Autonomous Weapon Systems, Human Dignity and International Law

Saxon, D.R.

Chapter Eight

Autonomous Weapon Systems and the Responsibility of States and Arms Manufacturers

I. Introduction

The introduction of AWs into modern battle space(s) creates new facts, scenarios, ideas and questions in international life. In chapters five, six and seven, we saw that, at least in theory, these new weapons can be used in compliance with the treaty and customary rules of international humanitarian and human rights law, and, at times, may improve the effectiveness of international criminal law. However, the possibility that states can use autonomous weapon systems consistently with the rules of international law does *not* answer the question whether the use of such weapons is lawful; more general legal principles have to be consulted.[1]

In chapter three, I argued that the legal duty to protect human dignity is a foundational responsibility of states imposed by the United Nations Charter.[2] Thus, the essential question is how nations use the concept of human dignity to guide the application of (international) legal rules to their autonomous weapons. As the Government of Ghana observed in 2015:

> Our ultimate objective as States remains the preservation of human dignity and respect for basic sanctity of humanity at all times and, most especially, during armed conflicts. The laws of war must in this regard remain at the forefront of all our efforts and ahead of technological developments. Technology must not be allowed to overtake our commitment to these goals.'[3]

---

[1] *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, Dissenting Opinion of Judge Shahabuddeen, I.C.J. Reports 1996, p. 377 (observing that although no prohibition of the threat or use of nuclear weapons exists in international law, that does not conclude the question whether the threat or use of such weapons is lawful).

[2] *Application of the Convention on the Prevention and Punishment of the Crime of Genocide*, Judgment, Preliminary Objections, Separate Opinion of Judge Weeramantry, I.C.J. Reports 1996, p. 645.

[3] Statement by the Delegation of Ghana at the Convention on Conventionl Weapons Meeting on 'The Way Forward on Discussions [Regarding] Lethal Autonomous Weapons,' 17 April 2015, <http://www.unog.ch/80256EE600585943/(httpPages)/6CE049BE22EC75A2C1257C8D00513E26?OpenDocument>. Also see for example, the Statement of Ecuador to Expert Meeting Concerning Lethal Autonomous Weapons, Convention on Certain Conventional Weapons, 13 – 17 April 2015, p. 2,

Yet, in chapter 4, I explained that the inevitable velocity of autonomous military engagements will obstruct the development of sound human judgment that arises from opportunities for reflection on questions and decisions involving complex values. This dynamic, I contend, will violate human dignity as the ability of humans to fully develop their personalities – including the capacity to respect the rights of others - will inevitably diminish. Absent regulation, as national armed forces and police increasingly employ autonomous weapon systems, a new, counter-intuitive kind of 'state accountability gap' emerges.[4] Without a co-active design that permits human involvement in complex decisions, the 'victims' over time will be the *users and operators* of the weapons, rather than their targets.[5] This result will occur even when the artificial intelligence software directing the weapons 'follows' the rules of international law.

The responsibility of states for the development and use of autonomous weapon systems is important for another, related reason. As explained in chapter seven, judgments about individual accountability, e.g. findings of criminal responsibility for misuse of autonomous weapons, will be complex and difficult for most cases absent clear proof of the individual's intent (or recklessness) to commit or contribute to crimes. The easy cases will occupy the extremes, but most allegations of misconduct will fall within the gray area dominated by the fog of war, civil strife, terrorist activities and the unforeseen reactions of artificial intelligence software to changing circumstances. The clarity and power of rules of state responsibility, as well as rules for non-state actors such as arms manufacturers, therefore, are necessary to

---

<http://www.unog.ch/80256EE600585943/(httpPages)/6CE049BE22EC75A2C1257C8D00513E26?OpenDocument>.

[4] I use the term 'counter-intuitive because, by definition, the state responsibility regime normally facilitates only *inter-state* accountability on the basis of positive legal rules. J Brunnée, 'International Legal Accountability Through the Lens of the Law of State Responsibility,' 36 *Netherlands Yearbook of International Law* (2005), 21, 23.

