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THE EQUILIBRIUM OF VIOLENCE: ACCOUNTABILITY IN THE AGE OF AUTONOMOUS WEAPONS SYSTEMS

Joel Hood*

History teaches that wars begin when governments believe the price of aggression is cheap. To keep the peace, we and our allies must be strong enough to convince any potential aggressor that war could bring no benefit, only disaster. So, when we neglected our defenses, the risks of serious confrontation grew.

Ronald Reagan¹

I. INTRODUCTION

Emerging technologies have tested the tenuous balance between the law of armed conflict, principles of humanity, and military necessity. Modern autonomous weapons systems are no exception.² Some argue that there is no acceptable equilibrium for these weapons systems and that they should be prohibited as a matter of international law.³ This situation is not without parallel. New technologies like aircraft, submarines, and asphyxiating gas fundamentally changed the nature of warfare in the years leading up to World War I and ultimately resulted in changes to the law of armed conflict (LOAC), but not until the new weapons systems had been used with terrible effect. These historical examples highlight the importance of emerging law and its need to keep pace with technological advancement. This paper argues that current LOAC provisions—with specific focus on Additional Protocol I art.

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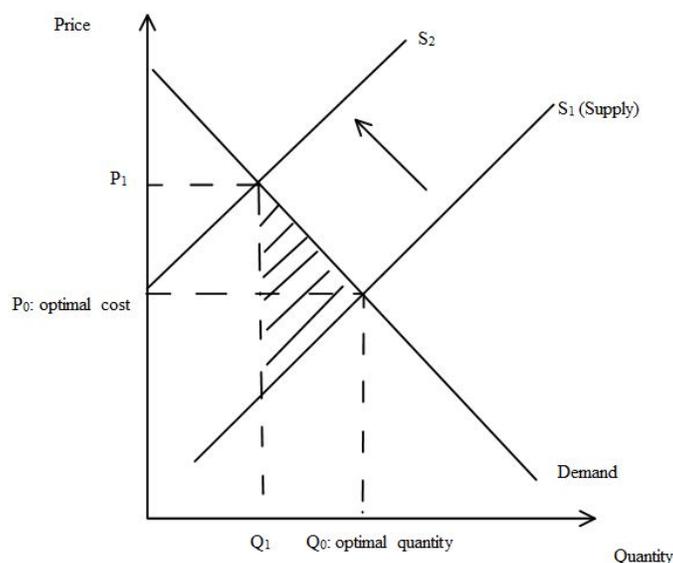
¹ Ronald Reagan, President, United States of America, Address to the Nation and Other Countries on United States-Soviet Relations (January 16, 1984), *available at* <http://www.reagan.utexas.edu/archives/speeches/1984/11684a.htm>.

² Many people likely associate autonomous weapons with “drones”—unmanned aerial vehicles (UAV)—due to their high-profile in the ongoing war on international terror networks. However, autonomous weapons operate with much less human interaction and include weapons systems like: the Iron Dome Defense system, Aegis and Patriot missile systems, and unmanned border turrets.

³ HUMAN RIGHTS WATCH, LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS 29 (2012) [hereinafter LOSING HUMANITY]. Human Rights Watch has asserted that there should be a worldwide ban on “killer robots” autonomous weapons. Law-of-armed-conflict scholar Michael Schmitt contends that these weapons systems are not *per se* illegal but rather, like almost all weapons, they can be employed in an impermissible manner. See Michael N. Schmitt, *Autonomous Weapon Systems and International Humanitarian Law: A Reply to the Critics* (HARVARD NATIONAL SECURITY JOURNAL JOURNAL FEATURE 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2184826.

36⁴—are anticipatory of new technology and make a repetition of history, particularly weapons systems abuse, unlikely. This paper explores this assertion by employing economic terms to understand what I term “the equilibrium of violence.”

Consider this basic economics question: what is the effect of a tax on the domestic market for cigarettes? Often, this kind of tax is called a “sin tax” because it taxes a social ill. The rationale is that smoking has serious negative spillover effects on non-smokers, e.g., side effects of secondhand smoke. This spillover, or negative externality, means that suppliers and smokers are not internalizing the effects of smoking; in other words, they are not paying enough to offset the damage they cause to the health of other people. The tax on each pack of cigarettes raises the overall price the consumer pays at the store, as seen in the graph below:



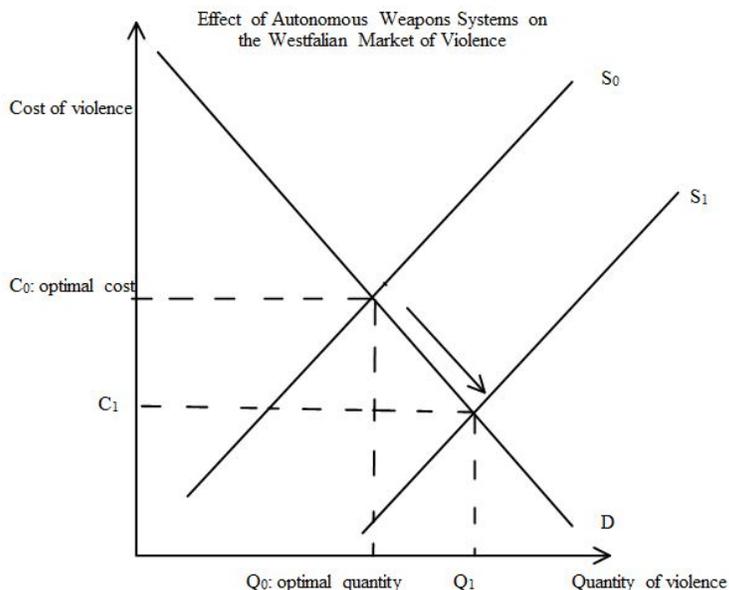
The point on the graph at Q_0, P_0 represents the market equilibrium as determined by supply and demand without government interference. The point Q_1, P_1 represents the new, artificial equilibrium point after the tax is imposed. At this point the tax achieves its goal of reducing the quantity of cigarettes demanded (conditional on the elasticity of demand for cigarettes) by raising the price. The shaded triangle traditionally represents the market inefficiency, or deadweight loss, created by the imposition of the tax. However, in this example of a tax attempting to compensate for a negative externality, it is a gain to society.

Now, instead of a tax, imagine that the government issued new laws on the ingredients of cigarettes, cigarette packaging, and where people can smoke. These laws impose real costs on the producer, who then

⁴ Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), June 8, 1977, 1125 U.N.T.S. 3 [hereinafter AP I].

passes those costs onto the consumer. They raise costs and lower the quantity demanded. Thus, laws can have the same effect as a direct tax. State-level production of violence is similar. Like cigarettes, state-level violence is a social and global ill. Unlike cigarettes, violence cannot be taxed directly. However, the obligations the LOAC imposes on state actors are real costs and can have the same effect as a direct tax, thus increasing the price state actor must pay to engage in violence and simultaneously reducing the quantity of violence produced in the international arena.

But what happens when new military technology emerges? New technology (in macroeconomic terms) shifts the entity's production possibilities frontier out—enabling it to produce more. Think, for example, of the cotton gin, the computer, and in our case, autonomous weapons systems. Autonomous weapons systems increase the ability of state actors to produce violence. Thus, the emergence of new military technology has the potential to destabilize the equilibrium that the legal regime has crafted and overproduce violence. The following graph displays this dynamic:



Point Q_0 , C_0 represents the artificial equilibrium of violence maintained by the international legal regime. Supply shifts out as represented by the arrow from S_0 to S_1 , and a new equilibrium point results at Q_1 , C_1 . You will notice that at this point the quantity of violence produced is greater and the cost of violence is lower. This is not an optimal outcome. However, Additional Protocol I article 36 acts as a tax on future weapons systems, meant to counterbalance the negative externalities that result from emerging autonomous weapons systems. Thus, the equilibrium of violence in the international market will likely

be maintained, and Human Rights Watch's assertion that there must be a ban on "killer robots"⁵ is unnecessary.

Part II is a brief history of technology and LOAC regarding aerial vehicles, submarines, and asphyxiating gas in the early 20th century. These historical examples show that the international community's efforts pre-World War I and in the interwar period did not sufficiently "tax" new technologies and the result was an excess of violence in war.

Part III gives a snapshot of current autonomous weapons systems. It also presents the current state of the LOAC that applies to these weapons. Part IV compares the historical examples from Part II and the contemporary issues in Part III and determines that the LOAC is fundamentally different today than it was at the turn of the 20th century.

Part V explains how today's LOAC is superior and can effectively control the inevitable use of autonomous weapons. The LOAC has this ability because it treats new technology that has the potential for greater violence as a negative externality and has provisions and the ability to regulate it. Part VI consists of recommendations, and Part VII is a conclusion.

II. A LESSON FROM HISTORY: LOAC IN THE EARLY 20TH CENTURY

A. Technology

Many technological advances were made in the period immediately preceding World War I. Telford Taylor, Chief Prosecutor at Nuremberg, explained: "The airplane, the submarine, and poison gas had profoundly affected the conduct of war" and were "largely untouched by the Hague Conventions" of 1899 and 1907.⁶ Each of these new weapons tested the nascent law of armed conflict. Delegates to both Hague Conferences instituted a total prohibition on gas warfare, a temporary prohibition on aerial vehicles, but nearly no specific guidance on submarines. The reactions and remedies to those technologies mirror reactions to autonomous weapons systems today. In the early 20th century, as now, there have been those that have called for the *per se* illegality of new technologies.⁷ However, some of those innovations, like the airplane and submarine, have become part of conventional warfare while others, like asphyxiating gas, continue to be prohibited by treaty and customary international law.⁸

⁵ LOSING HUMANITY, *supra* note 3.

