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MAKING LAWS FOR LAWS: THE LEGALITY OF LETHAL AUTONOMOUS WEAPON SYSTEMS

LAW523 – Law of Armed Conflict

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Abstract
This paper explores the legality technology lethal autonomous weapons systems (LAWS). Recent literature has claimed that LAWS should be subject to a pre-emptive ban, as they are incapable of abiding by the principles of international humanitarian law (IHL), and they will increase the risk of harm to civilians. This paper disputes that contention, arguing instead that LAWS could be capable of compliance with IHL. However, there are other moral and policy reasons which could justify further regulation, and therefore a form of partial ban, combined with a soft law instrument, could be helpful in international regulation of the more problematic aspects of LAWS. This paper does not seek to explore questions of accountability and liability for the actions of LAWS in any depth.

Key words
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Introduction

For the West, the phrase “killer robots” brings to mind pop culture science-fiction movies like *The Terminator*, *The Matrix* and *I Robot*. In reality, this phrase is simply the headline-grabbing term for lethal autonomous weapons systems (LAWS). While existing weapons systems exhibit some level of automation, autonomous weapons systems are not yet a reality. However, the line between automation and autonomy is becoming increasingly blurred. In the near future, systems which select and engage targets without further intervention by a human operator will become a reality.

These weapons systems have come to the attention of the international legal community largely due to a report by the Human Rights Watch and the International Human Rights Clinic entitled *Losing Humanity: The Case against Killer Robots*,¹ and the subsequent Campaign to Stop Killer Robots.² These organisations call for a pre-emptive ban on LAWS, arguing that they breach the core principles of international humanitarian law (IHL), and will increase the risk of harm to civilians during armed conflict. However, this paper, in conjunction with other commentators,³ will dispute these claims.

This paper seeks to examine the concerns raised by those arguing for a ban, by exploring whether LAWS are in breach of IHL principles or if there are other moral or policy reasons that would justify regulation or a ban. The guiding framework for this discussion is the weapons review provision of Article 36 of Additional Protocol I to the 1949 Geneva Conventions (Additional Protocol I). Therefore, LAWS must be assessed to see if they will comply with the core principles of IHL, as if they do not, there is essentially already a ban on their existence as they would be unlawful. Nonetheless, even if they can comply with IHL, there may be moral or policy reasons that may create an incentive for states restrict or regulate them. There are a

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multitude of ways in which this could occur, such as a treaty which creates a total or partial ban, a soft law instrument, or national policies and laws.

The structure of this paper is as follows: Part II will provide further definitions and explanation of LAWS. Part III will explore potential issues raised by LAWS, including the arguments made by the *Losing Humanity* report, the responses to that report and the current status of international debate on LAWS. Part IV explores whether LAWS are already “banned” due to their being unlawful under IHL treaty, custom or general principles. Part V explores whether there are non-legal reasons for LAWS which may influence legal arguments for restriction or regulation by outlining the positive and negative policy and moral considerations. Part VI explores the ways in which LAWS could be regulated or restricted, before the conclusion in Part VII.

This paper does not seek to explore questions of accountability and liability for the actions of LAWS in any depth.

**II Definitions**

It is important to adequately define LAWS so that we can understand how any ban or regulation imposed upon LAWS may be implemented, and importantly, to understand what LAWS are *not*. LAWS do not yet exist, and some states have been careful in their discussions on LAWS to emphasise this point; a ban or regulation would not affect currently weapons technology.4

LAWS are systems “that, once activated, can select and engage targets without further intervention by a human operator.”5 The “selection” aspect of this definition is important, as there is a distinction between a weapon which is triggered (for example, land mines), and a weapon which selects a target from multiple options.6

Key to understanding what a LAWS is, is understanding what “autonomous” means. Autonomy can be best thought of as a spectrum, rather than a binary choice between a system

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6  At 388.
which is autonomous and one which is not. It is clear that “the technology and basic architecture of an autonomous system and a nearly autonomous, highly automated system are basically the same”.\(^7\) This influences the practical ability to ban LAWS, as, “the tipping point from a highly-automated system to an ‘autonomous’ one is very thin”.\(^8\)

Having said that, there are three factors which can be looked at to assess what level of autonomy a weapons system has, and thus whether it can be classified as an autonomous weapons system: the complexity of the machine; which decisions are being automated; and the relationship between the human and the machine.\(^9\)

Complexity refers to the distinction between “automatic”, “automated” and “autonomous” systems. Land mines are an example of “automatic” weapons, whereas “automated” weapons are more complicated systems that follow a set of rules.\(^10\) “Autonomous” in this context therefore refers instead to systems which operate with some degree of self-direction or self-learning.\(^11\)

Evaluating the kinds of decisions a system makes also comes into an assessment of autonomy. Decisions related to the engagement of a target “include, but are not limited to, acquiring, tracking, identifying and cueing potential targets, aiming weapons, selecting specific targets for engagement, prioritizing targets to be engaged, timing of when to fire, maneuvering and homing in on targets, and the detonation itself”.\(^12\) Arguably, to fit into the definition of LAWS, a system must actually be lethal and have control over more than just tracking or target identification. In addition, the environment in which a system operates (offensive/defensive or air/naval/submarine/land) may change the level of risk of harm to civilians and civilian objects, and thus the decision-making ability which a system needs.

When looking at the relationship between the human and the machine there are three broad classifications utilised. At the least autonomous end of the spectrum, there are systems where

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\(^7\) At 397.
\(^8\) At 389. Discussed further in Part VI.
\(^10\) At 6.
\(^11\) At 6.
\(^12\) At 7.
a human actor is “in the loop”. A human operator selects targets which the weapons system attacks. United States Predator and Reaper drones are an example, as the operator is responsible for initiating any use of force, but usually from miles away. These systems are sometimes described as a “semi-autonomous weapon”. “On the loop” systems can select the target themselves, with a human operator who supervises its performance and can abort if the selection is erroneous. For this reason they are also known as “human-supervised autonomous weapons”. Missile defence systems, such as the Israeli Iron Dome, fall into this category. They use radar to identify rockets and artillery shells, with interceptor missiles to respond to such threats. “Out of the loop” systems are those which are truly autonomous; they select and engage targets where a human has not decided those specific targets that are to be engaged and without human monitoring or intervention.

All of these factors – the complexity of the system, the relationship between it and the human, and the types of decisions being made by the system – must be weighed when assessing whether a system is autonomous.

When referring to LAWS, most organisations and commentators mean only the “out of the loop” systems, rather than human-supervised “on the loop” or semi-autonomous “in the loop” weapons systems. It is the “off the loop” weapons systems which do not yet exist and which are predicted to cause legal, policy and moral problems.

However, all LAWS in future are still likely to have some level of human control (albeit perhaps only at a strategic level). One hundred per cent autonomous weapons, in sense of the killer robots from science-fiction pop culture may never exist. As one organisation writes, “No state is likely to argue in favour of the release of [LAWS] without any form of human control whatsoever – for example, [one] that could roam at will, killing people without reporting back to a human operator.” Further, it is unlikely a state has an interest in creating

13 Docherty, above n 1, at 2; Scharre and Horowitz, above n 9, at 8.
14 Scharre and Horowitz, above n 9, at 16.
15 At 16.
weapons to take over the strategic aspect of armed conflict, which would render human military commanders redundant. Therefore, LAWS that we talk about are ones that select and engage targets without human intervention after activation, but which are still subject to human decision-making in terms of the strategic decisions over entry into armed conflict and so on.

LAWS do not yet exist, at least according to publically available knowledge. However, experts predict they will appear within the next 20 to 30 years, if not earlier. Artificial intelligence and robotics, which feed heavily into the development of LAWS, are often the result of ongoing technological advancements in the commercial sphere (for example, surgical robots, self-driving cars, aircraft landing systems). Any new developments in robotics and artificial technologies in the commercial sphere are likely to be transferred across to the military sphere as states attempt to reduce loss of life not only amongst their troops, but among civilians in the conflict zone.

As mentioned above, there are precursors to LAWS in the form of semi-autonomous and human-supervised autonomous weapons. Such systems generally operate in defensive contexts and in environments where there is little risk to civilians (such as naval or air-to-air combat).

Some countries, notably South Korea and the United States are currently in the process of developing LAWS. The United States Defense Advanced Research Projects Agency (DARPA) has commissioned a project known as Collaborative Operations in Denied Environments (CODE) which aims to develop autonomous aerial vehicles to carry out all steps of a strike mission in situations where enemy signal-jamming makes communication with a human commander impossible. South Korea have developed sentry robots which can sense people in the Demilitarised Zone and send warnings to a command centre, which determines whether or not to use force. While these sentries cannot currently fire without a human command, they arguably could be easily adapted to be able to do so. Professor Chris Jenks, predicts that

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21 Anderson, Reisner and Waxman, above n 3, at 391.
offensive LAWS will be used in future, but only in sub-naval and air-to-air combat, or, potentially on land if used against another machine or weapon.\(^{24}\)

### III Issues raised by LAWS

#### A Losing Humanity report

In 2012, the publication of the *Losing Humanity* report by the Human Rights Watch and the International Human Rights Clinic in 2012 brought the discussion of LAWS and their potential flaws into public prominence. In the report, the organisations called for states to create an international legally binding instrument and national laws and policies which “prohibit the development, production and use of fully autonomous weapons”,\(^{25}\) on the basis that they “would not be consistent with [IHL] and would increase the risk of death or injury to civilians during armed conflict.”\(^{26}\) The report also called on roboticists and those in the industry to “[e]stablish a professional code of conduct governing the research and development of autonomous robotic weapons… to ensure that the legal and ethical concerns about their use in armed conflict are adequately considered at all stages of technological development.”\(^{27}\)

The report argued that a pre-emptive ban was necessary as LAWS would be incapable of abiding by the core IHL principles of distinction, proportionality and military necessity;\(^{28}\) that LAWS were also against the dictates of the public conscience, and thus would breach the Martens Clause;\(^{29}\) and that they would cause a threat to civilian protections as they lack human empathy as a check on killing and increase the ease at which militaries can engage in armed conflict.\(^{30}\) The accuracy of these assertions will be explored further in Parts IV and V.

