

Legality of Autonomous Weapons under International Humanitarian Law

• NITISH R DANIEL
NALSAR UNIVERSITY OF LAW, HYDERABAD

AWS were a subject of science fiction a few decade ago and now the development of AWS is attracting a lot of investment and interest of numerous states. This development is rightly causing unrest among the international community, media, NGOs etc w. Introduction of these AWS will bring with them a lot of legal implications which must be dealt with. Researchers are divided on whether these weapons will be able to comply with the principles of International humanitarian law or not. In the paper the researcher evaluates whether autonomous weapons will be able to comply with various principles of international humanitarian law like the principles of distinction, proportionality, and precautions to name a few. We'll have to evaluate the challenges in introducing such weapons, hence more participation in the discussion is required as only small number of countries have participated in the discussion surrounding autonomous weapons. Since the artificial intelligence is also going to be used for other civilian purposes and any decision on AWS is likely to affect the use of technology in civilian sphere. Some scholars recommend "upstream regulation" i.e., imposing restrictions at the development stages itself, so that the AWS that cross the line are never developed at all. While some researchers prefer "downstream regulation" i.e., checking legality of an AWS only after its full development.¹ We'll have to agree on what kind of regulation would be best suited for the regime.

Introduction

Slowly but steadily our knowledge about AWS is increasing as more and more countries are revealing that they are engaged in development of such kind of weapon systems. AWS were a subject of science fiction a few decade ago and now the development of AWS is attracting a lot of investment and interest of numerous states.² This development is rightly causing unrest among the international community, media, NGOs etc. Introduction of these AWS will bring with them a lot of legal implications which must be dealt with. In the scientific community, more than three thousand AI and robotics experts which includes famous names like Elon Musk, Stephen Hawking, Noam Chomsky, Steven Wozniak, have signed an open letter calling for a ban on AWS that don't have meaningful human control, so we'll have to see what the future entails.³ Shane Harris⁴ evaluated how through different ages weapons have slowly become more autonomous. He observed that B-17 bombings during the Second World War were very imprecise⁵, during Vietnam War accuracy of weapons increased and manpower required decreased significantly⁶, during Gulf War, pilots required to hit a target reduced drastically and further decreased during Afghanistan and Iraq wars⁷. US military's future plans up to year 2047 reveals that it wants pilot to be still part of operations but increase the number of aircraft one pilot would be able to control at the same time.⁸ This effectively means that these aircraft/drones will be quite autonomous. Quite a lot of autonomous weapons technology is already currently with us and is going to be developed further. So the question that arises is how will such weapons be regulated by IHL. There is no agreement on the legality of AWS and whether they should be introduced or not. Some researchers⁹ believe that AWS should be introduced as humans are fallible when it comes to distinguishing between civilians and combatants, some researchers believe the introduction of AWS as inevitable,¹⁰ while others argue that rules of IHL aren't quantifiable and hence, AWS won't be able to follow them.¹¹ Some researchers believe that use of AWS

¹ Kenneth Anderson and Matthew C. Waxman, "Law and Ethics for Autonomous Weapon Systems: Why a Ban Won't Work and How the Laws of War Can," Stanford University, Hoover Institution Press, Jean Perkins Task Force on National Security and Law Essay Series, 9 April 2013.

² Matt Burgess, *Killer Autonomous weapons are coming...but they are not here yet*, Wired, 2017 available at <http://www.wired.co.uk/article/killer-robots-elon-musk-autonomous-weapon-systems-uk>

³ Autonomous Weapons: An Open Letter from AI & Robotics Researchers," Future of Life Institute website, 2015,

⁴ Shane Harris, *Autonomous Weapons and International Humanitarian Law or Killer Robots are Here: Get Used to It*, 30 Temp. Int'l & Comp. L.J. 77 (2016).

⁵ Jonathan Yardley, Opinion, 'The Bombers and the Bombed Allied Air War Over Europe, 1940-1945' by Richard Overy, WASH. POST (Mar. 7, 2014), <https://www.washingtonpost.com/opinions/the-bombers-and-the-bombed-allied-air-war-over-europe-1940-1945-byrichard-overy/2014/03/07/7c2ba5de-9d60-11e3-a050-dc3322a94fa7-story.html>.

⁶ Nathan A. Canestaro, *Legal and Policy Constraints on the Conduct of Aerial Precision Warfare*, 37 VAND. J. TRANSNAT'L L. 431, 448-49 (2004).

⁷ *Six Targets One Blow: Cutting-Edge Interceptor Joins Russian Air Force*, SPUTNIK NEWS (Nov. 27, 2015), <http://sputniknews.com/military/20151127/1030878163/russia-air-forceinterceptor-jet-combat.html>

⁸ U.S. Air force, *Unmanned Aircraft systems flight plan 2009-2047* (2009), https://fas.org/irp/program/collect/uas_2009.pdf.

⁹ Shane Harris, *Autonomous Weapons and International Humanitarian Law or Killer Robots are Here: Get Used to It*, 30 Temp. Int'l & Comp. L.J. 77 (2016).

¹⁰ Gary E Marchant et al, 'International Governance of Autonomous Military Robots', online: (2011) 12 Colum Sci & Tech L Rev 272.

¹¹ Kjølv Egeland, *Autonomous weapons systems under international law*, Nordic Journal International law, NORD-1014, 2014.

will increase the instances of use of force between parties.¹²

Research Problem

AWS pose a lot of challenges to IHL, but still we find it hard to draw definitive conclusions on whether AWS are inherently illegal or not. Why? Because AWS are still in the realm of imagination and at the research stage. Although AWS have not yet been deployed in armed conflicts, they are undergoing rapid technological development. The question that whether AWS will adhere to the principles of IHL must be answered before they are put into operation and before the point where the underlying architecture of AWS is difficult to change. So, we'll have to develop such a legal framework that can accommodate the even changing technological advancements in the field of AWS.

Hypothesis

The hypothesis of the paper is that AWS strictly speaking might not be able to comply with principles of IHL, but are going to be introduced by various states in their arsenal of weapons in a few decades.¹³ So, there is a need to lay down the requirement of meaningful human control by multilateral agreement, any weapon lacking this element should be found illegal.

Research Questions

- Whether AWS will be legal under international humanitarian law and able to adhere to the principles of IHL?
- What could be the problems associated with any AWS that will make them non-compliant with the principles of IHL?