[5] Seventy years ago Professor Jessup observed, presciently, that the 'embodiment in international law of the principle of the duty to respect the rights of man suggests new complications.' *A Modern Law of Nations* (New York: The Macmillan Company, 1948), p. 93. Jessup pondered whether 'modernized international law' requires additional rules designed for the protection of special classes of individuals. *Ibid*, p. 103.

complement the processes of individual criminal responsibility, and, hopefully, to set standards for accountability[6] that reduce the likelihood of violations of international law.

Thus, this chapter has two goals: 1) to explain how the concept of human dignity underlies the international legal responsibility of states to apply these theories to their design, development and use of autonomous weapon systems;[7] and 2) to propose theories of legal responsibility for states and arms manufacturers for damage and injuries caused by autonomous weapon systems. I argue that three mechanisms for attributing responsibility in international environmental law, the preventive principle, the precautionary principle and the polluter pays principle, can, by analogy, serve to determine responsibility for harm resulting from autonomous weapons.

II. The Responsibility of States with Respect to Human Dignity and Autonomous Weapon Systems

A. The Duty of States to Protect Human Dignity

In chapter three, 'The Sources of International Law and the 'Place' of Human Dignity,' I discussed the Charter-based obligation of United Nations member states to promote and protect human dignity, as well as the duty under customary law to (at a minimum) commit themselves to this task.[8] This section describes the three general mechanisms by which states

[6] State responsibility is only one mode of international accountability to have evolved. For example, treaty-based regimes now provide procedural alternatives to the invocation of state responsibility. Brunnée, 'International Legal Accountability Through the Lens of the Law of State Responsibility,' 54.

[7] This chapter discusses primary and secondary rules of state responsibility relevant to the development and use of autonomous weapon systems. Primary rules are those that define the content of the international obligations whose breach gives rise to responsibility. Secondary rules explain the conditions under international law where states are considered responsible for wrongful acts or omissions and the resulting legal consequences. 'Responsibility of States for Internationally Wrongful Acts,' in *Draft Articles on Responsibility of States for Internationally Wrongful Acts with Commentaries*, International Law Commission, 2001, <http://legal.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf>.

[8] The Charter was not the first major international treaty to create state responsibilities for the protection of human dignity. The Treaty of Westphalia, for example, included provisions providing for the reparation of 'any Prejudice or Damage' caused by the belligerent states and their allies during the Thirty Years War. The purpose of the reparations was to re-establish, inter alia, the 'Dignitys' of the state parties and their 'Vassals, Subjects, Citizens, [and] Inhabitants.' *Treaty of Westphalia; 24 October 1648: Peace Treaty Between the Holy Roman Emperor and the King of France and their Respective Allies*,' section 6, available online at

can breach this duty: 1) through the affirmative act of violating international humanitarian law and international human rights law via the use of autonomous weapon systems, 2) by producing and employing lethal autonomous weapons systems that do not permit human involvement in decisions involving complex values, and 3) by failing to prevent the use of such autonomous weapon systems by state and non-state actors (i.e. the failure to exercise due diligence).

1. Affirmative Acts

International courts have defined the affirmative responsibility of states to protect the dignity and rights of their citizens as well as other persons. In its Judgment in the case concerning the Democratic Republic of Congo ('DRC') v. Uganda, the International Court of Justice ruled that Uganda was 'internationally responsible' for violations of international human rights law and international humanitarian law committed by members of its armed forces in the DRC, including a failure to comply with its obligations as an occupying power.[9] In addition, Uganda failed to fulfill its obligation to prosecute those responsible for grave breaches of international humanitarian law.[10] The international conventions violated by Uganda oblige states to conduct their relations in accordance with civilized behaviour and modern values, *including respect for human dignity.*[11] Consistent with the principles of state

<https://is.muni.cz/el/1423/podzim2008/MVZ430/um/Treaty-of-Westphalia.pdf>. Twenty years earlier, Hugo Grotius described circumstances – such as the burial of soldiers killed in battle – where states, as part of their mutual obligations, must consider the dignity of individuals. H Grotius, *On the Law of War and Peace* (1625), A.C. Cambell (trans.) (Kitchener: Batoche Books, 2001), pp. 177 - 178. Grotius also acknowledged the importance of the dignity of states themselves. *Ibid,* pp. 100, 136, 166, 172, 217, and 275. States lost their sovereign rights and the privileges of the law of nations when they provoked 'their people to despair and resistance by unheard of cruelties, having themselves abandoned all the laws of nature, ….' *Ibid*, p. 247.