#### B Responses

The inflammatory language of “killer robots” in the *Losing Humanity* report resulted in a lot of attention. There was widespread academic commentary and critique regarding the assertions made within the report.

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\(^{25}\) Docherty, above n 1, at 46.

\(^{26}\) At 1.

\(^{27}\) At 46.

\(^{28}\) At 3.

\(^{29}\) At 4.

\(^{30}\) At 37.
Some academic commentators such as Asaro, Goose and Russell joined the calls for a pre-emptive ban, again citing the inability of LAWS to comply with core IHL principles, the inherent immorality of leaving life and death decisions to robots, and the decreasing constraints on the use of force which was likely to negatively affect civilians. Toscano and Watsuki also noted that many roboticists do not want to take part in LAWS development for moral reasons.

In July 2015 around 1000 professionals, roboticists and researchers in the artificial intelligence and robotics industries, including Stuart Russell, Noel Sharkey, Stephen Hawking and Elon Musk, wrote an open letter promoting a pre-emptive ban on LAWS which are meaningful human control. They argued that artificial intelligence technology has reached a point where the deployment of LAWS would be practically (if not legally) feasible within years rather than decades. They also stated that without a ban, “a global arms race is virtually inevitable”, as “[u]nlike nuclear weapons they require no costly or hard-to-obtain raw material, so they will become ubiquitous and cheap for all significant military powers to mass-produce.”

However, not all responses to the Losing Humanity report were positive. Critics argued that the report ignored the reality of LAWS would be likely to be able to comply with the core principles of IHL, and may even result in greater distinction between civilians and civilian objects and military targets and combatants. Thus, some argued that a pre-emptive ban on LAWS would cause harm to civilians by restricting the use of technology which could better protect them. Furthermore, they argued that the policy and morality concerns raised about LAWS could be said of any weapon, as any improvement to military technology arguably lowers the “costs” of conflict and may increase the distance between a target and the weapon operator.

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32 Toscano and Watsuki, above n 3, at 243.


36 Arkin, above n 3.
Current international negotiation

Following the release of the Losing Humanity report, the Human Rights Watch, combined with other non-governmental organisations, launched the Campaign to Stop Killer Robots. In November 2013, as a result of this campaigning, state parties to the Convention on Certain Conventional Weapons (CCW) agreed to a mandate for an informal meeting of experts to address the emerging technology of LAWS. The first informal expert meeting was held in May 2014, with a second expert meeting following up in April 2015, meaning that “[for] the diplomatic world, the decision to take on [LAWS] was made at lightning speed”, highlighting its obvious importance. The treaties banning to land mines and cluster munitions each took five years from the launch of their respective campaigns, and decades after the weapons themselves had been developed and utilised.

The purpose of the CCW is “to ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately.” The Convention itself is quite limited, largely setting out administrative matters, with the substantive material left to the five protocols. The existing protocols regulate/ban non-detectable fragments; mines, booby traps and other devices; incendiary weapons; blinding laser weapons and explosive remnants of war. States are yet to agree to mandate for official negotiations regarding LAWS as a protocol to the CCW, instead committing to a third informal meeting of experts in April 2016 to further discuss questions relating to LAWS.

Even without a negotiating mandate however, it is possible to gauge the general position of most state parties. Key players (those likely to develop and/or use LAWS) have generally not been supportive of a pre-emptive ban, instead using much more cautious language to describe

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37 “About”, above n 2. The other members of the Steering Committee for the Campaign are: Article 36, Association for Aid and Relief Japan, International Committee for Robot Arms Control, Mines Action Canada, Nobel Women’s Initiative, PAX, Pugwash Conferences on Science & World Affairs and the Women’s International League for Peace and Freedom.
38 Goose, above n 31, at 45.
40 Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects 1342 UNTS 137 (opened for signature 10 October 1980, entered into force 2 December 1983), Protocols I–V.
the restrictions which should be placed on LAWS. For example, the United States emphasised that its *Directive 3000.09: Autonomy in Weapon Systems* “does not establish a US position on the potential future development of [LAWS] – it neither encourages nor prohibits the development of such future systems.” The United Kingdom has stated that there could be an “intelligent partnership” where “a human may of course be supported by a system that has the appropriate level of automation to assist the human to make informed decisions.” At the other end of the spectrum are states like Germany, who has said they “will not accept that the decision to use force, in particular the decision over life and death, is taken solely by an autonomous system without any possibility for human intervention in the selection and engagement of targets.” Only a small number of states explicitly called for a ban however.

### IV Are LAWS unlawful?

One of the primary rationales for a ban in the *Losing Humanity* report is that LAWS breach IHL. However, if this is true, then the development and use of LAWS will already face prohibition under IHL and thus there will be a de facto ban. Some theorists therefore argue that IHL itself will regulate LAWS to prevent the development of problematic LAWS (for example, those that could not distinguish between civilians and combatants). This part will explore whether LAWS are unlawful or not under existing IHL.

LAWS must comply with IHL due to article 36 of the Additional Protocol I to the 1949 Geneva Conventions, which states:

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

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46 Anderson, Reisner and Waxman, above n 3; Anderson and Waxman, above n 3; Arkin, above n 3; Marchant and others, above n 35; Schmitt, above n 35.
The aim of article 36 is:\(^48\) to prevent the use of weapons that would violate international law in all circumstances and to impose restrictions on the use of weapons that would violate international law in some circumstances, by determining their lawfulness before they are developed, acquired or otherwise incorporated into a State's arsenal.

“Means of warfare” is widely considered to refer to weapons and weapons systems, and thus LAWS must be assessed to see if they are prohibited by any rule of international law.\(^49\) The article itself requires state parties to Additional Protocol I to assess all new weapons systems for compliance with IHL as part of their study, development, acquisition or adoption. Some commentators state that article 36 is customary international law,\(^50\) while the International Committee of the Red Cross contends it “is arguably one [provision] that applies to all States [that] flows logically from the truism that States are prohibited from using illegal weapons, means and methods of warfare.”\(^51\)

LAWS are unique in that they require assessing whether a machine would be capable of following IHL itself, rather than whether a human could use a machine in accordance with IHL. However, it should also be noted that it is not necessary for LAWS to be 100 per cent incapable of violating IHL – rather they must simply be as capable or likely at IHL compliance as any human.

When thinking about LAWS it is important to remember that they are a “weapons system” rather than “weapon”, because the autonomy stems not simply from the firing weapon itself, but often from the relationship which the weapon has to the launching platform and sensors, as well as the targeting process and any communication infrastructure.\(^52\) For example, a surveillance drone may send footage to a centralised computer, which could then relay


\(^{49}\) Anderson, Reisner and Waxman, above n 3, at 398, n 27.


\(^{51}\) International Committee of the Red Cross, above n 48, at 9.

instructions to an attack drone or missile system. This is important in an article 36 analysis, as a weapon “cannot be assessed in isolation from the method of warfare by which [a weapon] is to be used”, meaning the whole LAWS should be assessed for legality, rather than the individual components.53

A Specific prohibition

The article 36 analysis first requires states to consider whether there are specific treaties or customary law which prohibit the use of LAWS.54 The use of weapons is not dependent upon specific authorisation. As the International Court of Justice has said “The pattern… has been for weapons of mass destruction to be declared illegal by specific instruments”,55 rather than being presumed illegal.

No treaties which specifically prohibit or regulate LAWS. No customary law exists either, and the non-existence of LAWs cannot be said to be the result of state practice or opinio juris in favour of a ban; technology simply has not reached the point where it is possible to build lawful LAWS.

B General prohibition

If there is no specific rule regulating the legality of LAWS, then the question of their legality must be examined in light of the general principles of IHL. These principles “constitute intransgressible principles of international customary law”,56 which apply “to all forms of warfare and to all kinds of weapons, those of the past, those of the present and those of the future”.57

Under the general principles of IHL, a weapon must be assessed both in terms of its nature (whether it is inherently unlawful), and its use (whether in practice it would be unlawful).58 In assessing inherent unlawfulness, there are three elements: the weapon cannot be indiscriminate

53 International Committee of the Red Cross, above n 48, at 10.
54 At 11.
56 At [79].
57 At [86].
58 International Committee of the Red Cross, above n 48; Schmitt, above n 35, at 3.
by nature,\textsuperscript{59} it must not cause unnecessary suffering or superfluous injury,\textsuperscript{60} and its harmful effects must be capable of being controlled.\textsuperscript{61} In assessing whether its use in practice would be unlawful, the key IHL principles of distinction, proportionality and precautions in attack are fundamental. All of these factors tie into the ultimate question of military necessity, which can be viewed as “meta-principle” which permeates IHL.\textsuperscript{62}

In reality, the ability of LAWS to comply with any of these principles of IHL will largely come down to the technical programming and characteristics of each system.\textsuperscript{63} As a result, it is likely there will be disparity between different LAWS which are developed, in terms of their ability to comply with IHL. Additionally, varying operating environments will require varying levels of technical sophistication – for example; whether a LAWS targets only machines, or whether it is authorised to use force against humans; whether it operates in civilian-populated areas; or whether it is offensive or defensive. In the end, whether a system is lawful or not will ultimately be a factual consideration when such a system exists. As Asaro states, “it becomes a technological question of whether [LAWS] might be developed which could be sufficiently discriminate and proportionate in their application of violent force. If so, then these systems would be legal. If not, then these systems would be prohibited.”\textsuperscript{64} The principles outlined below are analysed to see whether it could be possible for LAWS to comply with them, and if so, what they might look like. This does not assume that all attempts to create LAWS will comply with these principles, however, it is likely that at least some LAWS will legal per se, with the real concerns being their ability to comply with IHL when in use.\textsuperscript{65}

