon, means or method of warfare, the High Contracting Party shall determine whether its application would not give rise to some or all of the circumstances prohibited by this Protocol or any other rule of international law applicable to the High Contracting Party." The means of warfare are the weapons and weapon systems, while the method of warfare refers to the tactics, methods, and procedures by which combat is fought. An autonomous weapons system is a means of warfare. The use of multiple autonomous weapon systems to carry out, for example, a siege by targeting all vehicles entering or leaving a populated area illustrates their use as a method of warfare.

There is no consensus on whether there is a similar requirement for a legal review of methods of warfare. States parties to Additional Protocol I are expressly obliged to perform due diligence on an autonomous weapons system and any TTR its user develops. Since there is no corresponding requirement under customary international humanitarian law, non-participating states such as the United States need only ensure that a weapon is legal before using it. However, the organization correctly emphasizes that early due diligence can determine the development phase of a weapons system and, as a result, avoid unnecessary effort and expense associated with components and capabilities that may not pass legal due diligence a policy of conducting two legal reviews, one before a decision to begin official development is made and one before an autonomous weapons system is deployed. Setting aside the individual instances in which the United States may or may not have complied with the due diligence requirement, this obligation is now unequivocally reaffirmed in a Department of Défense directive that states that "the acquisition and purchase of weapons by the Department of Défense of the United States and weapons of the system must comply with all applicable national laws, treaties, and international agreements. Human Rights Watch expressed particular concern about the possibility of modifying autonomous weapons systems. "These are complex systems that often combine many components that work differently in different combinations." The organization also highlighted "the fact that some robotic technologies, while not inherently harmful, may one day be weaponized." A correct reading of the rule of international humanitarian law is that any significant modification to the weapons system requires legal scrutiny.

Losing Humanity cites several legal prohibitions that must be taken into account during due diligence. However, the report is too comprehensive as several of the cited bans mainly relate

to the illegal use of legal weapons. Legal reviews generally do not address questions of use, as they are contextual, whereas the only context for determining whether a weapon is legal per se is its intended use in the abstract. For example, the proportionality rule is not taken into account when reviewing weapons, since its compliance depends on the situational risk to civilians and civilian objects and the expected military advantage in the surrounding circumstances.

Because the assessment is contextual, it is generally inappropriate to make ex-ante judgments about a weapon's compliance with the rule. The requirement that an attacker take feasible precautions in attack to minimize harm to civilians and civilian objects is also context-specific, and therefore any assessment of compliance with the standard can only occur concerning its use in particular circumstances., not as part of the legal review. It illustrates the principle that the rules of international humanitarian law relating to the legality of weapons systems apply fully to weapons that did not exist at the time a particular treaty rule was made or customary law crystallized. It is indisputable that all the standards discussed apply equally to autonomous weapon systems.

Finally, Human Rights Watch states that legal reviews "should evaluate a weapon under the Martens Clause," a proposal echoed by the International Committee of the Red Cross. Today, a rich web of treaty laws governs the legality of weapons systems. Some of these treaties directly relate to the development of autonomous weapons systems. Restrictions on incendiary weapons, air-delivered antipersonnel mines, and cluster munitions, for example, limit their use in autonomous weapons systems by states party to the respective treaties.

By the turn of the 21st century, the probability that future weapons systems, including those that might be autonomous, would not violate applicable treaties and common law, but would instead be illegal under the Martens Clause, had become exceptionally low. Losing Humanity is right to stress the importance of weapons reviews in the process of developing and deploying new weapons. However, it should be noted that such reviews examine only the legality of a weapons system as such, not its use in any particular circumstance. Therefore, it is doubtful that the revision requirement will impede the development of autonomous weapon systems as a class of weapons.

## **VIII. RESPONSIBILITIES**

The higher the degree of automation and the lower the level of human interaction, the more questions arise about who is responsible for the actions carried out by autonomous weapons. This issue is more relevant if lethal force causes harm to the civilian population, either accidentally or intentionally. Who will be responsible for the criminal act in case of violation

of IHL? Are you a warlord, a system operator, or even a software programmer? military commander. Military commanders must prevent and, if necessary, take disciplinary or judicial action if they know that their subordinates or others under their control are about to commit or have already committed violations of IHL. Of course, military commanders are also responsible for illegal orders given to their subordinates. This responsibility does not change when the use of autonomous weapons is allowed. If the commander had known in advance about the possibility of illegal actions of autonomous weapons and still used them deliberately, he would probably have been held accountable. Conversely, if weapon experimentation and testing have provided sufficient evidence that autonomous weapons can be relied upon to comply with IHL, the commander is likely not to be held liable.

