(Fully) autonomous weapon systems.

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Introduction.

The past few years, a lot of wars and conflicts have been going on, for example, the war in Iraq, the fight against ISIS and the Arab spring. Everyone has taken knowledge of these wars and conflicts due to the information and communication technology. However, imagine that you turn on the television in the future and you see footage of a war far away. Instead of soldiers who are fighting for their country or their cause, you see robots. Robots who are fighting for the country that bought them or developed them. Robots that are programmed to fight for a certain cause determined by people. This might sound like science fiction, but it is not.

War and technological development have been linked together for centuries. For ages, states and military leaders have been searching for weapon systems that will minimize the risk for soldiers. So, weapon systems are becoming more and more advanced and humans are moving further away from the battlefield. Especially due to the development of artificial intelligence, weapon systems with limited human involvement have been developed.[1]

Currently, most autonomous weapon systems, like drones and the Dutch goalkeeper, are controlled, to some extent, by a human operator.[2] However, autonomous weapon systems that can select and engage targets without human intervention have already been developed. Fully autonomous weapon systems, which will be able to make decisions based on self-learned or self-made rules, and select and engage targets without any human involvement, have not been developed yet. However, scholars are of the opinion that those fully autonomous weapon system, also known as “Killer Robots” of “Lethal Autonomous Weapon Systems”, will be developed in several years.

Because technological advancements will make it possible that fully autonomous weapon systems will be developed in the future, they have become subject of discussion. Since 2013 the issue with regard to fully autonomous weapon systems has been placed on the agenda of the Human Rights Council, the First Committee and the agenda of the Convention on Certain Conventional Weapons.[3] Governments and civil society are debating the degree of which it is useful, legal and desirable to develop fully autonomous weapon systems.[4] Another concern governments and civil society have is that it is uncertain who can be held responsible for the actions of a fully autonomous weapon system.[5]

[1] Geneva Academy of International Humanitarian Law and Human Rights 2014, p. 3.
[2] Grut 2013, p. 5.
[3] Docherty 2012, p.1; Geneva Academy of International Humanitarian Law and Human Rights 2014, p. 5.
[4] Geneva Academy of International Humanitarian Law and Human Rights 2014, p. 4.
[5] AIV & CAVV 2015, p. 25.

Human Rights Watch, Sparrow and Matthias have argued that there is a responsibility gap when a fully autonomous weapon system violates international humanitarian law.[6] After all, a fully autonomous weapon system cannot be a defendant in a war crime trial.[7] So, who should and can be hold responsible? In literature, it has been stated that no one can be held responsible when a fully autonomous weapon system violates international humanitarian law.[8] However, some scholars claim that the commander can be held responsible for the actions of a fully autonomous weapon system.[9] Other scholars are of the opinion that commanders could claim that they were "outside the loop" of the computer's autonomous decision and therefore cannot be held responsible.[10] This thesis will examine whether and to what extend the commander can be held responsible, under international law, for the actions of a fully autonomous weapon system and which steps should and can be taken to overcome the hurdles autonomous weapon systems poses to the doctrine of command responsibility. Therefore, the main question of this thesis is:

"To what extent can the doctrine of command responsibility be applied when a (fully) autonomous weapon system is used?"

To answer the main question of this thesis, the first chapter will describe the historical development of autonomous weapon systems and the definition of autonomous weapon systems and fully autonomous weapon systems. In addition, the concerns that have been raised by the international community and the lawfulness/unlawfulness of fully autonomous weapon systems will be explained. After all, if a weapon system does not comply with international humanitarian law, the weapon cannot be LAWFULLY used. The following chapter will outline the doctrine of command responsibility as applied by the International Criminal Tribunal for the Former Yugoslavia (hereinafter: ICTY), the International Criminal Tribunal for Rwanda (hereinafter: ICTR) and the International Criminal Court (hereinafter: ICC). It should be noted that the doctrine of command responsibility has a stable foundation in international humanitarian law, but it is not a static concept. The doctrine of command responsibility has been applied in a creative meaner in order to adapt to the changing nature of armed conflicts. The third chapter will examine to what extend the commander can be held responsible for the actions of a fully autonomous weapon system. Lastly, an answer will be formulated to the main question and some concluding remarks and recommendations will be given.

[6] Docherty 2015.
[7] Margulies 2016, p. 1.
[8] Sparrow 2007, p. 70.
[9] AIV & CAVV 2015, p. 25.
[10] Margulies 2016, p. 1.

Before we dive deeper into the problem which fully autonomous weapon systems and autonomous weapon systems possess to the doctrine of command responsibility, some general remarks have to be made regarding the terminology and the scope of this thesis. In addition, the problems that scholars have pointed out regarding responsibility when a fully autonomous weapon system is used has to be clarified.

The first terminological remark that has to be made is that this thesis speaks about weapon systems instead of weapons. A weapon system is an "*intermediary platform from which the actual weapons are deployed*".[11] A weapon is "*an instrument that inflict damage or harm in a direct manner such as a mine or a cruise missile*".[12] So, a weapon system is more than an instrument used by a soldier under supervision of the commander. The platform (e.g. the vehicle or aircraft) and the weapon in itself are automated/autonomous.

The second terminological remark concerns the different levels of autonomy that can occur in an autonomous weapon system. Because there are different levels of autonomy within an autonomous weapon system, there are a lot of different terms used to convey machine-human interaction.[13] Therefore, Human Rights Watch has made a classification, which will be discussed in more detail in the following chapter, between the different kinds of autonomous weapon systems based on the level of autonomy and, consequentially, the amount of human involvement in their actions:

1. *"Human in the loop* weapon systems: Robots that can select targets and deliver force only with a human command;
2. *Human on the loop* weapon systems: Robots that can select targets and deliver force under the oversight of a human operator who can override the robots' actions;
3. *Human out of the loop* weapon systems: Robots that are capable of selecting targets and delivering force without any human input or interaction. Once the weapon system is activated, a human cannot intervene to stop the attack."[14]
4. *Human beyond the wider loop* weapon systems: these weapon systems would have strong artificial intelligence and would be able to operate with human-like intelligence.[15] To clarify what a *human beyond the wider loop* weapon system is, one can think of the robots that appear in the movie Terminator or Irobot. It should be noted that these weapon systems have not been developed yet.

[11] Liu 2012, p. 635.
[12] Liu 2012, p. 635.
[13] Anderson, Reisner & Waxman 2014, p. 389.
[14] Docherty 2015, p. 5.
[15] AIV & CAVV 2015, p. 17.

This thesis will only deal with *human out of the loop* weapon systems and *human beyond the wider loop* weapon systems. This thesis will refer to *human out of the loop* weapon systems as "autonomous weapon systems" and to *human beyond the wider loop* weapon systems as "fully autonomous weapon systems". If both types of weapon systems are meant, the term "(fully) autonomous weapon systems" will be used. Autonomous weapon systems, fully autonomous weapon systems and the difference between the two weapon systems will be discussed in more detail in the next chapter.

Regarding the scope of this thesis a definition of command responsibility should be given. Command responsibility is a means to hold the commander responsible for crimes committed by their subordinates.[16] The doctrine of command responsibility is a long-standing rule of customary international law.[17] It should be noted that no distinction will be made between non-international and international conflicts. After all, the ICTY has stated that it is not relevant whether a crime was committed or was about to be committed in the course of a non-international or international armed conflict in order to determine the responsibility of the commander.[18] The doctrine of command responsibility will be discussed in more detail in chapter 2.

Lastly, (fully) autonomous weapon systems must comply with international humanitarian law, just like any other weapon. If they cannot meet these requirements, they are unlawful and their use in war constitutes a war crime. Some scholars are of the opinion that (fully) autonomous weapon systems cannot meet these requirements. This issue will be briefly discussed in chapter 1. However, it lies beyond the scope of this thesis to examine the legality of (fully) autonomous weapons systems and their compliance with international humanitarian law in its entirety. In this respect, we assume that (fully) autonomous weapon systems are not unlawful and that international humanitarian law is applicable.

Since the terminological comments are made and the scope of this thesis is clarified, the problems outlined in the literature, regarding assigning responsibility to a commander, can be explained. Human Rights Watch states that: "*the fully autonomous weapon's fast processing speed as well as unexpected circumstances, such as communication interruptions, programming errors, or mechanical malfunctions, might prevent commanders from being able to call off an attack*".[19] In addition, a (fully) autonomous weapon system can choose its own targets and therefore the commander will have less control.[20] Furthermore, the subordinate cannot prevent the crime from happening, because there is

[16] Moloto 2009, p. 15.
[17] Henckaerts & Doswald-Beck 2005, p. 3775.
[18] Henckaerts & Doswald-Beck 2005, p. 3775.
[19] Docherty 2015, p. 24.
[20] Sparrow 2007, p. 70.

nog foresight as to what the machine will actually do. Since (fully) autonomous weapon system can change its target, it is difficult to predict a robot's next attack. Moreover, scholars have stated that the commander cannot punish the (fully) autonomous weapon system, because punishment presupposes moral personhood and the capacity to suffer and feel guilt.[21]

Despite these responsibility concerns, one must realize that (fully) autonomous weapon systems have a tactical and operational value. Autonomous weapon systems may provide a military advantage because those systems are able to operate free of human emotions and bias which cloud judgement.[22] In addition, these weapon systems are able to operate free from the needs for self-preservations and are able to make decisions a lot quicker. Because of the above given reasons, states are tempted to develop fully autonomous weapons. Therefore, it is important to examine who, in this case the commander, can be held responsible when a (fully) autonomous weapon system will commit a crime.

[21] Roff 2013, p. 15.
[22] Hollis 2016, p. 14.

Chapter 1: Autonomous weapon systems.

Weapons are becoming more and more advanced and humans are moving further away from the battlefield. It can be said that weapons are becoming more and more autonomous. The trend towards autonomous functions in weapons is not new. During the Second World War, the Germans used Zaunköning torpedoes. These weapons are acoustic torpedoes and once launched, the torpedo could find its target by using sound waves. Much has changed since then. Nowadays, there are weapons where a pilot is sitting in an operating room and he/she can control an unmanned aerial vehicle (hereinafter: UAV) better known as 'drone' to conduct lethal targeting operations on the other side of the world. Today's weapon systems require some sort of human intervention, but the next step with regard to weapon systems will be removing the human from the process altogether.[23] This step is towards fully autonomous weapon systems.

The first part of this chapter will provide a brief historical overview of weapons to show that weapon systems are becoming more and more autonomous. The second part of this chapter will discuss in more detail the definition of autonomous weapon systems and fully autonomous weapon systems. The third part will briefly explain the concerns that have been raised by the international community, and will explain if (fully) autonomous weapon systems are unlawful per se.

1.1: The rise of autonomous weapon systems.

For centuries, states and military leaders have responded to the changes in the means and methods of warfare. These developments have ranged from hardware development, such as the crossbow and gunpowder, to developments in tactics.[24] This development is still ongoing and weapons are becoming more and more autonomous.

Thomas A. Edison and Nikola Tesla were one of the first who thought that it would be possible to make weapons more autonomous. These men experimented with radio-control devices and worked on the transmission of electricity.[25] During the First World War, the idea that weapons could be more autonomous continued. An "electric dog", which followed a light source, was built to carry supplies.[26] This can be seen as the precursor to laser control.[27] The use of automated functions in weapons started at the end of the 19th century. Especially during the Second World War, autonomous functions

[23] Grut 2013, p. 5.
[24] Stewart 2011, p. 271.
[25] Mies 2010, p. 126.
[26] Mies 2010, p. 126.
[27] Mies 2010, p. 126.

in weapons became more and more important, and the development of automated functions in weapons expanded enormously.

One of the first automated functions in weapons, developed by the Germans during the Second World War, was the V-1. The V-1 was not a rocket and not a plane, but it can be described as a pilot-less propelled flying bomb with a gyroscope, a magnetic compass and an altimeter.[28] The V-1 could be carried under the wings of a bomber, or could be launched from the ground.[29] The guidance system of the V-1 was very crude and it was only possible to target a large area.[30] The second version, the V-2 rocket, was one of the most effective and major German innovations.[31] The V-2 was able to fly on a certain ballistic curve due to a guidance system, and reached the target automatically without further human interaction.[32] In 1944, a more advance weapon was developed, the so called A-4.[33] This weapon was the first long range ballistic missile, and it had much more speed and range than the V-1 and V-2.[34] Later on, the Germans introduced the Zaunköning torpedo. This torpedo was the first guided munition. The Zaunköning torpedo is an acoustic torpedo and once launched, the torpedo could find its target by using sound waves. Based on the sound of a ship's propeller in the water, the torpedo could correct its course.[35]

After the Second World War, developers searched for weapons that where more reliable and weapons that could attack a target that was beyond visuals range. This led to the development of a new range of weapons. The United States developed in the 1960's several types of sensor-triggered and air-dropped anti-personnel mines.[36] Once the mine was put in place, they were activated when a human stepped on them. Some mines, like naval mines, did not rely on direct contact, they were triggered by the magnetic, seismic or pressure influence of a ship.[37] In the early 1970's the first precision munitions or "smart" weapons were developed.[38] These weapons became robotic in the sense that the terminal guidance of these weapons (missiles and guided bombs) became automated.[39] In the Vietnam War, the first laser-guided bombs were used, which could find their targets by following a laser beam that was pointed at a target, either by the launching platform or by troops on the ground.[40] Later on,

[28] Nebeker 2009, p. 385 – 386.
[29] Krishnan 2009, p. 17.
[30] Krishnan 2009, p. 17.
[31] Mies 2010, p. 128.
[32] Mies 2010, p. 128.
[33] Nebeker 2009, p. 385 – 386.
[34] Nebeker 2009, p. 385 – 386.
[35] AIV & CAVV 2015, p. 8.
[36] Mies 2010, p. 130.
[37] Beard 2014, p. 630.
[38] Krishnan 2009, p. 20.
[39] Krishnan 2009, p. 20.
[40] Krishnan 2009, p. 20.