1 \textit{Inherent unlawfulness}

Article 51(4)(b) of Additional Protocol I prohibits inherently indiscriminate weapons. A weapon is deemed inherently indiscriminate if it cannot be aimed at a specific military target.\textsuperscript{66}

\begin{itemize}
\item \textsuperscript{59} International Committee of the Red Cross, above n 48, at 16; JM Henckaerts and L Doswald-Beck \textit{Customary International Humanitarian Law} (Cambridge University Press, Cambridge, 2005), Rule 71 at 244.
\item \textsuperscript{60} International Committee of the Red Cross, above n 48, at 16; Henckaerts and Doswald-Beck, above n 59, Rule 70 at 237.
\item \textsuperscript{61} Anderson, Reisner and Waxman, above n 3, at 399–400; Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I) 1125 UNTS 2 (opened for signature 8 June 1977, entered into force 7 December 1978), art 51(4)(c).
\item \textsuperscript{62} Reeves and Johnson, above n 3, at 27.
\item \textsuperscript{63} Baraniuk, above n 5.
\item \textsuperscript{64} International Committee of the Red Cross \textit{Expert Meeting: Autonomous Weapons System - Technical, Military, Legal and Humanitarian Aspects} (2014) at 49.
\item \textsuperscript{65} Anderson, Reisner and Waxman, above n 3, at 387.
\item \textsuperscript{66} Henckaerts and Doswald-Beck, above n 59, Rule 12 at 40.
\end{itemize}
Chemical and biological weapons are examples of those that are indiscriminate in nature as they cannot normally be aimed at discrete groups of people or targets. LAWS could comply with this principle as they can be programmed to engage only within specific targets, and to distinguish between civilians and combatants. They will would still be autonomous as they would have the ability to select from among targets.

Weapons which cause unnecessary suffering or superfluous injury are also deemed inherently unlawful.\textsuperscript{67} It is generally agreed that if the injury inflicted provides no military gain then the suffering is “unnecessary”.\textsuperscript{68} Under this provision, weapons such as expanding bullets, poisoned weapons and glass-filled projectiles are banned.\textsuperscript{69} There is nothing to suggest that LAWS will cause unnecessary suffering. Any potential suffering which may arise from autonomy (for example, the indignity of being killed by a machine rather than a human or a human-operated machine), can be off-set by the distinct military gain in having a machine that can kill.

Weapons which cause uncontrollable harmful effects will also be inherently unlawful. Importantly however, this is not that the weapon is uncontrollable, but that its harmful effects are. Thus, biological and chemical weapons are banned because, once released, they can spread and harm anyone.\textsuperscript{70} This is not the case with LAWS, as their harmful effects are likely to be no different to other weapons like missiles and drones. There is no evidence that autonomy in and of itself would lead to uncontrollable harmful effects.\textsuperscript{71}

It could be argued that the launch of an offensive LAWS could result in uncontrollable harmful effects, as the system is then choosing its targets with no human input. However, this cannot be deemed an uncontrollable effect, as it is highly unlikely that any LAWS would not have some kind of shut down mechanism.\textsuperscript{72} If a LAWS really was developed in which there was no

\begin{footnotes}
\item[67] Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I) 1125 UNTS 2 (opened for signature 8 June 1977, entered into force 7 December 1978), art 35(2).
\item[68] International Committee of the Red Cross, above n 48, at 19.
\item[70] Anderson, Reisner and Waxman, above n 3, at 400.
\item[71] Toscano and Watsuki, above n 3, at 207.
\item[72] Both the United States and United Kingdom have said that they will not create weapons over which they have no control.
\end{footnotes}
termination method after launching the weapon, then perhaps that would qualify as an uncontrollable harmful effect, and thus the weapon would be unlawful.

2 Unlawfulness through use

Three more principles relate to whether a LAWS in use as intended would be capable of complying with IHL when selecting and engaging targets. It is useful to point out that simply having a disparity of power or capability in weapons systems between parties to a conflict is not unlawful.73 Chivalric notions that one can only attack another with a comparable weapons system have not been in existence for most of modern warfare.74 Thus, LAWS are quite capable of being used against states or groups that do not possess their own LAWS with which to retaliate. Therefore, as with nuclear weapons and unmanned aerial vehicles, LAWS would be capable of being used as part of an asymmetric armed conflict. There is, however a question of whether states with LAWS would have an imperative to use them, which is discussed in Part V.

It is a fundamental principle of IHL that parties to a conflict must distinguish between civilian objects and persons, and military objectives and combatants.75 If a weapon by its nature or its method of use is indiscriminate, then it will not have the requisite level of distinction to comply with IHL.

Distinction is raised as one of the key issues for LAWS, as it is difficult for such a system to distinguish effectively where a human may do so out of common sense or intuition. It is true that it is difficult or impossible for current artificial intelligence systems to conduct the subjective judgments necessary for distinction and proportionality.76 Some believe that LAWS will never be capable of making this assessment accurately, as they cannot properly interpret human behaviour and body language.77

73 Anderson and Waxman, above n 3, at 8.
74 Roorda, above n 17.
75 Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I) 1125 UNTS 2 (opened for signature 8 June 1977, entered into force 7 December 1978), art 48; Jean-François Quéguiner “Precautions under the law governing the conduct of hostilities” (2006) 88 International Review of the Red Cross 793 at 793.
77 Austria “The concept of ‘meaningful human control’” (paper presented to Meeting of Experts on LAWS, 13 April 2015) at 2.
To comply with distinction, LAWS would need to be able to separate not only between civilians and combatant personnel, but also those *hors de combat*, surrendering combatants, prisoners of war, civilians directly participating in hostilities or the wounded. While this could potentially be straightforward for defensive LAWS (e.g. missile protection, defence perimeters) which could attack only if there was a trespassing person or object, an offensive LAWS would pose greater difficulties.

It could be possible to accomplish in LAWS due to facial and uniform recognition software, and weapons or heat scanning technology. A LAWS could be programmed to only use lethal force against those who carry weapons, are not identifiable as friendly soldiers (part of its home military) and who refused to surrender. Alternatively, even offensive LAWS could be programmed to only use lethal force if attacked first, meaning it will only be targeting combatants or civilians directly participating in hostilities, not civilians or those *hors de combat*. LAWS could also be deployed only in environments where distinction is less of an issue (for example, air-to-air combat, naval or sub-naval). However, this idea may not be practical, given that air-to-air techniques can easily be translated into air-to-land techniques. Further, states may be reluctant to exclude LAWS which operate on land, as this is an environment in which many armed conflicts take place.

In future, it is possible that LAWS may actually better at distinction than human soldiers, due to faster reaction times, scanning for facial recognition or behaviour cues, or for heat signatures or weapon traces.

The principle of proportionality requires that a judgment is made by a commander regarding the military advantage of an action compared to the anticipated civilian casualties or damage to civilian structures. This principle is not engaged if the target is only a military objective, with no civilians (such as a war ship). The civilian loss of life or damage to property must not be “excessive in relation to the concrete and military advantage anticipated”. However, “excessive” is not defined, meaning putting the principle of proportionality into practice “will

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79 Solis, above n 78, at 280.
80 Art 51(5)(b).
require complete good faith on the part of the belligerents, as well as the desire to conform with the general principle of respect for the civilian population.” 81

There is a real question about whether LAWS will ever be sophisticated enough to make these decisions about what is, and is not, a proportionate response. Doing so would require a high level of artificial intelligence which could weigh up and respond to several factors. Furthermore, Roff argues that requiring such calculations from LAWS creates a “strategic robot problem” in which human commanders become redundant, as well as human weapon operators. 82

Arkin and others proposed an “ethical governor” model, which would calculate both on proportionality and distinction after evaluating sensory information to determine if an attack is prohibited under IHL. 83 This would involve a high-level algorithm which would “[search] over the space of available weapon systems, targeting patterns and weapon release positions for a combination that serves to maximize the likelihood of target neutralization while minimizing collateral damage”. 84

The United States CODE program which is under development is one such LAWS which aims to have this capability. 85 It aims to “develop teams of autonomous aerial vehicles carrying out “all steps of a strike mission — find, fix, track, target, engage, assess” in situations in which enemy signal-jamming makes communication with a human commander impossible.” 86 Even if a human could make the initial proportionality calculation, a LAWS would need to be able to respond to changing conditions, such as a higher civilian presence than anticipated or the removal of the military advantage.

In some respects, a computerised system may be more effective at calculating proportionality through algorithms, as it may be able to gather and process information more quickly. However, these algorithms would still need to be programmed by humans, and a mere balancing exercise in terms of lives lost will not be sufficient. In practice, a LAWS would have

81 Sandoz, Swinarski and Zimmermann, above n 69, at [1978].
82 Roff, above n 19.
84 At 5.
85 Russell and others, above n 22.
86 At 415.
to gather sensory information, compared with information about its mission in order to
determine whether the military advantage was worth the risk of civilian casualties. A LAWS
could be able to place itself at greater risk (for example, entering an enemy insurgent building,
rather than a missile strike), to ensure that proportionality is achieved.

