FACULTY OF LAW
Lund University

Ajda Hosseini Ghasemi

Semi-Autonomous Weapon Systems in International Humanitarian Law

- A study of the new decision-making and responsibility issue in International Humanitarian Law relating to Semi-Autonomous Weapon Systems

JAMM04 Master Thesis

International Human Rights Law
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Supervisor: Gregor Noll

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Ajda Hosseini Ghasemi

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Summary

The purpose of my Master Thesis is to examine, in detail, how current international law relates to autonomous weapon systems. The background for this project is that the requirement of current international humanitarian law presupposes that the characters of war, namely soldiers and military officers, are human beings. Warfare has, however, changed increasingly since the Geneva Conventions were written in August 1949. War is now increasingly fought with machines or virtual networks that are somehow controlled by humans, and this method of warfare is here to stay. Artificial intelligence has made war-machines less dependent on human control and thus more autonomous. The use of autonomous weapon systems will cause difficulties in establishing responsibility for the implementation of humanitarian law when numerous individuals are involved, and when the *actor* is a robot. The question of accountability is therefore essential since this issue will arise in the framework of all fully autonomous and semi-autonomous weapon systems.

The concept of autonomous weapon systems (AWS) will be defined more precisely alongside three different forms of autonomy in order to demonstrate its compliance with current international law. The analysis will begin from the bottom of the decision-making process to gradually eliminate all candidates who do not have sufficient knowledge to assume accountability. The candidates that will be observed are the military personnel, the acquisition team, the programmer or manufacturer, corporations, and lastly, the robot. Each chapter will build upon the next and include a descriptive part in the beginning with an analysis toward the end of the thesis. Parallels will be drawn between the new legal phenomenon and existing legal systems.

The thesis will later lead to the conclusion that States cannot absolve themselves of their obligations under international humanitarian law when

deploying autonomous weapon systems on the field. The State will still remain responsible for ensuring that relevant and fundamental standards are met and that international law is respected. The thesis will also argue that there is no fully autonomous AWS existing at the present time, and AWSes can therefore not itself be held accountable for crimes under international law. Nevertheless, this new character of warfare will bring real challenges for military commanders, not least in how to manage the information to ensure proper conduct but also to maintain discipline amongst subordinates.

An effective system of accountability for autonomous weapon systems is when the lines for responsibility are well defined. To the extent that the autonomy of semi-autonomous causes gaps in current accountability instruments, it will be argued that the gaps can be filled through establishment of a new framework of command responsibility with a technical expert as a vital subordinate.

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Sammanfattning

Syftet med mitt examensarbete är att undersöka i detalj hur gällande folkrätt förhåller sig till autonoma vapensystem. Bakgrunden till detta projekt är att internationell humanitär rätt förutsätter att aktörerna i kriget, soldater och officerare är människor. Krigföring har dock förändrats i allt högre grad sedan de första Genèvekonventionerna skrevs i augusti 1949. Krig kämpas numera med maskiner eller virtuella nätverk som på något sätt kontrolleras av människan, och denna metod av krigföring är här för att stanna. Artificiell intelligens har gjort krigsmaskiner mindre beroende av mänsklig kontroll och därmed mer självständiga. Den nya användningen av autonoma vapensystem kommer att orsaka svårigheter i fastställandet av ansvar för implementeringen av humanitär rätt när många enskilda personer är inblandade och den som *agerar* är en robot. Frågan om ansvar således är viktigt eftersom frågan kommer att uppstå inom ramen för alla hel- och halvautonoma vapen.

Begreppet autonoma vapensystem kommer att preciseras genom tre olika former av självständighet för att se användandets överensstämmelse med gällande internationell rätt. Analysen kommer att göras i samband med bedömningen av den frågeställning som börjar längst ner i beslutsfattandet för att senare gradvis eliminera alla kandidater som inte hade tillräckliga kunskaper för att åta ansvar. De kandidater som kommer att observeras i uppsatsen är den militära personalen, personen/personer som anskaffar vapnet, programmeraren eller tillverkaren, företag och slutligen roboten. Varje kapitel kommer att innehålla en beskrivande del i början med en analys mot slutet av uppsatsen. Paralleller kommer även att dras mellan det nya rättsliga fenomenet och befintliga rättssystem.

Uppsatsen utgår sedan till slutsatsen att staterna inte kan frita sig från ansvar och skyldigheter enligt internationell humanitär rätt genom upphandlandet av autonoma vapensystem på fältet. Staten kommer fortfarande att fortsätta

att ansvara för att se till att de relevanta normerna uppfylls och att folkrätten respekteras. Uppsatsen kommer även hävda att det inte finns helt självständiga AWS existerande i dagsläget, vilket leder till dess oförmåga att ställas till svars för brott mot internationell rätt. Dock, kommer den nya karaktären av krigföring skapa verkliga utmaningar för militära befälhavare, inte minst i hur man ska hantera informationen från vapensystemet för att säkerställa operationer men också för att upprätthålla disciplinen bland underordnade.

Ett effektivt system för ansvarsskyldighet för det autonoma vapensystemet är när linjerna för ansvar är väl definierade och definitiva. I den mån halvautonoma vapensystem orsakar ofullständigheter i nuvarande ansvarsinstrument, kommer uppsatsen hävda att dessa luckor kan fyllas genom inrättandet av ett nytt ramverk av befälsansvar med den tekniska experten som en avgörande underordnad.

Preface

It is said that time flies when you are having fun and the weeks that I had at my disposal for this paper have really flown by. When putting, after a long process, the finishing touches to this thesis, my thoughts go out to the people who have meant the most to me these past two years.

I would like to take this opportunity to thank everyone who helped me with the thesis. I would like to thank my lovely family who has supported me.

I would also like to thank Marwa Roomi and my Poya who puts up with me. Writing an essay takes time and requires a lot of patience and understanding from your loved ones, which Poya knows by now.

Finally, I want to thank my supervisor Gregor Noll, who supported me in my work, giving constructive criticism and always being available when I needed help. Thank you!

I hope that the reader will find the content of this thesis as interesting as I did when I first examined the subject.

Lund, 28 May 2014

Ajda Hosseini Ghasemi

Abbreviations

ATS	Alien Tort Statute
AWS	Autonomous Weapon Systems
BMC	Battle Management & Weapon Control
DOD	The US Department of Defense
ICL	International Criminal Law
ICRC	International Committee of the Red Cross
IHL	International Humanitarian Law
LAR	Lethal Autonomous Robotics
LOAC	Laws of Armed Conflict
LOIAC	Law of International Armed Conflict
LOW	Law of War
ROE	Rules of Engagement
UAV	Unmanned Aerial Vehicle

1 Introduction

> *"We're entering an era in which unmanned vehicles of all kinds will take on greater importance – in space, in the air and on land".[1]*

First we had humans fighting wars without machinery. Then we had humans fighting wars with weapons and machinery. Finally we will have the machinery and weapons on battlefields without humans. We are now facing a new beginning, entering a new era where warfare will be fought in ways that could not have been done earlier. Fully and semi-autonomous weapon systems will be fighting wars on the ground, in the sea and up in the air. This will result in fewer humans on the battlefield, and more robots that are controlled and programmed through computers. This form of warfare may be appealing at first, by displaying a new humane alternative to methods of war and means of armed conflict; however it will also present dangerous scenarios of total catastrophe. What happens when things do not go as planned or as programmed? How can you program a reaction to the unexpected? Who will be held responsible when something goes wrong? These questions raise concerns with regard to international humanitarian law. In legal terms, it is still unclear where liability lies; whether it is within the military chain or with the software developer/developers.

The new use of autonomous weapon systems will cause difficulties in establishing the form of responsibility for the implementation of humanitarian law when numerous individuals are involved and the *actor* is a robot. Although the technology behind unmanned systems is rapidly developing, there is a slow assessment of their legal aspects. The question of accountability is essential since the issue will arise in the framework of all fully autonomous and semi-autonomous weapon systems. This indicates a

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[1] President George W. Bush, Citadel speech, 11 December 2001, available at http://www.citadel.edu/root/presbush01, accessed on 2 February 2014.

need for a revised decision-making process, which could be collective, individual, or perhaps a new form of decision-making.

1.1   Research question

The thesis will examine who can be held responsible for the implementation of international humanitarian law when autonomous weapon systems have been used.

1.2   Purpose

This thesis aims to fill the gaps in current literature by examining in detail how current laws, international law and legislation apply to autonomous weapon systems and to answer the research question.

1.3   Method

I will review and consider the question of responsibility and organization regarding autonomous weapons. The thesis will present the changes in technology and assume that these changes will on their own exert pressure on the traditional decision-making process. The assessment of the research question will start at the bottom of the decision-making process in order to gradually eliminate all candidates who will not have the sufficient knowledge to assume responsibility before legal responsibility is placed on the Head of State.