[9] *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda)*, Judgment, I.C.J. Reports 2005, paras. 220 and 245.

[10] *Ibid*, Separate Declaration of Judge Tomka, para. 9.

[11] *Ibid*, Separate Declaration of Judge Koroma, para. 6.

responsibility in international law, Uganda had a duty to make full reparations to the DRC for the injuries caused by its conduct.[12]

Similarly, in the seminal Case of Velásquez Rodriguez v. Honduras, the Inter-American Court of Human Rights found that Honduras was responsible for the enforced disappearance of Manfredo Velásquez in 1981. The Court held that the forced disappearance of persons constituted a multiple and continuous breach of obligations of state parties to the American Convention of Human Rights.[13] The Court noted that this practice had already received 'world attention' from the United Nations, the Organisation of American States as well as the Inter-American system of human rights.[14] Illustrating how the duty to protect human dignity limits the prerogative of sovereignty, the Court concluded that '…the power of the State is not unlimited, nor may the State resort to any means to attain its ends. The State is subject to law and morality. *Disrespect for human dignity cannot serve as the basis for any State action.*'[15]

More recently, the European Court of Human Rights concluded that the practice by the Central Intelligence Agency ('C.I.A') and European states of secret, incommunicado detention of persons violated the right to be free from arbitrary detention enshrined in the European Convention for the Protection of Human Rights and Fundamental Freedoms.[16] In addition, the Court ruled that this practice also breached the state's duty not to interfere with the right to private and family life, which protects the right to personal development as well as the right to develop relationships with other human beings and the outside world.[17] Thus, States should not treat persons '*in a way that causes a loss of dignity'* as 'the very essence of

[12] *Ibid*, Majority Opinion, para. 259.
[13] Judgment, 29 July 1988, para. 155, < http://www.corteidh.or.cr/docs/casos/articulos/seriec_04_ing.pdf>.
[14] *Ibid*, paras. 151 – 153.
[15] *Ibid*, para. 154 (emphasis added).
[16] *Case of Husayn (Abu Zubaydah) v. Poland*, Judgment, EctHR, Application No. 7511/13, 24 July 2014, paras. 521 – 526; *Case of El-Masri v. Former Yugoslav Republic of Macedonia*, Judgment, Application No. 39630/09, 13 December 2012, paras. 230 – 243.
[17] Abu Zubaydah, paras. 531 – 534; El Masri, paras. 248 - 250.

the Convention is respect for human dignity and human freedom.'[18] When states violate these duties, they incur responsibility to redress their acts and/or omissions.[19]

These judgments confirm that one of the principal concerns of the contemporary international legal system is state protection of the human rights and dignity of every individual.[20] Accordingly, when states deliberately employ autonomous weapon systems in the commission of serious violations of international law, they will be in affirmative breach of their international legal obligations.

2. *Failure to Exercise Due Diligence*

In addition to affirmative acts that violate human dignity, a failure to exercise due diligence in the design, procurement and use of autonomous weapon systems breaches the obligation to protect the dignity of individuals. The exercise of due diligence encompasses the reasonable preventive and precautionary measures that a well-administered government can be expected to exercise under similar circumstances.[21] For example, in the 'Iran Hostages Case,' the International Court of Justice ruled that Iran failed to perform its obligation to protect the premises, staff and archives of the U.S. Embassy and consulates in

[18] Abu Zubaydah, para. 532; El Masri, para. 248 (emphasis added).

[19] The Court instructed Poland to, inter alia, conduct an effective and expeditious investigation into the applicant's detention (including his treatment by the C.I.A.), prosecute those individuals responsible, recognise its violations of the applicant's rights, and compensate him for damage caused to his physical and mental health. Paras. 563 – 568. The InterAmerican Court of Human Rights ordered similar measures and reparations in the *Case of Myrna Mack Chang v. Guatemala*, Judgment, (Merits, Reparations and Costs), Inter-Am. Ct. H.R., 25 November 2003 paras. 275 – 292, and in the *Case of Maritza Urrutia Garcia v. Guatemala*, Judgment, Inter-Am. Ct. H.R., November 27, 2003, paras. 96 – 97, 129, 161 – 170 and 177.