The principle of precautions during attack requires that combatants shall take all possible
measures to target only military objectives while safeguarding against incidental loss of civilian
life or damage to civilian objects, and shall cancel an attack if it becomes apparent that the
objective is not military or will cause excessive civilian damage and casualties. It may be
argued that this would require the ability to cancel the attack after a LAWS has been activated.
However, this is not necessarily the standard that we apply to other weapons. For example, a
missile that is launched is not required to be able to cancel itself mid-flight. Rather, the principle
general operates at a higher level; as “situational awareness for those directly carrying out the
attack is often very low… they are often not in a position to make a judgment as to a change in
precautions”.

The principle of precautions in attack also requires that those who plan or decide upon an attack
shall “do everything feasible to determine that the objectives to be attacked are neither civilians
nor civilian objects…” This may be problematic for LAWS, as there is a question of this
provision would classifying the LAWS as the one planning or deciding on an attack, rather
than a human commander. If it is the latter, then perhaps a commander would be in breach, as
they would not be determining whether a target included civilian objects, the LAWS would.

C Evaluation

In evaluating a new weapons system under article 36 of Additional Protocol I, states must
determine whether the new system will breach IHL, either under specific treaty or customary
provisions, or the more general principles. There are no existing prohibitions on the use of
LAWS under international treaties or customary international law. Any assessment of the
legality of LAWS therefore must rely on an analysis of the general principles of IHL. In doing
so, there is nothing about autonomy which suggests LAWS will be inherently unlawful, as they

87 Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of
victims of international armed conflicts (Protocol I) 1125 UNTS 2 (opened for signature 8 June 1977,
entered into force 7 December 1978), art 57.
88 Anderson, Reisner and Waxman, above n 3, at 404.
89 Art 57(2)(a)(i).
are not indiscriminate in nature, do not cause unnecessary suffering and do not have uncontrollable effects.\textsuperscript{90} Additionally, there is nothing to suggest that technology will not advance to the point where LAWS will be capable of complying with the principles of distinction, proportionality and precautions in practice during an attack.\textsuperscript{91} On the contrary, many believe that it is likely and possible to occur in the foreseeable future.\textsuperscript{92}

As an entire class of weapons they are not unlawful, however, this is not to say that all LAWS will be compliant; any article 36 review of a LAWS must be fact-specific. Any LAWS which is not of the technological sophistication necessary to comply with any of the IHL principles will be unlawful. This makes it highly probably that lawful LAWS will be, at least a first, limited to those countries which are technologically advanced. The United States, United Kingdom, China and South Korea are likely to have IHL-compliant LAWS much sooner than, say, Pakistan or Poland. Although this creates disparity, that is no more than exists with every weapons technology.

On the whole, the application of existing legal principles to LAWS is “relatively straightforward”, and it is other policy and moral reasons which need to be looked at as justification for any regulation or restriction.\textsuperscript{93} It is these concerns which will be explored in Part V.

\textbf{D \textit{“Meaningful human control”}}

Before moving on to a discussion of the moral and policy concerns of LAWS however, it is necessary to the concept of “meaningful human control” (MHC). While not explicitly part of the analysis under article 36, or IHL, it has been the subject of substantial discussion during the CCW Meetings of Experts on LAWS. There seems to be general agreement amongst states and commentators that the use of armed force or any weapons system must not be uncontrollable,\textsuperscript{94} meaning that MHC may be an additional factor which must be taken into account when determining the legality of LAWS or regulating or restricting them.\textsuperscript{95} However,

\textsuperscript{90} Anderson, Reisner and Waxman, above n 3, at 400.
\textsuperscript{91} At 406.
\textsuperscript{92} Anderson, Reisner and Waxman, above n 3; Reeves and Johnson, above n 3; Toscano and Watsuki, above n 3.
\textsuperscript{93} “Australia: Q+A with Professor Chris Jenks on autonomous weapons”, above n 24.
\textsuperscript{94} Horowitz and Scharre, above n 52, at 4; Michael Biontino \textit{Report of the 2015 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS) CCW/MSP/2015/3} (2015); Maya Brehm “Meaningful human control” (2015 Meeting of Experts on LAWS, Geneva, 14 April 2015); International Committee of the Red Cross, above n 64, at 20.
\textsuperscript{95} International Committee of the Red Cross, above n 64, at 18.
opinion is divided over the definition of MHC; whether it is a framework to ensure that the principles of IHL outlined above are complied with, or a new principle in and of itself; and on what level of actor MHC is intended to operate.

1 What is MHC?

There Both the United States and the United Kingdom agree that at present, decisions about the use of force will be under human control.96 However, as the Losing Humanity report states, this “do[es] not preclude a change in that policy as the capacity for autonomy evolves”.97

How MHC should be defined or measured is still up for debate. As the Chairperson of the 2015 CCW expert meeting stated:98

There seems to be a widespread understanding that both the legal and ethical acceptability of a weapon system would require some form of human control. However, the exact nature of this control is still unclear.

“Meaningful” is said to be analogous to “significant, appropriate, proper, [or] necessary”, or a system which involves human judgment or human involvement.99 It would be possible to have human control which was not meaningful; the example given by Scharre and Horowitz is a human who sits in a closed room and presses a trigger every time a light turns on – there is human control over the use of force, but it is not meaningful.100

MHC was first defined by Article 36 (named after the provision regulating weapons reviews which was detailed above),101 as having three necessary requirements:102

- Information – a human operator, and others responsible for attack planning, need to have adequate contextual information on the target area of an attack, information on why any specific object has been suggested as a target for attack,

97 Docherty, above n 1, at 8.
98 Biontino, above n 15, at 10.
99 Horowitz and Scharre, above n 52, at 9.
100 At 10.
101 Article 36 is a United Kingdom non-profit organisation which “undertakes research, policy and advocacy and promotes civil society partnerships to respond to harm caused by existing weapons and to build a stronger framework to prevent harm as weapons are used or developed in the future”; “About” Article 36 <www.article36.org>.
information on mission objectives, and information on the immediate and longer-term weapon effects that will be created from an attack in that context.

- **Action** – initiating the attack should require a positive action by a human operator.
- **Accountability** – those responsible for assessing the information and executing the attack need to be accountable for the outcomes of the attack

This definition appears to only allow “on the loop” LAWS, as the attack initiation must be done by a positive human action, rather than simply retaining the ability to abort an attack. It is possible, however, that “initiating the attack” includes the powering on of defensive “in the loop” systems, such as the Iron Dome or Phalanx missile system described in Part II. Under this definition, if MHC is required for a LAWS to be lawful, there is essentially creates a ban on “out of the loop” systems.

In May 2014, another prominent non-governmental actor in the LAWS field, the International Committee for Robot Arms Control (ICRAC), released their own interpretation of minimum necessary standards for MHC, stating:

First, a human commander (or operator) must have full contextual and situational awareness of the target area and be able to perceive and react to any change or unanticipated situations that may have arisen since planning the attack.

Second, there must be active cognitive participation in the attack and sufficient time for deliberation on the nature of the target, its significance in terms of the necessity and appropriateness of attack, and likely incidental and possible accidental effects of the attack.

Third, there must be a means for the rapid suspension or abortion of the attack.

However, some have been critical of this definition, as it appears to rule out existing systems. Many current systems, for example, do not have means for the rapid suspension or abortion of the attack after it has been launched (such as missiles). The ICRAC definition was, therefore, seen as impractical and not likely to be adopted, as not only does it not allow for the development of new technologies, it would either prohibit existing systems, or quickly become an obsolete definition.

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103 ICRAC is comprised of academics in the field, such as Noel Sharkey, Heather Roff, Robert Sparrow, Frank Sauer and others, and was established in 2009; “Who We Are” ICRAC <icrac.net>.

104 Horowitz and Scharre, above n 52, at 10.

105 At 8.
A more recent definition states: \(^{106}\)

1. Human operators are making informed, conscious decisions about the use of weapons.
2. Human operators have sufficient information to ensure the lawfulness of the action they are taking, given what they know about the target, the weapon, and the context for action.
3. The weapon is designed and tested, and human operators are properly trained, to ensure effective control over the use of the weapon.

This definition could be adopted by state parties during the CCW expert meetings, or future instruments which will regulate or restrict LAWS. It accommodates existing weapons systems, and would allow for the development of LAWS so long as they complied with the other principles of IHL. To achieve MHC, a human would simply have to understand how the LAWS works, so that they can make a decision about whether its use is suited to the particular situation. However, as technology develops through the use of artificial intelligence and learning machines, human operators may not necessarily know why LAWS make the decisions they do. \(^{107}\) This may cause issues with ensuring MHC.

2 **At what level should control be exercised?**

It also still uncertain at what level MHC should be exercised. \(^{108}\) There is a difference between MHC being intended as a principle to be followed by a commander who has strategic oversight of the use of force, or an individual who is ordering a particular attack. Alternatively, MHC could simply refer to the fact that a human has programmed the LAWS to comply with IHL and thus has control over that stage.

Roorda argues that it is the human discretionary ability to decide on the use of a particular weapon or weapons system which is fundamental. \(^{109}\) He states that the current debate on the legality LAWS ignores the fact that: \(^{110}\)

> Humans will determine what type of system to launch for what type of mission and under what circumstances. It is this decision, and the planning considerations that inform

\(^{106}\) At 3.
\(^{107}\) Anderson, Reisner and Waxman, above n 3, at 394.
\(^{108}\) Horowitz and Scharre, above n 52, at 14.
\(^{109}\) At 2.
\(^{110}\) At 3.
it, that are essential in constraining the use of force and ensuring that operational and legal requirements are met.

Arguably, this means “humans will exercise control even when using weapons that are programmed to perform targeting tasks without direct human input.”\textsuperscript{111} Essentially this is arguing that MHC is only necessary at the strategic level. This would tie into questions around the proportionality assessment which a LAWS must follow. If it is a human commander deploying the LAWS who is held to have meaningful human control, perhaps it is only that commander who needs to assess proportionality at the time of the activation of the LAWS.