Each chapter will build upon the next and include a descriptive part in the beginning with an analysis toward the end of the thesis. I will draw parallels and compare new legal phenomena with existing legal systems.

Not a lot of research has been done in this area, and the limited material that is available has been produced in the US and UK. The thesis will also

include secondary literature and some case studies, but will mostly rely on existing international humanitarian law.

1.4   Limitations

In my thesis I intend to carry out a thorough analysis of the legal issues involved in the development of *new weapons* in international humanitarian law but will only mention the notion of cyber warfare without discussing it further. Different autonomous weapons systems will be mentioned throughout the thesis but there will not be any further elaboration on the weapons and their functions. The fully autonomous weapon system will be briefly discussed; however the thesis's primary focus will be on traditional international warfare between two sovereign States and on the usage of the semi- autonomous weapon systems and how this will challenge international humanitarian law.

2 New and advanced weapons

The function of International Humanitarian Law (IHL) is to achieve a justifiable balance between the necessities of war and humanitarian requirements. Thus, the requirements of IHL are intended to ease the human suffering caused by war and to humanize war, although the latter term may be considered by some as a contradiction. All of this presupposes that the actors of the war, the soldiers and military officers, are human. Warfare has, however, changed increasingly since the Geneva Conventions were written in August 1949.[2]

War is now increasingly fought with machines or virtual networks that are somehow controlled by humans, and this method of warfare is here to stay. Artificial intelligence has made the war-machines less dependent on human control and thus more autonomous. The Oxford dictionary has defined the word *autonomous* as "having the freedom to govern itself or control its own affairs"[3]. The weapons of the present warfare have developed to a new level of autonomy in different ways depending on the weapon.

This chapter will introduce the new notion of autonomous weapon systems (AWS). It will illustrate an example of an AWS and describe the different types of human involvement in an AWS.

2.1 The notion of autonomous weapon systems in warfare

Before turning to the real issue of the thesis, it is essential to examine the technological context in which the law will be applied. The starting point for

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[2] Available at http://www.icrc.org/applic/ihl/ihl.nsf/vwTreaties1949.xsp, accessed on 30 February 2014.
[3] Available at http://www.oxforddictionaries.com/definition/english/autonomous, accessed on 29 March 2014.

any discussion is the definition of the item triggering the concern, in this case the weapon system. Although it would be a mistake to assume that AWSes will resemble remote pilot systems,[4] it could however share some similarities. The notion of AWSes or lethal autonomous robotics (LARs)[5], as it is also called, has been defined by the US Department of Defense as: "A weapon system that, once activated, can select and engage targets without further intervention by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation."[6]

An AWS can also be seen as a machine or robot, since both are items that are manufactured by humans. All programmed robotic systems, including an AWS, include three parts; 1) the system, which is given instruments through programming and can provide information; 2) artificial intelligence or a processor that selects how to respond to a given situation; and 3) executions that act upon the decision made by either the human operator or the machine itself.[7]

2.1.1 Different types of human involvement in the AWS

AWSes are advanced weapon systems that are an *improved* version of previous weapons. The involvement of humans in these systems can be divided into three groups, where the participation of the human will be described by a so-called *loop*.

On the one hand, there is the AWS that has a degree of situational awareness, artificial intelligence, or processors that could decide to launch

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[4] Schmitt, Michael N. And Thurnher, Jeffrey S*., "Out of the Loop": Autonomous Weapon Systems and the Law of Armed Conflict,* 4 Harvard National Security Journal 23, 2013, page 240 available at http://ssrn.com/abstract=2212188 accessed on 10 April 2014.

[5] Both will be treated as synonyms for the purpose of this article.

[6] US Department of Defense, autonomy in weapons systems, directive 3000.09, 2012, (herein after called *Directive 3000.09)* pages 13–14

[7] Singer Peter W., *Wired for War,* Penguin Group Incorporated, 2009, (herein after called *Singer)* page 67.

an attack with a press of a button which requires significant human involvement in order for it to work, *a human in the loop*; and on the other hand there is the system which is fully autonomous and does not require any human participation, and is therefore considered *out of the loop*.[8] It should however be noted that the word autonomous or autonomy must be distinguished from the words *automated* or *automatic*. The term AWS in this context does not mean, nor is it meant to include, a concept of a moral agency or a free will.[9] Current development requires human participation in a *wider loop*, where the robotic system will be programmed with goals and the human operator will decide when to activate or deactivate the execution.[10]

Nevertheless, fully autonomous weapon systems must be separated from other categories of weapons; the crucial factor that will distinguish the *semi-autonomous weapons* from *fully- autonomous weapons* is supervision. Semi-autonomous weapon systems are systems that will target a potential military object automatically and *signal* its human operator. The human operator will then have the possibility of deciding whether he or she wants to launch an attack on the target; in other words, the human operator must select the attack and *press the button*. This is in contrast with fully-autonomous weapons that interpret the pre-programmed goals into tasks and achieve them without requiring any further human intervention.[11]

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[8] UN Human Rights Council, *Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions*, 9 April 2013, A/HRC/23/47, (herein after called *Report A/HRC/23/47*) paragraph 39, Available at: http://www.refworld.org/docid/51a747c54.html, accessed 8 May 2014.

[9] *Singer,* (See note 7) page 101.

[10] *Report A/HRC/23/47,* (See note 8) paragraph 40.

[11] International Committee of the Red Cross, *Weapons: ICRC statement to the United Nations*, 2013, availed at http://www.icrc.org/eng/resources/documents/statement/2013/united-nations-weapons-statement-2013-10-16.htm accessed on 6 April 2014.

The following table will display the involvement of humans in an AWS, as explained above.[12]

Scale of AWS	
Automated attack, not supervised	Human out-of-the-loop, full autonomy
Automated attack, supervised	Human on-the-loop, the autonomy is supervised
Automated targeting only, manned attack	Human in-the-loop, the autonomy is supervised

One example of an AWS that will be illustrated is the Iron Dome from Israel. The Iron Dome is a mobile defense solution. The purpose of the system is to counter short-range 155 mm artillery shell threats and rockets. The system consists of a special missile that detonates any target in the air, in all weather conditions, within seconds.

The system is designed to detect and identify artillery shells or rocket launches and their route. The target data is later communicated to the Battle Management & Weapon Control (BMC) for processing. Human operators estimate the expected impact quickly and analyze the data received from the Iron Dome. If the assessment made by the human operators indicates that the rocket route will pose a grave threat to Israel, a military command must make a choice within seconds and a missile is launched against the threat. The system will route updates from BMC.[13]

Another example is the United Kingdom's Taranis jet-propelled combat drone prototype that can autonomously search for, identify and trace

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[12] Bolt, Lieutenant-Colonel A., "The Use of Autonomous Weapons and the Role of the Legal Advisor", in *International Humanitarian Law and the Changing Technology of War*, (herein after called *Bolt*) ed. Saxon, Dan, vol. 41, Martinus Nijhoff Publisher, 2013, page 130.

[13] Available at http://www.rafael.co.il/marketing/SIP_STORAGE/FILES/6/946.pdf, accessed on 8 May 2014.

enemies; nevertheless, it can only engage in an attack if so authorized by mission control. The drone can also defend itself against enemies.[14] A third example of the weapon system is the Samsung Techwin surveillance and security guard robots; they are deployed in the demilitarized zone between North and South Korea. These robots will spot targets through infrared sensors. The robots have an *automatic mode* but are currently controlled by humans, in other words, they are still semi-autonomous.[15] The US Department of Defense (DoD) has a great interest in the AWS and has allocated approximately $36,424 million on developing and acquiring the unmanned systems on the ground, air and sea in 2011.[16]

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[14]Available at http://www.baesystems.com/product/BAES_020273/taranis, accessed on 2 April 2014.
[15]Available at http://singularityhub.com/2010/07/25/armed-robots-deployed-by-south-korea-in-demilitarized-zone-on-trial-basis, accessed on 2 April 2014.
[16] US Department of Defence, "Unmanned Systems Integrated Roadmap FY2011-2036"Reference number 11-S-3613, 2011, page 13.

3 Challenges for current international humanitarian law compliance

As previously mentioned in the introduction, AWSes will result in less human soldiers and more robots acting on the field. The principal challenges facing AWSes from a legal perspective are its compliance with IHL, such as the principle of distinction and proportionality. Another provision that is applicable is Article 36 of Additional Protocol I, which obliges all State Parties to determine whether the use of a new weapon, method, or means of warfare would be prohibited under IHL.[17]

This chapter is a brief introduction locating these principles within IHL, and will focus on (1) the principle of distinction; (2) the principle of proportionality; (3) the principle of precaution; (4) military necessity; (5) the Martens clause; and (6) Article 36 of Additional Protocol I. This chapter will also attempt to outline the challenges to these principles that will arise with the introduction of AWSes.