⁶ TELFORD TAYLOR, THE ANATOMY OF THE NUREMBERG TRIALS 18 (1992). Surprisingly, aerial bombardment, submarines, and poison gas received a great deal of treatment in both of these early Hague Conferences but resulted in relatively feeble treaty provisions.

⁷ LOSING HUMANITY, *supra* note 3; PROCEEDINGS OF THE LONDON NAVAL CONFERENCE OF 1930 73-4, DEPARTMENT OF STATE CONFERENCE SERIES, no. 4 (1931) [Hereinafter LONDON CONFERENCE OF 1930]; PROCEEDINGS OF THE HAGUE PEACE CONFERENCE OF 1899 299 (James B. Scott ed., 1920) [hereinafter HAGUE PEACE CONFERENCE OF 1899].

⁸ Major Joseph Burns Kelly, *Gas Warfare in International Law*, 9 MIL. L. REV. 1, 21-22 (1960).

1. Submarines

Submarines were first used on a wide scale in World War I,⁹ and were relatively slow and could not keep pace with surface ships.¹⁰ The Hague Convention of 1907 governed some aspects of submarine warfare, such as the laying of automatic contact mines.¹¹ However, the temptation to leverage the submarine's primary strength, concealment, proved too great a temptation for the German Navy. It began unrestricted submarine warfare in 1915 and again in 1917.¹² German unrestricted submarine warfare led to the sinking of the *RMS Lusitania* in 1915, which prompted the United States' entrance into World War I.¹³

In 1917, Germany declared the area surrounding the British Isles a war zone into which merchant vessels entered at their own peril. This economic warfare at sea attempted to both deny the enemy material and to starve the enemy into submission.¹⁴ In fact, "[n]either side denied using starvation as a method of warfare."¹⁵ Consequently, there was widespread humanitarian and governmental outcry against submarine warfare.¹⁶ Perhaps one of the most egregious violations of the law of war by use of unrestricted submarine warfare was the sinking of a British hospital ship and the destruction of both lifeboats and survivors.¹⁷

2. Aerial Vehicles

The use of aerial vehicles during wartime was first discussed in the late 1800's: "The use of dirigible airships had been discussed in international conferences in Chicago in 1893 and Paris in 1899."¹⁸ In the preceding decades states had used balloons as spotters for artillery and for aerial bombardment.¹⁹ However, their usefulness was limited.²⁰ As one of the United States' delegates to the 1899 Hague Conference, Captain Crozier, stated, "[I]t can carry but little; it is capable of hurling, only on points exactly determined and over which it may pass by chance,

⁹ *Submarine Chronology*, CHIEF OF NAVAL OPERATIONS SUBMARINE WARFARE DIVISION, <http://www.navy.mil/navydata/cno/n87/history/chrono.html> (last visited Nov. 26, 2014).

¹⁰ *Id.*

¹¹ PROCEEDINGS OF THE HAGUE PEACE CONFERENCE OF 1907 VOL. I 643 (James B. Scott ed., 1920) [hereinafter HAGUE PEACE CONFERENCE OF 1907].

¹² TAYLOR, *supra* note 6, at 18

¹³ *Topics in Chronicling America - Sinking of the Lusitania*, LIBRARY OF CONGRESS, <http://www.loc.gov/rr/news/topics/lusitania.html> (last visited Nov. 26, 2014).

¹⁴ Lieutenant David A. Melson, *Targeting War-Sustaining Capability at Sea: Compatibility with Additional Protocol I*, ARMY LAW., July 2009, at 44, 47.

¹⁵ *Id.* at 47.

¹⁶ TAYLOR, *supra* note 6, at 18.

¹⁷ *Id.* at 17. Lieutenant Patzig and his subordinate officers, Lieutenants Dithmar and Boldt, were charged in the Leipzig Trials, but Patzig fled the country and, although convicted, Dithmar and Boldt escaped from prison after only a few months.

¹⁸ W. Hays Parks, *Air War and the Law of War*, 32 A.F. L. REV. 1, 10 (1990).

¹⁹ *Id.* at 10.

²⁰ *Id.*

indecisive quantities of explosives, which would fall, like useless hailstones, on both combatants and non-combatants alike.”²¹

Aerial warfare changed dramatically starting in 1903 when the Wright brothers made the first sustained, powered heavier-than-air flight.²² As the Wrights, Santos-Dumont, and other aviation pioneers perfected their designs, states looked to their military applications.²³ The dirigible changed the quantities of explosives that an airborne vessel could carry. Certainly, no one in London in 1915 argued that the bombs descending from German dirigibles were “like useless hailstones.”²⁴ Rather, “by the end of the year over 200 civilians had been killed and many were terrorized.”²⁵ The deliberate targeting of steel and munitions factories by both sides of the conflict demoralized the enemy “consistent with the theory of collateral casualties.”²⁶

3. *Asphyxiating Gas*

“At 5 p.m. on 22 April 1915 a thick yellow smoke was seen to bellow up from the German trenches between Langemarck and Bixschoute near Ypres, Belgium.”²⁷ This was the first use of modern chemical warfare. “Soon a gas wall of chlorine two miles long and a hundred feet high began to drift toward the French positions at Langemarck.”²⁸ Five thousand soldiers died as a result of that first attack.²⁹ During the course of the year, the Germans, followed by the French and the British, continued to use gas clouds in an effort to break the lines of the entrenched enemy.³⁰ In 1917, artillery shells containing gas began to compliment the yellow clouds of chlorine and the smell of old hay that accompanied phosgene.³¹ By the end of the war phosgene would account for 80% of all military personnel gas deaths.³²

The German forces first used mustard gas on July 12, 1917.³³ It was much more effective than other gases producing eight times as many casualties.³⁴ Its main advantage was its persistence and potency. Contact with the skin produced blisters and it could remain on the ground for days after the attack. It became the chemical weapon of choice

²¹ *Id.* at 11.

²² Parks, *supra* note 18, at 16.

²³ *Id.*

²⁴ *Id.*

²⁵ TAYLOR, *supra* note 6, at 12.

²⁶ Parks, *supra* note 18, at 22.

²⁷ Major Kelly, *supra* note 8, at 3.

²⁸ *Id.*

²⁹ *Id.* at 6.

³⁰ *Id.* at 8, 9.

³¹ *Id.* at 9; see also *United States Army WWII Poster*, NATIONAL MUSEUM OF HEALTH AND MEDICINE, http://www.medicalmuseum.mil/assets/images/galleries/world_war_II/phosgene.jpg. (last visited Dec. 1, 2014).

³² Major Kelly, *supra* note 8, at 11.

³³ *Id.* at 10.

³⁴ *Id.* at 10–11

throughout that year and into the next.³⁵ The last gas was an American invention—lewisite.³⁶ Whereas chlorine gas caused many casualties but few deaths, lewisite was potent enough to “penetrate the pores and poison the body.”³⁷ While each of the aforementioned gases were grisly in their effects and placed enormous numbers of soldiers *hors de combat*,

[I]t must be noted that its victims were confined to troops in the field. It was not directed against nor did it affect the civilian population. This fortunate result was aided by the fact that the airplane was not used as a means of disseminating gases. Despite the escape of the civilian population in World War I it was fear for their safety from gas that preoccupied the states in the inter-war period.³⁸

B. Law and Reactions

1. Law Addressing Submarine Warfare

The 1899 Hague Conference had addressed the emerging topic of submarines and torpedo boats. However, the Conference only voted on the issue of the “prohibition of submarine or diving torpedo-boats”³⁹ and did not address submarine operations, assuming that law customary to the conduct of naval operations would apply.⁴⁰ Many of the delegates expressed the sentiment that if the proposed ban on submarines were unanimous, they would acquiesce.⁴¹ Needless to say, the delegates did not establish a prohibition, and the law of war regarding submarines was not seriously taken up again until the Washington Conference in 1921.

Thus, the law of armed conflict did not specifically address submarines during World War I. The market for violence was in deep disequilibrium. With the exceptions of hospital ships and the few instances in which survivors of a sinking ship were killed, “German U-boat attacks on enemy shipping violated no international law.”⁴² There was no lack of public rancor against the atrocities committed by

³⁵ *Id.*

³⁶ *Id.*

³⁷ *Id.* at 11.

³⁸ Major Kelly, *supra* note 8, at 12.

³⁹ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 299.

⁴⁰ TAYLOR, *supra* note 6, at 17.

⁴¹ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 367. German delegate, Captain Siegel, stated “that if all the other Governments agreed not to adopt vessels of this kind, Germany would join in this understanding.” *Id.* This of course was mooted by the delegate from France’s assertion “that the submarine torpedo has an eminently defensive purpose, and that the right to use it should therefore not be taken from a country.” *Id.* Contrast this serious political jostling with the pompous statement from the delegate from the Netherlands: “the submarine torpedo is the weapon of the weak.” *Id.*

⁴² TAYLOR, *supra* note 6, at 13.

submarines, airplanes, and poison gases regardless of their status under international law. As Telford Taylor aptly described:

[T]he enormous carnage of World War I stimulated public demand for measures to prevent a recurrence of such slaughter and destruction. Military and diplomatic interest was rekindled in the use of multinational treaties not only to limit armaments, but also to govern their use. The airplane, the submarine, and poison gas had profoundly affected the conduct of the war, and it was to these relatively new weapons, largely untouched by the Hague Conventions, that attention now turned.⁴³

Five conferences followed World War I that attempted to regulate submarine warfare: the Washington Naval Conference in 1921–22, Geneva Naval Conference in 1927, Second Geneva Naval Conference in 1932, London Naval Conference in 1930, and the Second London Naval Conference in 1935. Intuitively, the fact that these conferences occurred shows that there was an overproduction of violence. Additionally, the state parties involved attempted to use the force of law to raise the cost of submarine warfare and thereby reduce the externalities of its use.