[20] *Application of the Convention on the Prevention and Punishment of the Crime of Genocide, Preliminary Objections*, Judgment, Separate Opinion of Judge Weeramantry, p. 641; S Schmahl, 'An Example of Jus Cogens: The Status of Prisoners of War,' in C Tomuschat and JM Thouvenin (eds.) *The Fundamental Rules of the International Legal Order: Jus Cogens and Obligations Erga Omnes* (Leiden: Martinus Nijhoff Publishers, 2006), p. 48. During the nineteenth century, states implicitly assumed legal obligations to take positive steps in furtherance of human dignity, in particular with respect to ending the slave trade. Art. 10, *Treaty of Peace and Amity Between His Britannic Majesty and the United States of America* (1814), <http://avalon.law.yale.edu/19th_century/ghent.asp>; Additional Article on the Slave Trade, *Treaty of Paris* (1815), <http://napoleononline.ca/wp-content/uploads/2011/03/Treaty-of-Paris-1815.pdf>.

[21] D Shelton, 'Private Violence, Public Wrongs, and the Responsibility of States,' 13 *Fordham International Law Journal* 1 (1989-1990), 23.

Iran during the 1979 revolution.[22] These failures led to, inter alia, breaches of Article 29 of the Vienna Convention on Diplomatic Relations,[23] which prohibits the arrest or detention of diplomatic agents 'and any attack on his person, freedom *or dignity*'[24] as well as the principles of the United Nations Charter.[25]

The failure-to-exercise due diligence basis for state responsibility, however, provides a weaker theoretical basis for accountability than positive breaches of international rules. The objective analysis required by the due diligence doctrine creates greater intellectual space for states to test the boundaries of the legality (and illegality) of autonomous weapon systems.[26] Nevertheless, the creation of due diligence obligations provides additional guidance for states and non-state actors who develop and use this technology. In addition, the due diligence requirement provides an interpretive framework for assessing responsibility and compensation.

Indeed, international legal decisions have (implicitly or explicitly) recognized a duty of states to exercise due diligence and prevent harm with respect to the design and manufacture and use of weapons. For example, in the 'Alabama Case,' an arbitral tribunal determined that Great Britain did not exercise due diligence in the performance of neutral obligations when it failed to prevent the construction and armament of a warship intended for use by the Confederacy against Union forces during the American Civil War.[27] Moreover, in the Corfu Channel Case, the International Court of Justice held that Albania was responsible for the

[22] United States Diplomatic and Consular Staff in Tehran, Judgment, I.C.J. Judgment 1980, paras. 63 – 68.
[23] Done at Vienna on 18 April 1961, Entered into Force on 24 April 1964, <http://legal.un.org/ilc/texts/instruments/english/conventions/9_1_1961.pdf>.
[24] United States Diplomatic and Consular Staff in Tehran, Judgment , para. 77 (emphasis added).
[25] *Ibid*, para. 91.
[26] For a discussion of the failure of the International Court of Justice to clarify the theory of due diligence with respect to the responsibility of states, see A Gattani, 'Breach of International Obligations,' in A Nollkaemper & I Plakokefalos (eds.), *Principles of Shared Responsibility in International Law: An Appraisal of the State of the Art* (Cambridge University Press, 2014), pp. 38 – 45.
[27] Alabama Claims of the United States of America Against Great Britain, Award Rendered on 14 September 1872 by the Tribunal of Arbitration Established by Article I of the Treaty of Washington of 8 May 1871, <http://legal.un.org/riaa/cases/vol_XXIX/125-134.pdf>.

deaths of United Kingdom sailors and damage to warships because it failed to notify the shipping industry of the existence of a new minefield in Albanian waters, and to notify the warships approaching the minefields of the imminent danger.[28] 'In fact, nothing was attempted by the Albanian authorities to prevent the disaster.'[29] This failure to prevent harm incurred the international responsibility of Albania.[30]

Furthermore, in 1996, the United States Government agreed to pay nearly 132 million U.S. dollars to the Government of Iran as compensation for the 1988 shoot-down of an Iranian passenger plane by a U.S. warship operating in the Strait of Hormuz. The inadequate design of the ship's defense systems was an important contributing factor to the tragedy.[31]