3.1 The principle of distinction

The principle was initially set forth in the St. Petersburg Declaration, which prescribes that: "the only legitimate object which States should endeavor to accomplish during war is to weaken the military forces of the enemy".[18]

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[17] Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (herein after called *Additional Protocol 1*), adopted in 8 June 1977 and entered in force 7 December 1978.

[18] Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight, drafted in 1868, Saint Petersburg and entered into force on 11 December1868, preamble (cited in Schindler, D. and Toman, J., *The Laws of Armed Conflicts*, Martinus Nihjoff Publisher, 1988, page102.)

The principle is now codified in Articles 48, 51(2) and 52(2) of Additional Protocol I and is a principle that lies at the heart of an armed conflict in a targeting operation. To date, no reservations have been made by any State Party to this principle.[19]

The principle recognizes civilian damages or civilian casualties during a lawful attack on a military target. Such attacks will be considered lawful if they are proportionate in relation to the direct and tangible military advantage expected from the attack.[20] The distinction between combatants and civilians is a crucial feature in international humanitarian law, where the former may legally be targeted in military operations and the latter may not, with certain exceptions.[21] The inability for AWSes to distinguish between combatants and civilians because of its need to be pre-programmed might be a great obstacle.[22] Benjamin Krishnan has stated that "[d]istinguishing between a harmless civilian and an armed insurgent could go beyond anything machine perception could possibly do."[23].

Can an AWS distinguish between civilians taking direct part in the armed conflict and armed civilians such as law enforcement personnel or maybe hunters? AWSes have no sensing or visual systems that can make a distinction between the actors and non-actors on the field.[24] The robots do not possess the necessary human qualifications to examine an individual's intention on the field, such as understanding the individual's emotional

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[19] *Additional Protocol 1*, (See note 17) Article 48, Article 51(2) and Article 52(2)

[20] *Ibid.,* Article 57(2)

[21] Turns, David, "The Law of Armed Conflict (International Humanitarian Law)", in *International Law*, Ed. Malcolm D. Evans, 3rd ed., Oxford University Press, 2010, (herein after called *Turns)* pages 830-831.

[22] Sharkey, Noel, *Grounds for Discrimination: Autonomous Robot Weapons*, 2008, (herein after called *Sharkey*) page 87, available at http://rusi.org/downloads/assets/23sharkey.pdf, accessed on 2 April 2014.

[23] Krishnan, Armin, *Killer Robots: Legality and Ethicality of Autonomous Weapons*, Ashgate Publishing Limited, 2009, (herein after called *Krishnan*) page 99.

[24] *Sharkey,* (See note 22) page 87.

state. This can only be done if the examiner is a human combatant.[25] For example, an AWS sees an individual running with two other individuals away from the robot with unidentified objects in their hands. This is in fact a mother that is running after her two children playing with toy guns, to get them out of the field. A human combatant would be able to assess the situation in question as a harmless act and therefore not a threat, while a robot might only see individuals that are running and armed with weapons and could launch an attack on the targets.[26] It would also be difficult for an AWS to identify whether an enemy solider has become *hors de combat*[27] (a non-combatant) or if the situation is merely deceitful. For example, an AWS locates an enemy combatant, thus launches an attack and misses the combatant; however the combatant fakes an injury and lies down. Or in a vice-versa situation, an AWS launches an attack that injures a combatant. The assessment of the situation is a difficult task for a human solider, let alone for an AWS. Nevertheless, a human solider will be able to assess the entire context, whereas the AWS will only focus on specific visions or aspects because of its programming.

Would the AWS be able to determine whether an enemy combatant is making a sincere effort to surrender? All the above-mentioned scenarios are difficult, very sensitive, and indeed complex. There is no clear characterization of how a civilian should act, look or behave, this needs to be determined in each specific situation and on a case-by-case basis. A clear definition of who is a civilian is required to be established in order for an AWS to be programmed with the capacity to correctly distinguish a combatant from a civilian, which today is near to impossible. In other words, the necessity for a human commander to be in control remains until such requirement is met.

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[25] Guarini, Marcello and Bello, Paul, "Robotic Warfare: Some Challenges in Moving from Noncivilian to Civilian Theaters," (herein after called *Guarini*) in *Robot Ethics*, eds., Lin, Abney, and Bekey, The MIT Press, 2011, page 138.
[26] *Ibid.,* page 130.
[27] *Additional Protocol I,* (See note 17) article 41.

3.2   The principle of proportionality

This principle is codified in Article 51(5)(b) of Additional Protocol I, and affirmed in Article 57.

> "An attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.[28]

The Supreme Court of Israel has stated, in the case of *Beit Sourik Village Council v. Government of Israel*[29], that the principle of proportionality is based on three tests; 1) a request for a fit between means and goal; 2) the application of the least damaging means test; and 3) that damage caused to the individual by the means commissioned must be of appropriate proportion to the advantage gained from it.[30] In other words, the principle prohibits attacks on military targets if the predictable civilian harm of an attack outweighs its expected military advantage.[31] The principle also limits the incidental collateral damage to protected objects and persons.[32]

The context of the situation is vital to determining the proportionality and requires the military commander to take all feasible precautions when launching and planning an attack, such as warning the civilian population of an attack or to suspend or cancel an attack if it becomes evident that the attack cannot be executed without disproportionate collateral damage or that

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[28] *Additional Protocol I,* (See note 17) Article 51(5)(b).

[29] *Beit Sourik Village Council v. The Government of Israel*, HCJ 2056/04, Israel: Supreme Court, 30 May 2004, available at http://www.refworld.org/docid/4374ac594.html, accessed 14 May 2014

[30] Shaw N. Malcolm, *International Law*, 6th ed., Cambridge University Press, 2008, (herein after called *Shaw*) page 1182.

[31] *Additional Protocol 1,* (See note 17) art. 51(5)(b).

[32] International Committee of the Red Cross, *International Humanitarian Law and the challenges of contemporary armed conflicts,* 31st International Conference 2011, availed at http://www.icrc.org/eng/assets/files/red-cross-crescent-movement/31st-international-conference/31-int-conference-ihl-challenges-report-11-5-1-2-en.pdf, accessed on 5 April 2014.

the object is not a military object.[33] When determining the proportionality of a military operation, great importance must be attached to the complete overall picture and context. The US Air Force has specified that "proportionality in attack is an inherently subjective determination that will be resolved on a case-by-case basis."[34] In other words, the evaluation of what the likely collateral damage will be to civilian objects has to be completed before an actual launch of an attack.[35]

The Diplomatic Conference was the conference where the adoption of the Additional Protocols was made. Mexico specified that Article 51 was so indispensable that it "cannot be the subject of any reservations whatsoever since these would be inconsistent with the aim and purpose of Protocol I and undermine its basis".[36] The United Kingdom followed Mexico and stated that Article 51(5)(b) was "a useful codification of a concept that was rapidly becoming accepted by all States as an important principle of international law relating to armed conflict".[37] These statements illustrate the importance of Article 51 of Additional Protocol I.

3.2.1 The principle of precaution

The principle of precaution obligates each State party to a conflict to take all feasible precautions to protect both the civilian population and objects under

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[33] *Additional Protocol I,* (See note 17) Article 57.

[34] Air Force Judge Advocate General's Department, "Air Force Operations and the Law: A Guide for Air and Space Forces" first edition, 2002, http://web.law.und.edu/Class/militarylaw/web_assets/pdf/AF%20Ops%20&%20Law.pdf (accessed March 27, 2014), p.27.

[35] International Operational Law Department, The Judge Advocate General's Legal Center and School, US Army Charlottesville, Virginia, VIRGINIA LTC Bovarnick, Jeff A. Et al., *Law of war deskbook,* (herein after called LOW) *Ed.,* CAPT Bill, Brian J., 2010, page 155.

[36] Henckaerts, Jean-Marie et al., *Customary International Humanitarian Law: Volume 1: Rules,* Cambridge University Press, 2005, (herein after called *Henckaerts*) page 37

[37] *Ibid.,* page 4

its control against the effects of any attacks.[38] The article states the following;

> "[…] (i) do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not subject to special protection but are military objectives within the meaning of paragraph 2 of Article 52 and that it is not prohibited by the provisions of this Protocol to attack them;
>
> (ii) take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects;
>
> (iii) refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;
>
> (b) an attack shall be cancelled or suspended if it becomes apparent that the objective is not a military one or is subject to special protection or that the attack may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;
>
> (c) effective advance warning shall be given of attacks that may affect the civilian population, unless circumstances do not permit.
>
> 3. When a choice is possible between several military objectives for obtaining a similar military advantage, the objective to be selected shall be that the attack on which may be expected to cause the least danger to civilian lives and to civilian objects.

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[38] *Additional Protocol I,* (See note 17) Article 58(c).