The Washington Conference involved nine nations, seven treaties, and thirteen resolutions.⁴⁴ The general purpose of each treaty was to “prevent the possibility of another war” and engage naval competitors in negotiations.⁴⁵ During the course of the Conference, British delegate Lord Balfour called for the prohibition of the submarine, reasoning:

Is there any man who doubts that if they are once let loose to deal with merchantmen their powers will not in the stress of war be abused in the future as they have been so grossly abused in the past? I do not think, as I have already indicated, that it is the fighting use of the submarine which is really before us now. The question before use now is whether you are going to encourage an instrument of war which, if it be encouraged, if indeed it be permitted at all, will undoubtedly be used in the illegitimate destruction of commerce.⁴⁶

⁴³ *Id.* at 18

⁴⁴ NAVAL WAR COLLEGE, CONFERENCE ON THE LIMITATION OF ARMAMENT OF 1921 VII (1923) [hereinafter WASHINGTON CONFERENCE OF 1921].

⁴⁵ *The Washington Naval Conference 1921-1922*, OFFICE OF THE HISTORIAN, U.S. DEPT. OF STATE, <https://history.state.gov/milestones/1921-1936/naval-conference> (last visited Nov. 26, 2014); WASHINGTON CONFERENCE OF 1921, *supra* note 44, at 1. The Invitation to the Conference read: “It may also be found advisable to formulate proposals by which in the interest of humanity the use of new agencies of warfare may be suitably controlled.” *Id.*

⁴⁶ WASHINGTON CONFERENCE OF 1921, *supra* note 44, at 73–74.

Balfour drew upon the recent memory of German U-boat attacks during the war. His reasoning reflected Great Britain's strategic vulnerability to blockade. France's delegates stringently opposed the proposal and this led to an impasse.⁴⁷ The British Empire delegation made one last legal argument and had it formally placed on the record of the Conference, "[T]he use of submarines, whilst of small value for defensive purposes, leads inevitably to acts which are inconsistent with the laws of war and the dictates of humanity, and the delegation desires that united action should be taken by all nations to forbid their maintenance, construction, or employment."^{48, 49} This statement is similar to Human Rights Watch's call for a ban on "killer robots,"⁵⁰ and essentially advocates the use of law to tax submarines out of existence.

Notwithstanding the failure of the Conference to come to a consensus on submarines, the Five-Power Treaty was signed by the United States, Great Britain, Japan, France, and Italy.⁵¹ It required the countries to: limit themselves to a set ratio of warship tonnage; reduce the size of their navies by scrapping older ships; and outlawed expansion of bases in the Pacific.⁵² These treaties expired in 1936.⁵³

The Geneva Naval Conference in 1927 was called by U.S. President Calvin Coolidge to address classes of vessels not addressed by the Five-Power Treaty in 1921.⁵⁴ These classes of vessels included cruisers, destroyers, and submarines.⁵⁵ The parties failed to form a treaty due to U.S. and British disagreement over cruiser limitations.⁵⁶ The Second Geneva Naval Conference formed a part of the League of Nations World Disarmament Conference, which also failed when Hitler withdrew Germany from the Conference and the League of Nations in October 1933.⁵⁷

⁴⁷ *Id.* at 54. "France believes that the submarine is the only weapon which at present permits a nation scantily supplied with capital ships to defend itself at sea. For France, therefore, the submarine is an essential means of preserving her independence which she can not give up . . ." *Id.*

⁴⁸ *Id.* at 93.

⁴⁹ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 283, 328. Captain Mahan made a similar argument—though unconvincingly—in the 1899 Hague Conference. *Id.* The Conference reports: "[H]e thinks . . . it is no more cruel to asphyxiate one's enemies by means of deleterious gases than with water, that is to say, by drowning them, as happens when a vessel is sunk by the torpedo . . . he does not deem it logical to permit the use of submarine and submergible boats and to prohibit the use of shells filled with asphyxiating gases." *Id.*

⁵⁰ LOSING HUMANITY, *supra* note 3, at 3.

⁵¹ OFFICE OF THE HISTORIAN, U.S. DEPT. OF STATE, *supra* note 45.

⁵² WASHINGTON CONFERENCE OF 1921, *supra* note 44.

⁵³ TAYLOR, *supra* note 6, at 18. Perhaps the treaties limited tenure is why Taylor refers to them as a failure.

⁵⁴ *The Geneva Naval Conference 1927*, OFFICE OF THE HISTORIAN, U.S. DEPT. OF STATE, <https://history.state.gov/milestones/1921-1936/geneva> (last visited Nov. 26, 2014).

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ Edwin L. James, *GERMANY QUILTS LEAGUE; HITLER ASKS 'PLEBISCITE'; Berlin Orders Delegates to Leave Arms Conference as Britain and France Veto Rearming of Reich*, N.Y. TIMES, Oct. 15, 1933, at E1, available at <http://select.nytimes.com/gst/abstract.html?res=F40D1EFE395B137A93C7A8178BD95F478385F9>.

The London Naval Conference in 1930 was a new attempt to revise and extend the terms of the Five Power Treaty of 1922 and avoid a naval arms race.⁵⁸ Specifically, a Joint Statement of the President of the United States and the British Prime Minister on October 10, 1929 expressed the purpose of the Conference “not only to review the conversations on a naval agreement . . . but also to discuss some of the more important means by which the moral force of our countries can be exerted for peace.”⁵⁹ The tone of the Conference was one of establishing peace in light of the then-recent Kellogg-Briand Pact, but the terms of the treaties were much more pragmatic.⁶⁰

It limited the tonnage of auxiliary ships, granted the Japanese a higher ratio of tonnage for non-offense ship categories, and ended the impasse on cruiser vessels that ended the first Geneva Naval Conference.⁶¹ All of the provisions of the treaty except Article 22 were set to expire 31 December 1936.^{62, 63} Article 22 required submarines to follow the same standards of international law as applied to surface vessels. Specifically, the following are accepted as established rules of International Law:

- (1) In their action with regard to merchant ships, submarines must conform to the rules of International Law to which surface vessels are subject.
- (2) In particular, except in the case of persistent refusal to stop on being duly summoned, or of active resistance to visit or search, a warship, whether surface vessel or submarine, may not sink or render incapable of navigation a merchant vessel without having first placed passengers, crew and ship's papers in a place of safety. For this purpose the ship's boats are not regarded as a place of safety unless the safety of the passengers and crew is assured, in the existing sea and weather conditions, by the proximity of land, or the presence of another vessel which is in a position to take them on board.⁶⁴

⁵⁸ LONDON NAVAL CONFERENCE OF 1930, *supra* note 7, at 7.

⁵⁹ *Id.*

⁶⁰ *Id.* at 210–11.

⁶¹ U.S. DEPT. OF STATE OFFICE OF THE HISTORIAN, *supra* note 54.

⁶² U.S. DEPT. OF STATE OFFICE OF THE HISTORIAN, THE LONDON NAVAL CONFERENCE, 1930 (2013), available at <https://history.state.gov/milestones/1921-1936/london-naval-conf>.

⁶³ *Id.* In 1935, the United States, Great Britain, Japan, and France met to renegotiate the Washington and London Treaties before they expired the following year. Japan withdrew from the Conference and the remaining powers agreed to a six-year moratorium on building large light cruisers.

⁶⁴ LONDON CONFERENCE OF 1930, *supra* note 7, Part IV art. 22, at 73–4.

This article of the 1930 London Treaty became known as the London Submarine Protocol of 1936, and over 35 nations eventually subscribed to it.^{65, 66} Subsection two directly addressed the issue of unrestricted submarine warfare.⁶⁷ Notwithstanding these protections, “German submarines frequently sunk British and other merchant ships without warning” during World War II.⁶⁸ Balfour had been prophetic in 1921.⁶⁹ No measures of law or accountability had reigned-in the new technology.

2. *Concerning Aerial Bombardment*

Delegates in the 1899 Hague Peace Conference were among the first to address aerial bombardment.⁷⁰ The call for a conference began with a circular written by Count Mouraviev on behalf of Tsar Nicholas II. It began with a list of eight proposals, with the third proposal being the “prohibition of the discharge of any kind of projectile or explosive from balloons or by similar means.”^{71, 72} Thus, the original question presented to the Conference was whether there was a need to proscribe “the discharge of projectiles or of any explosive from balloons or by similar methods?”⁷³

In response, United States delegate, Captain Crozier, suggested a moratorium of five years rather than an indefinite prohibition. He argued that a moratorium of five years would be more appropriate because:

The present balloons cannot serve effectively in war. Moreover, their use for the purpose in question would neither be humane nor in accordance with the spirit which guides us, since it is impossible to foresee the place where the projectiles or other substances discharged from a balloon will fall and since they may just as easily hit inoffensive inhabitants as combatants, or destroy a church as easily as a battery. However, if it were possible to perfect aerial navigation in such a way as to do away with these defects, the use of balloons might decrease the length of combat and consequently the evils of war as well as the expenses entailed thereby At a later stage of its development, if it be seen that its less desirable qualities still predominate, there will

⁶⁵ Major Kelly, *supra* note 8, at 107.

⁶⁶ TAYLOR, *supra* note 6, at 87, 400. During the Nuremberg Trials, Admiral Karl Doenitz was prosecuted for unrestricted submarine warfare (among other things) in violation of this precedent.

⁶⁷ *Id.* Though this was not a sufficient deterrent to Nazi Germany or the United States in the Pacific theater.