Based on the 'human dignity paradigm' that I have developed in this dissertation the following duties are a non-exhaustive list of the due diligence responsibilities of states vis a vis the development and use of autonomous weapon systems:

1. Ensure that autonomous weapon systems designed for armed conflict scenarios and used by state armed forces will permit human involvement in assessments of complex values concerning, inter alia, proportionality and choice of means and methods of attack;

---

[28] *Corfu Channel Case*, Judgment, 9 April, 1949, I.C.J. Reports 1949, p. 22. Albania's obligations were based 'on certain general and well-recognized principles, namely: elementary considerations of humanity, even more exacting in peace than in war; the principle of the freedom of maritime communication; and every State's obligation not to allow knowingly its territory to be used for acts contrary to the rights of other States.' *Ibid.*

[29] *Ibid*, p. 23.

[30] *Ibid.* The 1907 Hague Convention (VIII) Relative to the Laying of Automatic Submarine Contact Mines prescribes several preventive measures for state parties. For example, anchored contact mines must become harmless as soon as they break loose from their mooring. Belligerents must 'do their utmost' to render anchored automatic contact mines harmless within a limited time. Arts. 1 and 2, 18 October 1907, <file:///Users/danielsaxon/Downloads/IHL-23-EN.pdf>.

[31] Settlement Agreement, on the Case Concerning the Aerial Incident of 3 July 1988 Before the International Court of Justice. The Aegis air and missile defence system on board the ship functioned as intended. However, the design of the human-machine interface did not permit certain crucial information at the time (whether the approaching plane was ascending or descending) to be displayed on the system's display console. Letter from W Crowe, Chairman, Joint Chiefs of Staff, 18 August 1988, para. 9, attached to *Investigation Report: Formal Investigation into the Circumstances Surrounding the Downing of Iran Air Flight 655* on 3 July 1988, see Part IV, A (6) and (11). Confusion about this matter contributed to the erroneous belief by the sailors on board the ship that the 'target' was a military aircraft.

2. Ensure that autonomous weapon systems designed for law enforcement scenarios and used by state authorities will permit human involvement in assessments of complex values concerning, inter alia, the 'absolute necessity' and proportionality of the use of lethal force;

3. Enact legislation that criminalizes the design, manufacture, procurement, import, export and use of autonomous weapon systems which do not possess a co-active design that permits human involvement in the kinds of complex decision-making described above;

4. Enact legislation that criminalizes the intentional or reckless design, manufacturer, procurement, programming and/or use of autonomous weapon systems in violation of international law;

5. Enact legislation that requires greater transparency in the processes of design, manufacture, procurement, import, export and use of autonomous weapon systems, including comprehensive legal reviews of new weapons technology as mandated by Article 36 of API.[32] To enforce this duty of transparency, enact legislation that requires (i) designers, developers, manufacturers and procurement officers to record fully all decisions concerning the ability of new autonomous weapon technology to

[32] Due to legitimate confidentiality concerns, the International Committee of the Red Cross suggests that states share information on their Art. 36 procedures, but not their decisions. This level of transparency demonstrates a state's commitment to its legal obligations and helps to set standards and best practices for such legal reviews. G Giacca, Remarks to panel on 'Challenges '[of Autonomous Weapons] to International Humanitarian Law, Informal Expert Meeting on Lethal Autonomous Weapons, Convention on Conventional Weapons, Geneva, 13 April 2016, <http://www.unog.ch/80256EE600585943/(httpPages)/37D51189AC4FB6E1C1257F4D004CAFB2?OpenDocument>.

be used in compliance with international law, including the preservation of human dignity;[33]

6. Enact legislation requiring all autonomous weapon systems to possess the technical capability to record all decisions made by commanders prior to and during the exercise of force; and

7. Enact legislation prohibiting the transfer of autonomous weapon systems to states and non-state actors who are unable or unwilling to operate this technology in accordance with international law.[34]

The absence of these due diligence measures encourages the delegation of human responsibility to computers for the complex, value-based decisions made during armed conflict and in periods of civil unrest. It limits the capacity of the individual to develop her own capacities for judgment and autonomy. Thus, when states fail to ensure compliance with one or more of these obligations by their actors,[35] they increase the risk that autonomous weapon systems will operate in ways that undermine the dignity of individuals, both the victims of attacks *and* the users and operators themselves.[36] If 'the ultimate objective' of

[33] This recording system can be similar to the requirement of a 'national control system' that must be established by state parties to the 2013 Arms Trade Treaty. Art 5 (2), <https://unoda-web.s3.amazonaws.com/wp-content/uploads/2013/06/English7.pdf>.