weapons that were even more automated were created. These weapons were called “fire-and-forget” weapons. The AIM-9 Sidewinder is an example of a “fire-and-forget” weapon. Once fired, this weapon used its own guidance system independent of external inputs and pursued its target autonomously.[41] “Fire-and-forget” weapons are not autonomous weapon systems in the sense that they could be automatically launched at targets, but they were already quite autonomous with respect to finding and attacking targets once they were launched.[42]

Moving further along the continuum of autonomy, remotely controlled weapon systems have been developed. The most well-known remotely controlled weapon system is the Unmanned Aerial Vehicle (UAV), better known as “drone”. UAV’s are launched in an area of interest and controlled from a remote control cabinet by an operator by using a satellite relay system. An example of these weapon systems are the MQ-1 Predator, which is capable of delivering a payload of two Hellfire missiles, and the MG-9 Reaper, capable of delivering fourteen Hellfire missiles.[43] The use of UAV’s in combat has increased in recent years. At the start of the Iraq war, the United States of America had only a few UAV’s but now they have more than seven thousand UAV’s.[44]

The last few years, weapons who are able to attack autonomously without human intervention have been created. At the moment, these autonomous weapon systems are being operated in fixed positions (rather than mobile), primarily used in unpopulated and relatively simple environments and mostly used as a defense system and not as a combat system. These weapon systems do not only have their own sensory, movement, and attack capabilities after launch, but have also the power (once activated) to decide which target they will attack and then act on that “decision”. The human involvement, when it exists at all, is limited to accepting or overriding the decision of the weapon system.[45] The goal of these systems is to act quickly to incoming threats thereby minimizing the risk of direct impact.[46] The United States Phalanx Close-In Weapon System is an example of such a weapon system. The Phalanx is a radar-guided gun system that can detect and destroy incoming missiles or threatening aircrafts.[47] The Phalanx has been described by the United States Navy as: “*the only deployed close-in weapon system capable of autonomously performing its own search, detect, evaluation, track, engage and kill assessment functions*”.[48] Samsung, a South Korean company, has created a weapon system with an even higher level of autonomy called Techwin. This weapon system

[41] Krishnan 2009, p. 20.
[42] Krishnan 2009, p. 20.
[43] Hattan 2015, p. 1035 – 1036.
[44] Hattan 2015, p. 1036.
[45] Human Rights Watch 2012, p. 9.
[46] Leveringhaus & de Greef 2015, p. 321.
[47] Hattan 2015, p. 1037.
[48] Docherty 2012, p. 10.

is an armed turret with heat-sensing as well as audio- and video- surveillance technology.[49] Techwin can detect a human from 500 meters away and alert its human operator, who can decide to allow the robot to engage with lethal force.[50] Israel has built and deployed an Unmanned Aerial Vehicle called Harpy. Harpy has been described as the precursor of a fully autonomous weapon system.[51] It is designed to control a specific area autonomously. Once it is in place, it seeks to detect hostile radar signals and destroys them.[52]

This section has discussed the gradually shift towards more and more autonomy in weapons. As shown, there are already autonomous defense weapon systems in use that are able to find their target and to attack that target if needed. Fully autonomous weapon systems have not been deployed yet or created, but several governments are working on developing such weapons. The next section will discuss the definition of autonomous weapon systems and fully autonomous weapon systems in more detail.

1.2: The definition and categorization of autonomous weapon systems.

The weapon systems used today are remotely controlled instead of capable of autonomously operating on their own.[53] From the perspective of international humanitarian law, remotely-operated weapon systems are rarely uncontroversial because they are under the control of a human operator.[54] The rising level of autonomy, which differentiate remote-controlled weapon systems from autonomous weapon systems and fully autonomous weapon systems, raises issues in relation to international law. Therefore, it is important to make a clear distinction between the different levels of autonomy within a weapon system.

First of all, there is no internationally recognized definition of a (fully) autonomous weapon systems. The definition used in this thesis is the definition given by the United States Department of Defense (DoD). The DoD has defined a (fully) autonomous weapon system as: "*a system that, once activated, can select and engage targets without further intervention by a human operator*".[55] The problem with this definition is that it covers a wide range of weapon systems. Therefore, a classification has been made by Human Rights Watch on the basis of the degree of autonomy, aka the amount of human involvement, in order to categorize the various forms of autonomous weapon systems.[56]

[49] Hattan 2015, p. 1036.
[50] Hattan 2015, p. 1036.
[51] Docherty 2012, p. 18.
[52] Docherty 2012, p. 18.
[53] Liu 2012, p. 631.
[54] Liu 2012, p. 631.
[55] US DoD Directive 3000.09 of 21 November 2012, p. 13.
[56] Docherty 2012, p. 2.

The first category is *human in the loop* weapons. These weapons are describes as: "*A weapon system that, once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator*".[57] So, these weapon systems can select individual targets or specific groups of targets and deliver force only with a human command.[58] These weapons are semi-autonomous.[59] An example of such a weapon is the guided munition. Some guided munitions, like the Tomahawk land-attack cruise missile, have communication links that allow the operator to retarget the missile once activated.[60] Others, like the "fire and forget" weapons, cannot be recalled once they are launched.[61]

The second category is *human on the loop* weapon systems. These weapon systems are defined as: "a*n autonomous weapon system that is designed to provide human operators with the ability to intervene and terminate engagements, including in the event of a weapon system failure, before unacceptable levels of damage occur*".[62] So, these weapon systems can autonomously select and engage specific targets. There is no human who has to decide if those specific targets are to be engaged, but there is a human operator who can intervene to halt the operation if necessary.[63] At the moment, these weapon systems are mostly used for defensive situations. For some of these weapon systems the time the human operator has to react is so short, that it is physically impossible to remain '*on the loop'*. With regard to those weapon systems, there is basically no possibility for a human operator to intervene if an unintended object is attacked.[64] An example of such a weapon system is the Dutch Goalkeeper and the Techwin.[65]

The third category are *human out of the loop* weapon systems. These weapon systems are defined as: "*A weapon system that, once activated, can select and engage targets without further intervention by a human operator*".[66] These weapon systems are capable of selecting targets and delivering force without any human input or interaction.[67] These weapon systems are programmed to autonomously select individual targets and attack them in a pre-programed selected area during a certain period of time.[68] The person who operates the weapon system does not know in advance which individual object

[57] US DoD Directive 3000.09 of 21 November 2012, p. 13 – 14.
[58] Docherty 2012, p. 2.
[59] AIV & CAVV 2015, p. 8.
[60] Scharre & Horowitz 2015, p. 9.
[61] Titus Hattan 2015, p. 1035 – 1036.
[62] US DoD Directive 3000.09 of 21 November 2012, p. 13 – 14.
[63] Scharre & Horowitz 2015, p. 8.
[64] AIV & CAVV 2015, p. 9.
[65] Scharre & Horowitz 2015, p. 12.
[66] US DoD Directive 3000.09 of 21 November 2012, p. 13 – 14.
[67] Beard 2014, p. 627.
[68] AIV & CAVV 2015, p. 9.

will be targeted, but the type of object that has to be targeted is pre-programmed.[69] At the moment, there are already a few examples of these types of weapon systems. However, they are autonomous defense weapon systems. The Israeli Harpy is a currently operational *human out of the loop* weapon system. The main difference with *human on the loop* weapon systems is that humans can not intervene to stop the attack once the weapon system is activated.[70]

Fully autonomous weapon systems are mostly categorized as *human out of the loop* weapon systems. However, some categorize fully autonomous weapon systems as *human beyond the wider loop* weapon systems, because autonomous weapon systems are not truly making their own choices, they are performing certain actions on the basis of human-defined rules and they respond to signals picked up by its sensors.[71] As mentioned, fully autonomous weapon systems do not exist yet, the development of these kinds of weapons depends on the development of artificial intelligence.

Artificial intelligence is complex and difficult to define, but there are three types of artificial intelligence to be distinguished: limited artificial intelligence (LAI), artificial general intelligence (GAI) and artificial superintelligence (ASI).[72] LAI is a restricted form of artificial intelligence which means that weapon systems have artificial intelligence but only for certain functions. Most autonomous weapon systems have LAI and they are only able to navigate, select targets and attack goals independently. Weapon systems with LAI are not fully autonomous weapon systems. Fully autonomous weapon systems will be weapon systems with AGI. AGI is humanlike intelligence.[73] AGI has not been realized in practice. Therefore, there are no weapons systems with this kind of intelligence level yet. However, it has been argued that weapons systems with AGI will be manufactured in the next few decennia.[74] Lastly there is ASI. This type of intelligence transcends human intelligence and a weapon system with this kind of artificial intelligence is definitely a fully autonomous weapon system.[75] A human is no longer able to understand the choices the machine makes. This type of artificial intelligence is the level SOME humans are afraid of, because they could eventually supplant humans and they could pose a threat to humanity itself.[76] So, on the basis of this analysis it can be concluded that fully autonomous weapon systems are weapon systems that can make decisions based on self-learned or self-made rules, and selects and engages targets without any human involvement.[77]

[69] AIV & CAVV 2015, p. 9.
[70] AIV & CAVV 2015, p. 9.
[71] AIV & CAVV 2015, p. 10.
[72] AIV & CAVV 2015, p. 16.
[73] AIV & CAVV 2015, p. 16.
[74] Backstorm & Henderson, p. 491.
[75] AIV & CAVV 2015, p. 16.
[76] AIV & CAVV 2015, p. 17.
[77] AIV & CAVV 2015, p. 17.

1.3: Are (fully) autonomous weapon systems per se unlawful?

In the first section we have seen that weapons have become more and more autonomous. In the second paragraph we have defined the different types of autonomous weapon systems and we have defined a fully autonomous weapon system. This paragraph will answer the question whether (fully) autonomous weapon systems are per se unlawful. (Fully) autonomous weapon systems are not regulated by any international conventions. However, (fully) autonomous weapon systems must, like all other weapons, be used in compliance with the international humanitarian law framework. International humanitarian law has two tracks to govern the development and use of weapons. One of those tracks focuses on the legality of the weapon system itself and the other track focuses on the use of the weapon system irrespective of whether the weapon system is lawful per se.[78]

1.3.1: Unlawful weapon system.

Article 36 of Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (hereinafter: Additional Protocol I)[79] deals with new weapons and reads: "*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 applicable to the High Contracting Party*". Under international humanitarian law, there are three reasons to ban a certain weapon.[80] First, means and methods of war are prohibited if the weapon cannot distinguish between military targets on the one hand, and civilians and civilian objects on the other hand. These weapons are able to strike their targets accurately, but the effects are uncontrollable. For example bacteriological weapons which will inevitably spread and infect civilian or autonomous weapon systems that conducts cyber-attacks and the malware used will spread into civilian network.[81] Second, international humanitarian law prohibits weapons that are causing unnecessary suffering or superfluous injury.[82] An example of such a weapon is a laser weapon that cause permanent blindness.[83] The third reason to prohibit weapons is if their effects cannot be controlled in a manner prescribed by international humanitarian law, which results in indiscriminate harm to soldiers and civilians.

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[78] Schmitt 2013, p. 8.
[79] Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), was adopted on 8 June 1977 and entered into effect on 7 December 1978. As of 2003, Additional Potocol I has been ratified by 174 states. The United States, Iran, and Pakistan have signed it on 12 December 1977, which signifies an intention to work towards ratifying it. (www.icrc.org).
[80] AIVD & CAVV 2015, p. 20.
[81] AIVD & CAVV 2015, p. 20 - 21; Schmitt 2013, p. 14.
[82] AIVD &CAVV 2015, p. 20 – 21.
[83] AIVD & CAVV 2015, p. 20.

Some scholars are of the opinion that there is a high risk of misidentifying civilian and combatants if there is no *man in/on the loop*.[84] Human Rights Watch has stated that: "*fully autonomous weapon would not have the ability to sense or interpret the difference between soldiers and civilians, especially in contemporary combat environment*"[85]. Obviously, the possibility that fully autonomous weapon systems cannot make a distinction exists. However, no conclusion can be drawn yet because a fully autonomous weapon system does not exist yet. Thereby, military technology has advanced well beyond the simple recognition of objects.[86] So, it is possible that software will be developed which enables (fully) autonomous weapon systems to identify individuals and to distinguish between combatants and civilians. In addition, if a weapon system is (fully) autonomous, that does not mean that it causes unnecessary suffering or superfluous injury. It might be possible that (fully) autonomous weapon systems are more accurate, and cause less suffering, than humans. Thereby, the possibility that a (fully) autonomous weapons system could be deployed in a manner that causes unnecessary suffering or superfluous injury is not a basis for imposing that a (fully) autonomous weapon system is an unlawful weapon system.[87] So, there is no reason to assume that a (fully) autonomous weapon system would fall under one of the prohibitions. It needs to be assessed on a case-by-case basis to define if a specific (fully) autonomous weapon systems falls under one of the prohibitions described by international humanitarian law.[88]

1.3.2: Unlawful use of a lawful weapon system.

Even if a weapons system is not in itself unlawful, it can be used in an unlawful manner. The principles of discrimination (or distinction), proportionally and precaution in attacks governs the legal use of force in an armed conflict.[89] These principles are customary international law.[90] The principle of distinction requires that armed forces distinguish between combatants and civilians. As discussed before, it could be possible that (fully) autonomous weapon systems would have software that enables them to distinguish between combatants and civilians. It depends on the technology of the weapon system, the algorithms and sensors to determine if it is possible for the weapon system to make a distinction.[91] Moreover, the context and environment in which the weapon system operates, plays a significant role. For example, if a (fully) autonomous weapons system is deployed in a battlefield where there are no civilians, the principle of distinction would not be an issue in that particular operation.[92]

[84] Schmitt 2013, p. 10.
[85] Docherty 2012, p. 30.
[86] Schmitt 2013, p. 11.
[87] Schmitt 2013, p. 11.
[88] AIVD & CAVV 2015, p. 21.
[89] Anderson, Reisner & Waxman 2014, p. 401; Schmitt 2013, p. 22; AIVD & CAVV 2015, p. 25.
[90] Henckaerts & Doswald-Beck 2005, p. 3 – 74.
[91] Anderson, Reisner & Waxman 2014, p. 401 – 402.
[92] Anderson, Reisner & Waxman 2014, p. 402.