Literature review

A lot of literature has been generated by experts in the field of IHL, but reaching to a conclusive decision with consensus on AWS hasn't been achieved yet. Most of the researchers just raise legal issues that may arise out of AWS in the future. A lot of new NGOs have arisen to raise concerns about AWS and to ban them, and the already established ones like Human Rights Watch and ICRC are also producing a lot of literature. ICRC's report says that in the discussions among government

experts broad agreement seems to be that humans must have "meaningful" or "effective" control over any weapon.¹⁴ ICRC itself believes there should be limits on autonomy.¹⁵ Shane Harris (Shane Harris, 2016¹⁶) reveals that introduction of AWS is inevitable, and even when the countries like USA plan to keep humans in the loop in future as well they want to keep increasing autonomy nonetheless. There is more literature that shows concern towards the AWS and its demerits like they will make going to war easier and remove moral reprehension (Kenneth Anderson & Matthew Waxman, 2012 ; James Foy, 2014)¹⁷, only few researchers are in favour of AWS and believe that they will follow IHL principles more rigorously than human soldiers (Gary E Marchant et al, 2011)¹⁸. Since ethics of killing by a robot are very murky there has been work done on that as well (P. Lin, G. Bekey and K. Abney, 2008). Some researchers have done a very detailed analysis of the topic including technical and legal issues (Marco Sassoli, 2014¹⁹).

Scope of Research

The scope of this research paper is limited only to the lethal AWS and whether they comply with the principles of IHL or not. The focus is on the principles of IHL and not Human rights though they are interconnected.

Research methodology

The methodology adopted is doctrinal, analytical, and descriptive. The Internet has been a major help to create the work and the Secondary sources like articles, journals, newspapers and websites have been heavily relied upon.

Current Weapons Systems with Some Degree of Autonomy

Weapons with some degree of autonomy are being used for some time now, but since weapons research is kept under wraps the international community has to rely on news reports and unofficial sources to know the exact details of such weapons. Vehicle active protection weapons like Arena²⁰, Quick Kill²¹, Trophy²² etc which protect armoured vehicles from incoming attack by missiles, rockets etc do the same as well. Anti-personnel

¹² *ibid*.

¹³ *Supra note 1*.

¹⁴ Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons. Expert meeting, Versoix, Switzerland, 15-16 March 2016.

¹⁵ ICRC (2014) *Autonomous weapon systems technical, military, legal and humanitarian aspects*, Report of an Expert Meeting held 26-28 March 2014 (published November 2014), <https://www.icrc.org/en/download/file/1707/4221-002-autonomousweapons-systems-full-report.pdf>.

¹⁶ Shane Harris, *Autonomous Weapons and International Humanitarian Law or Killer Robots are Here: Get Used to It*, 30 *Temp. Int'l & Comp. L.J.* 77 (2016)

¹⁷ Kenneth Anderson & Matthew Waxman, "Law and Ethics for Robot Soldiers" (2012) 176 *Policy Review* 35; James Foy, *Autonomous Weapons Systems: Taking the Human out of International Humanitarian Law*, 23 *Dalhousie J.*

Legal Stud. 47 (2014).

¹⁸ Gary E Marchant et al, "International Governance of Autonomous Military Robots", online: (2011) 12 *Colum Sci & Tech L Rev* 272 <<http://www.stlr.org>>.

¹⁹ Marco Sassoli, *Autonomous Weapons and International Humanitarian Law: Advantages, Open Technical Questions and Legal Issues to Be Clarified*, 90 *Int'l L. Stud. Ser. US Naval War Col. [i]* (2014)

²⁰ Konstruktorskoye byuro mashynostroyeniya, *Arena Active Protection System*, <http://www.kbm.ru/en/production/saz/368.html>.

²¹ Raytheon, *Active Protection System (APS)*, <http://www.raytheon.com/capabilities/products/aps>.

²² Rafael Advanced Defense Systems, *Trophy Situational Awareness Situational Awareness and Active Protection Systems* <http://www.rafael.co.il/Marketing/349-963-en/Marketing.aspx>.

sentry weapons like aEgis I and II²³ used by South Korea and Guardian²⁴ used by Israel exist to protect boundaries, perimeters from entry of unauthorised personnels are believed to be able to detect and attack autonomously. Major news sources indicate that South Korea is using a sentry robot SGR-1 made by Samsung which is capable of detecting, selecting target and firing at target autonomously with Humans out of the loop system.²⁵ Missile and rocket defence weapons like Goalkeeper Close-in weapons system²⁶, Iron dome²⁷, Kashtan Close-in weapon system²⁸ are designed to intercept incoming projectiles or aircrafts. These select and attack targets on their own but they are always human supervised. "Fire and forget" munitions like BONUS 155 mm projectile²⁹, M982 Excalibur 155 mm projectile³⁰, SMARt 155 mm projectile³¹ are launched for a specific area and then these munitions select the specific target themselves using different sensors. Loitering munitions like Harpy³² have even more autonomy to select and attack based on pre-programmed target signatures. Even when autonomy has been granted to these weapons they are constrained with respect to their function, area in which they will operate, time when they will operate etc. Future AWS on the other hand won't have such functional, spatial and temporal limits. ICRC's report indicates that there is a overall trend toward granting more autonomy to weapons systems³³.

²³ DoDamm Systems, *aEgis I & II, Super aEgis I & II & Athena*, <http://www.dodaam.com/eng/sub2/menu2.php>;

Other systems include the Samsung Techwin SGR-1: J Antal, *Defending the Republic of Korea, Military Technology*, October 2010, <http://www.stripes.com/machine-gun-toting-robots-deployed-on-dmz-1.110809>.

²⁴ G-nius unmanned ground systems, *Guardium MK III*, <http://g-nius.co.il/unmanned-ground-systems/guardium-mk-iii.html>.

²⁵ Velez-Green, Alexander). "The South Korean Sentry-A 'Killer Robot' to Prevent War", *Lawfare*, (March 1, 2015); Weinberger, Sharon "Next generation robots have minds of their own", *BBC* (November 18, 2014); Wagstaff, Keith, "Future Tech? Autonomous Killer Robots Are Already Here", *NBC*, (May 14, 2014).

²⁶ Thales, *Goalkeeper Close-in Weapons System*. According to the manufacturer it is deployed by Belgium, Chile, the Netherlands, Portugal, Qatar, South Korea, the UAE and the UK, <https://www.thalesgroup.com/en/netherlands/defence/goalkeeper-close-weapon-system>.

²⁷ Rafael Advanced Defense Systems, *Iron Dome Dual-Mission Counter Rocket, Artillery and Mortar (C-RAM) and Very Short Range Air Defense (V-SHORAD) System*, <http://www.rafael.co.il/Marketing/186-1530-en/Marketing.aspx>.