⁶⁸ *Id.* at 399.

⁶⁹ WASHINGTON CONFERENCE OF 1921, *supra* note 44, at 73–4.

⁷⁰ Parks, *supra* note 18, at 10.

⁷¹ *Id.* at 8.

⁷² HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at xviii.

⁷³ *Id.* at 275.

still be time to extend the prohibition; at present let us confine our action within the limits of our knowledge.⁷⁴

This proposal showed foresight. Perhaps unwittingly, Captain Crozier had proposed a five-year period during which the technology could grow and a suitable equilibrium could be deduced. The delegates supported the proposition and it became Declaration IV, 1 of the Convention, “The Contracting Powers agree to prohibit, for a term of five years, the launching of projectiles and explosives from balloons, or by other new methods of a similar nature.”⁷⁵

The Second Hague Conference of 1907 saw a renewal of the moratorium on aerial bombardment. However, the prohibition was “until the next Peace Conference” instead of a set number of years.⁷⁶ Neither Germany, Russia, nor France signed the declaration.⁷⁷ Furthermore, the outbreak of World War I interrupted the scheduled Third Hague Conference and made the prohibition unenforceable as to the remainder of nations. Thus, there were fewer restrictions to aerial bombardment when World War I began. The rules of land warfare applied to aerial bombardment in at least in one sense: undefended cities and towns were still non-targetable.⁷⁸ However, London was not technically undefended and, therefore, the zeppelin raids of World War I violated no laws of war.⁷⁹

In the interwar period, there were no further treaty developments on aerial warfare. The Washington Conference concluded “that it is not at practicable to impose any effective limitations upon the numbers or characteristics of aircraft, either commercial or military.”⁸⁰ Furthermore, the committee stated:

[T]he use of aircraft in war should be covered by the rules of warfare as adapted to aircraft, by a further conference which should be held at a later date. . . . The late war had revealed the imperative necessity for the adoption of new rules of warfare, and that these new rules of warfare should be framed so as to take into account the development of the science of aeronautics and its application to war.⁸¹

A committee met as per Resolution I of the Conference, but the *Hague Rules of Aerial Warfare* drafted were never presented to the

⁷⁴ *Id.* at 275, 354.

⁷⁵ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907 220 (James B. Scott ed., 1918).

⁷⁶ HAGUE PEACE CONFERENCE OF 1907 vol. I, *supra* note 11, at 67, 85–86.

⁷⁷ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75, at 237.

⁷⁸ TAYLOR, *supra* note 6, at 13.

⁷⁹ *Id.*

⁸⁰ WASHINGTON CONFERENCE OF 1921, *supra* note 44, at 229.

⁸¹ *Id.* at 229.

international community for official acceptance or discussion.⁸² Thus, aerial warfare continued to operate largely under only customary international law through both World Wars.⁸³ This was the equivalent of states stating that the new weapon system did not lower the cost of warfare (or increase strategic advantage) and that no accountability measures were necessary.

3. *Prohibition of Asphyxiating Gas*

Gas warfare was deemed impracticable during the 1899 Hague Conference. Captain Mahan of the United States delegation stated, “The question of asphyxiating gases is still intangible, since projectiles of this kind do not really exist.”⁸⁴ However, the Conference committees considered how they might be used. Russian delegate, Captain Schiene, considered gases “barbarous in character and . . . [the] equivalent of poisoning a river.”⁸⁵ Danish delegate Bille concurred, stating “[I]f directed against a besieged city, they would perhaps hit more harmless inhabitants than the ordinary projectiles.”⁸⁶ The potential externalities of the hypothetical weapon were immediately apparent.

All of the delegates to the Conference agreed that asphyxiating gases would be prohibited if there was unanimity on the issue. All delegates agreed to the prohibition except the delegates from the United States and Great Britain. The U.S. delegate stated his reasons thus:

- (1) The objection that a warlike device is barbarous has always been made against new weapons, which have nevertheless eventually been adopted. In the middle ages firearms were accused of being cruel; later on an attack was made against shells, and still more recently against torpedoes. It does not seem demonstrated to him that projectiles filled with asphyxiating gases are inhuman and useless cruel device, and that they would not produce a decisive result.
- (2) He is the representative of a nation which is actuated by a keen desire to render war more humane, but which may be called upon to make war, and it is therefore

⁸² HOWARD S. LEVIE, *TERRORISM IN WAR: THE LAW OF WAR CRIMES* 374 (1993); TAYLOR, *supra* note 6, at 19. “For air warfare there were no further treaty developments, and in retrospect it is easy to see why the 1923 draft failed to win adherents. In 1921, the Italian air general Giulio Douhet had published a widely read book, *Command of Air*, preaching the doctrine that in future years air power would be decisive Public opinion, during the years between the two world wars, settled into a fatalistic acceptance that future wars between great powers would surely involve urban infernos produced by bombers, and that nothing could be done about it.” TAYLOR, *supra* note 6, at 19.

⁸³ TAYLOR, *supra* note 6, at 10, 20.

⁸⁴ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 283.

⁸⁵ *Id.* at 366.

⁸⁶ *Id.*

necessary not to deprive one's self, by means of hastily adopted resolutions of means which might be later on be usefully employed.⁸⁷

All other delegates at the Hague Peace Conference signed the binding declaration prohibiting the use of asphyxiating gases except for the delegates from the United States and Great Britain. The text of the declaration stated in part that those contracting powers "agree[d] to abstain from the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases. . . . It shall cease to be binding from the time when, in a war between the contracting Powers, one of the belligerents shall be joined by a non-contracting Power."⁸⁸ Thus, as a matter of strict textual interpretation, the declaration ceased to be binding once the United States, a non-signatory, entered World War I. All other uses of gas warfare prior to that time were a violation of the declaration.

Despite not signing the declaration, Great Britain adhered to the declaration during the 1907 Hague Conference.⁸⁹ The Conference held that the prohibition on asphyxiating gases was still in force and that there was no need to modify the declaration,⁹⁰ suggesting that the *per se* illegality of the weapon is perpetual until such time as a Party repudiates its adherence.⁹¹ It also suggests that the potential externalities of the weapon are so great that the prohibition, essentially taxing it out of existence, had to continue.

III. CONTEMPORARY ISSUES: AUTONOMOUS WEAPONS SYSTEMS

A. The Emerging Technology of Autonomous Weapon Systems

Conferences and states failed to sufficiently regulate aerial vehicles, submarines, and asphyxiating gas in the early 20th century. Consequently, the international market for violence was in a state of disequilibrium and produced massive externalities. This brief history of submarines, aerial vehicles, and gas serves as a useful backdrop against which to consider modern developments in military technology, specifically autonomous weapons systems and whether they too will result in externalities of violence. There are hosts of current and emerging autonomous weapons systems, including "robots, unarmed and armed unmanned aerial and underwater vehicles auto-response systems such as armed unmanned

⁸⁷ *Id.* at 367.

⁸⁸ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75, at 225.

⁸⁹ HAGUE PEACE CONFERENCE OF 1907 vol. I, *supra* note 11, at 86.

⁹⁰ HAGUE PEACE CONFERENCE OF 1907 vol. III, *supra* note 11, at 98

⁹¹ The United States has never formally adhered to the Declaration and retains reserves of chemical agents.

sentry stations.”⁹² While the purpose of this article is not to describe autonomous weapons systems in depth, a brief overview highlights pertinent LOAC issues. We must first begin with the definition of “autonomous weapons systems” by dividing that term into its parts: “weapons systems” and “autonomy”.

Schmitt defines a weapon system as “a weapon and the items associated with its employment.”⁹³ For example, aircraft, submarines, and artillery would all constitute weapon systems. The U.S. Department of Defense has defined “autonomy” with regards to weapon systems as a weapon system that can select and engage targets without further intervention by a human operator.⁹⁴ This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation.⁹⁵

According to this definition, the Department of Defense recognizes two levels of autonomy: semi-autonomous or fully autonomous.⁹⁶ In contrast, Human Rights Watch suggests that autonomy of weapon systems ranges along a spectrum of human-in-the-loop, human-on-the-loop, and human-out-of-the-loop.⁹⁷ Currently, all autonomous weapons operate with a human-in-the-loop, but semi-autonomous, or human-out-of-the-loop, capabilities are being developed.⁹⁸ Thus, currently only human operators of autonomous weapons systems can command them to target and deliver force. Human-on-the-loop capability would mean that the human operator merely observes but has the ability to override the autonomous weapon’s actions. Lastly, full autonomy,⁹⁹ or human-out-of-the-loop, would mean that the weapon system could target and deliver a weapon without any human interaction.

⁹² Eric Talbot Jensen, *The Future of the Law of Armed Conflict: Ostriches, Butterflies, and Nanobots*, 35 MICH. J. INT’L L. 2, 38 (forthcoming 2014), available at <http://ssrn.com/abstract=2237509>.

⁹³ Schmitt, *supra* note 3, at 3.

⁹⁴ DEP’T OF DEF., DIRECTIVE 3000.09, AUTONOMY IN WEAPON SYSTEMS 3 (Nov. 2, 2012) [hereinafter DOD DIRECTIVE 3000.09].

⁹⁵ *Id.* at 13–14. Autonomy is a capability (or a set of capabilities) that enables a particular action of a system to be automatic or, within programmed boundaries, “self-governing.” Unfortunately, the word “autonomy” often conjures images in the press and the minds of some military leaders of computers making independent decisions and taking uncontrolled action. While the reality of what autonomy is and can do is quite different from those conjured images, these concerns are—in some cases—limiting its adoption. It should be made clear that human operators at some level supervise all autonomous systems, and autonomous systems’ software embodies the designed limits on the actions and decisions delegated to the computer. Instead of viewing autonomy as an intrinsic property of an unmanned vehicle in isolation, the design and operation of autonomous systems needs to be considered in terms of human-system collaboration.