The next principle, the principle of proportionality, requires that the expected civilian harm of an attack outweighs its anticipated military advantages.[93] As with the principle of distinction, the system's capabilities and the environment in which the weapon will operate have to be considered. There are battlefields where it is not likely that civilians will be present so it will not be necessary to make a cost-benefit analysis between the military advantages and the civilian harm. However, within a battlefield where there are civilians, it would be difficult for a (fully) autonomous weapon system to comply with the principle of proportionality. However, it could be possible that, one day, (fully) autonomous weapon systems will have software that will enable them to determine the likelihood of harm to civilians. There is already a system, the "collateral damage estimate methodology" (CDEM), which can determine the likelihood of collateral damage to objects or persons near a target.[94] Moreover, it has to be noted that many military lawyers have even questions whether human soldiers are capable of truly applying the proportionality test.[95]

The last principle is precaution in attacks. This principle requires that precautionary measures have to be taken to minimize the effects of the attack on civilians and civilian objects.[96] It could be programmed into a (fully) autonomous weapon system to do everything possible to minimize the effects of the attack.[97]

In sum, there is no reason to state that a (fully) autonomous weapon system is unlawful in itself and there is no reason that a (fully) autonomous weapon system could not satisfy the requirements of international humanitarian law. Like any other weapon, it depends on the use and the environment in which the weapon system is deployed. In addition, existing weapons systems have some limitations. For example, they are not capable of complex decision-making, they have little capacity to adapt to unexpected changes and they are incapable of operating outside simple environments.[98] Therefore and because they are not per se unlawful, it is understandable that there is interest in developing (fully) autonomous weapon systems. Fully autonomous weapon systems have several advantages. One of the advantages is that fully autonomous weapon systems have an increased action tempo and they operate and make decisions much faster than humans.[99] Secondly, letting a human operate a weapon system requires many employees while a fully autonomous weapon system only has to be "switched on" by one person. Gordon Johnson of Joint Forces Command at the Pentagon stated, with respect to fully autonomous weapon systems, in 2005: "*They don't get Hungry. They're not afraid. They don't*

[93] Docherty 2012, p. 30.
[94] Schmitt 2013, p. 19.
[95] Anderson, Reisner & Waxman 2014, p. 402.
[96] AIVD & CAVV 2015, p. 25.
[97] Anderson, Reisner & Waxman 2014, p. 404.
[98] ICRC 2014, p. 7.
[99] Hattan 2015, p. 1036.

forget their orders. They don't care if the guy next to them has just been shot. Will they do a better job than humans? Yes"[100].

1.4: Conclusion.

This chapter has shown that weapons have become more and more autonomous the past centuries. One of the first to experiment with automated functions in weapons where Thomas A. Edison and Nikola Tesla. Nowadays, weapon systems not only have their own sensory, movement, and attack capabilities after launch, they also have the power (once activated) to decide which target they will attack and then act on that "decision".[101]

The rising level of autonomy within weapon systems raises issues in relation to international law. Therefore, it is important to make a clear distinction between the different levels of autonomy within a weapon system and to define a (fully) autonomous weapon system. An autonomous weapon system can be defined as: "*a weapon system that employs autonomous functions*".[102] Human Rights Watch has made a classification in order to categorize the various forms of autonomous weapon systems.[103] Human Rights Watch differentiate between *human in the loop* weapons which are semi-autonomous weapons, *human on the loop* weapons which are weapons systems that can autonomously select and engage specific targets and *human out of the loop* weapons which are weapon systems that are programmed to autonomously select individual targets and attacks them in a pre-programed selected area during a certain period of time.[104] Once the *human out of the loop* weapon system is activated, a human cannot intervene to stop the attack.[105] Fully autonomous weapon systems are mostly categorized as *human out of the loop* weapons systems. However, some categorize fully autonomous weapon systems as *human beyond the wider loop* weapons systems.[106] These weapon systems can make decisions based on self-learned or self-made rules and selects and engages targets without any human involvement.[107]

The last question this chapter has answered is if (fully) autonomous weapon systems are unlawful per se. After all, if a (fully) autonomous weapon system is unlawful under international law, it makes no sense to develop such weapon systems. There are three reasons to determine if a certain weapon should be band. The first is if the weapon system cannot distinguish between military targets on the

[100] Reittinger 2015, p. 88.
[101] Backstorm & Henderson, p. 491.
[102] Crootof 2015, p. 100.
[103] Docherty 2012, p. 2.
[104] AIV & CAVV 2015, p. 9.
[105] Docherty 2015, p. 5.
[106] AIV & CAVV 2015, p. 10.
[107] AIV & CAVV 2015, p. 17.

one hand, and civilians and civilian objects on the other hand. Second, means or methods of warfare that are causing unnecessary suffering or superfluous injury.[108] Third, weapon systems that cannot be controlled in a manner prescribed by international humanitarian law which results in indiscriminate harm to soldiers and civilians. There is no reason to assume that (fully) autonomous weapon system will fall under one of the three prohibitions. It needs to be examined on a case-by case basis. Even though (fully) autonomous weapon systems are not unlawful in itself, they can be used unlawfully. The principles of discrimination (or distinction), proportionally and precaution in attacks governs the use of weapon systems in a lawful manner.[109] There is no reason to assume that (fully) autonomous weapon systems cannot be used according to the three principles. Like any other weapon, it depends on the use and the environment in which the weapon system is deployed.

Now that it is clear what an autonomous weapon system and a fully autonomous weapon system is, the question arises to what extend the commander can be held responsible for the actions of a (fully) autonomous weapon system. In order to answer this question, the next chapter will describe the evolution of the doctrine of command responsibility especially in the light of the degree of control exercised by the commander.

[108] AIV & CAVV 2015, p. 20 – 21.
[109] Anderson, Reisner & Waxman 2014, p. 401; Schmitt 2013, p. 22; AIVD & CAVV 2015, p. 25.

Chapter 2: The doctrine of command responsibility.

The use of (fully) autonomous weapon systems is governed by international humanitarian law and principles of international law. One of the requirements of international humanitarian law is the possibility to hold someone accountable for crimes that have been committed.[110] However, it is unclear who can be held responsible for deaths caused by (fully) autonomous weapon systems. After all, (fully) autonomous weapon systems are able to select targets and make decision autonomously without a *human in/on the loop*. So, who is to blame when a (fully) autonomous weapon system commits an international crime?

First of all, Sparrow has argued that no one will be responsible because it is not possible to describe any responsibility for the behavior of autonomous weapons systems to a human.[111] Others, such as Hellstorm and Asaro are of the opinion that autonomous weapon system will be, one day, responsible for their own behavior.[112] Human Right Watch has identified three human actors who could be held responsible when a (fully) autonomous weapon system is used and commits a crime. These are the commander, the programmer and the manufacturer. However, the opinions of authors are divided whether any of these three human actors can be held responsible for the behavior of a (fully) autonomous weapons systems.

This thesis will focus on the possibility that the commander can be responsible for the behavior of (fully) autonomous weapon systems. The doctrine of command responsibility includes two concepts. First, the commander can be held directly responsible for the orders he/she issued (direct command responsibility).[113] Second, the commander can be held responsible for the acts his subordinates carried out (indirect command responsibility).[114] The second concept is based on the commander's failure to act when under a duty to do so.[115] This chapter will outline the legal theory of command responsibility, which international criminal courts may apply to achieve accountability.

2.1: Early Post-World War II.

Command responsibility as a whole has a lengthy history which can be traced back as far as 2500 years ago to the China of Sun Tzu.[116] An early example of command responsibility, which is remarkably similar to the modern version of command responsibility, is the Ordinance at Orleans

[110] Sparrow 2007, p. 67.
[111] Sparrow 2007, p. 67.
[112] Noorman & Johnson 2014, p. 52.
[113] ICRC 2014, p. 1.
[114] ICRC 2014, p. 1.
[115] Moloto 2009, p. 12.
[116] Cryer e.a. 2010, p. 387.

instituted by Charles the 7the of France in 1439.[117] The first international attempt to make a commander responsible for the acts committed was at the Congress of Vienna in 1815.[118] An obligation to hold a commander liable for violations of international humanitarian law can be found in the 1899 and 1907 Hague Conventions.[119] These two Conventions are considered to be rules of customary international law. As such, they are binding upon states. The rules stressed in these Conventions are partly reaffirmed in the two additional protocols to the Geneva Conventions of 1949.

The first major modern case which dealt with command responsibility was the *Yamashita* case in 1945. The Yamashita judgement has played an important role in the development of the doctrine of command responsibility. Yamashita was the commanding general of the Imperial Japanese Army in the Philippines. He has been charged, convicted and sentenced to death by the U.S. War Crimes Commission. The U.S. War Crimes Commission charged him for: "*unlawfully disregarded and failed to discharge his duty as commander to control the operations of the members of his command, permitting them to commit brutal atrocities*".[120] The defense of Yamashita argued that he could not make contact with his subordinates. Therefore, he had no control over the actions of his subordinates and he had no knowledge about the atrocities committed by his soldiers.[121] However, the U.S. War Crimes Commission argued that: "*the crimes were so extensive and widespread, both as to time and area, that they must have been willfully permitted by the accused or secretly ordered*".[122] So, Yamashita did not stand trial for war crimes he committed or war crimes he directed his troops to commit, but he stood trial because he failed to punish violations of international humanitarian law and to prevent war crimes.

The idea that command responsibility is a basis for criminal liability has been codified in article 86 and article 87 of Additional Protocol I. Article 86 of Additional Protocol I provides that the commander is responsible for the actions of his subordinates if the commander: "*knew, or had information which should have enabled them (the commander) to conclude the circumstances at the time, that he (the subordinate) was committing or was going to commit such a breach (of the Geneva convention and Additional Protocol I) and if they did not take all feasible measures within their power to prevent or repress the breach*". Article 87 of Additional Protocol I is concerned with the duties of commanders. The provision oblige commanders to prevent breaches from being committed, to suppress them when they have been committed and to report them to the competent authorities.[123] To prevent and suppress

[117] Cryer e.a. 2010, p. 387 – 388.
[118] Green 1995, p. 321.
[119] Moloto 2009, p. 13.
[120] In re Yamashita 327 U.S. 1 (1946).
[121] In re Yamashita 327 U.S. 1 (1946).
[122] In re Yamashita 327 U.S. 1 (1946).
[123] Sandoz, Swinarski & Zimmerman 1987, p. 1017.

breaches, the commander has to make sure that their subordinates are familiar with their obligations under the Geneva Conventions and Additional Protocol I.[124] Furthermore, the commander has to initiate disciplinary or penal actions against violators under their command or under their control.[125] So, article 87 is not limited to the duties of a commander with respect to the soldiers under his/her command. The provision applies also to other persons under the control of the commander.[126]

With the adaptation of the Geneva Conventions and Additional Protocol I, the doctrine of command responsibility has been given an international basis. However, the doctrine of command responsibility has changed and specified thanks to the establishment of the ad hoc regional tribunals.[127]

2.2: The doctrine of command responsibility applied by the ad hoc tribunals.

The formation of the International Criminal Tribunal for the Former Yugoslavia (ICTY) and the International Criminal Tribunal for Rwanda (ICTR) contributed to the harmonization of the doctrine of command responsibility and has developed the doctrine even further through case law. The doctrine of command responsibility is codified in the Statute of the ICTY in article 7 and in the Statute of the ICTR in article 6. It should be noted that the ICTY and ICTR do not use the term command responsibility, they use the term superior responsibility. However, the two terms are meant to be the same principle.[128]

The *Delalić* case, later known as the *Čelebići* case[129], was the first case, after the Second World War, where the doctrine of command responsibility played an important role. In the *Čelebići* case, the Trial Chamber set out both concepts of command responsibility; direct command responsibility and indirect command responsibility.

Direct command responsibility derived from article 7.1 of the ICTY statute and article 6.1 of the ICTR statute stating: "*A person who planned, instigated, ordered, committed or otherwise aided and abetted in the planning, preparation or execution of a crime referred to in articles 2 to 5 of the present Statute, shall be individually responsible of the crime*"[130]. So, direct command responsibility can be established as a result of positive acts of the commander.[131] With respect to (fully) autonomous weapon systems,

[124] Sandoz, Swinarski & Zimmerman 1987, p. 1019.
[125] Sandoz, Swinarski & Zimmerman 1987, p. 1020.
[126] Sandoz, Swinarski & Zimmerman 1987, p. 1020.
[127] Molot 2009, p. 14.
[128] ICTY 16 November 1998, IT-96-21-T, paragraph 331 *(Prosecutor v. Delalić et al.)*.
[129] Celibici refers to the location of the prison where the alleged crimes have been committed.
[130] In the ICTR statute, the phrase:" referred to in articles 2 to 5 of the present Statute" has been replaced by the phrase: "referred to in articles 2 to 4 of the present Statute".
[131] ICTY 16 November 1998, IT-96-21-T, paragraph 331 *(Prosecutor v. Delalić et al.)*.

the most applicable action of the commander is "ordering".[132] The *actus reus* (illegal act) of "ordering" a crime requires that a person who is in a position of authority orders a person in a subordinate position to commit an offence.[133] Such authority can be de jure or de facto and can be reasonably implied.[134] It is sufficient if there is some proof of authority on the part of the accused. [135] To establish the *mens rea* requirement (intent) for "ordering" a crime, it must be proven that the individual who is in a position of authority orders an act with the awareness of the substantial likelihood that a crime will be committed in the execution of that order.[136] The *mens rea* of the accused does not need to be explicit but may be inferred from the circumstances.[137]

The concept of indirect command responsibility can be found in article 7.3 of the ICTY statute and article 6.3 of the ICTR statute: "*The fact that any of the acts referred to in articles 2 to 5 of the present Statute was committed by a subordinate does not relieve his superior of criminal responsibility if he knew or had reason to know that the subordinate was about to commit such acts or had done so and the superior failed to take the necessary and reasonable measures to prevent such acts or to punish the perpetrators thereof*".[138] Indirect command responsibility is based on an omission by the commander or a failure to act.[139] Three legal elements must be proven in order to establish indirect command responsibility:

1. "*The existence of a superior-subordinate relationship between the accused as superior and the perpetrator of the crime as his/her subordinate;*
2. *the superior knew or had reason to know that the criminal act was about to be or had been committed; and*
3. *the superior failed to take the necessary and reasonable measures to prevent the criminal act or punish the perpetrators thereof.*"[140]

2.2.1: The superior-subordinate relationship.