[34] *Ibid*, arts. 6 – 11. This provision is important because there are far more states purchasing weapons than manufacturing and exporting weapons. ICRC Commentary to Art. 36, API, para. 1473. Generally, states that knowingly aid or assist another state in the commission of a breach of international law by the latter are internationally responsible. Art. 16, Draft Articles on Responsibility of States for Internationally Wrongful Acts. A causal link should exist between the aid or assistance and the violation of international law by the receiving state. *Ibid*, Chapter IV, 'Responsibility of a State in Connection with the Act of Another State,' Commentary, para. (9).

[35] The conduct of state agents is considered an act of a state under international law. Corfu Channel Case, Judgment, p. 23; Draft Articles on Responsibility of States for Internationally Wrongful Acts, art. 3. Such 'agents' would include persons or groups of persons who act on the instructions of, or under the direction and control of that state in performing the conduct. *Ibid*. Thus, for example, a state bears responsibility for all acts contrary to international humanitarian law committed by its armed forces wherever those acts occur. *Partial Award, Central Front Ethiopia's Claim 2 Between The Federal Republic of Ethiopia and the State of Eritrea*, Eritrea Ethiopia Claims Commission, The Hague, 28 April 2004, para. 29.

[36] The principle of state sovereignty implies responsibility, and this responsibilty includes the duty of state authorities to protect the welfare of citizens. 'The Responsibility to Protect: Report of the International

state responsibility is the preservation of human dignity, states cannot ignore their legal responsibility to control the development and use of autonomous weapons.[37] The next section describes several interpretive mechanisms for assessing the responsibility of states and arms manufacturers for harm caused by autonomous weapon systems.

III. Theories of Responsibility for States and Arms Manufacturers for Harm Caused by Autonomous Weapon Systems

States incur international responsibility by acts imputable to them that violate a rule or rules of international law.[38] Today, states recognize that their responsibilities under international law extend to the use of autonomous weapon systems by their actors.[39] As explored in more detail above in the section on state responsibility and human dignity, when state behaviour constitutes deliberate unlawful acts or omissions, determination of state responsibility should be relatively straightforward.[40] The same should be true in situations of intentional, illegal use of autonomous weapon systems. Nevertheless, due to the complexity of these systems, situations will arise where autonomous weapons cause serious damage to life and property, yet fault – or even causation -- cannot be assigned precisely.

Commission on Intervention and State Sovereignty,' December 2001, para. 2.15, <http://responsibilitytoprotect.org/ICISS%20Report.pdf>.

[37] All law depends on the fundamental principle of the dignity and worth of the human person. Legality of the Threat or Use of Nuclear Weapons, Dissenting Opinion of Judge Weeramantry, p. 433.

[38] B Cheng, *General Principles of Law as Applied by International Courts and Tribunals* (London: Stevens & Sons Limited, 1953), p. 170. Characterisations of acts of state as internationally wrongful are governed by international law, not domestic law. <http://legal.un.org/ilc/texts/instruments/english/commentaries/9_6_2001.pdf>. Thus, an internationally wrongful act of a state consists of an act or omission that 1) is attributable to the state under international law and; 2) constitutes a breach of an international obligation of the state. *Ibid*, art. 2.

[39] See 'Poland's Position on Continuing the Discussions on Lethal Autonomous Weapon Systems within the CCW Framework,' Convention on Certain Conventional Weaspons, Annual Meeting of the States Parties, November, 2015, <http://www.unog.ch/80256EE600585943/(httpPages)/0D4B67A1E11A22BCC1257A410052DE38?OpenDocument>.

[40] See Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Judgment, paras. 220 and 245 (concerning violations of international humanitarian law and international human rights law by Ugandan forces in the Democratic Republic of Congo); Case of Velásquez Rodríguez v. Honduras, Judgment, para. 155.