²⁸ Navy Recognition, *Kashtan, Kashtan-M, CADS-N-1, Palma, Palash close in weapon systems (CIWS)*, <http://www.navyrecognition.com/index.php/east-european-navies-vessels-ships-equipment/russian-navy-vessels-shipsequipment/weapons-a-systems/123-kashtan-kashtan-m-kashtan-lr-cads-n-1-close-in-weapon-system-ciws-.html>.

²⁹ BAE Systems, *BONUS 155mm*, <http://www.baesystems.com/en/product/155-bonus>.

³⁰ US Army (2007) *Excalibur XM982 Precision Engagement Projectiles*.

Merits of AWS

There has been some merits associated with AWS due to which they are being developed.³⁴ Some believe they will do better jobs than humans as they won't get hungry, forget orders or get afraid.³⁵ They won't need rest so mission time could be extended. They will be cheaper to operate and will require fewer humans.³⁶ They will beat humans when it comes to sensory capabilities as they can be equipped with many different sensors like Infra-red, sonar, lidar etc. It has been believed that these enhanced sensory capabilities will allow more data for processing and help AW take better decision in war field than humans.³⁷ Gary Marchant believes that AWS won't have need of self preservation, will lack human emotions and psychological problems hence will follow IHL more than the human soldiers.³⁸ Research has shown that human self control mechanism gets shut down under stress which means human soldiers are more likely to commit war crimes.³⁹

Demerits of AWS

Demerits of AWS would be that they will make it easier to go to war as the human cost of going to war would be

<http://www.dote.osd.mil/pub/reports/FY2007/pdf/army/2007-excalibur>.

³¹ Gesellschaft für Intelligente Wirksysteme mbH (GIWS), *SMARt 155mm*, <http://www.giws.de/en/smart/system.html>.

³² Rafael Advanced Defense Systems, *HAROP*, http://www.iai.co.il/2013/36694-46079-en/Business_Areas_Land.aspx.

³³ US Department of Defense, Defense Science Board (2012) *Task Force Report: The Role of Autonomy in DoD Systems*, 19 July 2012; NATO (2014) *Policy Guidance: Autonomy in Defence Systems, Multinational Capability Development Campaign (MCDC) 2013-2014, Focus Area "Role of Autonomous Systems in Gaining Operational Access"*, NATO Supreme Allied Commander Transformation HQ, 29 October 2014; D Gonzales and S Harting (2014) *Designing Unmanned Systems with Greater Autonomy: Using a Federated, Partially Open Systems Architecture Approach*, RAND Corporation; P Scharre (2014) *Robotics on the Battlefield Part II: The Coming Swarm*, (footnote 52).

³⁴ *Supra note 1*

³⁵ Tim Weiner, 'GI Robot' Rolls Toward the Battlefield' *New York Times* (1 February 2005), online: [New York Times](http://www.nytimes.com) <http://www.nytimes.com>.

³⁶ Gary E Marchant et al, 'International Governance of Autonomous Military Robots', online: (2011) 12 *Colum Sci & Tech L Rev* 272.

³⁷ Major Michael A Guetlin, *Lethal Autonomous Weapons - Ethical and Doctrina Implications*, 2005.

³⁸ Gary E Marchant et al, 'International Governance of Autonomous Military Robots', online: (2011) 12 *Colum Sci & Tech L Rev* 272 <http://www.stlr.org>.

³⁹ Douglas A. Pryer, "The Rise of the Machines: Why Increasingly 'Perfect' Weapons Help Perpetuate Our Wars and Endanger Our Nation," *Military Review* 93, no. 2 (2013)

significantly lowered.⁴⁰ James Foy⁴¹ suggest that AWS will distance humans from the killing hence moral reprehension will decrease resultantly tendency to use AWS and kill will increase. As to the capability of AWS to comply with IHL principles doubt still remains among the international community, some scientists find no evidence that AWS of future will be able to comply with IHL principles and say that use of force shouldn't be delegated to machines.⁴² Researchers find that moral outrage over the use of AWS is so much that it can lead to perpetual warfare.⁴³ Researchers find that use of AI in AWS is likely to affect the use and perception of AI in other fields as well. If AWS race ensues public outrage against AI can also ensue and curtail the development of AI in other fields as well.⁴⁴

Definitional Problem

The first problem that arises with respect to the legality of AWS is the definitional problem, the manner we will define AWS will decide whether a certain weapon will be considered as autonomous or not. When we think of AWs we imagine something that looks like Terminator from the Terminator movie Franchise, but fortunately that kind of AWs are currently limited to fiction. This doesn't mean all kinds of AWs are still fiction, a lot of countries are currently engaged in development of such technology. Different organisations such as Human Rights Watch has called for a ban on the production and use of AWs,⁴⁵ while states keep developing them. If we have to reach an agreement on AWs the first problem that we'll have to face is how to define AWs. The problem is that there is no internationally agreed definition of AWS, ICRC says any weapon autonomous in its "critical functions" should be included in the definition of autonomous weapons system. The critical functions include "selecting" and "attacking" targets without human intervention.⁴⁶ US Department of Defence(DoD) in its definition of AWs provides that the important characteristics for a weapon to be considered

autonomous is that the weapon system should be able to select and engage targets without further human intervention once activated, and also included those autonomous weapons that can be overridden by human operator.⁴⁷ Human Rights Watch too has similar definition requiring selection and engagement targets without human supervision to be called AW.⁴⁸ The reason internationally agreed definition cannot be agreed upon is due to the fear that if we agree on a definition now, there is a chance that we might leave some AWS behind or the manufacturers would circumvent the definition. Also the problem arises in defining 'autonomy' and 'robot' itself. Subjectivity prevails among the scholars on the meaning of these words.⁴⁹ For Immanuel Kant autonomy meant capability of pursuing one's own ends, but in robotics it just means that the system is capable of acting without human control.⁵⁰ Can any weapon that triggers itself when detecting human presence not be called autonomous? So, coming up with a definition that excludes such low level autonomous weapons while including newer technology will be a tough task. The definition that has been given by G.S. Corn tackles this problem to some extent, the definition given by him requires that the AWS utilizes AI that replicates human cognitive reasoning i.e., the use of force is activated by the system not the victim like anti-personnel mines.⁵¹ Another problem is the definition will have to cover very broad range of weapons with different levels of autonomy not all the weapons will be fixed with high level of AI. What is recommended is that we adopt a broad definition that encompasses all current developments in AWS as well as future developments, this way we could guide the future developments in the fields of AWS to comply with the IHL principles by forcing the current AWS to comply with IHL.

⁴⁰ Kenneth Anderson & Matthew Waxman, 'Law and Ethics for Robot Soldiers' (2012) 176 Policy Review 35.