The doctrine of command responsibility is primarily based on subordination. If there is a clear military hierarchy, also known as a chain of command, that can be distinguished, this criterion will be simple to apply. After all, based on the chain of command it is unproblematic to assess who was in charge and therefore can be held responsible. For example, in the A*kayesu* case, the ICTR Trial Chamber

[132] Reitniger 2015, p. 103.
[133] ICTY 12 June 2007, IT-95-11-T, paragraph 441 *(Prosecutor v. Milan Martić).*
[134] ICTY 12 June 2007, IT-95-11-T, paragraph 441 *(Prosecutor v. Milan Martić).*
[135] ICTY 12 June 2007, IT-95-11-T, paragraph 441 *(Prosecutor v. Milan Martić).*
[136] ICTY 5 December 2003, IT-98-29-T, paragraph 172 *(Prosecutor v. Stanislav Galić)*.
[137] ICTY 5 December 2003, IT-98-29-T, paragraph 172 *(Prosecutor v. Stanislav Galić)*.
[138] In the ICTR statute, the phrase:" referred to in articles 2 to 5 of the present Statute" has been replaced by the phrase: "referred to in articles 2 to 4 of the present Statute".
[139] ICTY 16 November 1998, IT-96-21-T, paragraph 331 *(Prosecutor v. Delalić et al.).*
[140] Cryer e.a. 2010, p. 391.

stated that Akayesu had *de jure* control because according to Rwandese law, a position as burgomaster placed him as the head of the communal administration, as the *officier de l'état* and the person responsible for maintaining and restoring the peace.[141]

In modern conflicts there is not always a formal chain of command. So, the Appeals Chamber in the *Čelebići* case has determined that it is not always necessary that there is a formal, *de jure*, subordination.[142] A person who exercise *de facto* powers and control can also be a superior. Furthermore, the person who commits the crimes does not have to be directly subordinated to the superior.[143] The superior can also be several steps down the chain of command.[144] So, command responsibility applies to every commander at every level of the chain of command even if the commander was temporary the commander of the persons who committed the crime.[145]

However, what really matters is to determine whether the superior has control over his/her subordinates. In this regard, the Appeals Chamber in the *Čelebići* case has determined that there needs to be "effective control". To determine if there is "effective control", the Tribunals apply the "effective control" test: "*In order for the principle of superior responsibility to be applicable, it is necessary that the superior have effective control over the persons committing the underlying violation of international humanitarian law, in the sense of having the material ability to prevent and punish the commission of these offences*."[146] So, if the commander has the *material ability to prevent and punish criminal conduct*, there is a legal basis for command responsibility.[147] To determine if the "effective control test" has been satisfied, a tribunal must consider the evidence on a case-by-case basis. However, there are a few factors that may indicate that there is "effective control". For example, the capacity to issue orders, to promote people or to remove people from the battlefield and the ability to require people to engage or withdraw form hostilities.[148]

2.2.2: Knew or had reasons to know.

In order to incur criminal liability, the ICTY determined that a superior must *knew or had reasons to know* that crimes have been or are about to be committed. According to the *Čelebići* judgement, the necessary means rea occur if:

[141] Bantekas 1999, p. 578.
[142] Henckaerts & Doswald-Beck 2005, p. 3775 – 3776.
[143] Moloto 2009, p. 16.
[144] Moloto 2009, p. 16.
[145] Moloto 2009, p. 16.
[146] ICTY 16 November 1998, IT-96-21-T, paragraph 378 *(Prosecutor v. Delalić et al.).*
[147] Moloto 2009, p. 16.
[148] Cryer e.a. 2010, p. 391.

1. ”*He/she had actual knowledge, established through direct or circumstantial evidence, that his/her subordinates were committing or about to commit a crime; or*
2. *where he/she had in his possession information of a nature, which at the least, would put him/her on notice of the risk of such offences by indicating the need for additional investigation in order to ascertain whether such crimes were committed or were about to be committed by his/her subordinates*”[149].

The actual knowledge of a superior cannot be presumed. Actual knowledge can be established through direct proof or circumstantial evidence. Relevant circumstantial evidence includes: the time during which the acts occurred, the number and types of troops involved, the geographic location, whether the committed acts were widespread, the tactical tempo of operations, the officers and staff involved and the location of the commander at the time of the crimes.[150]

The legal standard of when a superior “had reasons to know” (constructive knowledge) of the crimes committed by his subordinates, have been interpreted quite broadly by the tribunals.[151] The main point is that there has to be information available for the superior which would have put him on notice of the crimes committed by his subordinates.[152] The information does not need to provide specific facts about the crimes that have been committed or the crimes that are about to be committed. Reports addressed to the superior, the level of training of subordinates, the instructions of subordinates and the characters of the subordinates can be considered in order to determine if the superior “had reasons to know” of the offences.[153] Thereby, if the superior did not take the necessary steps to acquire the knowledge, the superior cannot defend himself by stating that he did not had knowledge of the crimes committed. If the superior had actual knowledge or “had reasons to know” remains a question of fact that needs to be determined on a case-by-case basis.

2.2.3: Failure to take measures.

A commander can be held responsible if he/she failed to take the necessary and reasonable measures in order to prevent or punish the crimes committed. These two types of liability are two distinct legal duties for superiors.[154] The duty to prevent arises as soon as the superior has actual knowledge or constructive knowledge that a crime is about to be committed. This duty starts when a subordinate commence to plan or prepare for offenses.[155] Superiors are even responsible if they fail to take all the

[149] Henckaerts & Doswald-Beck 2005, p. 3776 – 3777.
[150] Cryer e.a. 2010, p. 392.
[151] Moloto 2009, p. 18.
[152] Moloto 2009, p. 18.
[153] Moloto 2009, p. 18.
[154] Moloto 2009, p. 18.
[155] Bantekas 1999, p. 591.

necessary means possible to prevent future crimes from happening. Such means are even factors like the age, training and mental health of the subordinates. The duty to punish arises as soon as the crimes have been committed by the subordinates. It imposes a duty on the superior to take disciplinary measures. It must be noted that, if a superior fails to take adequate measures to prevent crimes, this failure cannot be cured by punishing the subordinates afterwards.[156]

2.3: The International Criminal Court.

The judgements of the ICTY and the ICTR influenced the International Criminal Court (ICC). The ICC was formally established on 1 July 2002, when the Rome Statute entered into force.[157] The drafters of the Rome Statute included article 28 making command responsibility a basis for criminal responsibility.[158] Article 28 of the Rome Statute states: "*A military commander or person … shall be criminally responsible for crimes … committed by forces under his or her effective command and control, …, as a result of his or her failure to exercise control properly …*".[159] Although command responsibility is included in the Rome Statute, the cases before the ICC are rather limited. The *Bemba* case, one of the first cases where the ICC has dealt with the doctrine of command responsibility, will serve as the main source to show how the ICC deals with the doctrine of command responsibility.

In order for a commander to be found guilty and convicted as a commander under article 28 Rome Statute, six elements must be fulfilled.[160] Below, these requirements will be explained one by one and especially the differences with the ICTR and ICTY will be highlighted.

The first requirement is that a crime within the jurisdiction of the ICC must have been committed. The primary crimes are listed in article 5 Rome Statute and defined in later articles. The crimes are: genocide, crimes against humanity, war crimes and crimes of aggression. The different elements of the crimes will not be further addressed in this thesis. It is assumed that a crime has been committed.

The second element states that the accused must have been either a military commander or a person effectively acting as a military commander. The term "military commander" refers to a person who is formally or legally appointed to carry out a military command function and to individuals appointed as military commanders in non-governmental irregular forces (*de jure* commanders).[161] So, a military

[156] Moloto 2009, p. 19.
[157] Of the 139 states that have signed the Rome Statute, 124 states have ratified the Rome Statute. Among the States that have not ratified the Rome Statute are Russia and the United States. (www.icc-cpi.int)
[158] Bantekas 1999, p. 575.
[159] Article 28 Rome Statute.
[160] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 170 (*Prosecutor v. Bemba*).
[161] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 176 (*Prosecutor v. Bemba*).

commander could be a person occupying the highest level in the chain of command or a mere leader with a few soldiers under his or her command.[162] With respect to a "person effectively acting as a military commander", those are persons who are not elected by law to carry out a military commander's role but they are *de facto* in control.[163]

The third element requires that the accused has effective command and control, or effective authority and control, over the forces that committed the crimes. This element is the same as the "effective control test" the ICTY and ICTR have. Like the ICTY and the ICTR, the ICC has indicated that "effective control" requires that the commander have the material ability to prevent or repress the commission of the crimes or to submit the matter to the competent authorities. A lower degree of control, such as the ability to exercise influence, is not sufficient to establish command responsibility.[164] The factors that indicate "effective control" are the same factors used by the ICTY and ICTR.[165] For example, his/her power to issue orders, his/her capacity to ensure compliance with orders including consideration of whether the orders were actually followed, his/her authority to send forces to locations where hostilities take place and withdraw them at any given moment.[166]

The fourth requirement is the mental element requirement. The ICC makes a clear distinction between military supervisors and non-military supervisors. The mental element is different for a military superior than for a civilian superior. If a military superior stands trial, the prosecutor must show that "they knew or, owing to the circumstances at the time, should have known". In the *Bemba* case, the Trial Chamber has determined that the commander had actual knowledge (knew). This element is the same as the ICTY and the ICTR have. Actual knowledge must be established either by direct or indirect (circumstantial) evidence. Factors that may indicate knowledge include any orders to commit crimes, or the fact that the accused was informed personally that his forces were involved in criminal activity.[167] Other indicia include the number, nature, scope, location, and timing of the illegal act and the means of available communication, the modus operandi of similar acts and the location of the command at the time.[168] The Trial Chamber found it unnecessary in the *Bemba* case to consider the "should have known" standard, because they found that there was enough evidence to meet the standard of actual knowledge. The Pre-Trial Chamber has given some clarity regarding the "should have known" criteria and stated that the term "should have known" is a form of negligence.[169] This means that if the superior

[162] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 408 (*Prosecutor v. Bemba*).
[163] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 409 (*Prosecutor v. Bemba*).
[164] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 409 (*Prosecutor v. Bemba*).
[165] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 188 - 189 (*Prosecutor v. Bemba*).
[166] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 409 (*Prosecutor v. Bemba*).
[167] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 188 - 189 (*Prosecutor v. Bemba*).
[168] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 193 (*Prosecutor v. Bemba*).
[169] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 429 (*Prosecutor v. Bemba*).

failed to acquire knowledge of his subordinates' illegal conduct, this could lead to liability.[170] So, the Rome Statute has a looser *mens rea* requirement than the ICTY and ICTR.[171]

In order to establish the fifth requirement, the commander must have done all that is necessary and reasonable to prevent or repress the crimes committed by forces, or to submit the matter to the competent authorities.[172] This is the same in respect to the ICTY and ICTR. The duty to prevent depends on the material power of the commander to intervene in a specific situation. Relevant factors are: ensuring that the forces are adequately trained in international humanitarian law and taking disciplinary measures to prevent the commission of atrocities by the forces under the commander's command.[173] Failure to repress the commission of crimes, is an additional duty that the ICTY and ICTR do not have. The Trial chamber has stated that the duty to repress encompasses an obligation to punish forces after the commission of crimes.[174] The Trial chamber state that the purpose of the duty to repress is: "*to ensure that military commanders fulfil their obligation to search for the perpetrators and either bring them before the courts or hand them over to another state for trial*".[175]

The last requirement is an additional requirement that the ICTY and ICTR do not have, namely causality. The Trial Chamber has stated that the causality requirement would clearly been satisfied when it is established that the crimes would not have been committed, in the circumstances in which they were, had the commander exercised control properly, or the commander exercising control properly would have prevented the crimes.[176] However, The Chamber and the Pre-Trial Chamber have stated that it is not necessary to establish causation between a commander's omission and the crimes committed.[177]

2.4: Conclusion.

The use of (fully) autonomous weapon systems is governed by international humanitarian law and principles of international law. One of the requirements of international humanitarian law is the possibility to hold someone accountable for crimes that have been committed. [178] Regarding the use of (fully) autonomous weapon systems, it is unclear who can and should be held responsible. Human Rights Watch has identified three human actors who could be held responsible for the conducts of

[170] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 432 (*Prosecutor v. Bemba*).
[171] Cryer e.a. 2010, p. 394.
[172] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 197 (*Prosecutor v. Bemba*).
[173] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 203 (*Prosecutor v. Bemba*).
[174] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 206 (*Prosecutor v. Bemba*).
[175] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 206 (*Prosecutor v. Bemba*).
[176] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 213 (*Prosecutor v. Bemba*).
[177] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 211 (*Prosecutor v. Bemba*).
[178] Sparrow 2007, p. 67.

(fully) autonomous weapon systems. One of them is the commander. Thanks to the case law of the ICTY, ICTR and ICC, the doctrine of command responsibility is a well-established doctrine of international law.