4. In the conduct of military operations at sea or in the air, each Party to the conflict shall, in conformity with its rights and duties under the rules of international law applicable in armed conflict, take all reasonable precautions to avoid losses of civilian lives and damage to civilian objects.

5. No provision of this Article may be construed as authorizing any attacks against the civilian population, civilians or civilian objects."

The principle has been restated in numerous military manuals.[39] One example is The US Naval Handbook from 1995 which prescribes: "All reasonable precautions must be taken to ensure that only military objectives are targeted so that civilians and civilian objects are spared as much as possible from the ravages of war."[40]

It is very unlikely that an AWS could be pre-programmed in a way to be able to comply with the principles of proportionality and precaution whilst *managing* a number of different unforeseeable scenarios. For example: imagine an AWS that has identified a military leader in a building located in the capital of the state and the program therefore decides to launch an attack. The AWS will now face two problems. Firstly, the target is located in a capital city that indicates a crowded area, which means that the situation on the ground will change constantly; civilian cars moving, bicycles or even school buses driving in the vicinity of the target. Secondly, the AWS must also assess the expected military advantages of attacking a targeted person against casualties and the number of civilians.

The AWS's inability to evaluate a variety of different circumstances will interfere with its ability to comply with the principle of distinction. The

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[39] Available at http://www.icrc.org/customary-ihl/eng/docs/v1_cha_chapter6_rule22, accessed on 2 April 2014.

[40] United States, *The Commander's Handbook on the Law of Naval Operations,* NWP 1-14M7MCWP 5-2.1/COMDTPUB P5800.7, issued b the Department of the Navy, Office of the Chief of Naval Operations and Headquarters, US Marine Corps, and Department of Transportation, US Coast Guard, October 1995, §8.1.

interpretation of the shifting and complex scenarios will consistently invoke and require human judgment. The ICRC commentary has stated that making a decision regarding proportionality is based on common sense and the good faith of military commanders.[41] Professor Michael Schmitt has stated, "While the rule is easily stated, there is no question that proportionality is among the most difficult of LOIAC [law of international armed conflict] norms to apply."[42]

3.3   Military necessity

Military necessity is part of the assessment of proportionality, not an independent principle of IHL. It requires an assessment of the situation at hand. The military necessity principle, which is part of the legal justification for targeting an object, demands an analysis of the situation. The principle of military necessity forbids the use of unnecessary force.[43] For example, a goal will not be legitimate because its aggressor brings a military advantage. It may for example be a military advantage to attack civilians serving in an armor factory, but it is still illegal under the principle of distinction.

The principle has also been described as "a content-dependent, value based judgment of a commander".[44] The AWS must be able to first identify a

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[41] International Committee of the Red Cross, *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949,*(herein after called (*Commentary on the Additional Protocols)* pages 679-682, available at http://www.icrc.org/ihl.nsf/COM/470-750073?OpenDocument, accessed on 4 April 2014.

[42] Schmitt, Michael N., "Fault lines in the Law of Attack", in *Testing the Boundarieas of International Humanitarian Law*, Breau, Susan & Jachec-Neale, Agnieszka, eds., British Institute of International and Comparative Law, 2006, page 293

[43] Gillespie, Tony and West, Robin, *Requirements for Autonomous Unmanned Air Systems Set by Legal Issues,* The International C2 Journal, vol. 4, nr 2, 2010, (hereinafter called *Gillespie*) page 9, available on http://www.dodccrp.org/files/IC2J_v4n2_02_Gillespie.pdf, accessed on 4 April 2014.

[44] Kastan, Benjamin N., *"Autonomous Weapon Systems: A Coming Legal Singularity?",* 2012, (herein after called *Kastan*), Journal of Law, Technology and Policy 45, 2013, page 17, available on http://works.bepress.com/benjamin_kastan/1, accessed March 27, 2014.

military target, and second to assess whether the destruction of this target could result in a *definite military advantage*.[45] If the AWS cannot decide whether the target is a cultural object, medical facility, civilian, or military, then it will not be able to decide whether the destruction of the target would result in a military necessity or a military advantage.[46]

3.4   Martens clause

This is the clause that encompasses rules outside those found in international treaties. The clause requires that means of warfare should be evaluated along with the dictates of public conscience and in correspondence with the principles of humanity.[47]

> "Until a more complete code of the laws of war is issued, the High Contracting Parties think it right to declare that in cases not included in the Regulations adopted by them, populations and belligerents remain under the protection and empire of the principles of international law, as they result from the usages established between civilized nations, from the laws of humanity and the requirements of the public conscience."[48]

Experts and others have expressed strong opinions about weapon systems complementarity to the Martens Clause and on whether AWSes should be given the mandate to take the decision on when to launch an attack without the supervision of a human. It is still unclear what this means in reality; however, large majorities think that the idea of an automated decision is unacceptable and shocking.[49]

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[45] *LOW, (*See note 35) page 140.
[46] *Gillespie,* (See note 43) pages 9-10.
[47] *Additional Protocol I,* (See note 17) article 1(2)
[48] International Review of the Red Cross, No. 317, *The Martens Clause and Laws of Armed Conflict* by Ticehurst Rubert, 1997, available at
http://www.icrc.org/eng/resources/documents/misc/57jnhy.htm , accessed on 13 May 2014
[49] Human Rights Watch, *Losing Humanity: The Case against Killer Robots,* 2012 page 35, available at

3.5   Article 36 of additional protocol I to the Geneva Conventions

Article 36 of additional protocol I prescribes that States should review new and modified weapons.

> "In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party."[50]

AWSes should be subject to such review, which also has been specially highlighted by International Committee of the Red Cross (ICRC).

This principle applies to all States, irrespectively of them being a party to the Protocol or not.[51] The ICRC has argued that the obligation is binding for all States because "the faithful and responsible application of its international law obligations would require a State to ensure that the new weapons, means and methods of warfare it develops or acquires will not violate these obligations."[52] The evaluation of the weapons should take place at an early stage of their development and continue throughout the whole process.[53] In other words, the time is now.

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http://www.hrw.org/sites/default/files/reports/arms1112_ForUpload.pdf, accessed on 2 February 2014.

[50] Additional Protocol I, (See note 17) Article 36.

[51] *Commentary on the Additional Protocols,* (See note 41) pages 427-428.

[52] International Committee of the Red Cross, *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,* 2006, (herein after called *A Guide to the Legal Review of New Weapons*) page 4, available at
http://www.icrc.org/eng/assets/files/other/icrc_002_0902.pdf, accessed on 30 April 2014.

[53]*Ibid.,* page 24.

The purpose of this principle is to evaluate whether or not the weapon should be prohibited under IHL and to safeguard IHL. Firstly, States should study prohibitions in IHL and other treaties for already existing weapons.[54] However, there is no existing treaty today that forbids AWSes as a whole. Secondly, States should then, evaluate AWS compliance with other treaties and international customary law. The rules accepted, in particular under international customary law, are the principles of distinction, proportionality and military necessity, also known as the cornerstones of IHL. Indeed, the Martens clause might be relevant too.[55] States shall then cease the development of any weapon that fails to meet legal requirements and stop investing any further in the technology.

Is Article 36 enough to safeguard IHL? AWSes can comply with all relevant international instruments but still be a problem under IHL due to issues relating to accountability. Article 36 will only focus on the weapon's development and employment and not other issues.

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[54] *A Guide to the Legal Review of New Weapons*, (See note 52) page 24.
[55] *Ibid.,* pages 16-17.

4 The problem with accountability realating to the conduct of the AWS

AWSes are a new and multifaceted weapons system, as explained in chapter 2.1, which despite its superior skills, will sooner or later reach the point where malfunction is imminent. This is when, and why, the question of accountability will become an issue.

AWSes are produced and deployed through a number of people such as the military commander, the acquisition team, the programmer, and the manufacturer. The number of people involved in the process of creating an AWS and the semi-autonomous system itself will create an accountability vacuum because of its segment of autonomy. All of the candidates and items previously mentioned have a central role in the acts of an AWS that causes difficulties in establishing the accountability for an unlawful act caused by an AWS.

One question that remains unanswered is who may be held accountable when innocent people are injured.

This chapter will focus on the issue of accountability of AWSes.

4.1 State responsibility

State responsibility is a fundamental regulation of international law. The notion has developed from the doctrine of sovereignty and equality of States from the public international legal systems, and is a general rule of international law. A violation of international law will be followed by procedural and other consequences, such as reparations and so forth.[56]

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[56] *Shaw,* (See note 30) page 778.