⁹⁶ *Id.*

⁹⁷ LOSING HUMANITY, *supra* note 3, at 2. “Human-in-the-Loop Weapons: Robots that can select targets and deliver force only with human command; Human-on-the-Loop Weapons: Robots that can select targets and deliver force under the oversight of a human operator who can override the robots’ actions; and Human-out-of-the Loop Weapons: Robots that are capable of selecting targets and delivering force without any human input or interaction.” *Id.*

⁹⁸ *Id.* at 16.

⁹⁹ DOD DIRECTIVE 3000.09, *supra* note 94, at 13.

Many people likely associate autonomous weapons with “drones” – unmanned aerial vehicles (UAV) – due to their high-profile in the ongoing war on international terror networks.¹⁰⁰ In fact, as of 2012 31% of all military aircraft were UAVs. Between 2002 and 2010 the Department of Defense’s UAV inventory increased 40-fold.¹⁰¹ Contemporary UAVs are not autonomous weapons in the strict sense.¹⁰² Drones are remotely piloted aircraft (RPAs) whereas an autonomous weapon is one “capable of operating in a dynamic environment with no human control.”¹⁰³

The Aegis and Patriot weapon systems are perhaps the most numerous and longest-used of the true autonomous weapon systems.¹⁰⁴ There are currently 74 U.S. Navy ships equipped with the Aegis Weapon System.¹⁰⁵ The U.S. Navy reports that the nature of the weapons system allows for “simultaneous operations against multi-mission threats: anti-air, anti-surface and anti-submarine warfare.”¹⁰⁶ Patriot missile defense manufacturer Raytheon boasts that 12 countries use the system and that there are over 200 fire units fielded worldwide.¹⁰⁷ Lockheed Martin describes the Patriot Advanced Capability-3 missile as having been 100% effective in Operation Iraqi Freedom.¹⁰⁸

The missile flies to an intercept point specified prior to launch by its ground-based fire solution computer, which is embedded in the engagement control station... Shortly before arrival at the intercept point, the PAC-3 Missile's

¹⁰⁰ International Committee of the Red Cross, Fully Autonomous Weapons Systems (2013), <http://www.icrc.org/eng/resources/documents/statement/2013/09-03-autonomous-weapons.htm>. The ICRC is careful to distinguish between autonomous weapons systems and UAVs: “Autonomous weapons” must also be distinguished from “drones”—a.k.a. Unmanned Aerial Vehicles or Remotely Piloted Aircraft (RPA)—which are remote-controlled weapons. RPAs are typically operated and controlled by a crew located outside of the area of combat, composed of a pilot and a payload operator, and supported by a team of signals, and imagery intelligence analysts. RPAs require human operators to select targets and activate, direct and fire the weapons concerned. Based on the ICRC’s understanding of the expert literature, an “autonomous weapon” is one that is programmed to learn or adapt its functioning in response to changing circumstances in the environment in which it is deployed. A truly autonomous weapon system would be capable of searching for, identifying and applying lethal force to a target, including a human target (enemy combatants), without any human intervention or control. This definition connotes a mobile system with some form of artificial intelligence, capable of operating in a dynamic environment with no human control.

¹⁰¹ JEREMY GERTLER, CONG. RESEARCH SERV., R42136, U.S. UNMANNED AERIAL SYSTEMS (2012), available at <http://www.scribd.com/doc/77662547/1105-001>.

¹⁰² *Id.*

¹⁰³ *Id.*

¹⁰⁴ UNITED STATES NAVY FACT FILE, AEGIS WEAPON SYSTEM (2013), available at http://www.navy.mil/navydata/fact_display.asp?cid=2100&tid=200&ct=2.

¹⁰⁵ *Id.*

¹⁰⁶ *Id.*

¹⁰⁷ RAYTHEON, PATRIOT (2014), available at <http://www.raytheon.com/capabilities/products/patriot/>.

¹⁰⁸ *Id.*

on board Ka band seeker acquires the target, selects the optimal aim point and terminal guidance is initiated.¹⁰⁹

Both of these weapons systems initially deployed in the early 1980s and have been updated since that time.¹¹⁰

At least 11 states, in addition to the U.S. field the Patriot air missile defense system, have developed their own systems.¹¹¹ Perhaps most recently, Israel has developed its Iron Dome weapon system as a defensive weapon against rockets launched into Israeli territory. Israel asserts that the weapon system has had an incredible 80% successful interception rate.¹¹² The weapon system's manufacturer, Rafael Advanced Defense Systems, states: "Its ability to discriminate between threats headed towards the defended area and those that will fall into the sea or open fields reduces costs and limits unnecessary interceptor launches."¹¹³

South Korean defense firm DoDAAM has been developing what it calls the "Super aEgis II" – a "turret-based weapon platform capable of locking onto a human target three kilometers away."¹¹⁴ This defensive autonomous weapon is one of the first weapon systems to take the step toward semi-autonomy due to its ability to target and engage while the human operator observes. Israel and South Korea are only two examples of the over forty-four countries are currently developing military robotics that will almost certainly change the face of modern warfare.^{115,116}

All current autonomous weapons involve a measure of human involvement—there are no fully autonomous weapons yet.¹¹⁷ Unless their use is prohibited, their emergence into the modern battlefield is not a question of "if" but "when".¹¹⁸ The fact that at least 44 countries have

¹⁰⁹ LOCKHEED MARTIN, PAC-3 MISSILE (2014), available at <http://www.lockheedmartin.com/us/products/PAC-3.html>.

¹¹⁰ RAYTHEON, *supra* note 107.

¹¹¹ *Id.*

¹¹² Uzi Ruben, *Is the Iron Dome Effective?*, JERUSALEM POST, Apr. 4, 2013, available at <http://www.jpost.com/Opinion/Op-Ed-Contributors/Is-the-Iron-Dome-effective-308711>.

¹¹³ RAFAEL ADVANCED DEFENCE SYSTEMS LTD., IRON DOME (2010), available at <http://www.rafael.co.il/Marketing/186-1530-en/Marketing.aspx>.

¹¹⁴ *South Korean "super gun" packs hi-tech killing power*, REUTERS, Feb. 14, 2011, <http://www.reuters.com/video/2011/02/14/south-korean-super-gun-packs-hi-tech-kil?videoId=187406842>.

¹¹⁵ *Combat Robot: Combat station and control center*, DODAAM SYSTEMS LTD. (2013), http://www.dodaam.com/eng/sub2/menu2_1_7.php. The nature of the demilitarized zone allows for a reduced need for human interaction since any human target will likely be a lawful target.

¹¹⁶ *U.S. Army and Lockheed Martin Complete Advanced Autonomous Convoy Demonstration*, LOCKHEED MARTIN (Jan. 30, 2014), <http://www.lockheedmartin.com/us/news/press-releases/2014/january/mfc-013014-us-army-lm-complete-advanced-autonomous.html>. In addition to these offensive and defensive weapons, there is the emerging issue of autonomous convoys, which introduce autonomy into the arena of logistics.

¹¹⁷ DOD DIRECTIVE 3000.09, *supra* note 94, at 7.

¹¹⁸ Schmitt, *supra* note 3, at 5. Schmitt states: "Nor are there any 'plans to develop lethal autonomous weapon systems other than human-supervised systems for the purposes of local defense of manned vehicles or installations.' That said, Human Rights Watch is correct in noting that this fact does 'not preclude a change in that policy as the capacity for autonomy evolves.' At some point in the future, such systems will find their way into the battlespace." *Id.*

or are in the process of building military robotics shows that autonomous weapons are the prevailing trend.¹¹⁹

B. Questions Raised by Autonomous Weapons Systems

These weapons systems and the level of their autonomy present questions of law that deserve serious consideration. In fact, the United Nations Office at Geneva reports that “at the 2013 CCW Meeting of High Contracting Parties, a new mandate on lethal autonomous weapons was agreed on.”¹²⁰ An informal meeting of experts met from 13 to 16 May 2014 to discuss lethal autonomous weapons. The chairperson of the meeting released a report to the 2014 Meeting of the High Contracting Parties to the Convention.¹²¹ Anti-autonomous robotics group, Article 36, has heralded this as the first step to outlawing “killer robots”.¹²²

Human Rights Watch asserts that fully autonomous weapons systems will never be able to comply with the fundamental LOAC principles of distinction, proportionality, and military necessity.¹²³ They also raise the issue of accountability, as if to say that accountability is impossible.

They also assert that autonomous weapons systems run afoul of Martens Clause because they run counter to the “dictates of public conscience”.¹²⁴ They cite the International Court of Justice (ICJ) as support that the Martens Clause is customary international law, but international courts do not operate under common law tradition, and their opinion is non-binding on other courts and non-parties.¹²⁵ Rather, “the clause applies only in the absence of treaty law” since “[t]he text of the clause refers to ‘cases not covered by this Protocol or by other international agreements.’”¹²⁶

Human Rights Watch’s argument is only loosely based on law. It is based on the false premise that their conscience as an organization

¹¹⁹ Steven Kanigher, *Author [Peter Singer] Talks About Military Robotics and the Changing Face of War*, LAS VEGAS SUN, March 17, 2011, available at <http://www.lasvegassun.com/news/2011/mar/17/military-robotics-and-changing-face-war/>.