⁴¹ James Foy, 'Autonomous Weapons Systems: Taking the Human out of International Humanitarian Law', 23 Dalhousie J. Legal Stud. 47 (2014).

⁴² International Committee for Robot Arms Control (ICRAC), 'Scientists' Call to Ban Autonomous Lethal Robots,' ICRAC website, October 2013, accessed 24 March 2017

⁴³ Douglas A. Pryer, 'The Rise of the Machines: Why Increasingly 'Perfect' Weapons Help Perpetuate Our Wars and Endanger Our Nation,' *Military Review* 93, no. 2 (2013)

⁴⁴ 'Autonomous Weapons: An Open Letter from AI [Artificial Intelligence] & Robotics Researchers,' Future of Life Institute website, 28 July 2015, accessed 8 March 2017, <http://futureoflife.org/open-letter-autonomous-weapons/>.

⁴⁵ Human Rights Watch, *Losing Humanity: The Case Against Killer Robots*, online: International Human Rights Clinic

<http://www.hrw.org/sites/default/files/reports/arms1112ForUpload00.pdf>.

⁴⁶ ICRC (2015) *International humanitarian law and the challenges of contemporary armed conflicts*, Report to the 32nd International Conference of the Red Cross and Red Crescent held 8-10 December 2015 (published October 2015), pp 44-47,

<https://www.icrc.org/en/download/file/15061/32ic-report-on-ihl-and-challenges-of-armed-conflicts.pdf>.

⁴⁷ US, Department of Defense, *Directive Number 3000.09: Autonomy in Weapon Systems* (21 November 2012), online:

<http://www.dtic.mil/whs/directives/corres/pdf/300009p.pdf> [DOD 3000.09].

⁴⁸ Human Rights Watch, *Losing Humanity: The Case Against Killer Robots*, online: International Human Rights Clinic

<http://www.hrw.org/sites/default/files/reports/arms1112ForUpload00.pdf>.

⁴⁹ P. Lin, G. Bekey and K. Abney, 'Autonomous Military Robotics: Risk, Ethics, and Design'. Report Prepared for the US Department of Navy, *Office of Naval Research*. California Polytechnic State University (2008).

⁵⁰ R. Siegwart, I.R. Nourbakhsh, and D. Scaramuzza, *Introduction to Autonomous Mobile Robots*, 2nd edn. (MIT Press, MA, Cambridge, 2011).

⁵¹ G.S. Corn, 'Autonomous Weapon Systems: Managing the Inevitability of "Taking the Man out of the Loop"', in N Bhuta et al (n 14) 209, 230-238.

IHL and Autonomous Weapons Systems

We know that primary subjects of IHL are states while the rules of hostilities are addressed to human beings. Three situations can arise where IHL would affect the legality of any weapon. First, when the weapon is specifically prohibited by any treaty or convention like the chemical weapons convention⁵², bacteriological weapons convention⁵³, blinding laser convention⁵⁴, anti-landmine⁵⁵, cluster munitions⁵⁶. Second, when the weapon cannot follow the criteria of core principles of IHL. Third, when a otherwise legal weapon is used unlawfully either in breach of international law or principle of distinction. Currently, IHL would affect the legality of AWS in two ways: *Firstly*, the weapon must be able to adhere to the principles of IHL. *Secondly*, weapon must be used in a lawful way or against lawful target. The four Geneva conventions have been ratified by all UN members so they can be said to have acquired the status of international customary law.⁵⁷ ICJ has held that all states are bound by the customary law principles which already existed and were just codified in API, such as Martens clause.⁵⁸ The court didn't specify what these principles will be, but principle of distinction and unnecessary suffering were held as cardinal principles. Unfortunately, these grounds are very weak as in the case of *Legality of the Threat or Use of Nuclear Weapons*⁵⁹, even when nuclear weapons are amongst the most deadly weapons, were found to be capable of following the principles of distinction, proportionality and not causing superfluous injuries or suffering. Despite all this AWS will have to comply with these core/cardinal principles. So, what are these cardinal principles? The core principles of IHL⁶⁰ are: (i) Principle of distinction⁶¹, (ii) Principle of proportionality, (iii) Precaution in attack, (iv) Avoiding unnecessary suffering, (v) Martens clause. One has to remember that these principles are intertwined and cannot be seen independent of each other. It can be admitted that to follow these principles

is getting more difficult as nature of wars has turned more towards guerrilla warfare, but still these principles must be adhered to. ICRC has serious doubts on whether AWS will be able to comply with these. ICRC believes AWS might be able to comply with IHL rules in the simplest of environment and narrowest of scenarios, with human supervision and control.

The Principle of distinction

This customary international law principle states⁶² that parties to conflict will at all time distinguish between civilians and combatants and also distinguish between civilian objects and military objectives.⁶³ This principle has also been codified in Article 48 Additional Protocol I of Geneva Convention.⁶⁴ The rationale behind this principle is protection of civilians and ICJ has held this as a cardinal principle of IHL.⁶⁵ API further prohibits indiscriminate attacks i.e., "*employment of means or methods of combat that cannot be directed against a specific military objective*".⁶⁶ Complications arise in implementing this principle as the distinction between combatant and non-combatant is not black and white, same person could be combatant or non-combatant depending of the context. As AWS will also have to identify the soldiers or combatants that are surrendering to the AWS, how will the AWS ascertain that is unclear.

Problem of sensory limitations

AWS will rely on their sensors to distinguish between combatants and non-combatants, but the technology is still under development and hasn't achieved sufficient accuracy. To be capable of distinguishing between civilian and military targets the sensory technology must be developed sufficiently, so that AW has enough data to process and take decision. Current warfare is mostly internal armed conflicts or guerrilla warfare where combatants are non-uniformed. In such situations humans use situational awareness and human intention

⁵² Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction 1974 UNTS 45; 32 ILM 800 (1993).

⁵³ Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction 1015 UNTS 163; 11 ILM 309 (1972).

⁵⁴ Additional Protocol to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects (Protocol IV, entitled Protocol on Blinding Laser Weapons) United Nations, Treaty Series, vol. 1380, p. 370; Doc. CCW/CONF.I/16 Part I).

⁵⁵ Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction Alternative Title(s): Antipersonnel Mine Ban Convention Ottawa Convention.

⁵⁶ Convention on Cluster Munitions, United Nations, Treaty Series, vol. 2688, p. 39; depositary notification C.N.776.2008.TREATIES-2 of 10 Nov 2008

⁵⁷ C. Greenwood, 'Historical Development and Legal Basis', in D. Fleck (ed), *The Handbook of International Humanitarian Law*, 2nd edn (2008), Oxford University Press, at 129; D. Fleck, 'The Law of Non-International Armed Conflicts', in D. Fleck (ed), *The Handbook of International Humanitarian Law*, 2nd edn (2008), Oxford University Press, at 1201.