Article 8 of the Draft Articles on Responsibility of States for Internationally Wrongful Acts [57], specifies that;

> "The conduct of a person or group of persons shall be considered an act of a State under international law if the person or group of persons is in fact acting on the instructions of, or under the direction or control of, that State in carrying out the conduct."[58]

The commentary to the article highlights the following, "Such conduct will be attributable to the State only if it directed or controlled the specific operation and the conduct complained of was an integral part of the operations"[59]. Hence, State responsibility exists independently of any individual criminal liability or intent.[60]

States are consequently responsible for its military and other agents, and thus liable for any and all violations of IHL.[61] This means that any State that deploys its armed forces with unmanned AWSes will be held liable as a matter of State responsibility for breaches of IHL. Nevertheless, States also have an obligation to disseminate and provide instructions to its armed forces in the field, such as imparting and implementing training programs, which include training in the law of armed conflicts (LOAC)[62], combined with appropriate instructions. Another obligation for States while implementing and upholding IHL is to investigate and to punish violations

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[57] Draft articles on Responsibility of States for internationally wrongful acts adopted by the International Law Commission at its fifty-third session (2001) (extract from the Report of the International Law Commission on the work of its Fifty-third session, Official Records of the General Assembly, Fifty-sixth session, Supplement No. 10 (A/56/10), chp.IV.E.1) (herein after called *Draft Articles*)

[58] *Ibid.,*

[59] *Shaw,* (See note 30) page 790.

[60] Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land, adopted in The Hague 18 September 1907, entered into force in 16 January 1910, (herein after *The Hague IV*) Article 3.

[61] *Additional Protocol I,* (See note 17) Article 91.

[62] *Turns*, (See note 21) page 842.

that have been committed by the State. The legal process could occur in either the national court or in international criminal courts. [63]

4.1.1   Responsibility of the acquisitioned

As mentioned in chapter 3.5, Article 36 of the additional protocol 1 requires the State to review the legality of the weapon, the AWS, at various phases of the weapon's development and deployment.[64] The phrase "in some or all circumstances"[65] in the article obliges all States to determine the legality of both the use and the *anticipated* use of the weapon at all phases of the process. The Third Committee of the Diplomatic Conference explained the following about the article:

> "It should be noted that [article 36] is intended to require States to analyse whether the employment of a weapon for its *normal or expected use* would be prohibited under some or all circumstances. A State is not required to foresee or analyse all possible misuses of a weapon, for almost any weapon can be misused in ways that would be prohibited."[66]

In other words, the language of Article 36 has been interpreted to mean that States must consider the expected use of the weapon as well, which is the use that will go beyond *normal* use and the *designed* uses. States must assess the legality of the weapons in the context of a few imaginable misuses.[67]

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[63]   See for example, Convention (IV) relative to the Protection of Civilian Persons in Time of War, adopted in Geneva 12 August 1949, entered into force 21 September 1950, Article 146.

[64] *Additional Protocol I,* (See note 17) Article 36.

[65] *Ibid.*

[66] Report to the Third Committee on the Work of the Working Group Committee III, Doc No CDDH/III/293 in Levie, Howard S., *Protection of War Crimes: Protocol 1 to the 1949 Geneva Conventions,* Ocena Publications, 1980, vol 2, page 287

[67] Fry, James D., *The XM25 individual semi-automatic airburst weapon system and international law: Landing on the wrong planet?*, University of New South Wales Law Journal, vol. 36(2), 2013, available at

The form of liability could also differ depending on whether it is a department making the decision or a sole person; however one fact that will not change is the need for expertise knowledge. How can an individual with no expert technical knowledge notice that something is wrong with the AWS? The individual or team acquiring the AWS will be held liable if the anticipated use of the weapon points toward incompatibilities with international instruments and cannot therefore escape liability by *lack of knowledge* but instead needs to assess the weapon before employing it and during the entire process.

4.2   Individual responsibility

The question of individual responsibility relating to unmanned AWSes is a multidimensional issue, which will raise some complex and inevitable issues for international law. As the robot system is semi-autonomous and deployed through a number of persons who are involved in different parts of the process, this will result in a vacuum arising with regards to the question of accountability. The fact that an AWS will carry the human decision-making responsibilities will cause difficulties in holding someone liable for violations of international law caused by actions of the AWS.

There are a few conceivable candidates to hold responsible for an AWS's wrongful acts. These candidates are the combatant, military commanders, the AWS's programmer or manufacturer, the corporation, or possibly the robot itself. The next section will review the different candidates for liability under IHL.

4.2.1   Military personal

As with acts of the armed forces, all acts committed by an entity or person, that by law has been empowered by governmental authority are attributable

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http://www.unswlawjournal.unsw.edu.au/sites/default/files/13_fry_unswlj_362.pdf, accessed on 2 April 2014, pages 701-702.

to the State.[68] This means that the actions of the military personnel are attributed to the State and the State will be held accountable for violations of international law. This section will deliberate on the role and accountability of the combatant and the military commander.

4.2.1.1   Combatant

Article 1 of the 1907 Hague Regulations[69] defines a combatant as; "1) To be commanded by a person responsible for his subordinates; 2) to have a fixed distinctive emblem recognizable at a distance; 3) to carry arms openly; and 4) to conduct their operations in accordance with the laws and customs of war. In countries where militia or volunteer corps constitute the army, or form part of it, they are included under the denomination "army.""[70]

Combatants are required to comply with correct conduct of hostilities. The fundamental principle forming the basis of these rules is Article 35 of the Additional Protocol I. The article states the following;

> "1. In any armed conflict, the right of the Parties to the conflict to choose methods or means of warfare is not unlimited. 2. It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering. 3. It is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment."[71]

A combatant is also prohibited from using the presence of civilian persons to render certain points or areas immune from military operations.[72]

AWSes can be used in two different scenarios. The first scenario is where the solider is the *main fighter* on the field and is using the AWS as a method

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[68] *Draft Articles*, (See note 57) articles 4 and 5.
[69] *The Hague IV,* (See note 59).
[70] *Ibid.,* Article 1.
[71] *Additional Protocol I,* (See note 17) Article 35.
[72] *Ibid.,* Article 51, Paragraph 7.

of war. In this scenario section 3 of Article 35 of Additional Protocol I is of particular relevance for the combatant using the AWS. As mentioned in section 3.5, relating to Article 36 of the Additional Protocol I, the review of the weapons is once again very important. The combatant may be held liable for using an AWS; if the combatant is aware of the chance that the AWS will work differently on the field then what it is designed to do.

The second scenario is when the AWS is employed as a *fighter* on the field along side the combatants. It would be unreasonable to hold a combatant liable for another combatant's actions, let alone for an item such as the AWS. However, there could be a possibility for a combatant to be held liable if the combatant could foresee or noticed an error or inaccuracy with the AWS and withholds the information from his or her commanders.

4.2.1.2   Military commander

Another option for holding someone individually accountable for a wrongful act is through the military commanders who are the ones that deploy the autonomous weapon systems on the battlefield.[73] Military commanders are responsible for controlling the behavior of their subordinates, and are thus liable for their failure.[74] The principle of holding the commander responsible for his or her subordinates' conduct applies if the military commander had knowledge or should have known that the individual planned a wrongful act but did nothing to hinder it.[75]   The military commander will be held liable if he or she: 1) personally sees or hears of unlawful acts being committed by his/her subordinates; 2) obtains reports of unlawful conduct of his or her troops through his or her subordinates, such as officers and staff, yet fails to prevent a violation; or 3) the military commander neglects or is reckless about his or her troops and is unaware of their actions. [76]

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[73] Sparrow, Robert, *Killer Robots,* Journal of Applied Philosophy, vol. 24, no. 1, 2007, (herein after called *Sparrow)* page 70.
[74] *Additional Protocol I,* (See note 17) Article 86(2)
[75] *Ibid.,* Articles 86(2) and 87.
[76] *Turns*, (See note 21) page 842.

Can an AWS be considered a subordinate to the military commander? Subordinate has been defined as "1) placed in or belonging to a lower order or rank, 2) of less importance; secondary, 3) subject to or under the authority of a superior, 4) subservient or inferior, 5) subject; dependent, 8) a subordinate person or thing"[77]. The definition of subordinate includes the word *thing*; which could in fact also apply to the AWS, making it subordinate to the commander.

The fact that an AWS, which is truly *fighting* on the ground, is semi-autonomous, will cause complications in establishing the accurate legal accountability for the military commander for acts of such AWS. This is due to the fact that the military commander cannot be held legally responsible for actions of machineries over which he or she did not have sufficient control or most likely did not understand, such as an AWS.[78]

On the other hand, the principle of command responsibility might apply in situations of autonomous weapons too. For example, it could apply in situations where the commander was aware in advance that the AWS might potentially perform unlawful actions against civilians and yet decides to deploy it anyway. This could entail legal accountability for the commander.[79] The United States has accepted the principle that those involved in AWS operations may be held accountable for their decisions. The Department of Defense has emphasized that "persons who authorize the use of, direct the use of, or operate autonomous and semi-autonomous weapon systems must do so with appropriate care and in accordance with the law of war, applicable treaties, weapon system safety rules, and applicable rules of engagement (ROE)."[80]

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[77] Definition taken from http://dictionary.reference.com/browse/subordinate?s=t, accessed on 28 April 2014.