¹²⁰ U.N. Office at Geneva, Disarmament: Lethal Autonomous Weapons, May 13–16, 2013), [http://www.unog.ch/80256EE600585943/\(httpPages\)/6CE049BE22EC75A2C1257C8D00513E26?OpenDocument](http://www.unog.ch/80256EE600585943/(httpPages)/6CE049BE22EC75A2C1257C8D00513E26?OpenDocument) (last visited Nov. 25, 2014).

¹²¹ *Id.*

¹²² Press Release, Article 36, States take first step towards curbing the threat of killer robots, (Nov. 15, 2013), <http://www.article36.org/press-releases/states-take-first-step-towards-curbing-the-threat-of-killer-robots/>.

¹²³ LOSING HUMANITY, *supra* note 3, at 1. The publication contains very few actual legal arguments. Rather, it is an appeal to conscience with a legal flavor. Its clear audience is the general public, as demonstrated in the publication’s introductory summary: “It is time for the broader public to consider the potential advantages and threats of fully autonomous weapons.” *Id.* One gets the sense that Human Rights Watch is trying to scare that broader public with the phrase “the case against killer robots.” *Id.* To their credit, they conduct a review of state responsibilities under AP I Article 36, but at the same time neglect to mention that states already comply with weapons reviews and that the United States has been doing so since before AP I was signed, thus binding itself as a matter of state practice to what is now arguably customary international law.

¹²⁴ *Id.* at 25.

¹²⁵ *Id.* at 26. This is especially true since the publication cites only an advisory opinion: Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion 1996 I.C.J. 257, 259 (July 8).

¹²⁶ Schmitt, *supra* note 3, at 32; AP I, *supra* note 4.

reflects public conscience. Simply because “killer robots” violate the dictates of conscience of a group does not make it binding upon states as a matter of customary international law. If states, however, began to issue statements to the effect that they considered autonomous weapons to be illegal, then there might be a stronger case for the illegality of autonomous weapons based on state practice.

Whether or not Human Rights Watch makes a compelling legal argument against autonomous weapons systems, the issues of military necessity, humanity¹²⁷ (which includes distinction and proportionality), and accountability¹²⁸ are pressing. For instance, if a fully automated Reaper drone attacked a targetable individual, wounded him to the point of incapacitation, and then returned and killed him – who might be responsible for this violation of GWS Articles 3, 12, and API Articles 10, 41(2)?¹²⁹ Does the LOAC appropriately address these issues? If not, what course of action ought states to take?

C. Contemporary Law

The current LOAC regime is fundamentally different than that created by the Hague Conferences of 1899 and 1907. As such, there are greater legal costs on developing weapons like autonomous weapons systems than there were on aircraft, submarines, and asphyxiating gases. This section provides a snapshot of applicable law to emphasize that point.

A weapon or weapon system is legal unless it is prohibited either *per se* through international agreement or through an individual state’s determination.¹³⁰ Under AP I Article 36 a state may determine that a weapon’s use would “in some or all instances be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.”¹³¹ The Article 36 analysis includes the basic LOAC principles of humanity,¹³² military necessity,¹³³ distinction,¹³⁴ and

¹²⁷ Schmitt, *supra* note 3, at 8. The principle of humanity refers to the “*per se* illegality of means or methods of warfare that are of a nature to cause superfluous or unnecessary suffering.” *Id.* This standard originated with the 1868 St. Petersburg Declaration, which prohibited “the employment of arms which uselessly aggravate the sufferings of disabled men, or render their death inevitable.” I.C.R.C., *Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight*, (Nov. 29/Dec. 11, 1868), available at <https://www.icrc.org/applic/ihl/ihl.nsf/Article.xsp?action=openDocument&documentId=568842C2B90F4A29C12563CD0051547C>.

¹²⁸ Schmitt, *supra* note 3, at 33. In this context “accountability” refers to the human that is responsible for the actions of the autonomous weapon system.

¹²⁹ DEPARTMENT OF THE ARMY, DEPARTMENT OF THE ARMY FIELD MANUAL, 27–10, § 215 (1956) (citing GWS Article 12).

¹³⁰ AP I, *supra* note 4.

¹³¹ *Id.* at art. 36. Additional Protocol I art. 36 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.” *Id.*

¹³² *Id.* at art. 32(2); Common Articles 2 & 3.

¹³³ Francis Lieber, General Order No. 100, Article 16, Instructions for the Government of Armies of the United States in the Field (Apr. 24, 1863). <http://www.icrc.org/ihl/INTRO/110?OpenDocument>; 1907 Hague IV, art. 23.

proportionality.¹³⁵ None of these principles actually mean anything without accountability structures; thus, accountability, while derivative, is a crucial principle. A weapon or weapon system is not unlawful simply because it might be used in a way that violates these principles. A weapon or weapons system *is* unlawful when it cannot be used without violating the principles of humanity, military necessity, distinction, and proportionality.

For example, the M-16A4 service rifle¹³⁶ is a perfectly lawful weapon to use under military necessity because it is (1) not prohibited by international law, (2) is “indispensable for securing the complete submission of the enemy as soon as possible.”¹³⁷ Additionally, the rifleman controls the amount of force¹³⁸ and can choose between semiautomatic fire (single round) or automatic fire with a burst of three rounds. He is accountable through his chain of command, which also controls his use of force.

This otherwise legal weapon may be used in an illegal manner if used in violation of the principles of humanity, distinction, or proportionality. Expanding bullets, first addressed in the 1899 Hague Conference,¹³⁹ illustrate how the rifle might violate the principle of humanity. Expanding bullets were prohibited because, although they more readily render combatants *hors de combat*, they also make it substantially more likely to render death inevitable.¹⁴⁰ The principle of humanity would also be violated if the rifleman shot and incapacitated an enemy but then beat the enemy with the butt of his rifle, thereby violating GWS Art. 3. Does this mean that the law of armed conflict prohibits rifle butts? Certainly not. Rather, the manner in which the rifleman employed his weapon was illegal. Likewise, the rifle as a weapon does not violate the principle of distinction; rather, the rifleman might violate the principle if he does not ascertain whether an individual is targetable. Lastly, it is again the rifleman that controls the application of the principle of proportionality. Opening fire on lawful combatants mixed among a crowd of civilians

¹³⁴ AP I, *supra* note 4, at art. 48 (stating “In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.”).

¹³⁵ *Id.* at art. 57, 51(5)(b). “An attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.” *Id.* at 51(5)(b).

¹³⁶ As a United States Marine, the author cannot restrain himself from using his rifle as a primary example.

¹³⁷ DEPARTMENT OF THE ARMY FIELD MANUAL, *supra* note 129, at § 3.

¹³⁸ OFFICE OF THE JUDGE ADVOCATE GENERAL, CANADIAN DEFENSE FORCES, JOINT DOCTRINE MANUAL, LAW OF ARMED CONFLICT: AT THE OPERATIONAL AND TACTICAL LEVELS, B-GJ-005-104/FP-021, (Aug. 13, 2001), *available at* http://www.forces.gc.ca/jag/publications/Training-formation/LOAC-DDCA_2004-eng.pdf.

¹³⁹ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 276–78, 80–82; THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75, at 227, “Declaration IV, 3”.

¹⁴⁰ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75, at 79. Since the St. Petersburg Declaration in 1868, this propensity to make death inevitable has been referred to as “superfluous injury or unnecessary suffering”. *Id.*

would almost certainly violate proportionality.¹⁴¹ These LOAC principles impose crucial costs on the use of every weapon in battle such that the optimum level of violence is maintained.

Autonomous weapons systems can be analyzed in much the same way. First, would they violate the principle of humanity by causing superfluous injury or unnecessary suffering? The answer to this question is the same as with the rifle. Think of the rifleman as the weapon system—the delivery system of violence. The bullets he fires may, if scored in such a way as to cause expansion, cause unnecessary suffering. Likewise, the autonomous weapon could potentially deliver a weapon that violates the principle of humanity. However, this is not the primary concern raised by Human Rights Watch. Rather, they assert that artificial intelligence can ever advance to the point where it can satisfy the principles of distinction and proportionality.¹⁴² In short, they argue that there are no workable “taxes,” no workable regulations, laws, or administrative costs—that can produce a LOAC-compliant weapon. This assertion ignores several realities—the first of which is that not even human intelligence has evolved to the point of a zero-error rate in causing superfluous injury or unnecessary suffering. Additionally, the concepts of superfluous injury and unnecessary suffering are arbitrarily set by international standards.

The second reality is a more scientific one and argues that a current prohibition does not take into account potential future advances in technology.¹⁴³ Advances in computational power are often described using Moore’s law. Moore’s law is the observation that the number of transistors on circuits doubles approximately every two years.¹⁴⁴ Researchers have already begun to develop transistors that are only nanometers in diameter and that will serve as “building block[s] for new, more powerful computer memories, advanced electronic materials, and the basic components of quantum computers that could solve problems so complex that all of the world’s computers working together for billions of years could not crack them.”¹⁴⁵

These advances in computational power mean that autonomous weapons systems may ultimately have every capability to distinguish “between a fearful civilian and a threatening enemy combatant.”¹⁴⁶ In fact, “[i]t may well be, for instance, that weapons systems with greater and greater levels of automation can—in some battlefield contexts, and perhaps more and more over time—reduce misidentification of military

¹⁴¹ AP I, *supra* note 4, art. 51(5)(b).

¹⁴² LOSING HUMANITY, *supra* note 3, at 4, 24, 29.

¹⁴³ This is why the author argues for the status quo—the AP I, art. 36 paradigm. See AP I, *supra* note 4.

¹⁴⁴ *Excerpts from A Conversation with Gordon Moore: Moore’s Law*, INTEL CORPORATION (2005), http://large.stanford.edu/courses/2012/ph250/lee1/docs/Excerpts_A_Conversation_with_Gordon_Moore.pdf.