An exercise of control at this level is means that LAWS will never be autonomous in setting strategic goals regarding the use of force (mentioned in Part II).\textsuperscript{112} However, as mentioned in Part II, there is little, or even no, incentive for states to develop weapons over which they have no control (regardless of the technological possibility).\textsuperscript{113}

3 \textit{Is it a new legal principle or is it a sum of others?}

Aside from the definition of MHC, there is a greater debate about what role MHC plays in relation to the core principles of IHL. There are two schools of thought concerning MHC. The first school of thought argues that IHL and international human rights law implicitly and explicitly require human control and human decision-making.\textsuperscript{114} MHC is seen as an overarching expression of other IHL principles, that is, merely “a principle for the design and use of weapons systems in order to ensure that their use can comply with [IHL]”.\textsuperscript{115}

The second school of thought argues that MHC is a separate and additional concept to the existing principles of IHL.\textsuperscript{116} If this is true, then the question is why do LAWS raise problems that cannot be addressed by existing IHL principles? As demonstrated above, there is no principle of IHL cannot be adapted for an analysis of LAWS, and indeed, this is why the core principles are phrased in general terms, focused on the effects of weapons.

\textsuperscript{111} At 13.
\textsuperscript{112} At 13.
\textsuperscript{113} Roorda, above n 17, at 13; Roff, above n 19.
\textsuperscript{114} International Committee of the Red Cross, above n 64, at 24.
\textsuperscript{115} Horowitz and Scharre, above n 52, at 7.
\textsuperscript{116} At 6.
Additionally, MHC cannot be a customary principle of IHL unless there is sufficient state practice and opinio juris to back it up.\textsuperscript{117} It would be difficult to prove state practice, considering the non-existence of LAWS is currently more to do with technological limitations than an active avoidance of LAWS.

For these reasons, MHC should be viewed as a lens through which the core principles of IHL can be viewed. These principles were all drafted with the assumption that it would be a human making the assessments required, not a machine. Arguably therefore, MHC should require that there is still some human engagement with the core principles, rather than delegating them all to the LAWS. Even if this is only at the strategic level, when considering the use of LAWS commanders should also ensure that they have evaluated the ability and likelihood of the LAWS to comply with IHL principles in those circumstances; this will be MHC.

\section*{V Reasons for restriction or regulation}
If LAWS are not already banned under IHL treaty or custom, we must then consider whether there are sufficient reasons outside of the law which could influence states into creating a restriction or regulation on LAWS. Therefore, this Part outlines the policy and moral risks and benefits which need to be balanced when considering if a restriction or regulation of LAWS is justified.

\subsection*{A Policy considerations}
\subsubsection*{1 Speed}
Proponents of LAWS argue that LAWS will be more effective as they can sense and process information faster than human military personnel.\textsuperscript{118} This is of huge importance due to the “increasing tempo of military operations in which, other things being equal, the faster system wins the engagement.”\textsuperscript{119}

Robotic sensors are better equipped for battlefield observation than human personnel are.\textsuperscript{120} Faster reaction times enable a faster response, meaning better protection from modes of attack that are too fast for human reactions.\textsuperscript{121}

\textsuperscript{117} Continental Shelf (Libya Arab Jamahiriya v Malta) (Judgment) [1985] ICJ Rep 13.
\textsuperscript{118} Docherty, above n 1, at 28.
\textsuperscript{119} Anderson, Reisner and Waxman, above n 3, at 390.
\textsuperscript{120} Arkin, above n 4, at 46.
\textsuperscript{121} Anderson, Reisner and Waxman, above n 3, at 393.
The speed of LAWS also means an increased ability to synchronise attacks. For example, sniper rifles could be synchronised to fire at exactly the same time that all had a clear shot at their target, but not otherwise. Such coordination would be much more difficult for human personnel simply because reaction times are slower. LAWS also allow for response to an overwhelming attack, such as a naval ship attacked by multiple missiles.

There could also be huge downfalls when it comes to speed. Scharre points to the US stock market “flash crash” on 6 May 2010, where automated stock trading caused a loss in value of 10 per cent in a few minutes as the system was using trading algorithms which were operating at speeds too fast for humans to intervene.\footnote{122} There is a real possibility that a LAWS could interact with its environment or against another LAWS too quickly for human intervention, perhaps resulting escalating levels of violence or excessive collateral damage.

2 \textit{Less risk to personnel}

The use of LAWS reduces the risk of harm to human personnel, as they would not be required to enter conflict zones, or risky situations, as often. Simply put, if a military uses LAWS, there would be a lower likelihood of its human soldiers being killed. LAWS can be understood as an evolution in the increasing distance between placed between the attacker and the target. From bow and arrow, to gun, to missile, to drone, to LAWS, increasing distance means less risk of harm to a military’s personnel when they are conducting an attack. While this occurs presently through the use of drones, this has led to high levels of stress among drone pilots.\footnote{123} LAWS would “reduce or eliminate personnel exposure to […] stress”, as there is no human operator who is “driving” the weapon.\footnote{124} Thus, not only physical, but emotional and mental risk to human soldiers could be reduced.

Furthermore, human personnel can be costly to states in a way that LAWS would not be. Salaries, food, medical care, training costs, the Veterans’ Affairs department and payments to

widows, as well as the political cost of the loss of human life would all be reduced by the use of LAWS.

3 Military capability
One of the reasons many states are reluctant to ban LAWS is that they enable militaries to continue operations in areas where communication networks are degraded or access is denied. In an area of “denied access”, where communications are jammed, LAWS would enable a state to engage in that combat zone regardless. This is because unlike drones, LAWS would not rely on continuous contact with a human commander, and thus their mission could continue unimpeded.

LAWS could also increase the military ability of states to engage in multiple areas of armed conflict if requested, without requiring an increase in the numbers of human soldiers. Further, LAWS may be able to engage in environments and combat zones that perhaps are avoided because the risk to humans may be too great. For example – in extreme temperatures, the use of LAWS would prevent against heat exhaustion or hypothermia which human soldiers are susceptible to. LAWS may also enable military budgets to stretch further; in the realm of non-lethal robotics, the cost of an explosive ordinance disposal technician is estimated at $1 million, compared to a $117,000 robot which does the same job.

4 Accuracy and protection of civilians
One of the major benefits which LAWS could bring is greater protection of civilians and civilian objects. The purpose of IHL is to restrain the damage caused by armed conflict and in particular to reduce suffering on the ‘innocent’ populations. Throughout history humankind has not been particularly effective at this goal; LAWS could change that.

Firstly, as mentioned above, LAWS can more readily place themselves at risk than human personnel can, as they can be programmed to lack the desire for self-preservation, and as machines, LAWS are less vulnerable than humans. This may reduce the level of force needed to be used, or even mean that a LAWS could wait to be attacked first, rather than needing to

125 For example, the CODE system being developed by the United States.
127 Quintana, above n 126.
128 Toscano and Watsuki, above n 3, at 202.
use pre-emptive force. LAWS will not need to “shoot first, ask questions later”. For example, if a LAWS came across someone holding a weapon, and were uncertain as to their intentions, it could more easily wait to see what action the person took before making a decision. If a human were in the same situation, their vulnerability and desire for self-preservation may influence them into a pre-emptive attack.

Secondly, targeting, if programmed accurately, could become more precise than if done by a human. A LAWS which had access to multiple channels of information may be able to tell more about a target than a human, largely because it can synthesise new information as it arrives. This could help avoid situations like the bombing of a Médecins Sans Frontières hospital in Afghanistan by the United States. One of the causes of the attack was human error, as the aircrew provided the coordinates for the hospital, which was a known protected site. It is possible that if attack had been carried out by a LAWS, it could have cross-referenced the given attack coordinates with the pre-existing list of coordinates for known protected sites and aborted the mission.

5 A new arms race?

One of the primary drivers for the development of LAWS is the fear that other countries will develop these systems and gain military advantage. A United States Congressional Research Service report states “if US companies fail to capture this market share, European, Russian, Israeli, Chinese, or South African companies will.” This fear is likely to lead to an arms race and escalation of LAWS, similar to previous arms races. Asaro states, “[LAWS] have the potential to cause regional or global instability and insecurity, to fuel arms races, to proliferate to non-state actors, or initiate the escalation of conflicts outside of human political intentions”. Roboticists and AI researchers themselves are also concerned that a global arms race is a “virtually inevitable” result of LAWS proliferation, as the equipment and technology to create them is relatively accessible (as compared to nuclear weapons).  

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129 Arkin, above n 3, at 47.
132 Goose, above n 31, at 43.
133 Asaro, above n 31, at 692.
6 Deterrence on use of force

A second strategic fear is that the presence of LAWS will make it easier for states to enter into new conflicts. It is argued that without the risk to human personnel, and with lower risk to civilians from precision, states may be more willing to engage in armed conflict.

Anderson and Waxman critique this argument, saying:

Foregoing available protections for civilians or soldiers in war, for fear that political leaders would resort to war more than they ought, morally amounts to holding those endangered humans as hostages, mere means to pressure political leaders.

Furthermore, risk to personnel or civilians is not the only constraint on armed conflict. Cost, time, resources and geopolitical relationships are all likely to factor into any decision to use force, and simply having a technologically superior military is not necessarily a guarantee of success.

7 Misuse and abuse

Those against LAWS call for a ban to prevent LAWS on the grounds that they may be used by a government against its own people. The Losing Humanity report argues that an autocratic government “would be free of the fear that armed forces would rebel. [LAWS] would not identify with their victims and would have to follow orders no matter how inhumane they were.” Would the Arab Spring have been possible if those governments had possessed LAWS? What Syria look like if the Islamic State or Assad had the use of LAWS?