⁵⁸ *Legality of the Threat or Use of Nuclear Weapons*, International Court of Justice Advisory Opinion, 08.07.1996, at Para. 84.

⁵⁹ Advisory Opinion [1996] ICJ Rep 226, [*Nuclear Weapons Advisory Opinion*].

⁶⁰ Gary D Solis, *The Law of Armed Conflict: International Humanitarian Law in War* (New York: Cambridge University Press, 2012).

⁶¹ S. Oeter, 'Methods and Means of Combat', in D. Fleck (ed), *The Handbook of International Humanitarian Law*, 2nd edn (2008), Oxford University Press, at. 404.

⁶² S. Oeter, 'Methods and Means of Combat', in D. Fleck (ed), *The Handbook of International Humanitarian Law*, 2nd edn (2008), Oxford University Press, at. 404.

⁶³ Gary D Solis, *The Law of Armed Conflict: International Humanitarian Law in War* (New York: Cambridge University Press, 2012)

⁶⁴ *Protocol Additional to the Geneva Convention of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3, art 48, (entered into force 7 December 1979) [*Additional Protocol I*].

⁶⁵ *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion [1996] ICJ Rep 226, [*Nuclear Weapons Advisory Opinion*].

⁶⁶ API, Article 51(4)(b)

of the person to determine whether he's a combatant or not.⁶⁷ Whether AWS will be able to do this is still unanswered. Solution that some suggest is that AWS be introduced only where clear difference exist between combatants and civilians, and fire only when fired upon⁶⁸ or use them only where there are no civilians.⁶⁹ Situations where there are no civilians and only combatants will be rare so it is not practically feasible. Some suggest that AWS should be programmed to target weapons rather than humans, so any human injuries or casualties would then be considered as collateral damage,⁷⁰ but again the sensors of the AWS might not be able to differentiate between a weapon and any other object⁷¹, and what if children are asked to carry the weapons.

Problem of slow processing

According to Armin Krishnan, AWS will have to process a lot of data on battle field so they will be slow. To solve this problem the programmers will restrict the data AW will consider as relevant. So to possible scenarios could arise either the AWS will be too slow to be used in battle or will not be able to follow IHL rules like distinction and proportionality.⁷² In case of doubt about whether a person is a civilian or combatant, the presumption will be that he's a civilian. This rule is also considered international customary law and codified in Additional Protocol I.⁷³ So, the AWS must hesitate to attack if it is not sure of the nature of person, such threshold will have to be put by the programmer i.e., a point of beyond which if the AWS is not confident that the person is a combatant then it will consider the person as civilian, but at what limit threshold is put will make AW's legality questionable. AWS will be run by very complicated software developed by more than one person so software error can always take place.⁷⁴ Further, as AI develops and becomes smarter than us it would be difficult to know if the AW action is a software error or something humans cannot see. Such thing happened when the chess playing computer became smarter than its programmers, the programmers

were not able to understand if it was a chess move or an error.⁷⁵

Drones and Autonomous weapons systems

The most basic difference that is given between UAV and AWS is that the decision to kill is taken by a human in the UAV but by a machine in AWS. These drones or UAVs work on predetermined 'signatures' or 'profile' of an individual. What this means is that the drone studies the characteristics of a person based on its predetermined design like gender, location, whether he's carrying weapons or not, and then the final decision to release the missile is with the drone operator. The drones can stay in the air for long so they can collect better intelligence and give their operators the appropriate knowledge to decide whether the person is civilian or combatant. Still, studies have found that 10 times more civilians are killed by drones or UAV strikes than a conventional aircraft strike.⁷⁶ So what could be potential implications on the principle of distinction, when even the drone operator is removed from the loop is yet to be seen.

The Principle of Proportionality

Even despite all efforts situation may arise where civilian casualties cannot be avoided to achieve a military objective. So, IHL provides the principle of proportionality to mitigate the civilian casualties. The principle is believed to be international customary law and has been codified in API⁷⁷. The principle states that where in an attack incidental losses of lives of civilian population, or incidental damage to civilian objects, or both are expected and this will be excessive in relation to the specific military objective then it will be in violation of principle of proportionality. ICRC argues that this principle has evolved into international customary law and is a principle of humanity, hence even when not included in AP2 it still applies to internal armed conflicts.⁷⁸ United states military tribunal during the Nuremberg trials had held that positive rules cannot be violated due to the reason of military necessity.⁷⁹

⁶⁷ Noel Sharkey, "Saying No! to Lethal Autonomous Targeting" (2010) 9:4 Journal of Military Ethics 369

⁶⁸ James Foy, Autonomous Weapons Systems: Taking the Human out of International Humanitarian Law, 23 Dalhousie J. Legal Stud. 47 (2014)

⁶⁹ Michael N Schmitt, "Autonomous Weapons Systems and International Humanitarian Law: A Reply to Critics" *Harvard National Security Journal* (5 February 2013) at 3 online: Harvard National Security Journal <<http://harvardnsj.org/wp-content/uploads/2013/02/Schmitt-Autonomous-Weapon-Systems-and-IHL-Final.pdf>>

⁷⁰ John S Canning, "A Concept of Operations for Armed Autonomous Systems" (2006), online: Defense Technical Information Center <<http://www.dtic.mil/ndia/2006disruptive-tech/canning.pdf>>

⁷¹ Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Surrey: Ashgate Publishing Limited, 2009).

⁷² Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Surrey: Ashgate Publishing Limited, 2009).

⁷³ Article 50(1) *Protocol Additional to the Geneva Convention of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol)*, 8 June 1977, 1125 UNTS 3, art 48, (entered into force 7 December 1979) [*Additional Protocol I*].

⁷⁴ Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Surrey: Ashgate Publishing Limited, 2009).

⁷⁵ Nate Silver, *The Signal and the Noise: Why Most Predictions Fail but Some Don't* (New York: The Penguin Press, 2012) at 286

⁷⁶ J. Scahill and G. Greenwald, 'The NSA's Secret Role in the U.S. Assassination Program', *The Intercept*, 10 February 2014

⁷⁷ Article 51(5)(b) *Protocol Additional to the Geneva Convention of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol)*, 8 June 1977, 1125 UNTS 3, art 48, (entered into force 7 December 1979) [*Additional Protocol I*].