Furthermore, harm from autonomous weapon systems may arise due to misconduct and/or negligence of the arms manufacturer who produced the system, apart from or, in addition to, the state. [41] The status of non-state actors such as corporations varies under international law.[42] At present, however, neither international humanitarian law, international human rights law nor international criminal law[43] contain (primary or secondary) rules defining responsibility of private enterprises for harm caused by weapons manufactured by them.[44] Whilst broad guidelines and other forms of 'soft law' encourage principled and conscientious behavior, these protocols and frameworks do not constitute legal rules or create legal duties.[45]

To close these 'gaps' in state and corporate responsibility, this section explores possible options for holding states and weapons-manufacturers accountable in these hard

[41] Generally, under international law, the conduct of private enterprises is not attributable to states. Draft Articles on Responsibility of States for Internationally Wrongful Acts with Commentaries, Commentary to art. 8.

[42] E Roucounas, Non-State Actors: Areas of International Responsibility in Need of Further Exploration,' in M Ragazzi, (ed.), *International Responsibility Today: Essays in Memory of Oscar Schachter* (Leiden: Martinus Nijhoff, 2005), p. 403. For example, 'persons,' non-governmental organisations and groups of individuals may have 'victim' status before the European Court of Human Rights ('ECtHR'). Art. 34, European Convention on Human Rights. The Court interprets the word 'person' to include legal persons such as corporations. *Case of Bosphorous Hava Yollari Turizm Ve Ticaret Anonim Şirketi v. Ireland*, Judgment, Application No. 45036/98, 30 June 2005, paras. 139 – 140.

[43] In 2005, the Dutch Court of Appeal affirmed the conviction of Frans van Anraat for complicity in the commission of war crimes in Iraq. During the 1980's a company owned by Anraat exported precursor chemicals to the Hussein regime, which subsequently produced chemical weapons that were targeted against Iraqi-Kurd communities. However, the Netherlands prosecuted Anraat as an individual, not as a business enterprise. <http://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:GHSGR:2007:BA6734>.

[44] Generally, under international law, the conduct of private enterprises is not attributable to states. Art. 8, Draft Articles on Responsibility of States for Internationally Wrongful Acts with Commentaries. In particular circumstances, however, secondary rules may permit the attribution of responsibility for the (mis)conduct of private enterprises to states. For example, states cannot abdicate their international responsibilities to independent corporations. Hence, nations cannot circumvent the rules of state responsibility by transferring powers, normally exercised by state officials, or by acquiescing to the assumption of such functions, to private entities. R Wolfrum, 'State Responsibility for Private Actors: An Old Problem of Renewed Relevance,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, p. 431. Similarly, if a person or group of persons acts under the instructions or control of a state, the conduct of the individual or group is considered an act of the state. Art. 8, *Draft Articles on Responsibility of States for Internationally Wrongful Acts with Commentaries*.

[45] For example, the United Nations 'Guiding Principles on Business and Human Rights' contains 'principles' that explain what corporations should do to respect and protect human rights, including performing 'human rights due diligence.' Arts. 11 – 21 (2011), <http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf>. States should ensure that those affected by corporate failures to adhere to these principles have access to an effective remedy. *Ibid*, para. 25.

cases.[46] By analogy, I use three principles from international environmental law as potential mechanisms for holding states and corporations responsible for injury and damage caused by autonomous weapon systems: the preventive principle,[47] the precautionary principle and the polluter pays principle.

A. The Preventive Principle

Where activity may cause significant harm to the environment,[48] the international environmental law principle of prevention obliges parties to prevent, or at least mitigate, the damage.[49] When activities in one state may impact the territory of others, states bear a duty of prevention of harm to other states and not merely of reparation for the harm caused.[50] Thus, the obligation to prevent requires vigilance and preventive action to be taken *before* damage has actually occurred,[51] and to respond appropriately when damage does occur.[52]

---

[46] A (future) system of accountability for non-state actors is crucial because civilian entities play a leadership role in the development of autonomous systems. A Kasperson, Head of International Security at the World Economic Forum, Remarks to 'Private Sector Perspectives on the Development of Lethal Autonomous Systems,' Geneva, 12 April 2016. Indeed, private entities may develop autonomous technologies for very benign reasons, only to see them 'reincarnated' on the battlefield. A Fursman, Remarks to 'Private Sector Perspectives on the Development of Lethal Autonomous Systems,' Geneva, 12 April 2016.