¹⁴⁵ *Super-small transistor created: Artificial atom powered by single electrons*, SCIENCEDAILY, (Apr. 19, 2011), www.sciencedaily.com/releases/2011/04/110418110418135541.htm.

¹⁴⁶ LOSING HUMANITY, *supra* note 3, at 4.

targets, better detect or calculate possible collateral damage, or allow for using smaller quanta of force compared to human decision-making.”¹⁴⁷ In the meantime, it is DoD policy that, “Autonomous and semi-autonomous weapon systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.”¹⁴⁸ Thus, DoD accountability measures and current LOAC provisions are appropriately imposing costs on the development of autonomous weapons, and thereby bring the market for violence into equilibrium.

Autonomous weapons are a military necessity in our technologically advanced era, and the DoD continues to assess their strategic value.¹⁴⁹ Furthermore, “the condition that military objectives yield some military advantage would make any separate requirement for military necessity superfluous.”¹⁵⁰

Both the principles of distinction and proportionality hinge on technological advancement and safeguards built into the weapons systems. The DoD policy is that “Persons who authorize the use of, direct the use of, or operate autonomous and semi-autonomous weapon systems must do so with appropriate care and in accordance with the law of war, applicable treaties, weapon system safety rules, and applicable rules of engagement (ROE).”¹⁵¹ Additionally, every weapon system must go through a stringent legal review in “coordination with the General Counsel of the Department of Defense,”¹⁵² thus complying with AP I art. 36. The effect of this legal review is twofold: (1) it slows down the implementation of new technology much like the five-year prohibition on aerial bombing in the 1899 Hague Convention, and (2) it imposes legal costs as well as additional oversight (accountability) for the new weapon.

D. Accountability in the Age of Autonomous Weapons Systems

Accountability is largely a matter of state responsibility. While there can be individual repercussions for both grave and simple breaches,¹⁵³

¹⁴⁷ KENNETH ANDERSON & MATTHEW WAXMAN, LAW AND ETHICS FOR AUTONOMOUS WEAPONS SYSTEMS: WHY A BAN WON'T WORK AND WHY THE LAWS OF WAR CAN 15 (Hoover Institution, 2013), available at http://media.hoover.org/sites/default/files/documents/Anderson-Waxman_LawAndEthics_r2_FINAL.pdf.

¹⁴⁸ DoD DIRECTIVE 3000.09, *supra* note 94, at 2. There is the additional protection that “Semi-autonomous weapon systems that are onboard or integrated with unmanned platforms must be designed such that, in the event of degraded or lost communications, the system does not autonomously select and engage individual targets or specific target groups that have not been previously selected by an authorized human operator.” *Id.*

¹⁴⁹ *Id.* at 6. “Systems will go through rigorous hardware and software verification and validation (V&V) and realistic system developmental and operational test and evaluation (T&E)”, including analysis of unanticipated emergent behavior resulting from the effects of complex operational environments on autonomous or semi-autonomous systems. *Id.*

¹⁵⁰ Schmitt, *supra* note 3, at 22; see AP I, *supra* note 4, art. 52(2).

¹⁵¹ DoD DIRECTIVE 3000.09, *supra* note 94, at 3.

¹⁵² *Id.* at 7.

¹⁵³ See Convention (IV) Relative to the Protection of Civilian Persons in Time of War, art. 146, Aug. 12, 1949, available at <http://www.icrc.org/ihl/INTRO/380>.

the development of autonomous weapons exposes commanders and operators to liability for a weapon they may not control and in whose development they likely had no part. Human Rights Watch asserts:

If the killing were done by a fully autonomous weapon, however, the question would become: whom to hold responsible. Options include the military commander, the programmer, the manufacturer, and even the robot itself, but none of these options is satisfactory. Since there is no fair and effective way to assign legal responsibility for unlawful acts committed by fully autonomous weapons, granting them complete control over targeting decisions would undermine yet another tool for promoting civilian protection.¹⁵⁴

This conception of accountability depends on individual criminal liability to act as the primary deterrent to violations of the LOAC. The blanket statement that “there is no fair and effective way to assign legal responsibility”¹⁵⁵ sells states short, as they certainly can, and do, put in place accountability structures.¹⁵⁶

It seems to this author that Human Rights Watch’s stronger case would be to increase the redundancy of accountable parties, rather than to assert that no one could be held responsible for a violation of LOAC or ROEs. Culpability at the command, operator, evaluator, and legal analyst level would increase the administrative costs and mean that at each level the weapon system would receive greater scrutiny. If instead, accountability is a measure of fairness, rather than redundancy, then the burden ought to shift from the commander and operator to the evaluator and attorney in the case of fully autonomous weapons. Accountability of necessity will remain with the commander and operator as long as there is human-system collaboration.¹⁵⁷ This arrangement will likely impose sufficient potential costs on commanders and operators of semi-autonomous weapons systems that will minimize negative spillovers.

IV. LEARNING FROM THE PAST

In a very real sense the international community has already faced the legal conundrum presented by new technology. The prescient Hague Conventions in 1899 and 1907 discussed aerial vehicles, submarines, and gases although each was in its infancy and were considered impractical.¹⁵⁸ They demonstrated the necessity of forward thinking with

¹⁵⁴ LOSING HUMANITY, *supra* note 3, at 42.

¹⁵⁵ *Id.*

¹⁵⁶ *E.g.*, DOD 3000.09, which places a burden on care on commanders, operators, legal analysis, and evaluators.

¹⁵⁷ See DEPARTMENT OF DEFENSE, THE ROLE OF AUTONOMY IN DOD SYSTEMS 11 (2012).

¹⁵⁸ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 283.

regards to the law of armed conflict. Rather than being purely reactionary, states have the ability to sense the zeitgeist of technology in warfare and plan accordingly.

Notwithstanding this prescience, the Hague and interwar conferences failed to sufficiently regulate (tax) new weapons systems or simply left them to customary international law. There were no real, individualized accountability measures until the Nuremberg and Tokyo Trials that imposed significant costs on the market of violence.¹⁵⁹ The lack of safeguards was certainly a factor that led to the atrocities during both world wars. One lesson from the past is certain—leaving the regulation of new technology to customary international law is a poor solution for weapons with potentially large spillover effects.

Part I provided historical examples that highlight the distinction between *per se* illegality of weapons and unlawful use of weapons. The submarine was first thought to be incapable of humane use because it would have to forfeit its strategic use, concealment, to escort the captured vessel to port.¹⁶⁰ Lord Balfour emphasized that unrestricted submarine warfare was, in his opinion, inevitable. Indeed, German U-boat sank merchant and hospital ships. However, the submarine itself was a tool that could be used in such a way as to not cause unnecessary suffering, could target appropriately, and whose sailors could perform an appropriate proportionality assessment. Captain and crew could be held accountable. In fact, Lieutenant Patzig and his subordinate officers, Lieutenants Dithmar and Boldt were each charged during the Liepzig trials.¹⁶¹ Admiral Karl Donitz was similarly charged during the Nuremberg trials and served a ten-year sentence.¹⁶² States finally found the appropriate level of legal and accountability taxation on the submarine through trial and error.

Like submarines, aerial vehicles were not illegal *per se* after the Hague Conferences but were subject to a five-year moratorium because they ran afoul of the principles of distinction and proportionality.¹⁶³ As Captain Crozier aptly stated in the 1899 Conference, “[T]heir use for the purpose in question would neither be humane nor in accordance with the spirit which guides us, since it is impossible to foresee the place where the projectiles or other substances discharged from a balloon will fall.”¹⁶⁴ The moratorium expired. The maneuverability of aerial craft increased such that they could choose legitimate targets. That ability to control the craft and its targets would have also allowed for

¹⁵⁹ International criminal law serves the role of signaling to the international market of violence that it is not in equilibrium.

¹⁶⁰ TAYLOR, *supra* note 6, at 17. This was the burden under customary international law. See also INTERNATIONAL INSTITUTE OF INTERNATIONAL LAW, MANUAL ON THE LAWS OF NAVAL WAR, (1913), available at <http://www1.umn.edu/humanarts/instree/1913a.htm>.

¹⁶¹ TAYLOR, *supra* note 6, at 17. The inefficacy of the Leipzig Trials is indisputable. However, the fact remains that there were clear notions of who should be held accountable.

¹⁶² *Id.* at 616.

¹⁶³ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75.

¹⁶⁴ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 275.

accountability of pilots and crew had there been any international rules governing aircraft.¹⁶⁵ Through World War II, no real costs scaled back the devastating potential of aerial warfare. The externality persisted.

Asphyxiating gases were made *per se* illegal in 1899 Hague Declaration IV, 2.¹⁶⁶ Gas succeeded as perhaps no other weapon ever in placing men *hors de combat*. In battle gas was proven effective and it appropriately targeted opposing forces, never having incidentally affected civilians.¹⁶⁷ Thus, proportionality was not an issue. Once released, however, the gas could not discriminate targets. It violated the principle of humanity by inflicting superfluous and unnecessary suffering as witnessed then by the civilian population as droves of permanently disabled soldiers returned home. Delegates to the 1899 Conference compared its hypothetical use to poisoning a river.¹⁶⁸ The potential indiscriminate use of gas against civilians persuaded the delegates to prohibit gas completely.¹⁶⁹ They attempted to tax it out of existence by making it *per se* illegal.