⁷⁸ Jean-Marie Henckaerts et al, eds, *Customary International Humanitarian Law*, vol 1, ICRC (Cambridge: Cambridge University Press, 2005)

⁷⁹ *United States v. List*, Quoted in C. Greenwood, 'Historical Development and Legal Basis', in D. Fleck (ed), *The*

Problem arises in the interpretation of this principle as one needs to balance potential military necessity and advantage with potential civilian harm. Potential civilian harm is relatively easier to be calculated, but military advantage is comparatively difficult as it introduces subjectivity depending upon the situation. This subjectivity factor will make it difficult for the AWS to fulfil this criteria as determining military necessity is not an exact science.⁸⁰ It is believed that 'military advantage' must be "concrete and direct", which means that the commander must believe that there is a honest and reasonable expectation that the attack will make a relevant contribution to the success of overall operation.⁸¹ The balancing the interests of civilians and military will have to be done on case to case basis, and it has been admittedly found to be difficult to be so done.⁸² So the processing problem we had seen earlier will play a role here as well. To calculate the proportionality the AWS will have to assess every possible action it could take, for which it will require a huge amount of data. This data processing will take a lot of time making AWS useless, to solve this programmers will narrow down the factors AWS will look at. This narrowing down of data might lead to disproportionate attacks. AWS will have to work in unstructured environments, complex software prone to errors along with the problem mentioned above could lead to disproportionate attacks. One solution that has been suggested is that limits to how much the AWS must engage should be set differently in different situations by human commanders depending upon the probabilities of success and probabilities of collateral damage.

According to Professor Marco Sassòli makes a strong case against use of fully autonomous weapons for long periods of time. He argues that in an armed conflict the 'concrete and direct military advantage' is not constant but changes according to circumstances in the conflict, military developments on both the sides and commander's strategy. An AWS to be able to apply the proportionality principle will have to be updated about these military operations, plans, circumstances all the time. So, it will be practically impossible to leave fully AWS to work on its own without any assistance. Perhaps a solution can be to determine the importance of a mission before initiation of the mission, but that will mean the AWS will have to be reprogrammed for each mission.⁸³ Also the importance of mission could change during combat.

There can be debate on whether or not the AWS will be able to follow these principles but all will agree that we must ensure that AWS are not introduced before

safeguards are put in place. There is a chance that AWS may never reach level of development where they could fulfil the requirements of proportionality and distinction.⁸⁴

The Principle of Precautionary Measures

This principle will tie up with the principle of proportionality. The principle has been incorporated in API in Article 57 which deals with the precautions to be taken by the attacker and 58 which deals with precautions against an attack. Article 57 requires that while conducting military operations constant care should be taken by those who plan or decide upon the attack to avoid damages to civilian population and objects. They must ensure that the target is actually a military target, the means and methods chosen for the attack must be such so as to cause minimum incidental loss of life, and avoid attack where loss, injury or damage would be in excess to concrete and direct military advantages anticipated. Perhaps, this provision could be satisfied by AWS if the commander deploying AWS follows the principles. But, the military targets can keep changing during combat, a military target while planning an attack needn't not be a target while conducting the attack, in a normal combat situation the mission commander will have to modify his decisions according to the needs of the mission and precautionary principle. If AWS are engaged in the field, AWS will have to be kept updated all the time this will be arduous task. AWS must avoid damage to civilian population and if not possible choose to minimize incidental loss of life when concrete and direct military advantage is anticipated. The problem is even humans have not been clearly able to decide what amounts to 'clear and direct military advantage'. The problem of balancing the 'incidental loss of civilian lives' and 'concrete and direct military advantage anticipated' would arise like in previous section, and when humans cannot perfectly derive a ratio for this can we expect AWS to do so?

The Principle of Avoiding Unnecessary Suffering

Weapons like dum-dum bullets, mines, non-detectable fragments, incendiary weapons and cluster weapons have been banned for non-compliance with this principle. This principle has been incorporated in API⁸⁵, which prohibits weapons that cause superfluous injury or unnecessary suffering as the aim of war is just to incapacitate your opponent not destroy him. All AWS will have to comply with this principle to be called legal.

Handbook of International Humanitarian Law, 2nd edn (2008), Oxford University Press, at 133.

⁸⁰ Yoram Dinstein, *The Conduct of Hostilities Under the Law of International Armed Conflict*, Cambridge University Press (2004), at 122.

⁸¹ Canada, Office of the Judge Advocate General, *The Law of Armed Conflict at the Operational and Tactical Level*, 2001, s 415(2), online: Office of the Judge Advocate General <<http://www.forces.gc.ca/jag>>.

⁸² *Final Report to the Prosecutor by the Committee Established to Review the NATO Bombing Campaign Against the Federal Republic of*

Yugoslavia, (8 June 2000) at para 48 (International Criminal Tribunal for the Former Yugoslavia), online: ICTY <<http://www.icty.org>>.

⁸³ R.C. Arkin, 'Governing Lethality: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture', Technical Report GIT-GVU-07-11, *U.S. Army Research Office* (2008)

⁸⁴ Kenneth Anderson & Matthew Waxman, 'Law and Ethics for Robot Soldiers' (2012) 176 *Policy Review* 35

⁸⁵ Article 35 API

Problems in the Obligation to Review Mechanism

Article 36 of API obliges states to determine whether the weapons they are developing, employing, studying, acquiring, adopting would in some or all circumstances be prohibited by API or any other international law rule. Problem arises in ensuring truthfulness by the states, and low level of compliance with the provision. Irrespective of this ICRC still believes this legal review mechanism is a critical measure to ensure respect for IHL.⁸⁶ The states must ensure that the weapon will comply with IHL in all circumstances in which it is intended to be used. To determine in which situations the weapon can be used will require foreseeing the capabilities and effects of the weapon, which will require extensive testing. The problem with AWS is that since AI is involved in their development it would be harder to predict what could be the capabilities of AWS. This predictability factor will play important role in determining the legality of any AWS, as any AWS whose effects are wholly or partially unpredictable will create a high risk of non-compliance with the IHL principles. In short, the predictability of AWS's capabilities and limits must be very high. ICRC's report suggests that increased mobility (capability of encountering newer environment over longer period of time), increased adaptability (capability to modify its own goals depending upon the environment) would make the AWS less predictable as well as unreliable.⁸⁷ ICRC's report suggests that technical factors like tasks of a weapon, target of a weapon, environment it will be used in, time required for the mission, need for adaptability and reliability, and the need of human supervision along with the circumstances in which the AWS will be used, will be important in predicting whether the AWS will comply with IHL rules or not.⁸⁸

Another problem with the obligation to review is that there are no standard methods or protocols to test the weapons that'll determine the compliance with the IHL rules. These weapons will have to be reliable i.e., not develop malfunctions easily, immune from cyber-security attacks or hacking but what standards are to be adopted to test these is unclear i.e., what will be

considered reliable and what will be considered unreliable.