[78] Andreas, Matthias, *The Responsibility Gap: Ascribing Responsibility for the Actions of Learning Automata,* Journal of Ethics and Information Technology, vol. 6, 2004 pages 176 and 183.

[79] *Additional Protocol I,* (See note 17) Articles 86(2) and 87.

[80] *Directive 3000.09,* (See note 6) page 13–14

Nevertheless, an ordinary commander might not possess the knowledge to be able to identify a threat pre-deployed because he or she did not program it, hence the inability to spot inaccuracies.[81] Thus the commander would not be able to hinder the actions of the AWS once it is on the battlefield, which he or she could have with a combatant.[82] The following scenario may illustrate what a situation like this might look like. The AWS identifies a target incorrectly and launches an attack; the military commander in charge fails to prevent this, which consequently ends with innocent civilian deaths. If the military commander was aware that the target was identified incorrectly before an actual launch but did not take the necessary precautions needed to prevent it, then the military commander would be held accountable for the unlawful act. However, it is almost impossible for a military commander to stop an attack after deciding to launch it. Correspondingly, whether the commander can be held responsible for acts of the AWS depends entirely on the technical configuration and other sources of information presented to the military commander before the actual launch.

4.2.2   The programmer or the manufacturer

An unlawful attack could also be the consequence of design or programming errors and/or flaws. The belief that an unlawful act is the reason for a violation of IHL would place responsibility on the programmer or the manufacturer of the AWS, which could be a very complex issue. The individual manufacturer, who otherwise is a civilian, will undoubtedly lay the foundation for the whole system; however, the AWS will still be semi-autonomous, which means that it will be operated by another human operator, as reviewed in chapter 2.1 of this thesis.

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[81] *Report A/HRC/23/47*, (See note 8) paragraph 78.
[82] *Ibid.,* paragraph 41.

4.2.2.1.1   Civil liability

This form of liability is new, and represents one possibility for holding programmer or manufacturer responsible for IHL violations occurring as a consequence of negligence from the programming.[83]

Conversely, the notion of being held liable for creations would induce programmers or manufacturers to construct exceptionally reliable AWSes in order to avoid liability.

4.2.2.1.2   Criminal liability

The laws regulating International Criminal Law (ICL) are all based on the vital fact that no one should be held liable for an unlawful act that he or she neither committed, nor participated in the planning of. Furthermore, no liability exists for omissions that cannot be attributed to him or her.[84] However, it is highly implausible that any company or manufacturer would sell any weapon that is naturally unsafe, knowing that the company or manufacturer could be held criminally liable for its use.[85] Further, it would be unreasonable to hold someone responsible when they are geographically displaced from and have a lack of knowledge of IHL, and of the rules of engagement (ROE).

Programmers or manufacturers of AWSes undoubtedly have proficient knowledge about the system that relates to each AWS, and could somehow detect inaccuracies or miscalculations in the system because they know how it should be. However, to hold them responsible for the actions of the AWS after they have sold it, when they cannot control or oversee its actions would be unfair, ineffective and unlawful. Furthermore, the UK Joint Doctrine on unmanned aircraft systems has affirmed that the responsibility for programmers and manufacturers will be discharged as soon as the

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[83] *Report A/HRC/23/47*, (See note 8) paragraph 79.
[84] Cryer, Robert, "International Criminal Law", in *International Law*, Ed. Evens Malcolm D., 3rd ed., Oxford University Press, 2010, (herein after called *Cryer)* pages 765-769.
[85] *Krishnan,* (See note 23) page 43.

country's relevant civilian air authorities or national military has permitted the weapon systems.[86]

4.2.3   Corporations

Programmers and manufacturers will assumingly have a position in a corporation. How will this affect the corporation? In what ways can the corporation be held liable? Assuming that the weapon system, as part of its discharge to the military, has been through a legal review and proven lawful[87], most weapon manufactures and programmers would consider that their liability would end there.

4.2.3.1   Civil liability for corporations

One State that recognizes exceptions under its Federal Tort Claims Act for *government contractors*, in cases where certain criteria are fulfilled, is the United States, thus barring courts from hearing liability claims.[88]

The notion of a "government contractor" received its definition through the case *Boyle v United Technologies Corporation*.[89] The petitioner in the case was David Boyle, a marine helicopter pilot. Boyle died when he crashed in a helicopter manufactured by United Technologies Corporation, the respondent. The Court concluded that regardless of the absence of specific legislation protecting government contractors from liability for design flaws, the question of their liability is still of a distinctive federal concern. The Court added that such claims could be barred if "[(1)] the United States approved reasonably precise specifications for the equipment; [(2)] the

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[86] Joint Doctrine Note 2/11 (JDN 2/11), *The UK approach to unmanned aircraft systems (UAS),* 2011, available at
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/337
11/20110505JDN_211_UAS_v2U.pdf, accessed on 30 April 2014, paragraph 510.
[87] *Singer,* (See note 7) page125.
[88] Chu, Vivian S. And Manuel, Kate M., *Torts Suits Against Federal Contractors: An Overview of the legal issues,* Congressional Research Report R41755, 2011, (herein after called *Chu*) page 12
[89]*Boyle Personal Representative of the Heirs and Estate of Boyle v. United Technologies Corporation,* 487 U.S. 500. U.S. Supreme Court: June 27, 1988

equipment conformed to those specifications; and [(3)] the supplier warned the United States about dangers in the use of the equipment that were known to the supplier but not to the United States."[90] This means that the notion would apply for all claims brought against manufactures and programmers of AWSes under US law.

The United States has another specific exception in its tort law relating to combat activities. The exception, in rule 28 U.S.C. § 2680(a)[91], excludes tort liability for contractors in claims arising out of combatant activates of the military forces during times of war.[92]. This was the case with the liability of Varian Associates Inc, who was the manufacturer of the Aegis Air Defense System. The manufacturer was excluded liability for the alleged design flaws in the system, *USS Vincennes,* which shot down an Iranian civilian aircraft, thereby killing 290 civilians.[93]

4.2.3.2   Criminal liability for corporations

Corporations in general cannot be prosecuted before an international court, as a rule of international law; neither can current international criminal law impose criminal liability on corporations. Article 25 of the Rome Statute recognizes individual criminal responsibility and defines it as follows: "(a) Commits such a crime, whether as an individual, jointly with another or through another person, regardless of whether that other person is criminally responsible;"[94] All the same, corporations cannot be criminally liable for unlawful actions under international law.

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[90] Boyle v. United Technologies Corp. and the Government Contractor Defense: *An Analysis Based on the Current Circuit Split Regarding the Scope of the Defense*, Sean Watts, William and Mary Law Review, Volume 40 | Issue 2 Article 9, 1999, page 689.

[91] Information available at http://www.law.cornell.edu/uscode/text/28/2680, accessed on 25 April 2014.

[92] *Chu,* (See note 87), pages 13-14.

[93] *Bentzlin v Hughes Aircraft Co*, 833 F. Supp 1486 (C.D. Cal. 1993)

[94] Rome Statue of the International Criminal Court, adopted in Rome 17 July 1988, entered into force 1 July 2002.

4.2.3.2.1   The Alien tort statute

The Alien Tort Statute ("ATS") is a law first adopted in 1789, which grants jurisdiction to federal district courts for "all causes where an alien sues for a tort only in violation of the law of a nation or of a treaty of the United States". Broadly speaking, this is a law that grants universal jurisdiction to federal district courts to hear lawsuits filed by non-US citizens on violations of international law.[95] It has also been used as a tool to sue transnational corporations for violations of international law in countries other than the United States. The territorial presence required for the Court to have jurisdiction is minimal; for example, it can be enough to have an office in the United States.[96] Nevertheless, the Supreme Court's decision in the case of *Kiobel v. Royal Dutch Petroleum, Co.*[97] (Shell) has rejected this embedded understanding of the ATS as a worldwide cause of action. The judgment specified that claims without *some* significant connection to the United States are not unlawful under the ATS, and therefore dismissed the *Kiobel* plaintiffs' claims against foreign defendants.