While it is easy to imagine horrific breaches of IHL and international human rights law, we must remember that human soldiers are often not much better at refusing immoral and illegal orders. Nazi Germany, Pol Pot’s regime in Cambodia, the ethnic cleansing in Bosnia and Herzegovina are but a few examples of the gross breaches of IHL which have been committed by humans in modern history. Arguably LAWS would not be any worse than the apathy of humanity, and depending on how strongly they are programmed to follow IHL, they may actually be better at refusing to directly attack civilians. Unless an autocratic regime or non-state group created their own LAWS from scratch, any LAWS they utilised would need to be

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135 Docherty, above n 1, at 39; Asaro, above n 31, at 692.
136 Anderson and Waxman, above n 3, at 18.
137 Toscano and Watsuki, above n 3, at 223.
138 Docherty, above n 1, at 38.
modified to remove the IHL-compliance mechanisms. It may be debatable whether some regimes have the technical knowledge to do so.

Furthermore, the concerns about misuse and abuse of weapons are not unique to LAWS. They are true of every weapon which may fall into the “wrong” hands, and yet even nuclear weapons are not banned on this basis.

8 Accountability for LAWS malfunction

Although this paper will not go into depth about the accountability issue raised by LAWS, it is necessary to examine briefly what could happen in the event that a LAWS suffers a malfunction. Concern has been raised about an “accountability gap”, as the neither the programmer nor the commander or state could be held responsible.139

There are real problems around how to extend command responsibility or how to provide accountability when individual criminal liability is redundant. If a malfunction is due to software or engineering, arguably the programmer or company should be tortiously responsible, yet this does not fit easily into the realm of IHL. Similarly, states are unlikely to accept strict liability for any breach of IHL by a LAWS.

This paper does not provide the scope for an in depth analysis of the accountability gap, but it is an important consideration when deciding if further regulation or restriction on LAWS are necessary. Arguably, until a workable accountability mechanism for LAWS is developed, there should be such restrictions to reduce the likelihood of a breach of IHL by a LAWS.

139 At 42.
B  Moral considerations

1  Martens clause

Morality is legally important in armed conflict. The Martens Clause, a provision in many IHL treaties,\(^\text{140}\) is “an effective means of addressing the rapid evolution of military technology,”\(^\text{141}\) which requires that weapons, means and methods of warfare accord with the laws of humanity and the requirements of public conscience (also sometimes referred to as the dictates of the public conscience), as well as treaty and customary international law.\(^\text{142}\) The principles of humanity are interpreted as prohibiting means and methods of war which are not necessary for the attainment of a definite military advantage.\(^\text{143}\)

It is argued that LAWS breach this provision because it is “inherently wrong, morally and ethically”, to allow “robotic weapons systems [to make] life and death decisions on the battlefield”,\(^\text{144}\) and is thus against the public conscience to allow such systems. Those opposed to LAWS argue that in giving over the decision to use lethal force to a machine, “we fundamentally change the nature of the moral considerations involved in the use of violent force.”\(^\text{145}\)

The first problem, however is that morality is inherently subjective. Morality in this context comes down to the “public conscience”, which is sometimes attempted to be shown through survey evidence. Public opinion on LAWS through actual survey evidence is hard to come by, and like all surveys, is dependent upon the wording of questions. Research at the University of Massachusetts in 2013 found that 55 per cent of Americans opposed the use of “robotic

\(^{140}\) Convention (II) with Respect to the Laws and Customs of War on Land (opened for signature 29 July 1899, entered into force 4 September 1900), preamble; Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of international armed conflicts (Protocol I) 1125 UNTS 2 (opened for signature 8 June 1979, entered into force 7 December 1978), art 1(2); Hague Regulations concerning the Laws and Customs of War on Land 1907, preamble; 1949 Geneva Conventions 75 UNTS 287 (opened for signature 12 August 1949, entered into force 21 October 1950); Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the protection of victims of non-international armed conflicts (Protocol II)1125 UNTS 609 (opened for signature 8 June 1977, entered into force 7 December 1978), preamble; Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects 1342 UNTS 137 (opened for signature 10 October 1980, entered into force 2 December 1983), preamble.

\(^{141}\) Legality of the Threat of Nuclear Weapons (Advisory Opinion), above n 55, at [78].


\(^{143}\) Ticehurst, above n 142.

\(^{144}\) “Nations agree to take on killer robots!” (15 November 2013) Campaign to Stop Killer Robots <www.stopkillerrobots.org>.

\(^{145}\) International Committee of the Red Cross, above n 64, at 50.
weapons that can independently make targeting and firing decisions without a human in the loop”.\textsuperscript{146} However, these respondents were given no prior information about LAWS, and some of their responses explaining their opposition played into Terminator stereotypes.\textsuperscript{147} Furthermore, this survey data contrasts more recent research by Horowitz, which found that the public both in India and the United States was not significantly opposed to the use of LAWS.\textsuperscript{148}

Moreover, survey evidence could be skewed by the cultural perceptions of the respondents. There is a strong argument to be made that the West’s concern about LAWS stems more from pop culture paranoia than any reasoned objection. Other countries, such as Japan, which have a much more positive view of robots and autonomous technology, may feel very differently about whether a LAWS is immoral or contrary to the public conscience.\textsuperscript{149}

The second problem is that morality and the public conscience can change over time, and so IHL created on historical views may become outdated. While perhaps presently some may have a visceral negative reaction to LAWS, the tide of public opinion is likely to change. Professor Chris Jenks believes that "societally we are at the cusp of desensitization or acceptance of increasingly autonomous systems in our lives.”\textsuperscript{150} With the increasing likelihood of automation in everyday activities, it may be that future generations may “come to routinely trust the computerised judgments of [machines]”.\textsuperscript{151} As driverless cars and robot surgery technologies become more common place, not just out of convenience but out of safety, “our basic notions about machine and human decision-making will evolve”.\textsuperscript{152} Thus, objections to LAWS based on morality or the public conscience are likely to wane over time.

Arguments based on the inherent immorality of autonomy also ignores the fact that killing has already become increasingly automated. The disassociation of humans from the use of lethal force “is inherent in the nature of warfare”, as “[w]hether a crossbow, rifle or artillery, you

\begin{itemize}
\item \textsuperscript{146} Charli Carpenter \textit{US Public Opinion on Autonomous Weapons} (University of Massachusetts, 2013) at 1.
\item \textsuperscript{147} Charli Carpenter “How scared are people of ‘killer robots’ and why does it matter?” (4 July 2013) openDemocracy <www.opendemocracy.net>.
\item \textsuperscript{149} Toscano and Watsuki, above n 3, at 244.
\item \textsuperscript{150} “Australia: Q+A with Professor Chris Jenks on autonomous weapons”, above n 24.
\item \textsuperscript{151} Anderson, Reisner and Waxman, above n 3, at 391.
\item \textsuperscript{152} Anderson and Waxman, above n 3, at 16.
\end{itemize}
want to use force in a manner which your opponent can’t effectively counter.”¹⁵³ In truth, the experience for a combatant who is killed by a human firing via a drone is not any different to a combatant killed by a LAWS firing based off its own decision-making.

2 Utility of human emotion

What may cause discomfort amongst some is that LAWS could engage in lethal force, yet they do not, and will never, experience the range of emotions which humans do. The fundamental question then, is whether human emotion is necessary or useful in armed conflict. IHL does not normally consider emotion when determining legality, yet judgments on the utility of emotion may nonetheless influence legal developments in future.

Those pushing for a ban on LAWS argue that human emotions are desirable, and even necessary, as they allow for mercy and compassion. In theory, human soldiers retain the ability to emotionally identify with civilians.¹⁵⁴ The targets of a weapons system have no ability to appeal to humanity in the way they could to a human soldier, and some argue that this “would be like being exterminated”.¹⁵⁵ Arguably however, the same can be said for any kind of remote weapon, including but not limited to all forms of missiles and projectiles.

Those against supporting the development and use of LAWS argue that human morality and decision-making are often flawed due to emotions such as prejudice, anger, fear or fatigue. Therefore, removing them from armed conflict will be positive. Toscano and Watsuki give the example of a United States marine in Iraq:¹⁵⁶

While in the mosque, a marine corporal observed a wounded insurgent lying on the floor with his left arm concealed behind his head. This marine already experienced an act of treachery during a previous incident, where an insurgent feigning serious injury rolled over while lying on the ground, apparently injured or dead, and shot his weapon in the corporal’s face, wounding him. Upon approaching the wounded insurgent in the mosque, the marine corporal shouted repeatedly, "He's [expletive deleted] faking death!" and then shot the insurgent. Other than the fact that the insurgent's left arm was concealed, there were no immediate indicators suggesting the insurgent's treachery.

This example demonstrates how human emotion and previous experiences can negatively impact ethical and legal decision-making.

¹⁵³ “Australia: Q+A with Professor Chris Jenks on autonomous weapons”, above n 24.
¹⁵⁴ Docherty, above n 1, at 38.
¹⁵⁵ Chris Baraniuk, above n 63.
¹⁵⁶ Toscano and Watsuki, above n 3, at 226–227.
Moreover, research shows that human ethics and morality are not fixed.\textsuperscript{157} Factors such as the level of noise, emotional state and even the cleanliness of the surrounding environment have all been held to impact on how humans make “moral” choices. Arguably therefore, machines and artificial intelligence may provide more consistent ethical decision-making than any human could ever hope. LAWS could even monitor the ethical behaviour of their human counterparts, ensuring that Abu Ghraib situations do not occur in future.