The requirement of Human Control and its Implications

In a CCW Meeting of Experts on Lethal Autonomous Weapon Systems⁸⁹ the International committee of Robot Arms Control said that "violence mustn't be delegated to machine". This would be against human dignity, democracy, and human right. It is believed that the IHL in general and Martens clause are founded upon human reasoning and deliberations and machine won't be able to understand the value of human life. It is something about giving a non-human entity power to end a life of human that makes us uneasy. The "principles of humanity and the dictates of public conscience" also known as Martens clause⁹⁰ (which has been held by ICJ⁹¹ to be effective means of addressing rapid evolution of military technology) is believed to be antithetical to use and development of AWS.

Multilateral Conventions

In the CCW Meeting of Experts on Lethal Autonomous Weapon Systems of 2014 majority of delegates believed that the article 36 obligation to review mechanism⁹² was not a strong framework for regulating AWS and that multilateral action was required. They believed that rarely a situation arises were a threat/evil could be curbed pre-emptively, so they called for 'meaningful human control' as an essential requirement for AWS. Some believe it would be impossible to reach to a consensus on whether to ban AWS or not, as there is no uniform view against AWS⁹³, but at least some guidelines and discussions are essential before AWS are introduced in mainstream. Human Rights Watch wants blanket ban on AWS.⁹⁴ Multilateral conventions have before regulated weapons like the Biological Weapons Convention⁹⁵ which prohibits all state-parties from acquiring, developing, producing, stockpiling, retaining biological weapons. Similar limitations have been introduced even in Chemical Weapons Convention.⁹⁶ Use of Blinding Lasers have been prohibited by the

⁸⁶ 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.

⁸⁷ ICRC (2014) *Autonomous weapon systems technical, military, legal and humanitarian aspects*, Report of an Expert Meeting held 26-28 March 2014 (published November 2014), <https://www.icrc.org/en/download/file/1707/4221-002-autonomous-weapons-systems-full-report.pdf>.

⁸⁸ ICRC (2014) *Autonomous weapon systems technical, military, legal and humanitarian aspects*, Report of an Expert Meeting held 26-28 March 2014 (published November 2014), <https://www.icrc.org/en/download/file/1707/4221-002-autonomous-weapons-systems-full-report.pdf>.

⁸⁹ Civil society perspectives on the CCW Meeting of Experts on Lethal Autonomous Weapon Systems 13-16 May 2014.

⁹⁰ *Article 1(2) of Additional Protocol I, (the preamble of Additional Protocol II to the Geneva Conventions It has its name from Fyodor Fyodorovich Martens, a Russian delegate to the Hague Peace*

Conferences in 1899 and 1907, and is on the face of it an attempt at filling unforeseeable loopholes in IHL)

⁹¹ ICJ (1996) *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, ICJ Reports 1996.

⁹² Protocol Additional to the Geneva Convention of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocoll), 8 June 1977, 1125 UNTS 3 (entered into force 7 December 1979) [Additional Protocol I].

⁹³ Kenneth Anderson & Matthew Waxman, "Law and Ethics for Robot Soldiers" (2012) 176 Policy Review 35.

⁹⁴ Mary Wareham, *It's Time For a Binding, Absolute Ban on Fully Autonomous Weapons*, HRW, 2012

⁹⁵ *Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction*, 10 April 1972, 1015 UNTS 163 (entered into force 26 March 1975).

⁹⁶ *Convention on the Prohibition of the Development, Production and Stockpiling of Chemical Weapons and on their Destruction*, 13 January 1993, 1974 UNTS 45 (entered into force 29 April 1997).

Protocol IV on CWC.⁹⁷ AWS come with different level of autonomy, if we demand ban on all AWS then a lot of weapons already being used will have to be banned which doesn't seem feasible. (See section 2 of the paper). The world is concerned about AWS and their possible implications, this is proved by the informal meeting of experts on lethal autonomous weapons systems (LAWS) which has been made by the state parties to CCW in 2013.⁹⁸ In 2016, a Group of Governmental Experts (GGE) on Lethal Autonomous Weapons System (LAWS) chaired by Ambassador Amandeep Singh Gill of India was established. The GGE has been tasked to examine emerging technologies in AWS, consider LAWS from different angles like military, ethical, legal, technological etc and provide platform for discussion among diverse group of experts.⁹⁹

Meaning of 'Meaningful human control'.

A Human Rights Watch report divided AWS in three categories: First, Human in the loop AWS i.e., weapon that can select targets but deliver force only be the command of a human. Second, Human on the loop AWS i.e., weapon can select and attack on its own but subject to override by a human. Third, Human out of the loop AWS i.e., weapons that require no human assistance at all.¹⁰⁰ ICRC's report¹⁰¹ suggests that there is a broad agreement that there should be "meaningful human control" over any weapons.¹⁰² Other similar terms used are "appropriate human control" or "effective human control". But, how do we define "meaningful human control", and why should be there "meaningful human control". CCW Meeting of Experts on Lethal Autonomous Weapon Systems¹⁰³, found it imperative to maintain meaningful human control on any weapon system and said that this could act as a criteria to impose prohibition on the weapons which don't fulfil this criteria. In the meeting Austria, Croatia, Pakistan, Switzerland, Germany, were strongly in favour of meaningful human control, Canada stressed on the need

to further develop the term, while India found the concept vague and USA found that the concept did not take into account all the stages of development of weapon like development, acquisition, deployment. Without this concept the requirement of command responsibility in IHL couldn't be fulfilled by the AWS.¹⁰⁴

What we will consider as "meaningful human control" will depend upon at what stage of do we consider human involvement as relevant and meaningful. ICRC's report points out that there can be 3 stages involved in a "life cycle" of AWS.¹⁰⁵ First stage is during its programming, second stage is when the AWS is deployed or activated by the commander or operator, third stage is when the AWS operates i.e, selects and attacks its targets. There is no doubt that there will be human control during the first and second stages, but whether this control is enough to make it "meaningful human control" even when in the third stage there is no human control. ICRC's report suggests that human control on AWS will be read into as humans will select AWS depending upon the task of weapon, target of weapon, environment it will be used in, time required for the mission, need for adaptability and reliability, and the need of human supervision.¹⁰⁶

Command responsibility

Human Rights Watch puts forth a question that if an unlawful killing is conducted by an AWS who would be held responsible for it.¹⁰⁷ It will be difficult to determine who would be accountable for violations of IHL committed by an autonomous weapon system. The AWS will have no sense of ethics or sense of punishment so it would make little sense to attribute it with responsibility. Some simply say that the programmers will be liable for the violations. Yet, since the machine can select and attack targets autonomously, programmers may not be liable for each instance of violation of IHL rules.