4.2.4   The robot

The idea that the robot itself should be held accountable has been brought up a few times. Krishnan writes;

> "At the moment, it would obviously be nonsensical to do this, since any robot that exists today, or that will be built in the next 10-20 years, is too ignorant to possess anything like intentionality or real capacity for agency. However, this might

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[95] Information about the Alien Tort Statue is taken from http://www.law.cornell.edu/wex/alien_tort_statute, accessed on 21 May 2013.
[96]Branson, Douglas M., *Holding Multinational Corporations Accountable – Achilles' Heels in Alien Tort Claims Act Litigation,* vol. 1, issue 8, Santa Clara Journal of International Law, 2011, (herein after called *Branson*) page 227, available at http://heinonline.org/HOL/LandingPage?collection=journals&handle=hein.journals/scjil9&div=12&id=&page=, accessed on 30 May 2013.
[97] *Kiobel, Individually and on the behalf of her late husband Kiobel, et al. v. Royal Dutch Petroleum, Co.* et al., No. 10–1491, U.S: SUPREME COURT 17 April 2013

change in a more distant future once robots become more sophisticated and intelligent."[98]

It is important to accentuate that when mentioning the robot as a plausible candidate, the focus is then on the fully autonomous AWS. Ronald Arkin is a scholar that has argued that the robot could easily meet legal standards. "The application of lethal force as a response *must* be constrained by LOW [law of war] and ROE [rules of engagements] before it can be employed by autonomous systems."[99] He argues further that this can be achieved through an *ethical governor*. This would entail the weapon system following a two-step program.

The first step is that the fully AWS must evaluate the information it senses and has processed in order to determine whether a launch of an attack is lawful under international law and ROE. If the attack in question is lawful under international law and ROE, the system can then proceed with the launch if the attack is under military operational orders.[100] The second step is that the fully AWS must then evaluate the attack under the principle of proportionality[101]. The "ethical governor" will calculate a variety of criteria, such as the risk of injury to civilians or civilian objects, or the likelihood of a military effective attack, all this based on technical data. It will later use an algorithm that will combine the "incoming perceptual information" with the statistical data. The weapon system can only launch an attack if the target "satisfies all ethical constraints and minimizes collateral damage in relation to the military necessity of the target".[102]

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[98] *Krishnan,* (See note 23) page 105.
[99] Arkin, Ronald C., *Governing Lethal Behavior in Autonomous Robots,* CRC Press, 2009, (herein after called *Arkin)* page 69.
[100] *Ibid.,* pages 183-184.
[101] *See chapter 3.2*
[102] *Arkin,* (See note 98) page 187.

Nevertheless, as a machine, an AWS cannot be held accountable for violations or be prosecuted if IHL is violated.[103] However, let's assume that an AWS would be capable of carrying out military attacks without any human intervention in the process. It will then by itself have the capacity to carry out the decision-making, to first identify a military target and later carry out the attack on this military target. What if something goes wrong? Can the AWS be held responsible?

At the present time, we may conclude that an AWS will not have an independent *wish* to kill civilians.[104] Furthermore, an AWS's decision-making could be as simple as: IF object on right - THEN turn to the left, IF object is running THEN launch an attack, ELSE continue. The robot will therefore be incompetent to be held accountable for crimes under international humanitarian or criminal law.[105]

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[103] International Committee of the Red Cross, *Autonomous weapons: states must address major humanitarian, ethical challenges,* 2013, available at http://www.icrc.org/eng/resources/documents/faq/q-and-a-autonomous-weapons.htm, accessed on 1 May 2014.
[104] *Singer,* (See note 7) page 388.
[105] *Cryer,* (See note 83) pages762-764.

5 New and existing forms of responsibility

Technological innovations are an integral part of our everyday life and have a great principal importance for individuals and our society. Creativity and innovation are important for long-term economic growth and help to create space for the effective protection of fundamental values. AWSes are within the framework of fundamental values and rights protected by international conventions and customary law, which express the international community's attention and commitment globally.

Technological development is something very positive and a worthwhile endeavor; however, it must remain under control and within the sphere of accountability, in order to safeguard the rule of law. In other words, if man does not master AWSes and the technology behind them, but permits them to master him, he will be destroyed by technology.[106]

The issue with accountability is truly a complex question, as raised throughout the thesis, where established forms of liability may no longer be appropriate to the situation with AWSes.

This chapter will discuss new and existing forms of responsibility.

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[106] *Commentary on the Additional Protocols*, (See note 41) paragraph 1476.

5.1 Individual responsibility in compliance with international humanitarian law

Chapter 4.2 goes through the different plausible *candidates* to hold accountable for the wrongful acts of AWSes. One issue that has not been covered by chapter 4.2 is how liability of the different candidates will comply with IHL.

Military personnel, such as combatants and military commanders, are all actors who have been the main actors in the field during wartime since the beginning of war. Their rights and duties are therefore well established under IHL.[107] The regulations on this area even include rules on the treatment of combatants that have been imprisoned.[108]

The same goes for the liabilities of State organs, such as the acquirer whose liability is also well established under IHL since his or her work is attached and he or she works for the State.[109] However, there are some plausible liabilities that have been brought up during the thesis with regards to AWSes, such as, liability with regards to the programmer or manufacturer, corporations, and the robot. These are all actors and items that are new to the well-established IHL, which could indeed hinder possible liability if the criteria are not meet. This chapter will discuss the new liabilities compliance with IHL.

5.1.1.1 The programmer or manufacturers liability

The programmer or manufacturer has always been seen as a civilian, a person that will not and should not have any connection to warfare. That is however an aspect that has changed during recent years, where the programmers and manufacturers play a bigger role in relation to weapons and weapon systems. The programmers or manufacturers are of course

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[107] *Additional Protocol I,* (See note 17) Article 86(2) and art 87.
[108] Convention (III) relative to the Treatment of Prisoners of War, adopted in Geneva 12 August 1949, entered into force 21 September 1950,
[109] *Additional Protocol I,* (See note 17) Article 36.

human, which can be seen as one of the criteria for compliance under IHL. However, will the programmer or manufacturer need a rank within the military chain to be held liable? Is the programmer or manufacturer within the military chain?

Chapter 4.2.2 mentioned that the programmer or manufacturer could be held liable under ICL, which is under IHL. There has been an express view that the programmer or manufacturer should be charged under the State's national criminal law for manslaughter for recklessness in their programming, causing the systems to commit serious errors resulting in injury or death.[110]

In other words, there could be liability under international law for programmers and manufactures.

5.1.1.2 The corporation's liability

Chapter 4.2.3 presented that corporations cannot be held accountable for unlawful actions under IHL, as a general rule under international law. Nevertheless, as mentioned in chapter 4.2.3.2.1 the ATS has been used effectively in cases involving torture and extrajudicial killing, State-sponsored sexual violence, arbitrary detention, war crimes and crimes against humanity. For example, transnational corporations have under this law been sued for being involved and having operated in areas where human rights violations have occurred.

Nevertheless, there is no recognized liability under international law for corporations.

5.1.1.3 The robot's liability

The idea that a robot shall be held responsible for unlawful actions of IHL is an idea that is quite absurd. It has however been argued from various scholars as a form of liability, even though it is a thing. Let's bear in mind

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[110] Geneva Adademy, *Experts meeting on Armed drones and Robots under International law,* Divonne, France, 2013, Summary of discussions, Prepared *by Trascasa, Milena C, paragraph 17.*

that today it is hard to establish liability for a corporation that consists of individuals because of the lack of knowledge of who actually ordered it, let alone a robot, a weapon system, an item that is built and programmed by humans. Even though the AWS might be fully autonomous in the future, there will still be a human somewhere in the process that has decided for it to be so.

No treaty has covered this kind of liability for an item and the likelihood that any treaty ever will is very small.

5.2 Collective responsibility

As mentioned in the chapter 1, 2.1 and 4.2, the AWS will cause difficulties in establishing accountability for a wrongful act. The previous chapter, chapter 5.1, displayed that one individual, whether a military commander or a technical expert, cannot be held accountable for the acts of an AWS because of its multi-faceted features. Each of the plausible candidates identified above are either unsuitable or unreasonable. This could in fact create a responsibility vacuum. There is however one option left, namely to apply collective responsibility on the wrongful acts of the AWS. This section will deliberate on two plausible collective forms of accountability for the AWS.

5.2.1 The role of a legal advisor

The procedure that could be used to ensure the AWS's compliance with IHL and eventually solve the accountability issue includes the role of a legal advisor in ensuring the principles of IHL. Article 82 of Additional Protocol I prescribes the following requirement for the legal advice:

> "The High Contracting Parties at all times, and the Parties to the
> conflict in time of armed conflict, shall ensure that legal advisers
> are available, when necessary, to advise military commanders at
> the appropriate level on the application of the Conventions and

this Protocol and on the appropriate instruction to be given to the armed forces on this subject."

Although this article only applies to the parties to the protocol; it is likely that this rule could apply as customary law as well.[111] Nevertheless, the legal advice, if correctly given, should result in protection and form legal accountability.