The doctrine of command responsibility includes two concepts. The first concept is direct command responsibility which means that the commander can be directly held responsible for ordering a crime. The second concept of command responsibility is indirect command responsibility. This concept entails that the commander can be held criminally responsible for crimes committed by his/her subordinates if he/she knew, or had reason to know, that his/her subordinates were about to commit or were committing such crimes and did not take all necessary and reasonable measures within their power to prevent their commission, or if such crimes had been committed, to punish the persons responsible.[179]

The second concept of command responsibility, indirect command responsibility, constitutes of three legal elements which has to be proven in order to hold the commander responsible. The first element is the existence of a relationship between the accused as superior and the perpetrator of the crime as his subordinate. If there is a clear military hierarchy that can be distinguished, this criterion will be simple to apply. After all, based on the chain of command it is unproblematic to assess who was in charge and therefore can be held responsible. However, in modern conflicts there is not always a formal chain of command. So, the Appeals Chamber in the *Čelebići* case has determined that it is not always necessary that there is a formal, *de jure*, subordination.[180] A person who exercises *de facto* powers and control can also be a superior. However, what really matters is to determine whether the superior had control over his/her subordinates. In this regard, the Appeals Chamber in the *Čelebići* case has determined that there needs to be "effective control". The second element requires that the superior knew or had reasons to know that the criminal act was about to be committed or has been committed. The actual knowledge of a superior cannot be presumed; it can be established through direct proof or circumstantial evidence. The legal standard of when a superior "had reasons to know" of the crimes committed by his subordinates, has been interpreted quite broadly by the tribunals.[181] The main point is that there has to be information available for the superior which would have put him on notice of the crimes committed by his subordinates. It should be noted that the Rome Statute has a looser means rea that the ICTY and ICTR Statutes. The last element that must be proven to hold a commander responsible for the actions of his subordinates is the failure of the commander to take the necessary and reasonable measures to prevent the criminal act from happening or the failure of the

[179] Moloto 2009, p. 12.
[180] Henckaerts & Doswald-Beck 2005, p. 3775 - 3776.
[181] Moloto 2009, p. 18.

commander to punish the perpetrators. These two types of liability are two distinct legal duties for the commander. The duty to prevent arises as soon as the superior has actual knowledge or has reasons to know that a crime is about to be committed. This duty starts when a subordinate commence to plan of prepare for offenses.[182] The duty to punish arises as soon as the crimes have been committed by the subordinates. It imposes a duty on the superior to take disciplinary measures. The ICC has also included a duty to repress, which means that the commander is obligated to search for the perpetrators and either bring them before the courts or hand them over to another state for trial.[183] In addition, the ICC has added an extra legal element to these three legal elements, namely causality. However, The Chamber and the Pre-Trial Chamber have stated that it is not necessary to establish causation between a commander's omission and the crimes committed.[184]

[182] Bantekas 1999, p. 591.
[183] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 206 (*Prosecutor v. Bemba*).
[184] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 211 (*Prosecutor v. Bemba*).

Chapter 3: Command responsibility & (fully) autonomous weapon systems.

There is a strong technological development towards fully autonomous weapon systems and they will be used on future battlefields.[185] In addition, autonomous weapon system, which are capable of selecting targets and delivering force without human interaction have already been developed. However, these weapon systems are, at this moment, only used as defense systems. In the future, they might be used as combat systems. Therefore, it is important to regulate (fully) autonomous weapon systems. In order to regulate fully autonomous weapon systems and autonomous weapon systems, one of the many questions that needs to be answered is if the commander can be held responsible when a (fully) autonomous weapon system commits a crime. In this chapter, the doctrine of command responsibility will be applied with respect to (fully) autonomous weapon systems in order to determine if/to what extent the commander can be held responsible when a (fully) autonomous weapon system is used.

3.1: General observations.

Before the doctrine of command responsibility will be applied in relation to (fully) autonomous weapon systems, some general observations have to be made. First, fully autonomous weapon systems do not exist yet and since autonomous weapon systems, who are currently deployed, are only used as a defense system, the answer whether commanders can be held responsible, can only be speculative. Second, Canning has stated that (fully) autonomous weapon systems should only target other (fully) autonomous weapon systems.[186] In this manner, there will be no civilian causalities.[187] However, since countries have already developed and used unmanned aircraft vehicles that are precursors to fully autonomous weapon systems in armed conflicts[188] and since there is a lot of funding for such weapon systems[189], it will not be likely that a (fully) autonomous weapon system will only be used to target another (fully) autonomous weapon system.[190] Last, when it comes to the question if a commander can be held responsible for the behavior of autonomous weapon systems and especially fully autonomous weapon systems, the most frequently mentioned statement is that, because those weapon systems are able to select and engage targets without human supervision or control, there is a responsibility gap.[191] Matthias states that: "*In situations where the operator has reduced control over*

[185] Schulzke 2013, p. 204.
[186] Canning 2006.
[187] Canning 2006.
[188] Docherty 2012, p. 18.
[189] Müller 2016, p. 4. (The US Department of Defense is currently spending $5 billion USD per year on unmanned systems.)
[190] Müller 2016, p. 4.
[191] Schulzke 2013, p. 206.

the machine he bears less or no responsibility because the operator cannot, in principle, predict its future behavior".[192] Sparrow states that the actions of a (fully) autonomous weapon system are unpredictable and unreliable. Consequently, a commander cannot be held responsible because he/she has no control over the (fully) autonomous weapon system.[193] However, even when a weapon system is fully autonomous, the uncertainty in the 'computer system' that governs the behavior of these weapon systems does not necessarily mean that the commander cannot be held responsible.[194] Therefore, it could be possible that a commander can be held responsible for the actions of a (fully) autonomous weapon system.

3.2: Direct command responsibility and (fully) autonomous weapon systems.

In order to hold a commander directly responsible, the *actus reus* (illegal act) and *mens rea* (intent) needs to be established. Sassóli states that: "*it is as fair to hold a commander of a robot accountable as it would be to hold accountable a commander who instructs a pilot to bomb a target he describes as a military headquarters, but which turns out to be a kindergarten.*"[195] Not only Sassóli, but also Reitinger state that the elements of direct command responsibility can be fulfilled when a (fully) autonomous weapon system is used.[196]

Before the different elements of direct command responsibility, in relation to autonomous- and fully autonomous weapon systems, will be analyzed, a potential scenario will be described. Assume that a (fully) autonomous weapon system is used on the battlefield. This weapon system is entering a house. The weapon system is programmed to look around, room after room, for certain characteristics and it has to identify who is a civilian and who is a combatant. Then, instead of killing the combatant, the (fully) autonomous weapon system kills the entire family who lives in that house.

In order to clarify how the *actus reus* can be established, the above mentioned example will be taken into consideration. If the commander gives an illegal order to the (fully) autonomous weapon system (kill the civilians) and the (fully) autonomous weapon system acts upon that order (kills the civilians), the *actus reus* can be established. Because of the illegal order, which might be pre-programmed into a (fully) autonomous weapon system, the (fully) autonomous weapon system kills the civilians in the house. This means that there is a casual link between the illegal order and the illegal act, which means that the *actus reus* has been established.

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[192] Matthias 2004, p. 175 - 176.
[193] Sparrow 2007, p. 65.
[194] Noorman & Johnson 2014, p. 60.
[195] Sassóli 2014, p. 324.
[196] Reitinger 2015, p. 112.

However, an autonomous weapon system makes its own decisions and engage in target selection on its own. A fully autonomous weapon has humanlike intelligence, which means that they can, for example, disobey orders. So, if a fully autonomous weapon system disobeys the order of the commander and commits another crime, the *actus reus* cannot be established. In addition, an autonomous weapon system can also refrain from attacking the specific target. Therefore, it can be argued that the commander's illegal order merely influenced the actions of the (fully) autonomous weapon system.[197] In this respect, sparrow states that: "*The autonomy of the machine implies that its orders do not determine (although they obviously influence) the actions. The use of autonomous weapons therefore involves a risk that military personnel will be held responsible for the action of machines whose decisions they did not control. The more autonomous the systems are, the larger the risk looms. At some point, then, it will no longer be fair to hold the Commanding Officer responsible for the actions of the machine. If the machines are really choosing their own targets, then we cannot hold the Commanding Officer responsible for the death that ensure*".[198] Also Human Rights Watch has stated that a (fully) autonomous weapon system can launch independently and unforeseeable an indiscriminate attack against civilians. Consequently, the *actus reus* of the commander cannot be established because the commander did not order that specific attack.[199]

It is correct that the commander will not exactly know how the (fully) autonomous weapon system will attack. Nevertheless, the commander has pre-programmed the illegal order, and if the (fully) autonomous weapon system acts upon that order, the *actus reus* can be established. In addition, the commander controls where the (fully) autonomous weapon system will be deployed.[200] So, if a commander gives an illegal order and he/she ensures that the (fully) autonomous weapon system can act upon that order, for example by deploying the (fully) autonomous weapon system in an environment where the illegal order can be carried out, there is a casual link between the illegal order and the illegal act.[201] In addition, Wagner have stated that: "*legal responsibility for any military activity remains with the last person to issue the command authorizing a specific activity.*"[202] So, it can be stated that the actus *reus* can be established if the commander was the last one to give the order and the order he/she gave was illegal.

The second element, the *mens rea* element, is much more difficult to establish. Reitinger states that if the commander has issued an illegal order and that order is carried out by a (fully) autonomous

[197] Reitinger 2015, p. 112.
[198] Sparrow 2007, p. 71.
[199] Docherty 2015, p. 19 – 20
[200] Schulzke 2013, p. 15.
[201] Reitinger 2015, p. 113.
[202] Wagner 2014, p. 1405

weapon system, the commander has directly engaged in the crime and therefore has the requested *mens rea*. For illustration, if the commander knew that there were civilians in the house and the commander was aware of the substantial likelihood that the (fully) autonomous weapon system would or could kill the civilians in the house, the *mens rea* element can be established. It can be argued that the commander will not exactly know how the (fully) autonomous weapon system will attack.[203] This is true, however, the ICTY and the ICTR have stated that commanders are liable even without full knowledge of the actions of their subordinates.[204]

Another view with respect to the *mens rea* element is that it is linked to the commanders understanding of the (fully) autonomous weapon system. It has been stated by Sparrow that (fully) autonomous weapon systems are unpredictable and complex, which means that the commander cannot understand and comprehends the complex algorithms and programming of the (fully) autonomous weapon system.[205] Therefore, the commander can never have the requested *mens rea*. However, Sassóli has stated that the commander does not have to understand the complex programming of the (fully) autonomous weapon system, he/she needs to understand the result.[206] So, according to Sassóli, the *mens rea* element can be established if the commander was aware of the substantial likelihood that, by deploying a (fully) autonomous weapon system, the result might be that the weapon systems kills the civilians in the house. However, if (fully) autonomous weapon systems are unpredictable, how can a commander understand the result of what the (fully) autonomous weapon system can and cannot do?

Human Rights Watch has stated that: "*The liability of a commander would rest on whether the decision to deploy a (fully) autonomous weapon system under the circumstances amounted to an intention to commit an indiscriminate attack.*"[207] However, it would still be difficult to describe responsibility. Especially when a fully autonomous weapon system is used, because a fully autonomous weapon system can change its target based on self-learned or self-made rules. Consequently, the commander did not have the intent that the (fully) autonomous weapon system would commit that specific crime. In addition, some scholars have the opinion that the *mens rea* may occur when the commander sends a (fully) autonomous weapon system into a situation for which it is not designed or in an inappropriate situation. However, it cannot be expected of the commander that he/she knows in advance all the aspects of a future mission. This uncertainty makes the establishment of *mens rea* difficult.

[203] Reitinger 2015, p. 113.
[204] Reitinger 2015, p. 117.
[205] Sparrow 2007, p. 70.
[206] Sassóli 2014, p. 324.
[207] Human rights act 2015, p. 20

In order to be able to establish the *mens rea* element, Beard proposes that commanders should be familiar with the behavior of autonomous weapon systems.[208] This can, for example, be done by giving special trainings so that commanders will understand the capabilities, risks and limits of autonomous weapon systems.[209] In this manner, if the commander willfully uses a (fully) autonomous weapon system in a manner that is inconsistent with international humanitarian law, the commander has the requested *mens rea*.

It should be noted that even when the commander has the requested *actus reus* and *mens rea*, it remains difficult to prove responsibility. After all, the programming of a (fully) autonomous weapon system is often done by many individuals. So, each individual could try to shift the blame regarding the illegal order in the programming of the (fully) autonomous weapon system to another.

As stated above, if a fully autonomous weapon system disobeys the illegal order and commits another crime, direct command responsibility cannot be established. After all, there is no connection between the committed act and the intent of the commander. However, the commander may be responsible by using the doctrine of indirect command responsibility.

3.3: Indirect command responsibility and (fully) autonomous weapon systems.

A commander can be held responsible for the acts of a subordinate: "*if he knew or had reason to know that the subordinate was about to commit such acts or had done so and the superior failed to take the necessary and reasonable measures to prevent such acts or to punish the perpetrators thereof*".[210] So, indirect command responsibility is based on an omission. It should be mentioned that the doctrine of command responsibility is a concept that governs relationships between the commander and a human subordinate and not between a commander and a robot.[211] In this respect, if we see a (fully) autonomous weapon system as a robot, the doctrine of command responsibility cannot be applied to (fully) autonomous weapon systems. Nevertheless, Heyns proposes that: *"since a commander can be held responsible for an autonomous human subordinate, holding a commander accountable for a (fully) autonomous weapon system may appeal analogous*".[212] Thereby, as we have seen in chapter 2 of this thesis, the doctrine of command responsibility is a new doctrine which has been developed and fine-tuned the past few years. Therefore, it is not unthinkable that the doctrine of command responsibility may, one day, be applicable to (fully) autonomous weapon systems. In addition, some

[208] Beard 2014, p. 653 – 654.
[209] Beard 2014, p. 653 – 654.
[210] Article 7.1 of the ICTY statute and article 6.1 of the ICTR statute.
[211] Heyns 2013, paragraph 78.
[212] Heyns 2013, paragraph 78.

scholars refer to (fully) autonomous weapon systems as agents, which gives the impression that (fully) autonomous weapon systems are 'robotic combatants'/analogous to humans.[213]

In order to establish indirect command responsibility, there needs to be a relationship between the superior and the subordinate. The first problem that arises here is that the prerequisite superior-subordinate relationship has been held to date as an interpersonal relationship.[214] This means that a (fully) autonomous weapon system should be analogous to a subordinate soldier before indirect command responsibility can be applied.