3 \textit{Is there a moral imperative to use LAWS?}

With the rapid advances expected in this field of technology, it is possible that one day LAWS will be better at complying with IHL than human personnel. Some commentators argue that as a result, deploying LAWS would mean a lower risk to civilians and those \textit{hors de combat}.\textsuperscript{158} If LAWS can reduce human casualties in this way, in addition to placing fewer military personnel at risk, do we have a moral imperative to use LAWS? If the point of IHL is to limit human suffering, particularly that of civilians, that would imply exploring all possible options to do so. If LAWS and other autonomous technologies are known to limit the negative impacts of armed conflict, particularly for civilians, then states may be causing unnecessary human suffering by refusing to use LAWS.

The counterargument is that creating a “moral imperative” assumes that LAWS will be used in the place of humans, which for some “is a bit like if we assumed that cruise missiles would only be used in the same circumstances where spears were used in the past.”\textsuperscript{159} For these critics, rather than replacing humans, LAWS will simply be used in addition to humans, meaning wider conflict zones and more civilian risk. Alternatively, if LAWS are predominantly used in situations where civilians are not present (air-to-air or naval combat), then they may not alter the situation for civilians much at all.

\section*{C Evaluation}

This Part has outlined whether there are sufficient reasons other than the core IHL principles that would justify the restriction or regulation of LAWS. There are a multitude of policy and moral risks and benefits which need to be balanced when considering if a restriction or

\textsuperscript{158} Anderson, Reisner and Waxman, above n 3; Arkin, above n 3.
\textsuperscript{159} Russell, above n 76. From original French: “C'est a peu comme si on supposait que les missiles de croisère ne seront utilisés que dans les même circonstances où l'on aurait utilisé les lances dans le passé.”
regulation of LAWS is justified. On the one hand, LAWS could produce faster and more accurate military capability, with fewer risks to civilians and personnel. In such a scenario, there may be a moral imperative to use LAWS to reduce unnecessary human suffering. On the other hand, there are still major concerns about LAWS being regulated only by the core principles of IHL. Despite their legality, they may still lead to an arms race, lower the constraints on the use of force, be vulnerable to misuse and potentially could produce an accountability gap. There are also subjective questions of whether the general public is morally opposed to the existence of LAWS, or if the lack of human emotion is a negative aspect of LAWS. Overall, while some may think that the concerns raised are true of other types of weapons, the ease in which a machine may make a life or death decision results in too large a risk to civilians, particular if the LAWS were to malfunction or fall into the wrong hands. The international community should act to provide some form of guidance or restriction for the development and future use of LAWS rather than adopting a “wait and see” approach.

VI Alternative ways of regulation or restriction

Many academics, state parties and experts have proposed various ways of dealing with the legal, policy and moral questions which LAWS raise. Broadly, they cover five main proposals:

1. No action; IHL is sufficient to regulate LAWS;
2. A hard law instrument creating total ban on LAWS (either temporary or permanently);
3. A hard law instrument creating a partial ban on certain types of LAWS or uses of LAWS;
4. A soft law instrument, such as some form of policy or manual similar to the *Tallinn Manual on the International Law Applicable to Cyber Warfare*; or
5. National-level policies and protocols.

This part seeks to explain each of these proposals in turn, including outlining who the advocates and critics of each are, analysing and discussing which of these proposals is the most likely and useful at dealing with the moral and policy questions raised by LAWS.

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160 Anderson, Reisner and Waxman, above n 3, at 393.
A **IHL principles are sufficient**

Some theorists believe that IHL are sufficient to regulate LAWS. As outlined in Part IV, the core principles of IHL already regulate the ways in which LAWS can be developed and used. That is, “the principles and rules of law applicable in armed conflict … make the conduct of armed hostilities subject to a number of strict requirements.” There will be a de fact ban on any LAWS which is developed that is inherently indiscriminate, causes unnecessary suffering or uncontrollable harmful effects, or cannot comply with the targeting principles of distinction, proportionality and military necessity. A system which cannot comply with these principles is unlawful, and it could be argued that this is all the regulation or restriction which needs to occur.

Some states adopt this position, including the United Kingdom, who has stated; “[a]t present, we do not see the need for a prohibition on the use of LAWS, as international humanitarian law already provides sufficient regulation for this area,” although they have also stated “the Government of the United Kingdom do not possess [LAWS] and have no intention of developing them”. However, as was raised in Part V, there are moral and policy questions raised even by those systems which are capable of complying with IHL principles. Failing to provide some other form of regulation or restriction over LAWS risks ignoring these concerns.

B **Total ban**

The outcome which was first proposed as a way to deal with LAWS was a total ban. The purpose of such a pre-emptive ban is arguably to prevent future harm and take a precautionary approach. Alternatively, some have proposed a moratorium on development while these legal, policy and ethical issues are properly considered, rather than a permanent pre-emptive ban.

A ban would need to be created via treaty, as there currently is no prohibition on LAWS in treaty, customary international law, or due to the core principles of IHL. This would need to

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162 Arkin, above n 3; Reeves and Johnson, above n 3.
163 Legality of the Threat of Nuclear Weapons (Advisory Opinion), above n 47, at [95].
165 (17 June 2013) 564 GBP D HC 733.
166 Docherty, above n 1.
167 Goose, above n 31, at 45.
168 Arkin, above n 3.
occur in a multilateral treaty, with the most obvious and likely contender being a new protocol under the CCW. As expert meeting are already occurring under the auspices of the CCW, it would be possible for state parties to agree to an official negotiating mandate. A ban on LAWS could therefore appear as an additional sixth protocol. Alternatively, a ban could take place through an entirely new convention, similar to what occurred with the Ottawa Convention Against Land Mines and the Convention on Cluster Munitions.169

A treaty banning LAWS would create “hard law”, that binding obligations on state parties. Hard law instruments create greater ability for enforcement, however they are often harder to negotiate and may have fewer signatories. In contrast, “soft law” refers to international instruments which do not create binding obligations. Instead, the instrument takes the form of “may” and “should” provisions, with state peer pressure playing the primary role in enforcement. States may be more willing to sign, and less pedantic about the language as they know they can breach any provisions of the instrument if they needed to in future, with only political repercussions.

Those in favour of a total ban include the non-governmental organisations involved in the Campaign to Stop Killer Robots, as well as commentators like Asaro and Goose.170 There has been some endorsement of this position by states; in 2014, the European Union Parliament passed a resolution calling for member states to “ban the development, production and use of fully autonomous weapons which enable strikes to be carried out without human intervention.171 At the second expert meeting on LAWS a small number of states also supported a pre-emptive ban.172

There has also been support for a ban in an open letter from thousands within the robotics and artificial intelligence industry.173 In 2014, a Canadian robotics company called Clearpath became the first commercial entity to support a ban on LAWS.174


170 Docherty, above n 1; Asaro, above n 31; Goose, above n 31.


172 Cuba, Ecuador, Egypt, Pakistan and the Holy See; Sauer, above n 45, at 3.


Those calling for a ban on LAWS argue that regulation will not be enough, as there is always the risk of abuse of the technology by groups which do not respect IHL or international human rights law. As Stuart Russell states, “you can’t logically state that well-trained soldiers from civilised nations are so bad a following [IHL] that robots could do better, and state at the same time that rogue states, dictators and terrorist groups are so good at following [IHL] that they will never use robots in a way which doesn’t respect [IHL].”\(^{175}\) A ban would stigmatise the weapon and severely curtail research and development into it, which regulation would not do.

A ban is opposed by several theorists,\(^ {176}\) and may be inadvisable for multiple reasons. Firstly, as discussed in Part II, the line between LAWS and other, highly automated, systems is extremely blurry. This makes a ban “relatively easy to circumvent and very difficult to enforce”,\(^ {177}\) as it will be difficult to “demarcate permissible from impermissible weapon systems.”\(^ {178}\)

Secondly, an outright ban “trades whatever risks [LAWS] might pose in war for the real, if less visible, risk of failing to develop forms of automation that might make the use of force more precise and less harmful for civilians”.\(^ {179}\) A ban could be short-sighted, when research and development into them is only a couple of decades old, and therefore not conclusive.\(^ {180}\) The argument to ban LAWS made by the Losing Humanity report are said to “[make] notional and very speculative assumptions about the development, evolution and employment of future technology not yet currently available”.\(^ {181}\)

Thirdly, Reeves and Johnson argue that a pre-emptive ban is likely to retard the development of more discriminative technology which could be beneficial for the protection of civilians and civilian objects, drawing a historical analogy to the prohibition against aerial bombardment at

\(^{175}\) Russell, above n 76. From original French: “On ne peut pas déclarer logiquement que les soldats bien entraînés des nations civilisées sont tellement mauvais pour suivre les règles de la guerre, que les robots peuvent faire mieux, et déclarer au même temps que les états voyous, les dictateurs, et les groupes terroristes sont si bons pour suivre les règles de la guerre, qu'ils n'utiliseront jamais les robots d'une manière qui ne respectent pas ces règles.”

\(^{176}\) Anderson, Reisner and Waxman, above n 3; Arkin, above n 3; Reeves and Johnson, above n 3.

\(^{177}\) Anderson, Reisner and Waxman, above n 3, at 398.

\(^{178}\) “Australia: Q+A with Professor Chris Jenks on autonomous weapons”, above n 24.

\(^{179}\) Anderson and Waxman, above n 3, at 1.

\(^{180}\) At 15.

\(^{181}\) Toscano and Watsuki, above n 3, at 224.
the turn of the 20th Century. That historical prohibition retarded the development of more discriminative technologies for bombing, leading in part to the high levels of civilian casualties sustained in World War Two.