The legal advice relating to an AWS can be given at three stages. The first stage is when the decision of deploying the AWS is made, the second stage is when the system is given its *mission orders*, and the third stage is when the robot is on the field.[112] All AWSes will be able to process the legal advice in the second stage; however, only the supervised AWS will be affected by decisions while the systems are on the field. In other words, no legal advice can be given to a fully autonomous AWS while on the field; it can only be given at the mission order stage.[113]

5.2.1.1   Mission order stage

This is the stage where the legal advisor will have the best chance to influence the AWS and make the system's legal review.[114] For example; it has been decided that the AWS will be deployed in an area where there will a number of civilians near the targeted object. The legal advisor will then have to be concerned with how the AWS is expected to act on the mission, including the overall failure rate, as well as how accurate the orders will fit the weapon system, such as how good is the targeting data that has been programmed to the AWS to use facial recognition.[115]

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[111]   *Bolt,* (See note12) page135.
[112] *Ibid.,* page 126.
[113] *Ibid.,* page 131.
[114] *Ibid.,* page 132.
[115] *Ibid.*

The mission order stage could also include the length of the mission, what and whom the AWS can attack, and how the AWS will react to threats against itself.[116]

5.2.1.2   Field stage

As previously mentioned in chapter 5.2.1, this stage can only be applied to the semi-autonomous weapon systems. One model of the legal advisor's function is for the advisor to place her- or himself in a command position, *in fact.* The supervised AWS will then have the legal advisor, acting as the AWS's *human in-the-loop*, and the advisor will embody an operating role. This form could however be questioned because of the command delegation, where the military commander will cease its role and where the legal advisor will act independently.

Another option could then be that the legal advisor could take the position next to the military commander and still be able to influence the decision-making, *in effect.*

5.2.1.3   "Appropriate level" to recorrect the AWSes bevahiour

Article 82 of Additional Protocol I states that the advice should be given at an "appropriate level", but when is the appropriate level? The term is not used in an objective sense, in other words each State decides where the appropriate level lays within that State. [117]

It can easily be stated that this is a very complex and delicate issue, especially when the robot is designed to act fast and where a press of a button may not be undone for some systems. The failure rate might be high where it can practically be almost impossible for an advisor to know when the appropriate time is at all.[118] One approach could however be that the State chooses a level in its military hierarchy where it is most suitable for advice to be given, preferably in a post-programming position but pre-attack

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[116] *Bolt,* (See note12) page 133.
[117] *Ibid.,* page 139.
[118] *Ibid.,* page 140

position. This is for the mere reason that not all situations can be foreseeable at the programming stage, yet all factors must be accurately calculated while on the field and before a decision to attack is made. All military operations have their mistakes and failures; however, the operation can at least be properly accurate with this approach. The appropriate level is not exactly defined; the levels could vary depending on the assignment or not exist at all.

5.2.2   A new framework of command responsibility with the technical expert

The concept of command responsibility is a concept that continually has been adapted to meet new situations.[119] On the one hand, the increasing use of contractors, advisors, and other civilian experts will unquestionably blur the traditional chains of military command. On the other hand, this change in the concept should also allow new possible forms of relationships for accountability.[120] Warfare has entered a time where sensors and data from far away control the weapon systems used on the field, for example the machine might operate in Afghanistan while the so called controller is in an office in Washington, US. This notion of controlling something from a far distance could by itself raise some issues, leaving the machine vulnerable, and easily accessible.

The following example will illustrate one of many problems with having sensors as the main control. An American unmanned aerial vehicle (UAV) was in December 2011 captured by Iranian forces near the city of Kashmar in northeastern Iran. The Iranian government announced later that Iran's elite Revolutionary Guards, which claimed to have brought down the UAV electronically, brought down the UAV safely. US officials later confirmed

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[119] *Garraway, Charles,* " The Application of Superior Responsibility in an Era of Unlimited Information" in *International Humanitarian Law and the Changing Technology of War*, (herein after called *Garraway*) ed. Saxon, Dan, vol. 41, Martinus Nijhoff Publisher, 2013, page 201.
[120] *Ibid.,* page 202.

that the UAV was captured in Iran but insisted that the UAV crashed and was not hijacked by Iran. President Barack Obama also appealed for a return of the UAV, to later be refused by the argument that the UAV's flight over Iran was a hostile act and a violation of Iran's airspace.[121]

Should a commander be judged by everything done by the weapon system? The answer to this question is in the phrase 'should have known'[122], existing in Additional Protocol I, which was mentioned in chapter 4.2.1.2. A military commander obviously cannot be expected to have personal expert knowledge of every piece of information given by the AWS. Nonetheless, the commander should have technical expertise in order to filter the information given by the AWS so that the commander only receives information that is actually necessary for him or her to carry out his or her responsibilities, such as proper conduct. It is within the commander's responsibility to make sure that his or her filter system, namely his or her subordinates, functions successfully in order to operate correctly according to IHL, and if it does not, ensure that failure can be directed to the commander in charge. Hence, the new framework of accountability must take a collective form, for it to cover all areas of the AWS and all its features.

A collective form that could be suggested for the semi-autonomous system, including the *filter-system,* is the ordinary form of command responsibility, instead with other actors subordinated to him or her, which will be his or her filter system. The military commander will have the overall responsibility, as he or she usually has on the battlefield; however, the commander will have a technical expert on his team in this case to filter the information given by the AWS, to keep track of the weapon system. The reason for this is to fill the gap and the lack of intelligence, which continuously has been an

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[121] The information is available at
http://www.theguardian.com/world/2013/feb/07/iran-footage-cia-spy-drone,
accessed on 10 May 2014.
[122] *Additional Protocol I*, (See note 17) Articles 86(2) and 87.

issue with AWSes. Nevertheless, there will never exist a system that is completely flawless, but this framework could give the commanders an overall understanding of an AWS, and foresee any errors or miscalculations in the system before an actual launch, errors that the commander might have missed if the expert was not present.

For example, the technical expert can be seated next to the military commander and supervise the AWS whenever a target is being attacked. The technical expert could provide the military commander with minute-to-minute advice during the execution of the mission, focusing on the interpretation of the AWS, the balance between the necessity of the attack, and the collateral damage expected from it as calculated from the AWS.

This new framework of command responsibility would make it easier to conform with the rules in Additional Protocol I where it is established that the commander 'should have known', even if that information had not reached him or her, because the commander should always ensure that his or her filter system operates effectively. The new framework would not require a change of principle. However this form will plausibly require a greater burden on commanders, in the sense that the commander has to ensure that his or her staff provides all necessary and relevant information for a proper and lawful military operation. The management of information has always been a vital element in any military operation, thus it is a matter of military common sense to ensure that the commander at all times receives all necessary and important information. As outlined in the Yamashita case[123]:

> "There must be a personal dereliction. That can occur only where the act is directly traceable to [the commander] or where his failure properly to supervise his subordinates constitutes criminal negligence on his part. In the latter case it must be a

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[123] *Yamashita v. Styer Commanding General, U.S. Army Forces, Western Pacific,* 327 U.S. 1, U.S.: Supreme Court, 4 February 1946.

personal act amounting to a wanton immoral disregard of the action of his subordinates amounting to acquiescence."[124]

The expert will provide minute-by-minute information about the AWS, tracking its location, calculations, and other intruders, providing information to the commander in charge that is vital for its proper functioning.

The necessity for a filter system is crucial to enable the commander to make reliable and correct operational decisions in times of changing technology.

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[124] *Garraway*, (See note 118) page 205.

6 Conclusion

The character of *traditional* warfare has now been changed by new technologies. Military commanders no longer have the same degree of control on the ground or over their domain, since the introduction of autonomous weapon systems. The technical changes have had two major effects on current international humanitarian law. Firstly, warfare can now be conducted and controlled thousands of miles away from the battlefield, and secondly, questions arise as to how to manage the information of the weapon system.

Nevertheless, States cannot absolve themselves of their obligations under international humanitarian law by contracting the weapon systems on the field. The State will still remain responsible for ensuring that the relevant and fundamental standards are met and that international law is respected.

At the present time, we may furthermore conclude that the there is no fully autonomous AWS existing, thus making AWSes incompetent to be held accountable for crimes under international humanitarian or criminal law. Nevertheless, this innovative character of warfare will bring real challenges for military commanders, not least in how to manage the information to ensure its proper functioning but also to the discipline amongst subordinates. An effective system of accountability for the AWS is when the lines for responsibility are well defined and definite. To the extent that the autonomy of semi-autonomous weapon systems causes gaps in current accountability instruments, I will argue that the gaps can be filled through the establishment of a new framework of command responsibility with the technical expert as a vital subordinate. The technical expert will function as a *filter system* that will filter the information given by the AWS so that the commander only receives information that is necessary for him or her to carry out his or her responsibilities. The military commander will then have the overall responsibility, as he or she usually has on the battlefield. The reason for this is to fill the gap and the lack of intelligence, which

continuously has been an issue with the new weaponry and also to prevent future hijack opportunities when everything is controlled through computers. The technical expert's minute-to-minute advice during the whole execution of the mission will help the military commander take accurate decisions based on the data from the weapon system, thus making the commander responsible for the implementation of IHL and unlawful attacks by the AWS.

My thesis ends now; however this debate has surely only begun.

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