The second problem is that there needs to be *de jure* or *de facto* control. *De jure* control means that there is an authority to command and control subordinates. *De facto* control is based on informal authority who have command and control over their subordinates. The problem with respect to control is, as Sparrow has stated, that (fully) autonomous weapon systems are unpredictable. Therefore, the commander has no control over the actions of the (fully) autonomous weapon system.[215] In addition, fully autonomous weapon systems will have the possibility to disobey orders and they will be able to learn from their environment and adapt to situations. So, with respect to fully autonomous weapon systems, the commander will have no control over the actions. Arkin has proposed a solution with respect to the unpredictability and complexity of a (fully) autonomous weapon system. According to Arkin, it will be possible to make fully autonomous weapon systems "*responsibility transparent and explicit, through the use of a responsibility advisor at all steps in the deployment of these systems*".[216] Arkin states that: "*the responsibility advisor would be part of the human-robot interaction component and used for the pre-mission planning*".[217] According to Arkin, the responsibility advisor will discuss every detail of the mission before the (fully) autonomous weapon system will be deployed. This means that, according to Arkin, there will be "control" over a (fully) autonomous weapon system, if prior to the deployment of a (fully) autonomous weapon system, all possibilities and risks have been discussed.[218]

Critical to the doctrine of command responsibility is that there needs to be "effective control". In order to determine if there is "effective control" it is needed that the commander has "*the material ability to prevent or punish criminal conduct*".[219] It might be possible to punish a (fully) autonomous weapon system, for example, by destroying them or reprogramming them. However, these punishments would not be effective because a (fully) autonomous weapon system does not have the capacity to feel guilt

[213] Ohlin 2016, p. 14.
[214] Liu 2016, p. 8.
[215] Sparrow 2007, p. 71.
[216] Arkin 2011, p. 9.
[217] Arkin 2011, p. 61.
[218] Schulzke 2013, p. 15.
[219] ICTY 16 November 1998, IT-96-21-T, paragraph 378 *(Prosecutor v. Delalić et al.)*.

for their actions or to suffer when they are punished.[220] Fully autonomous weapon systems will be systems with humanlike intelligence, but this does not mean that they are moral agents and can feel guilt. Regarding preventing criminal conduct, Human Rights Watch has stated that: "*the fast processing speed as well as unexpected circumstances, such as communication interruptions, programming errors, or mechanical malfunctions, might prevent commanders from being able to call off an attack*".[221] Consequently, commanders are not able to prevent criminal conduct. In addition, Roff argues that it will be impossible to prevent or punish (fully) autonomous weapon systems for committing a war crime because due to their "*processing speed*" and the "*multitude of operational variable involved*" it is impossible to control them.[222] However, determining "effective control" is a matter of evidence and not of substantive law. So, in order to establish "effective control" the international criminal tribunals and the International Criminal Court uses an in exhaustive list of indicators. This may result in a new indicator regarding "effective control" with respect to (fully) autonomous weapon systems. For example, the decision to activate or not to activate the (fully) autonomous weapon system lays in the hands of the commander which may lead to "effective control". Furthermore, the decision to use or not to use the (fully) autonomous weapon system will be made by a commander which may be an indicator for "effective control".[223]

The second element that needs to be established is that the commander "*knew or had reasons to know*" that the (fully) autonomous weapon system was about to commit or has committed a crime. Actual knowledge (knew) can only be established if the (fully) autonomous weapon system explains to the commander what its target is going to be before it attacks. Within this respect, Human Rights Watch states: "*Actual knowledge of an impending criminal act would only occur if a (fully) autonomous weapon system communicated its target selection prior to initiating an attack*".[224] So, according to Human Rights Watch, actual knowledge cannot be established. Furthermore, if we take the complexity of the system into account, it is unlikely that a commander can foresee and understand the consequences of the different algorithms within a (fully) autonomous weapon system. As a result, the behavior of a (fully) autonomous weapon system will be difficult to predict. In addition, the environment in which a fully autonomous weapon system is deployed can have an effect on the behavior of the fully autonomous weapon system. After all, if a weapon system is self-learned, the environment will likely influence the decisions of the fully autonomous weapon system. Furthermore, the ICTY Trial Chamber has stated that the more distance there is between the commander and the place where the crime has been committed, more indicators are needed to prove that the commander knew of the

[220] Sparrow 2007, p. 72.
[221] Docherty 2015, p. 24.
[222] Roff 2013, p. 15.
[223] Reitinger 2015, p. 115.
[224] Docherty 2015, p. 22.

crimes.[225] As a consequence, it will be very difficult to establish that the commander knew that a (fully) autonomous weapon system was about to commit a crime. However, scholars have argued that when a commander makes the decision to send the (fully) autonomous weapon system into combat, the risk that it might go wrong is accepted by the commander. So, according to some scholars, by accepting this risk, the commander has established actual knowledge.

In order to establish constructive knowledge (had reasons to know), the commander must have information that would put him on notice of the risks of a subordinate's crime that is sufficiently alarming to justify further inquiry.[226] If a commander does not have complete oversight, it would be difficult to examine if a commander has the requested knowledge. After all, it is unclear how the commander can get the information that is needed in order to know that a (fully) autonomous weapons system is going or about to commit a crime. However, if it is known that a specific (fully) autonomous weapon system has, in the past, committed offenses, this information will be sufficiently alarming. Consequently, the commander has to do further research. If the commander fails to do so, this can lead to liability because the commander had constructive knowledge (reasons to know). On the other hand, the problem with this statement is that it needs to be clarified what kind of information the commander should have. For example, is the fact that a (fully) autonomous weapon system committed a crime in the past enough to establish constructive knowledge? Should it be information regarding the technical specification of the (fully) autonomous weapon system and how they work?[227] Or, should it be information about the civilians that have been killed? Thereby, Lin argues that: "*advances in communication technologies potentially drown the commander in a deluge of information, such that the amount of information that can objectively be imputed to the commander potentially becomes overwhelming*".[228]

The Pre-Trial Chamber of the ICC in the *Bemba* case has given another interpretation to the "should have reasons to know" criteria. They have stated that the term "should have known" is a form of negligence.[229] This means that if the superior failed to acquire knowledge of his/her subordinates' illegal conduct, this could lead to liability.[230] This will mean that the commander has an active duty to take the necessary measures to secure knowledge of the conduct of the (fully) autonomous weapon system. However, as stated before, the amount of information can be overwhelming to the commander due to advances in communication technologies.

[225] ICTY Trial Chamber, 31 March 2003, paragraph 72, (Prosecutor v. *Naletilic and Martinovic).*
[226] Docherty 2015, p. 22.
[227] Beard 2014, p. 659.
[228] Liu 2016, p. 8.
[229] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 429 (*Prosecutor v. Bemba*).
[230] ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08, paragraph 432 (*Prosecutor v. Bemba*).

Reitinger states that establishing responsibility is based on an omission of the commander which means that establishing responsibility does not depend on the commander's knowledge of the illegal outcome of the crime.[231] To illustrate, a (fully) autonomous weapon system attacks civilians in the house. The commander does not know that there are civilians in the house, but he/she does know that there are civilians in the neighborhood. So, the commander will know that if he/she activates and deploys a (fully) autonomous weapon system, there might be a chance that the (fully) autonomous weapon system hits civilians in the area. Assume that the (fully) autonomous weapon system attacks the house and it turns out that the house is full of civilians. According to Reitinger, the commander can be held responsible because he neglected his duty by consciously ignoring the fact that civilians might be in the area.[232] In short, even though the commander knew that there were civilians, he/she chooses to send the (fully) autonomous weapon system regardless, which is an omission of the commander.[233]

The last element that needs to be established is if the commander has taken all the necessary and reasonable measures in order to prevent or punish the crimes that have been or are about to be committed. The possibility to punish (fully) autonomous weapon systems and the possibility to prevent crimes form happening, has already been discussed in relation to "effective control". It must be noted that it is not defined in any international agreement what constitutes "necessary and reasonable measures".[234] So, with respect to (fully) autonomous weapon systems, it would be possible that "necessary and reasonable measures" will be investigating what happened so that the failure will not happen again in the future. In this manner, the commander would be able to fulfil his/her obligation. In addition, a commander can fulfill his/her duty to prevent crimes from happening. For example, if a commander knows that a (fully) autonomous weapon system is likely to commit a war crime, the commander should not activate the (fully) autonomous system. Another possibility is that, before the (fully) autonomous weapon system is send into combat, the commander has to be certain that the (fully) autonomous weapon system can be used safely. Otherwise, the commander has not fulfilled his duty to take all the necessary and reasonable measures to prevent crimes from happening.

The ICC has an additional requirement which the ICTY and ICTR do not have, namely causality. However, The Chamber and the Pre-Trial Chamber have stated that it is not necessary to establish causation between a commander's omission and the crimes committed.[235] Since indirect command responsibility is based on an omission, it is not necessary to establish causation.

[231] Reitinger 2015, p. 114.
[232] Reitinger 2015, p. 115.
[233] Reitinger 2015, p. 114.
[234] Beard 2014, p. 657.
[235] ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08, paragraph 211 (*Prosecutor v. Bemba*).

3.4: External factors.

We have seen that it is, to some extent, possible to hold the commander responsible when a (fully) autonomous weapon system is used. However, there are also a few external factors that needs to be considered. For example, can the commander still be held responsible when a (fully) autonomous system has been hacked or when there is a technical malfunction? These two external factors will be discussed below.

It may be difficult to establish responsibility for the commander if the computer system of a (fully) autonomous weapon system has been hacked.[236] Liu states on this matter that computer systems of (fully) autonomous weapon systems are vulnerable to cyberattacks.[237] If a (fully) autonomous weapon has been 'hijacked', the hijacker might take over control and might use the (fully) autonomous weapon system to commit a war crime.[238] That this risk is a real possibility can be illustrated by referring to the 'Keylogger' computer virus which had infected the cockpits of U.S. unmanned aerial vehicle.[239] As far as known, the 'Keylogger" virus has not transmitted any secret information to third parties.[240] In addition, Iran claimed in 2011 that it had brought down an U.S. stealth drone by hacking into its system.[241] This claim was confirmed by US-president Obama who asked for the return of the UAV.[242] With respect to establishing responsibility for the commander if a (fully) autonomous weapon system is hacked, Liu states that there are two main problems: "*The first is simply that the control may constantly be under doubt because of the possibility that its information systems have been compromised. This raises questions about whether it will be possible to definitively attribute responsibility over such a system. The second difficulty stems from the nature of cyberwarfare itself. Leaving aside the additional difficulties associated with cybercrime and cyberterrorism, unlike 'the physical world, when a country is at war, it knows it is at war and, most likely, with whom', when it comes to cyberwarfare it may be impossible to ascertain 'who was responsible for the attacks or why they were launched'*".[243] With respect to the doctrine of command responsibility, it is not possible to hold a commander responsible if he/she has no control over the (fully) autonomous weapon system. In addition, the commander will not have the requested knowledge or the possibility to intervene when a (fully) autonomous weapon system is hacked. Thereby, it will be uncertain who has launched the attacks. So, this will lead to impunity of the commander. Another external factor that needs to be addressed are technological malfunctions. If a commander deploys a (fully) autonomous weapon

[236] Schmitt 2013, p. 7.
[237] Liu 2012, p. 647.
[238] Liu 2012, p. 648.
[239] Liu 2012, p. 647.
[240] Shachtman 2011.
[241] Liu 2012, p. 648.
[242] Hartman & Steup, 2013, p. 7.
[243] Liu 2012, p. 648.

system and the (fully) autonomous weapon system commits a war crime because of a technical malfunction, it would be difficult to hold the commander responsible for the committed act. It is even impossible to hold the commander responsible if he/she acted in good faith, which means that he/she had no knowledge regarding this technical malfunction.

3.5: Conclusion.

The development and deployment of fully autonomous weapon systems and the deployment of autonomous weapon systems into armed conflict, poses challenges with respect to responsibility. In this chapter, the doctrine of command responsibility, which includes direct command responsibility and indirect command responsibility, has been applied to (fully) autonomous weapon systems.

First of all, we have analyzed if it is possible to hold a commander responsible, by using direct command responsibility, when a (fully) autonomous weapon system is used. In order to hold a commander directly responsible, the *actus reus* (illegal act) and *mens rea* (intent) needs to be established. If a commander gives an illegal order and the fully autonomous weapon system or an autonomous weapon system acts upon that order, the *actus reus* can be established. It has to be stated that the commander will not exactly know how the (fully) autonomous weapon system will attack. Nevertheless, the commander does control some aspects of the (fully) autonomous weapon system. So, if the commander ensures that the illegal order he/she gives can be carried out by the (fully) autonomous weapon system, there is a link between the illegal act and the illegal order. Thereby, if we follow the statement of Wagner, the *actus reus* can be established if the commander is the last one to give the order.[244]

With respect to the second element (*mens rea*), Reitinger states that if the commander has issued an illegal order and that order is carried out by a (fully) autonomous weapon system, the commander has directly engaged in the crime and has the requested *mens rea*. Even though the commander will not exactly know how the (fully) autonomous weapon will act, commanders are liable even without full knowledge of the actions of their subordinates.[245] However, if a fully autonomous weapon system is used and disobeys an order, the intent of the commander cannot be established. After all, the commander would not have the intent that the (fully) autonomous weapon system would commit that specific crime. In addition, it needs to be stated that it will be difficult to prove that a (fully) autonomous weapon system has acted upon an illegal order given by the commander. After all, the programming of a (fully) autonomous weapon system would often be done by many individuals involved.

[244] Wagner 2014, p. 1405.
[245] Reitinger 2015, p. 117.

Besides direct command responsibility, indirect command responsibility has also been analyzed. First of all, it should be mentioned that the doctrine of command responsibility is a concept that governs the relationship between the commander and a human subordinate and not between a commander and a robot.[246] So, if we see a (fully) autonomous weapon system as a robot, the doctrine of command responsibility cannot be applied.