⁹⁷ Protocol to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects (Protocol IV, entitled Protocol on Blinding Laser Weapons), 13 October 1995, 33 ILM 1218 (entered into force 30 July 1998).

⁹⁸ Draft Final Report, 2013 Session, Meeting of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, (15 November 2013), CCW/MSP/2013/CRP at para 32, online: Reaching Critical Will

<http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/ccw/MSP-2013/Documents/draftreport.pdf>.

⁹⁹

[https://www.unog.ch/80256EE600585943/\(httpPages\)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/F027DAA4966EB9C7C12580CD0039D7B5?OpenDocument).

¹⁰⁰ Bonnie Docherty, Losing Humanity: The Case against Killer Robots (Cambridge, MA: Human Rights Watch, 19 November 2012), 2, accessed 10 March 2017, <https://www.hrw.org/report/2012/11/19/losing-humanity/case-against-killer-robots>.

¹⁰¹ Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons. Expert meeting, Versoix, Switzerland, 15–16 March 2016.

¹⁰² Report of the 2015 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), Submitted by the Chairperson of the Informal Meeting of Experts, UN Document, CCW/MSP/2015/3, 2 June 2015.

¹⁰³ CCW Meeting of Experts on Lethal Autonomous Weapon Systems 13–16 May 2014. <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/ccw/2014/ccwreport/CCWR1.5.pdf>

¹⁰⁴ Ray Acheson, *Editorial: Ethics, law, and principles of humanity*, CCW report, Final Edition Vol.1, No.5, 2014 available at <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/ccw/2014/ccwreport/CCWR1.5.pdf>.

¹⁰⁵ Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons. Expert meeting, Versoix, Switzerland, 15–16 March 2016.

¹⁰⁶ ICRC (2014) *Autonomous weapon systems technical, military, legal and humanitarian aspects*, Report of an Expert Meeting held 26–28 March 2014 (published November 2014), <https://www.icrc.org/en/download/file/1707/4221-002-autonomous-weapons-systems-full-report.pdf>.

¹⁰⁷ Human Rights Watch 'Losing Humanity: The Case Against Killer Robots', with International Human Rights Clinic (IHRC), Harvard Law School (2012), at 42.

For any criminal liability the programmer or any other human must be attributed with intent to commit IHL violation or negligence on his part, but in case of AWS programmer might not have intended the actions AWS took. The software of these AWS will consist of millions or billions of lines of coding by multitude of programmers and despite all this AWS could act in an unpredictable manner. So on which programmer do we impose the intent and the resultant liability, it would be very unfair.¹⁰⁸ A programmer will certainly be liable if he intentionally programs autonomous weapon to commit war crimes, and a commander will certainly be liable if he uses AWS in unlawful manner. Design defects and programming errors could possibly be governed by product liability laws.¹⁰⁹ Professor Marco Sassòli of University of Geneva, Switzerland believes that AWS are not addressees of the law only humans are, so their autonomy must be limited otherwise we won't be able to predict what they'll do and a human being cannot be made responsible for AWS's conduct.¹¹⁰ But would it be legally and morally right to hold a manufacturer or programmer liable for war crimes when these people won't have any *mens rea* and the causal link between these people and the killing would be so far removed.

State Responsibility

It is a principle of international law that if state organs commit any unlawful act a state is responsible for them and this has been also provided in the Geneva conventions¹¹¹ and API¹¹². Question that arises is whether AWS be treated as 'persons' making states liable for their actions.

Individual criminal responsibility

The basic jurisprudence of individual criminal liability revolves around the accused being culpable i.e., accused having 'intent and knowledge'.¹¹³ AWS would work on algorithms and computer codes it is hard to imagine how could we impose 'intent and knowledge' to the AWS, and even if we did how could we possibly punish the AWS.

Conclusion and Recommendations

AWS were a subject of science fiction a few decades ago and now the development of AWS is attracting a lot of investment and interest of numerous states. This development is rightly causing unrest among the international community, media, NGOs etc. Introduction of these AWS will bring with them a lot of legal implications which must be dealt with. Firstly, we have to agree on a universal precise definition of

'autonomous weapons' should be our first task. Such definition should be flexible enough to incorporate future developments in the field of AWS. Then, more participation in the discussion is required as only small number of countries have participated in the informal meeting of experts. Developing countries and those not involved in development of such technology must participate as well. We have to understand that agreeing on a multilateral international instrument to ban or regulate the AWS will be difficult and complicated, since the AWS technology and artificial intelligence is also going to be used for other civilian purposes and any decision on AWS is likely to affect the use of technology in civilian sphere. The domestic review mechanism should not be trusted unless a supervisory body inspects the weapons. Imposing individual criminal responsibility on anyone would be nearly impossible due to lack of intent in AWS. Some scholars recommend "upstream regulation" i.e., imposing restrictions at the development stages itself, so that the AWS that cross the line are never developed at all. While some researchers prefer "downstream regulation" i.e., checking legality of an AWS only after its full development.¹¹⁴ Upstream regulation is preferable to downstream regulation. ICRC believes three approaches could be adopted by the world towards AWS. First, a state itself follows the obligation to review mechanism strictly in compliance with IHL. Second, states together limit the autonomy in a weapons system. Third, states agree to make human control element mandatory in AWS and also put minimum human control parameters. ICRC believes third approach is the one that should be adopted and that seems to be our best hope to regulate AWS.

¹⁰⁸ P. Lin, G. Bekey, and K. Abney, 'Autonomous Military Robotics: Risk, Ethics, and Design', report prepared for the US Department of Navy, *Office of Naval Research*. California Polytechnic State University (2008).

¹⁰⁹ A.M. Johnson and S. Axinn, 'The Morality of Autonomous Robots', 12 *Journal of Military Ethics* 2, (2013), at 132.

¹¹⁰ Marco Sassòli, *Can autonomous weapon systems respect the principles of distinction, proportionality and precaution?* [Autonomous weapon systems: Technical, military, legal and humanitarian aspects. Expert meeting, Geneva, Switzerland, 26-28 March 2014.

¹¹¹ Geneva Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field, Article 51. Also Geneva Convention (GC) II, Article 52, GC III, Article 131, GC IV, Article 148.

¹¹² API, Article 91.

¹¹³ Rome Statute, Article 30.

¹¹⁴ Kenneth Anderson and Matthew C. Waxman, "Law and Ethics for Autonomous Weapon Systems: Why a Ban Won't Work and How the Laws of War Can," Stanford University, Hoover Institution Press, Jean Perkins Task Force on National Security and Law Essay Series, 9 April 2013.