As with the case of asphyxiating gas, the LOAC of the past addressed each emerging technology individually. This was perhaps one of the early legal regime's greatest failings because it was reactionary. Because each new technology would have to be addressed individually the damage would likely have already been done. The modern LOAC paradigm has built upon this failure in timing and addresses the development of weapons generally, i.e., through AP I art. 36. Attempts to address individual technologies at the international level through specific treaties have often been onerous and contentious, such as the Ottawa Treaty on anti-personnel mines.¹⁷⁰ Instead, AP I, art. 36 acts as a tax on future weapons systems in a proactive attempt to find the correct equilibrium of violence. This modern paradigm has its historical analogue in the 1899 Hague Conference when Captain Crozier reflected on balloons, "At a later stage of its development, if it be seen that its less desirable qualities still predominate, there will still be time to extend

¹⁶⁵ Parks, *supra* note 18.

¹⁶⁶ THE HAGUE CONVENTIONS AND DECLARATIONS OF 1899 AND 1907, *supra* note 75, at 224. Interestingly, the declaration states: "The contracting Powers agree to abstain from the use of projectiles the sole purpose of which is the diffusion of asphyxiating or deleterious gases . . . it shall cease to be binding from the time when, in a war between the contracting Powers, one of the belligerents shall be joined by a non-contracting Power." *Id.* In 1907 Great Britain adhered to the declaration, but the United States never did. Thus, gas warfare in Europe before the entrance of the United States was illegal, but legal once the United States had entered the conflict. This is not to suggest that the United States could act with impunity, but rather that as early as 1899, and certainly earlier in the St. Petersburg Conference, reciprocity was the main enforcement mechanism of LOAC.

¹⁶⁷ Major Kelly, *supra* note 8, at 11.

¹⁶⁸ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 295–6, 366.

¹⁶⁹ *Id.* at 366.

¹⁷⁰ CONVENTION ON THE PROHIBITION OF THE USE, STOCKPILING, PRODUCTION AND TRANSFER OF ANTI-PERSONNEL MINES AND ON THEIR DESTRUCTION, 18 Sept. 1997, available at <https://www.icrc.org/ihl/INTRO/580>; Felicia Schwartz, *U.S. Moves Closer to Compliance With Treaty Banning Land Mines*, WALL ST. J., Sept. 23, 2014, available at <http://online.wsj.com/articles/u-s-moves-closer-to-compliance-with-treaty-banning-land-mines-1411509618>.

the prohibition; at present let us confine our action within the limits of our knowledge.”¹⁷¹

V. THE EQUILIBRIUM OF VIOLENCE: LOAC THROUGH AN ECONOMIC LENS

Customary international law and treaties attempt to find the correct equilibrium of violence without actually engaging in armed conflict. The price paid to find that equilibrium in the 20th century was two world wars—a cost we ill can afford again. Perhaps what Human Rights Watch has meant to argue is that autonomous weapons systems have an effect on the market for violence. It’s a policy argument, not a legal one. In *Losing Humanity* they state, “It is time for the broader public to consider the potential advantages and threats of fully autonomous weapons.”¹⁷² Certainly they do not allude to a “rise of the machines” moment of singularity, but rather that with any technology there are always tradeoffs.¹⁷³ One of these trade-offs is that the monopoly on violence and the nature of warfare change as technology advances.

As unsavory as it sounds, states participate in an international market for violence. While not all states have equal shares of that market, each is affected by common market shifts, including: information, technology, education, and capital. The introduction of technology increases a state’s productivity; in this case its capacity to produce violence. Technology has the dual ability to decrease costs of production and increase quantity of goods produced. Consider, for example, how the computer has enabled businesses to do both of those things. Likewise, new technology for states decreases costs and facilitates the production of violence. The potential result is a negative externality: violations of the laws of armed conflict. However, if sufficient taxation (in the form of law and accountability measures) is put in place to compensate for this negative spillover, then the excess of violence will be scaled-back. The examples of technologies discussed in Part I illustrate this point.

Following World War I, unrestricted submarine warfare was condemned and submarines were required to follow the rules of international law to which surface vessels were subject. Gas warfare had previously been prohibited and in future conflicts the prohibition was adhered to in large measure. The treaties and changes to the LOAC following both world wars evidence that the international consensus was

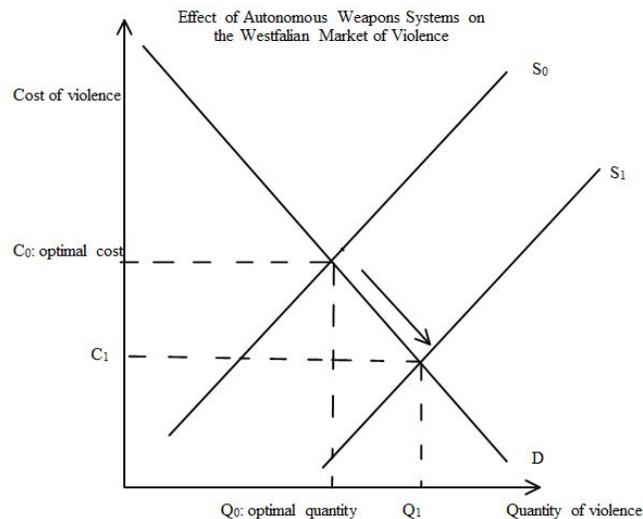
¹⁷¹ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 354.

¹⁷² LOSING HUMANITY, *supra* note 3, at 1.

¹⁷³ HAGUE PEACE CONFERENCE OF 1899, *supra* note 7, at 283, 328. It is useful at this point to revisit Captain Mahan’s repeated stance on prohibitions of new technology during the 1899 Hague Conference: “[T]he objection that a war-like device is barbarous has always been made against all new weapons, which were nevertheless eventually adopted. In the Middle Ages firearms were criticized as being cruel, and later on mortars and still more recently torpedoes received the same accusation.” *Id.*

that the equilibrium of violence, the optimum level of aggression, had been surpassed. In short, the international community recognized the negative externality and taxed it. The Washington Naval Treaty, the London Treaties, Leipzig Trials, the League of Nations, the Nuremberg Trials, and the Geneva Conventions were all taxes in the form of international law by which the victors of war sought to raise the cost of violence and bring the marketplace for violence to an acceptable equilibrium point.

Lastly, the current legal paradigm in the form of AP I art. 36 demonstrates the wisdom of experience. That article requires a legal review of the “development, acquisition or adoption of a new weapon”. Legal reviews impose costs. These costs make it harder for states to produce violence, which buys precious time to address particularly difficult issues surrounding the implementation of new technologies like autonomous weapons systems. The following graph, while simplistic, accurately depicts the concept:



Technology today in the form of autonomous weapons¹⁷⁴ shifts the violence production frontier out, but law and accountability taxes can maintain the equilibrium at an acceptable level. The analogue to this economic framework is in Michael Schmitt’s response to Human Rights Watch: “[T]he question becomes whether international humanitarian law provides sufficient safeguards with respect to the use of these weapon systems.”¹⁷⁵ If the LOAC does not serve as a sufficient tax on autonomous weapons systems, then regardless of their conformity with the principles of humanity, distinction, and proportionality the quantity of violence will increase.

¹⁷⁴ Autonomous weapons are only a fraction of the new technologies that are transforming the nature of armed conflict and ultimately the LOAC. For an in-depth review, see Jensen, *supra* note 92.

¹⁷⁵ Schmitt, *supra* note 3, at 14.

VI. RECOMMENDATIONS

Of necessity, violations of the LOAC are remedied after an abuse has occurred. This is much like any other market; equilibrium points are determined over time by repeated market failure. These failures indicate to actors, in this case states, what their choices should be. However, the threat of culpability on states and combatants imposes costs as well. Thus, there are both safeguards before and after an unlawful action occurs.

If states act under the assumption that autonomous weapons systems (like any technology shock) by definition produce an externality, there are additional measures they can take that would act as a tax and which would prevent a surplus of violence. They can increase costs by expanding the number of people accountable for the function of autonomous weapons systems. It is clear that commanders and operators will have only limited control over future weapons. Thus, the new technology will require new accountability structures. The author recommends that those involved at the development and verification of systems stage share liability with attorneys that conduct the legal analyses of new weapons and commanders that order the weapons use. By creating redundant accountability measures and linking their tasks, all groups must work together to ensure that autonomous weapons systems comply with the law of armed conflict and that they preserve the equilibrium of violence.

Of course, this solution may not sit well with Human Rights Watch and other like-minded groups. It depends on state responsibility. It depends on the institutional memory of states regarding the failed market of violence during the early 20th century. Members of the Human Rights Watch may be deceiving themselves. Even a prohibition is no guarantee that autonomous weapons systems will not be used in future conflicts.¹⁷⁶ If anything, a prohibition redistributes the costs actors pay for using autonomous weapons such that they only pay for their use after a violation. The current paradigm imposes costs during development and after a violation. Thus, a prohibition is actually much more difficult to manage than the imposition of legal costs.

VII. CONCLUSION

States are actors in the international market for violence. They produce violence, a negative externality, and new technology decreases the cost of violence and increases the quantity produced if left unchecked. The 1899 and 1907 Hague Conferences addressed new technologies of the day—airial vehicles, submarines, and asphyxiating gases—so as to appropriately regulate their use and arrive at an

¹⁷⁶ *E.g.*, asphyxiating gas.

acceptable equilibrium of violence. The delegates' failure to do so resulted in massive externalities in warfare.

The modern law of armed conflict addresses new technology generally through the broad scheme in principles customary international law and AP I art. 36, which serve as a tax on autonomous weapons systems. By following this paradigm states avoid the pitfall of attempting to address each new technological development individually. Autonomous weapons systems deserve our caution through over-taxation by careful legal analysis and additional accountability measures. Accountability is at the state's discretion but is an essential operational cost in order to maintain the equilibrium of violence. Because we do not know where the true equilibrium point is and because the risk of externality is high, states ought to err on the side of caution by increasing costs.