Finally, treaties take a long time to draft and negotiate, with states needing time to sign and ratify an agreement. It is seen as “unrealistic to suspend all autonomous weapons testing and development until a legal and regulatory framework is created… because the technological advances require a contemporaneous dialogue on the topic”. Furthermore, those states who do not wish to be subject to a ban would simply not ratify the treaty. Without ratification, states are not bound by it, under the principle of pacta sunt servanda. This severely limits the utility of ban given that the states most likely to be opposed to a ban are those which will develop or use LAWS in future.

C Partial ban

A less extreme argument for a ban is one which only bans certain types of LAWS. This partial ban could take many forms; it could prohibit systems deemed to have “too much” autonomy, and allow only human-supervised LAWS; it could allow only defensive LAWS and not offensive ones; it could only allow LAWS in certain environments. For example, use could be constrained to operations where there is little risk to civilians, such as air-to-air, submarine combat or naval combat.

The process of negotiating for any treaty would be as outlined in the preceding section, and may result in similar disadvantages. Any states who did not want to be bound would simply not ratify the treaty. Additionally, a partial ban which attempted to separate permissible and impermissible LAWS on the basis of levels of autonomy could easily become stalled at the definition stage, as autonomy exists as a spectrum, not a binary (see Part II).

However, a partial ban may be more successful if restricting environments or types of use. For example, use could be constrained to operations where there is little risk to civilians, such as air-to-air, submarine combat or naval combat. By creating such a partial ban now, the

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182 Reeves and Johnson, above n 3, at 29.
183 At 29.
184 At 27.
likelihood of these environments blurring together (for example, air-to-air technology being used for air-to-land combat) is lessened. Alternatively offensive LAWS could be banned, while defensive LAWS were not.

A ban preventing LAWS from operating outside these context could better protect civilians, and address some of the concerns raised in Part V. Morality considerations would be less prominent, as the risk to civilians from these limited types of LAWS would be lower. Similarly, concerns about an arms race, a reduce deterrence on the use of force and misuse or abuse by certain actors is reduced if the LAWS have limited utility in land combat, or offensive combat.

Allowing some LAWS also allows the technology to continue to develop, albeit in a different context. This would alleviate the concerns of Toscano and Watsuki, and prevent the retardation of beneficial technologies. Arguably such a partial ban could be temporary, until LAWS did themselves safe enough to be used in a wider context.

D  Soft law instrument

Soft law instruments provide another avenue for regulation and restriction of LAWS. This has occurred in the context of cyber warfare, with the Tallinn Manual on the International Law Applicable to Cyber Warfare.\textsuperscript{186} The Tallinn Manual was written by a group of international law scholars and practitioners, detailing non-binding information on how IHL applies to cyber warfare.\textsuperscript{187}

A similar process could see the creation of a manual on LAWS, setting out agreed frameworks and principles which apply to the use and development of LAWS, and perhaps even minimum standards. Such an instrument would be developed through consultation with international legal experts “to develop and propose interpretive guidance for States’ and other actors’ consideration.”\textsuperscript{188} As a soft law instrument, any such manual would be persuasive, but not binding upon state parties. This would allow the international community to set a bottom line, which could be used as a starting point for any future hard law instruments. Over time, such an instrument may even come to represent customary international law. However, because soft law is not binding, such an instrument could also be easily ignored by states if it was contrary

\textsuperscript{186} Schmitt, above n 161.
\textsuperscript{187} Schmitt, above n 161.
\textsuperscript{188} Anderson, Reisner and Waxman, above n 3, at 408.
to their goals. IT would rely on international goodwill and political peer pressure for compliance.

Commentators see this as a more nuanced way of regulating LAWS, rather than a ban.\textsuperscript{189} Anderson, Reisner and Waxman, and Toscano and Watsuki, advocate for such an instrument, with Anderson, Reisner and Waxman believing that “ambitions for a multilateral treaty regulating or prohibiting autonomous weapon systems are misguided”.\textsuperscript{190}

\textit{E National policies}

A further option for providing some form of regulation over LAWS is the creation and promulgation of national rules and policies. This would involve individual states developing their own laws and policies, either around the use of LAWS by their militaries, or regulating of development of LAWS by the robotics, engineering and defence industries.

The United States and United Kingdom already have policies in place regarding their militaries’ use of LAWS.\textsuperscript{191} Japan and South Korea have also begun work on codes of ethics for the development of robots, which could be relevant for the development of LAWS.\textsuperscript{192} This proposal for national policies and rules is supported by Anderson, Reisner and Waxman, but in conjunction with an international-level agreement.\textsuperscript{193}

In terms of the utility and effectiveness of national laws as a way to regulate LAWS, there are likely to be problems. Firstly, states are likely to only create laws which act in their favour. Therefore, if states foresee a military advantage or financial gain from the development and use of LAWS, they are less likely to create restrictive policies and laws. Secondly, acting from a national level creates inconsistencies in how LAWS are developed and used. This undermines the utility of national laws being used to regulate an international problem. However, national policies and rules could serve as an indicator to pressure other states, could set a starting point

\textsuperscript{189} Arkin, above n 3.
\textsuperscript{190} Anderson and Waxman, above n 3, at 21; Anderson, Reisner and Waxman, above n 3, at 407; Toscano and Watsuki, above n 3, at 244; Schmitt, above n 161.
\textsuperscript{193} Anderson, Reisner and Waxman, above n 3, at 408.
for international negotiations or could (in time) lay the foundation for the state practice necessary for the creation of customary international law.

**F Evaluation**

There are multiple ways in which LAWS could be regulated or restricted. IHL will regulate LAWS to some extent already, setting out core principles which may not be derogated from. However, IHL principles alone will not address some of the moral and policy concerns which LAWS raise (outlined in Part V). These moral and policy reasons outlined in may provide impetus for legal instruments to create a total or partial ban, soft law or national policies and rules.

There are advocates for and against all of these proposed options. While hard law instruments that create a total or partial ban would be the most enforceable, they may be too blunt an instrument to manage the technological nuances of LAWS. Conversely, opting merely to rely on soft law instruments and national policy statements risks creating instruments which will be ignored on the international scale, with the risk that moral and policy concerns are not address by legal means.

Presently, a total ban would be too restrictive, for reasons outlined above, and therefore is unlikely to gain the necessary support from key states involved in the LAWS discussion. A partial ban may be more successful if framed in terms of an offensive/defensive split, or a limitation on environment. This could be coupled with soft law instruments to regulate some of the more contentious aspects of LAWS, with the hope that it will provide guidance, and may for the basis for future customary international law. National rules and laws could serve to supplement this, but would be insufficient on their own due to inconsistencies between states. Allowing some development and use of LAWS enables further research into improvements which could ultimately reduce the harm for civilians in armed conflict, while also guarding against the present-day risk that LAWS will create a deterrence on the use of force, may be misused, and may lack accountability mechanisms.

**VII Conclusion**

This paper has sought to explain the concerns raised by the Human Rights Watch and others regarding the possible future technology known as LAWS, or more colourfully: “killer robots”.
The Human Rights Watch and others involved in the Campaign to Stop Killer Robots argue that LAWS will contravene the core principles of IHL, cause increased risk to civilians and are inherently immoral and thus in breach of the Martens Clause. As a result, they argue for a pre-emptive ban on the development and use of LAWS.\textsuperscript{194}

However, this paper, when examining LAWS in accordance with the weapons review provision of article 36 of the Additional Protocol I, found that LAWS are not inherently unlawful, and that it could be possible for them to be lawful in use. They are therefore not subject to any current form of prohibition, instead simply being constrained by the guiding principles of IHL such as distinction, proportionality and precautions in attack.

However, as was raised by the \textit{Losing Humanity} report, there may be other policy and moral reasons which could still influence the development of regulations and restrictions on LAWS. These include the risk of a new arms race, a decreasing deterrence on the use of force, the risk of misuse or abuse by failed states or autocratic regimes, machine malfunction or failure and the role of the Martens Clause in upholding international morality. These risks must be weighed by states against the potential benefits of LAWS, such as faster reaction times and distinction, reduced risk to personal, increased military capability and perhaps increased protection for civilians. If states believe that the risks involved with LAWS outweigh the benefits, then they may consider regulation or restriction of LAWS, beyond what the principles of IHL outline, is necessary.

There are range of possible options for regulation or restriction which have been put forward by academic commentators, non-governmental organisations and states. The proposed options fall within five categories: a total ban on all LAWS, a partial ban on some forms of LAWS, an international soft law instrument, or national policies and laws.

A total ban is inadvisable, as it ignores the potential benefits which may come from LAWS, is not realistic in terms of the likely technological developments and military utility states will perceive in LAWS. Any ban would also be difficult to enforce, given the fine line between autonomous and highly-automated systems. For this reason, a partial ban based on the complexity of a LAWS’ decision-making would also be problematic, but a partial ban based

\textsuperscript{194} Docherty, above n 1; Asaro, above n 31; Goose, above n 31.
upon environment or an offensive/defensive distinction could work. A soft law instrument is more likely to be agreed to, but ultimately it will be only persuasive and may not have sufficient force to counter some of the risks of LAWS which a hard law instrument might be able to address. Finally, national policies and rules would also be flexible for the needs of each country, but may be contradictory and not sufficiently widespread to have any impact on the use and development of LAWS.

Given the critiques which can be made of each proposal, the best option may be to combine a form of partial ban, which limits the environments or nature (offensive/defensive) of LAWS with a soft law instrument to regulate some of the more contentious aspects relating to LAWS. This would allow the development of some LAWS, which could ultimately reduce the risk of harm for civilians in armed conflict, while still guarding against the risks which LAWS raise.

Ultimately, until humanity ceases its appetite for armed conflict, we should be aiming for “the promotion of means or methods of warfare that best protect humanity within the lawful bounds of war, irrespective of whether the means to that end is human or machine or some combination of the two.”

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195 Anderson, Reisner and Waxman, above n 3, at 410.
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