In order to establish indirect command responsibility, there needs to be a relationship between the superior and the subordinate. The prerequisite superior-subordinate relationship has been held to date as an interpersonal relationship.[247] This means that a (fully) autonomous weapon system should be analogous to a subordinate soldier before indirect command responsibility can be applied. In addition, there needs to be *de jure* or *de facto* control. Since (fully) autonomous weapon systems are unpredictable, it will be difficult to establish control. In addition, the commander needs to have "effective control". In order to establish "effective control" the commander must have "*the material ability to prevent or punish criminal conduct*".[248] It might be possible to punish a (fully) autonomous weapon system, for example, by destroying them or reprogramming them. However, these punishments would not be effective because a (fully) autonomous weapon system does not have the capacity to feel guilt for their actions or to suffer when they are punished.[249] In addition, according to Human Rights Watch it will not be able to prevent crimes from happening, because (fully) autonomous weapon systems have a fast processing speed. However, in order to establish "effective control" the international criminal tribunals and the International Criminal Court uses an in exhaustive list of indicators. This may result in a new indicator regarding "effective control" when a (fully) autonomous weapon systems is used.

Regarding the second element, "*knew or had reasons to know*", actual knowledge can only be established if the (fully) autonomous weapon system explains to the commander what its target is going to be before it attacks. In addition, if a fully autonomous weapon system is deployed, which can learn from its environment, the environment will likely influence the decisions of the fully autonomous weapon system. As a consequence, it is not possible to establish that the commander knew that the fully autonomous weapon system was about to commit a crime. In order to establish constructive knowledge, the commander must have information that would put him on notice of the risks of a subordinate's crime that is sufficiently alarming to justify further inquiry.[250] If we assume that a commander does not have complete oversight, it would be difficult to examine if a commander has the

[246] Heyns 2013, paragraph 78.
[247] Liu 2016, p. 8.
[248] ICTY 16 November 1998, IT-96-21-T, paragraph 378 *(Prosecutor v. Delalić et al.).*
[249] Sparrow 2007, p. 72.
[250] Docherty 2015, p. 22.

requested knowledge. After all, it is unclear how the commander can get the information that is needed in order to know that a (fully) autonomous weapons system is going to commit a crime. However, if it is known that a specific (fully) autonomous weapon system has, in the past, committed offenses, this information will be sufficiently alarming. Consequently, the commander has to do further research. However, it needs to be clarified what kind of information the commander should have before it can be stated that he/she had constructive knowledge. According to Reitinger, establishing responsibility does not depend on the commander's knowledge of the illegal outcome of the crime but it is based on an omission by the commander.[251] So, if the commander would know that the possibility arises that a crime will be committed if he/she deploys an (fully) autonomous weapon system and deploys it anyway, constructive knowledge can be established.

The last element that needs to be established is if the commander has taken all the necessary and reasonable measures in order to prevent or punish the crimes. It is not defined in any international agreement what constitutes "*necessary and reasonable measures*".[252] So, with respect to (fully) autonomous weapon systems, it would be possible that "*necessary and reasonable measures*" will be investigating what happened so that the failure will not happen again in the future. In this manner, the commander would be able to fulfil his/her obligation.

In sum, direct command responsibility can be established if the commander gives an illegal act and the (fully) autonomous weapon system acts upon that order. Indirect responsibility cannot be established. After all, the doctrine of command responsibility is a concept that governs the relationship between the commander and a human subordinate and not between a commander and a robot.[253] However, depending on the development of indirect command responsibility, it might, one day, be possible to hold a commander responsible when a (fully) autonomous weapon system is used.

Besides the elements of direct and indirect command responsibility, there are also two external factors that needs to be considered. If a (fully) autonomous weapon system has been 'hijacked', there will be no control and no knowledge if a crime has been committed. So, this will lead to impunity of the commander. Another external factor that needs to be addressed are technological malfunctions. If a commander deploys a (fully) autonomous weapon system and the (fully) autonomous weapon system commits a crime because of a technical malfunction, it would be difficult to hold the commander responsible for the committed act.

[251] Reitinger 2015, p. 114.
[252] Beard 2014, p. 657.
[253] Heyns 2013, paragraph 78.

Chapter 4: Conclusion and recommendations.

War and technological development has always been linked together. Nowadays, weapon systems are becoming more and more autonomous and humans are moving further away from the battlefield. Currently, most autonomous weapon systems are, to some extent, controlled by a human operator.[254] However, scholars are of the opinion that fully autonomous weapon system, which would have humanlike intelligence, will be developed in several years.[255] Because technological advancements will make it possible that fully autonomous weapon systems will be developed, they have become subject of discussion. One of the questions that scholars have raised is: who can be held responsible if a (fully) autonomous weapon system commits a crime? This thesis has focused on this question in relation to the commander, which resulted in the following research question: *To what extent can the doctrine of command responsibility be applied when a (fully) autonomous weapon system is used?*

In this final chapter, the findings of the previous chapters will be discussed briefly and an answer to the research question will be formulated. In the end, some recommendations will be formulated with respect to the responsibility of a commander when a (fully) autonomous weapon system is used.

Weapon systems are becoming more and more autonomous and there are different levels of autonomy within a weapon system. Human Rights Watch has made a classification between the different kinds of autonomous weapon systems based on the level of autonomy and, consequentially, the amount of human involvement in their actions.[256] Human Rights Watch differentiate between *human in the loop* weapon systems which are semi-autonomous weapons, *human on the loop* weapon systems which are weapon systems that can autonomously select and engage specific targets and *human out of the loop* weapon systems which are weapon systems that are programmed to autonomously select individual targets and attacks them in a pre-programed selected area during a certain period of time.[257] Fully autonomous weapon systems are categorized as *human beyond the wider loop* weapon systems.[258] These weapon system can make decisions based on self-learned or self-made rules and selects and engages targets without any human involvement.[259] This thesis has only dealt with *human out of the loop* weapon systems and *human beyond the wider loop* weapon systems.

[254] Grut 2013, p. 5.
[255] AIV & CAVV 2015, p. 17.
[256] Docherty 2012, p. 2.
[257] AIV & CAVV 2015, p. 9.
[258] AIV & CAVV 2015, p. 10.
[259] AIV & CAVV 2015, p. 17.

Holding the commander responsible when a *human out of the loop* weapon system (autonomous weapon system) or a *human beyond the wider loop* weapon system (fully autonomous weapon system) is used, can be based on the doctrine of command responsibility. The doctrine of command responsibility includes two concepts. First, the commander can be held directly responsible for the orders he/she issued (direct command responsibility).[260] The *actus reus* of "ordering" a crime requires that a person who is in a position of authority orders a person in a subordinate position to commit an offence.[261] To establish the *mens rea* requirement for "ordering" a crime, it must be proven that the individual who is in a position of authority orders an act or omission with the awareness of the substantial likelihood that a crime will be committed in the execution of that order.[262] Second, the commander can be held responsible for the acts his/her subordinates carried out (indirect command responsibility).[263] The second concept is based on the commander's failure to act when under a duty to do so.[264] In order to establish indirect command responsibility, the ICTY and ICTR has established three legal elements which needs to be proven. Firstly, there needs to be a relationship between the superior and the subordinate who commits the crime.[265] Secondly, the superior "knew of had reasons to know" that the criminal act was about to be or had been committed.[266] Lastly, the superior has failed to take the necessary and reasonable measures to prevent the criminal act from happening or he/she failed to punish the perpetrator of the criminal act.[267]

Based on the findings of the previous chapter, it can be concluded that the commander can be held responsible when he/she gives an order to a (fully) autonomous weapon system and the (fully) autonomous weapon systems acts upon that order. The commander can give an illegal order by, for example, programming the illegal order into the (fully) autonomous weapon system. Even though the commander does not know how the (fully) autonomous weapon system will act/attack, the *actus reus* can be established. Besides the possibility to give the illegal order, the commander controls where the (fully) autonomous weapon system will be deployed and the commander can give instructions on how they should act. So, if the commander gives an illegal order and makes sure that the (fully) autonomous weapon system is deployed in an environment so that the illegal order can be carried out, there is a link between the illegal order and the illegal act. This means that the *actus reus* can be established. If the commander has issued an illegal order and that order is carried out

[260] ICRC 2014, p. 1.
[261] ICTY 12 June 2007, IT-95-11-T, paragraph 441 *(Prosecutor v. Milan Martić).*
[262] ICTY 5 December 2003, IT-98-29-T, paragraph 172 *(Prosecutor v. Stanislav Galić)*.
[263] ICRC 2014, p. 1.
[264] Moloto 2009, p. 12.
[265] Cryer e.a. 2010, p. 391.
[266] Cryer e.a. 2010, p. 391.
[267] Cryer e.a. 2010, p. 391.

by the (fully) autonomous weapon system, the commander has directly engaged in the crime and has the requested *mens rea*. Even though the commander does not exactly know how the (fully) autonomous weapon system will attack, the *mens rea* element can still be established because the ICTY and the ICTR have stated that the commander can also be held responsible without full knowledge of the actions of their subordinate. In addition, Sassóli state that the commander does not have to understand the complex programming of the (fully) autonomous weapon system, he/she needs to understand the result.[268] So, if the commander know that his/her illegal order will result in a crime, the commander will have the requested *mens rea*. However, if a commander gives an illegal order to a fully autonomous weapon system and the fully autonomous weapon system disobeys the order and commits another crime, the commander cannot be held responsible under the doctrine of direct command responsibility. After all, the commander did not have the intent that the (fully) autonomous weapon system committed that specific crime.

When a (fully) autonomous weapon system commits a crime, it will be impossible, under the current circumstances, to establish that the commander is responsible because he/she failed to act. One of the reasons that indirect command responsibility cannot be established is because indirect command responsibility is a doctrine that governs relationships between the commander and a human subordinate and not between a commander and a robot.[269] So, if we see a (fully) autonomous weapon system as a robot, the doctrine of indirect command responsibility cannot be applied. In addition, the relationship between a commander and his subordinate has been defined as an interpersonal relationship.[270] So, the (fully) autonomous weapon system should be analogous to a human, otherwise the doctrine of command responsibility cannot be applied. In addition to the above mentioned problems, another problem is that there is too much uncertainty regarding the interpretation of the different elements. In order to establish indirect command responsibility, the commander needs to have “effective control”. In order to establish “effective control” the commander must have “*the material ability to prevent or punish criminal conduct*”.[271] It might be possible to punish a (fully) autonomous weapon system, for example, by destroying them or reprogramming them. However, these punishments would not be effective because a (fully) autonomous weapon system does not have the capacity to feel guilt for their actions or to suffer when they are punished.[272] Regarding the possibility to prevent crimes from happening, it must be noted that commanders might not have enough knowledge to trigger the duty to prevent crimes from happening. Thereby, commanders might lack the ability to prevent a (fully) autonomous weapon

[268] Sassóli 2014, p. 324.
[269] Heyns 2013, paragraph 78.
[270] Liu 2016, p. 8.
[271] ICTY 16 November 1998, IT-96-21-T, paragraph 378 *(Prosecutor v. Delalić et al.).*
[272] Sparrow 2007, p. 72.

system from committing a criminal act since they are not able to intervene. Actual knowledge can only be established if the (fully) autonomous weapon system explains to the commander what its target is going to be before it attacks. In addition, if we take the complexity of the system into account, it is unlikely that a commander can foresee and understand the consequences of the different algorithms within a (fully) autonomous weapon system. As a result, the behavior of a (fully) autonomous weapon system will be difficult to predict. In order to establish constructive knowledge, the commander must have information that would put him on notice of the risks of a subordinate's crime that is sufficiently alarming to justify further inquiry.[273] It is unclear what kind of information the commander needs to have in order to know that a (fully) autonomous weapon system is going or about to commit a crime. In addition, the amount of information can be overwhelming to the commander which might drown the commander in a deluge of information. Finally, the commander must have taken all the necessary and reasonable measures in order to prevent or punish the crimes. However, it is not defined what constitute "necessary and reasonable measures". So, it is unclear how far the commander must go and what he/she must do to prevent crimes from happening.

Because it is not possible to hold a commander responsible when he/she failed to act, it can be stated that there is a responsibility gap, as Sparrow and Matthias argued, when a (fully) autonomous weapon system is used.[274] However, it might be possible to hold the commander responsible if the doctrine of indirect command responsibility will be amended. The issues listed below should be investigated by the international community in more detail so that it will be possible and fair to hold a commander responsible when a (fully) autonomous weapon system is used.

First, the doctrine of indirect command responsibility only governs the relationship between a commander and a human. So, the relationship between the commander and a (fully) autonomous weapon system must be defined in a way that indirect command responsibility can be applied. In addition, the relationship must be defined in a way that the jurisprudence regarding indirect and direct command responsibility will be applicable when a (fully) autonomous weapon system is used. Since there is no international recognized definition of a (fully) autonomous weapon system yet, the international community can take the superior-(fully) autonomous weapon system relationship into account when they will create a definition. A possible solution might be to create a definition which entails that a (fully) autonomous weapon system is analogous to a human. Another possibility is to

[273] Docherty 2015, p. 22.
[274] Sparrow 2007, p. 65; Matthias 2004, p. 175 - 176.

define the relationship between the commander and a (fully) autonomous weapon system equal to a relationship between the commander and his/her (human) subordinate.

Second, fully autonomous weapon systems are unpredictable and unreliable and because they can disobey or change orders, the commander will not have “effective control” over the actions of a fully autonomous weapon system. However, the commander can control if, where and when a (fully) autonomous weapon system will be deployed. So, the decisive point in time for the establishment of “effective control” moves to the point in time when the commander decides to deploy a (fully) autonomous weapon system or when the commander delegates decisions to the (fully) autonomous weapon system. As a result, it should be examined more closely what the meaning of “effective” is and at what point in time such effectiveness must be proven. For example, has the commander “effective control” if he/she decides to activate the (fully) autonomous weapon system?

Third, in order to state that the commander has “effective control” there needs to be clear evidence that all possible measures have been taken to prevent an unwanted outcome. However, it is uncertain what kind of measures the commander has to take. So, it would be recommended to establish such measures so that the commander knows what he/she has to do before he/she deploys a (fully) autonomous weapon system. A possibility might be to create a checklist that has to be “checked” by the commander before he/she makes the decision to go "live". If the commander has taken into account all the requirements of the checklist, this shows that the commander had no intent to make the (fully) autonomous weapon system perform illegal actions. In addition, it will show that the commander has done everything to prevent crimes from happening. If the commander does not comply with the checklist, this means that the commander neglected his duty. Thereby, the commander can control the checklist with the responsibility advisor that Arkin proposed. If this will be the case, there will be two persons who will take into account the measure that are needed to state that you are “in control” before the (fully) autonomous weapon system is deployed. In addition, it might be possible to incorporate, within the checklist, where a (fully) weapon system can and where a (fully) autonomous weapon system cannot be deployed. This will mean that a (fully) autonomous weapon system might only be used in situations where it is known to be functional. Any situation outside this "box" is not a viable area to deploy the (fully) autonomous weapon system which could lead to indirect command responsibility.