**System operator** Depending on the level of human interaction, if required, the individual responsibility of the system operator may vary. However, some autonomous systems already in place, such as Phalanx or Sea Horse, can operate in a mode where the human operator only has a limited amount of time to prevent the system from automatically releasing a weapon if a potential threat is detected. The attribution of responsibility to the operator is doubtful if the time interval between the alarm and the firing of the weapon is not sufficient to manually verify whether the detected threat is real and whether hitting the calculated target would be legal under IHL.

**Programmer.** Software plays a key role in many modern automated systems. Therefore, the programmer may be predominantly responsible for the behavior and actions of autonomous weapons. However, modern software applications clearly show that the more complex the program, the greater the potential for software "bugs". Large software development companies are usually developed and modified by a large team of programmers, with each person having only a limited understanding of the software as a whole. Furthermore, it is doubtful that an individual programmer can predict in detail any potential interaction between his piece of source code and the rest of the software. Therefore, holding an individual responsible for software deficiencies is probably not possible unless intentionally erroneous programming can be proven.

## **IX. CONCLUSIONS**

International law does not explicitly deal with manual, automatic, or even autonomous weapons. Therefore, there is no legal difference between these weapons. Regardless of the presence or absence of direct human control, any weapon and its use in armed conflict must comply with the principles and rules of IHL. Therefore, autonomous weapons cannot simply be

declared illegal or illegal. They can be perfectly legal if they are capable of complying with the principles and norms of IHL.

International humanitarian law restrictions on the use of weapons will, however, restrict their use in certain circumstances. This is true for any weapon, from rock to rocket. Of course, the fact that autonomous weapons systems detect and attack people and objects without human intervention raises unique challenges. These calls are not grounds for a complete system ban. On the contrary, the limitations of international humanitarian law on the use of weapons in particular, the requirements that they be directed only against combatants and military objectives, not be used indiscriminately, their use does not cause excessive harm to civilians or civilian objects, and not be used when other available weapons can provide a similar military advantage by exposing civilians and civilian objects to less risk are reliable enough to protect humanitarian values when using autonomous weapon systems.

But can states ban these weapons for the foreseeable future? As noted in the Saint Petersburg Declaration of 1868, international humanitarian law establishes "technical limits under which the needs of war must yield to the demands of humanity." Almost every rule in it reflects the balance established by states between these two important factors - humanitarian considerations and military necessity. The humanitarian concerns that are included in the equation reflect the interest of states in ensuring that their combatants and civilians are protected to the maximum extent possible by international humanitarian law in times of armed conflict. Because states are selfish actors, these fears are tempered by their desire to retain the ability to fight effectively to achieve national interests. The result of this dialectical interaction is international humanitarian law, either in the form of treaty law, which was agreed upon by states based on their assessment of the balance, or in the form of customary law, deriving from the practice of states and opinion juris, reflecting the balance.

Given this norm-formulation process, Human Rights Watch's position is unlikely to find support. As shown in the new DoD directive on autonomous weapons systems, states are sensitive to the humanitarian consequences of these systems. However, autonomy in combat is in its infancy. Until their potential for unintended human consequences and their combat potential are better understood, it is unlikely that any state will seriously consider banning autonomous weapons systems. Indeed, there is little precedent in history for a weapon to be banned before it is adopted.

While it may seem counterintuitive, it would be irresponsible to ban autonomous weapons at this stage in their development. As already noted, such weapons can provide an opportunity to

attack the enemy with little risk to the attacker. Although this "value" has sometimes been criticized about unmanned combat aircraft systems such as the Predator, there is no reason in international humanitarian law to suggest that attacking forces should take the risk. On the contrary, it is often forgotten that international humanitarian law positively protects combatants. A paradigmatic example is the "cardinal" ban on weapons that cause unnecessary suffering. International humanitarian law dealt almost exclusively with the protection of combatants until the adoption of the Fourth Geneva Convention in 1949. The proposal is that a weapon system that reduces harm to combatants in situations in which its use does not increase the risk to the civilian population should be illegal.

An even more compelling argument is that banning autonomous weapons systems before their potential is realized could deprive commanders of the tool to minimize the risk to civilians and civilian objects in certain attack scenarios. Admittedly, the development of autonomous weapons systems is not yet at a stage where it can be authoritatively concluded that the systems will offer less dangerous options than human-controlled systems. However, this is also not the point at which such a possibility can be ruled out.

Human Rights Watch should be commended for drawing attention to the issue of fully autonomous weapons systems. However, in the absence of even one such system, it is premature to conclude either their legitimacy or the broader question of whether they should be banned for political purposes. Understanding the potential of systems for both positive and negative purposes is currently too primitive to draw comfortable conclusions about their legal, moral, and operational costs and benefits.

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