Fourth, with respect to the constructive knowledge requirement, the commander must have information that would put him on notice of the risks of a subordinate’s crime that is sufficiently

alarming to justify further inquiry.[275] However, the amount of information that a (fully) autonomous weapon system can process, can be overwhelming to the commander which might drown the commander in a deluge of information. A possible solution would be to let the information controlled by another computer/machine. This computer system must be programmed to test the quality of the information and it has to test and control if the (fully) autonomous weapon system stays within the attack limits. It can be recommended to incorporate within the computer system an alarm if the (fully) autonomous weapon systems steps out of its boundary's. Even though it might be too late and a crime has already been committed, if the commander has the possibility to shut down the (fully) autonomous weapon system, for example by creating a "red button", the commander can prevent further crimes from happening. However, it must be noted that if a (fully) autonomous weapon system is self-learned, the possibility exist that it will learn to bypass the computer system.

In short, if solutions can be found to the above stated problems, it will be possible to hold a commander responsible under the doctrine of indirect command responsibility. With respect to direct command responsibility and the external factors, there are two problems that needs to be solved.

The commander can be held directly responsible when he/she gives an illegal order to a (fully) autonomous weapon system. However, there might be uncertainty about who has programmed the illegal order. After all, there are several humans involved in the programming and development of a (fully) autonomous weapon system. Lack of clarity when the illegal order was programmed may cause that each individual would shift the responsibility to another. So, it might result in impunity if it is impossible to examine who has given the order. Therefore, arrangements should be made about what kind of orders would be incorporated in the programming of a (fully) autonomous weapon system before they will be 'given' to the commander. These arrangements will be important for the commander and for the developer/programmer of a (fully) autonomous weapon system. In this way, they cannot blame someone else for the illegal order.

The last problem that needs to be considered, is hacking. If a (fully) autonomous weapon system is 'hijacked' it is no longer possible to hold the commander responsible because he/she has no control over the (fully) autonomous weapon system and he/she did not have the intent that a certain crime would happen. However, the possibility that a computer system might be hacked is, in my view, general knowledge. So, if the commander deploys a (fully) autonomous weapon system, must he/she take into account that there might be a possibility that the (fully) autonomous weapon system will be hacked? It should be examined whether the knowledge that a (fully) autonomous weapon

[275] Docherty 2015, p. 22.

system might be hacked, might result in an omission of the commander to haven taken all “the necessary and reasonable measures to prevent crimes from happening”. Because it is not defined what constitutes “necessary and reasonable measures”, this might lead to uncertainties about the duty of the commander. Therefore, guidelines should be created with respect to the “necessary and reasonable measures” a commander should and must have taken in order to prevent a crime form happening. By using these guidelines, it will be clear when a commander can or cannot be held responsible.

In sum, the commander can be held responsible when a commander gives an illegal order and a (fully) autonomous weapon system acts upon that order. However, there might be uncertainty about who has given/programmed the illegal order. After all, there are several humans involved in the programming and development of a (fully) autonomous weapon system. The commander cannot be held responsible for failure to act when a (fully) autonomous weapon system is used. However, when the doctrine of indirect command responsibility will be fine-tuned and if the problems related to “effective control”, actual- and constructive knowledge and the possibilities to prevent crimes from happening has been solved, it will certainly be possible to hold the commander responsible when a (fully) autonomous weapon system will be used.

Bibliography.

Books and book sections:

- **Crootof 2015.**

R Crootof, 'The Varied Law of Autonomous Weapon Systems' in: A. Williams & P. Scharre (red), *Autonomous Systems: Issues for Defence Policy Makers*, The Hague: NATO Communications and Information Agency 2015.

- **Cryer e.a. 2010.**

Cryer e.a., *An Introduction to International Criminal Law and Procedure*, New York: Cambridge University Press 2010.

- **Hartman & Steup 2013.**

K. Hartmann & C. Steup, ´The Vulnerability of UAVs to Cyber Attacks - An Approach to the Risk Assessment´, in: K. Podins, J. Stinissen & M. Maybaum (red.), *5th International Conference on Cyber Conflict*, Tallinn: NATO CCD COE Publications 2013.

- **Henckaerts & Doswald-Beck 2005.**

J. M. Henckaerts & L. Doswald-Beck, *Customary International Humanitarian Law Volume I: Rules*, New York: Cambridge University Press 2005.

- **Krishnan 2009.**

A. Krishnan, *Killer robots: legality and Ethically of autonomous weapons*, Farnham: Ashgate Publishing Limited 2009.

- **Leveringhaus & de Greef 2015.**

A. Leveringhaus & T. de Greef, ´Keepin the Human "in the-Loop": a Qualified Defence of Autonomous Weapons´, in: M. Aaronson e.a. (red.), *Precision strike warfare and international intervention: strategic, ethico-legal and decisional implications*, New York: Routledge 2015.

- **Liu 2016.**

H. Y. Liu, ´Refining Responsibility: Differentiating Two Types of Responsibility Issues Raised by Autonomous Weapons Systems´, in: N. Bhuta e.a. (red), *Autonomous Weapons Systems: Law, Ethics, Policy,* Cambridge: Cambridge University Press 2016.

- **Margulies 2016.**

P. Margulies, ´Making Autonomous Weapons Accountable: Command Responsibility for Computer-Guided Lethal Force in Armed Conflicts´, in: E.E. Press & J.D. Ohlin (red), *Research Handbook on Remote Warfare*, United Kingdom: Edward Elgar Publishing 2016.

- **Müller 2016.**

V.C. Müller, ´Autonomous Killer Robots are Probably Good News´, in: E. di Nucci & F.S. de Sio (red), *Drones and responsibility: legal, philosophical and socio-technical perspectives on the Use of Remotely Controlled Weapons*, London: Ashgate Publishing Limited 2016. (Forthcoming)

- **Nebeker 2009.**

F. Nebeker, *Dawn of the Electronic Age: Electrical technologies in the shaping of the modern world, 1914 to 1945*, New Jersey: John Wiley & Sons Inc. 2009.

- **Roff 2013.**

H.M. Roff, ´Killing in war: responsibility, liability and lethal Autonomous Robots´, in: F. Allhoff, N.G. Evans & A. Henschke (red), *Routledge Handbook of Ethics and War: Just war theory in the twenty-first century*, New York: Routledge 2013.

- **Sandoz, Swinarski & Zimmerman 1987.**

Y. Sandoz, C. Swinarski & B. Zimmerman, *Commentary on the Additional Protocols of 8 June 1977 to the Geneva Conventions of 12 August 1949,* Geneva: International Committee of the Red Cross 1987.

- **Stewart 2011.**

D. M. Stewart, 'New Technology and the Law of Armed Conflict' in: R.A. Pedrozo & D.P. Wollschlaeger (red), *International Law and the Changing Character of War*, Newport: US Naval War College 2011.

Articles:

- **Anderson, Reisner & Waxman 2014.**

K. Anderson & D. Reiner, M.C. Waxman, "Adapting the Law of Armed Conflict to Autonomous Weapon Systems", *International Law Studies* (90) 2014, p. 386 - 411.

- **Asaro 2012.**

P. Asaro, "On banning autonomous weapon systems: human rights, automation, and the dehumanization of lethal decision-making" *International Review of the Red Cross* (94) 2012, p. 687 – 709.

- **Arkin 2011.**

R.C. Arkin, "Governing Lethal Behavior: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture", *Technical Report* 2011, p. 1 – 177.

- **Backstorm & Henderson 2012.**

A. Backstrom & I. Henderson, "New capabilities in warfare: an overview of contemporary technological developments and the associated legal and engineering issues in Article 36 weapons reviews", *International Review of the Red Cross* (94) 2012, p. 483 – 514.

- **Bantekas 1999.**

I. Bantekas, "The Contemporary Law of Superior Responsibility", *The American Journal of International Law* (93) 1999, p. 573-595.

- **Beard 2014.**

J.M. Beard, "Autonomous Weapons and Human Responsibilities", *Georgetown Journal of International Law* (45) 2014, p. 617 – 681.

- **Green 1995.**

L.C. Green, "Command responsibility in international humanitarian law", *Transnational Law & Contemporary Problems* (5) 1995, p. 319 – 371.

- **Grut 2013.**

C. Grut, "The Challenge of Autonomous Lethal Robotics to International Humanitarian Law", *Journal of Conflict and Security Law* (18) 2013, p. 5 – 23.

- **Hattan 2015.**

T. Hattan, “Lethal Autonomous Robots: Are They Legal under International Human Rights and Humanitarian Law?”, *Nebraska Law Review* (93) 2015, p. 1035 – 1065.

- **Hollis 2016.**

D.B. Hollis, “Setting the Stage: Autonomous Legal Reasoning in International Humanitarian Law”, *Temple International & Comparative Law Journal* 2016, p. 1 – 16.

- **Liu 2012.**

H. Y. Liu, “Categorization and legality of autonomous and remote weapons systems”, *International Review of the Red Cross* (94) 2012, p. 627 – 652.

- **Matthias 2004.**

A. Matthias, “The responsibility gap: ascribing responsibility for the actions of learning automata”, *Ethics and Information Technology* 2004, p. 175 - 183.

- **Mies 2010.**

G. Mies, “Military robots of the present and the future”, *AARMS* (9) 2010, p. 125 – 137.

- **Moloto 2009.**

B.J. Moloto, “Command Responsibility in International Criminal Tribunals”, *Berkeley Journal of International Law Publicist* (3) 2009, p. 12 – 25.

- **Noorman & Johnson 2014.**

M. Noorman & D.G. Johnson, “Negotiating autonomy and responsibility in military robots”, *Ethics and Information Technology* (16) 2014, p. 51 – 62.

- **Reitinger 2015.**

N. Reitinger, “Algorithmic Choice and Superior Responsibility: Closing the Gap Between Liability and Lethal Autonomy by Defining the Line Between Actors and Tools”, *Gonzaga Law Review* (51) 2015, p. 79 – 119.

- **Ohlin 2016.**

J.D. Ohlin, “The Combatant´s Stance: Autonomous Weapons on the Battlefield”, *International Law Studies* (93) 2016, p. 1 – 30.

- **Sassóli 2014.**

M. Sassóli, “Autonomous Weapons and International Humanitarian Law: Advantages, Open Technical Questions and Legal Issues to be Clarified”, *International Law Studies* (90) 2014, p. 307 – 340.

- **Schmitt 2013.**

M.N. Schmitt, “Autonomous weapon systems and international humanitarian law: a reply to the critics”, *Harvard National Security Journal Feature* 2013, p. 1 – 37.

- **Schulzke 2013.**

M. Schulzke, “Autonomous Weapons and Distributed Responsibility”, *Philosophy & Technology* (26) 2013, p. 203 – 219.

- **Sparrow 2007.**

R. Sparrow, “Killer Robots”, *Journal of Applied Philosophy* (24) 2007, p. 62 – 77.

- **Wagner 2014.**

M. Wagner, “The Dehumanization of International Humanitarian Law: Legal, Ethics, and Political Implications of Autonomous Weapon Systems”, *Vanderbilt Journal of Transnational Law* (47) 2014, p. 1371 – 1424.

Other sources:

- **AIV & CAVV 2015.**

AIV & CAVV, *Autonome wapensystemen. De noodzaak van betekenisvolle menselijke controle, (*report of oktober 2015, No. 97 AIV / No. 26 CAVV).

- **Canning 2006.**

J.S. Canning, *A concept of operations for armed autonomous systems*, (presented 3rd Annual Disruptive Technology Conference September 2006).

- **Docherty 2012.**

B. Docherty, *Losing Humanity: The Case against Killer Robots*, (Human Rights Watch and the International Human Rights Clinic 2012).

- **Docherty 2015.**

B. Docherty, *Mind the Gap: The Lack of Accountability for Killer Robots*, (Human Rights Watch and the International Human Rights Clinic 2015).

- **Geneva Academy of International Humanitarian Law and Human Rights 2014.**

Geneva Academy of International Humanitarian Law and Human Rights, *Academy Briefing no. 8: Autonomous Weapon Systems under International Law*, (November 2014).

- **Heyns 2013.**

C. Heyns, *Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions* (28 may 2010), *UN Doc* A/HRC/23/47.

- **International Committee of the Red Cross 2014.**

International Committee of the Red Cross, *Expert Meeting: Autonomous Weapons System - Technical, Military, Legal and Humanitarian Aspects* (24 to 28 march 2014).

- **Scharre & Horowitz 2015.**

P. Scharre & M. Horowitz, *An Introduction to Autonomy in Weapon Systems*, (Center for New American Security working papers 2015).

- **Shachtman 2011.**

N. Shachtman, 'Computer virus hits U.S. Drone fleet', *wired* 10 July 2011 (www.wired.com).

- US DoD Directive 3000.09 of 21 November 2012

Cases:

- In re Yamashita 327 U.S. 1 (1946) (www.supreme.justia.com).
- ICTY 16 November 1998, IT-96-21-T *(Prosecutor v. Delalić et al.).*
- ICTY 5 December 2003, IT-98-29-T *(Prosecutor v. Stanislav Galić)*
- ICTY 12 June 2007, IT-95-11-T *(Prosecutor v. Milan Martić).*
- ICC Pre-Trial Chamber II 20 April 2009, N° ICC-01/05-01/08 (*Prosecutor v. Bemba*).
- ICC Pre-Trial Chamber II 5 June 2009, N° ICC-01/05-01/08 (*Prosecutor v. Bemba*).
- ICC Trial Chamber 26 March 2016, N° ICC-01/05-01/08 (*Prosecutor v. Bemba*).