[47] In a recent publication, Human Rights Watch and Harvard Law School's International Human Rights Clinic make a similar argument for grounding state responsibility for the use of autonomous weapon systems in the preventive principle. *Killer Robots and the Concept of Meaningful Human Control*, Memorandum to Convention on Conventional Weapons (CCW) Delegates, April 2016, pp. 15 – 16.

[48] 'Environment' broadly encompasses air, water, land, flora and fauna, natural ecosystems and sites, human health and safety, and climate. Award in the Arbitration Regarding the Iron Rhine ('Ijzeren Rijn') Railway Between the Kingdom of Belguim and the Kingdom of the Netherlands, Decision of 24 May 2005, para. 58, <http://legal.un.org/riaa/cases/vol_XXVII/35-125.pdf>.

[49] *Ibid*, para. 222. The 'ultimate objective' of the 1992 United Nations Framework Convention on Climate Change is to achieve 'stabilization of greenhouse gas concentrations in the atmosphere at a level that would *prevent* dangerous anthropogenic interference with the climate system.' Art. 2 (emphasis added), <https://unfccc.int/resource/docs/convkp/conveng.pdf>. Similarly, one of the 'Commitments' in the Convention is for state parties to promote and cooperate in the development and diffusion 'of technologies, practices and processes that control, reduce or *prevent* anthropogenic emissions of greenhouse gases ….' *Ibid*, Art. 4 (c) (emphasis added). Principle 7, Declaration of the United Nations Conference on the Human Environment ('Stockholm Declaration') (1972), <http://www.unep.org/documents.multilingual/default.asp?documentid=97&articleid=1503>.

[50] *Gabčikovo-Nagymaros Project (Hungary/Slovakia)*, Dissenting Opinion of Judge Herczegh, I.C.J. Reports 1997, p. 185.

[51] *Ibid*, Judgment, para. 140; Dissenting Opinion of Judge Oda, para. 33; P Sands, et. al., *Principles of International Environmental Law*, 3rd ed. (Cambridge University Press, 2012), p. 201. This preference arises from the consideration that the correct objective of international environmental law is to prevent damage rather than simply provide victims with mechanisms to obtain compensation. T Scovazzi, 'Some Remarks on

The duty to prevent environmental harm includes an obligation to act with due diligence with respect to all activities performed by a party, or which take place under its jurisdiction and control.[53] Due diligence does not require a guarantee of no harm, but it demands the best possible efforts by states.[54] As the risk level of activities rises, so will the expected amount of due diligence.[55] Indeed, '*activities which may be considered ultra-hazardous* require a much higher standard of care in designing policies and a much higher degree of vigour on the part of the State to enforce them. ….'[56] Part of the risk involved in the use of autonomous weapon systems is that the technology is so new that it 'has not been given a chance to reveal its full potential for danger.'[57] The use of new autonomous weapons, therefore, would fall within the 'ultra-hazardous' category.[58] Moreover, due to the relentless development of new technologies, perceptions of appropriate levels of due diligence can

---

International Responsibility in the Field of Environmental Protection,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, p. 212.

[52] 'Contingency Plans,' Art. 4 to Annex VI to the Protocol on Environmental Protection to the Antarctic Treaty: Liability Arising from Environmental Emergencies (1991), <http://www.ats.aq/documents/recatt/Att249_e.pdf>. 'Each party shall require its operators to: (a) establish contingency plans for responses to incidents with potential adverse impacts on the Antarctic environment or dependent and associated ecosystems; and (b) co-operate in the formulation and implementation of such contingency plans.'

[53] *Pulp Mills on the River Uruguay (Argentina v. Uruguay)*, Judgment, I.C.J. Reports 2010, para. 197. 'A state is … obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing signficant damage to the environment of another state.' *Ibid*, para. 101.

[54] *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, International Law Commission, 2001, Commentary to Art. 3, 'Prevention,' para. 7. Art. 3 provides that 'the State of origin shall take all appropriate measures to prevent significant transboundary harm or at any event to minimize the risk thereof.' <http://legal.un.org/ilc/texts/instruments/english/commentaries/9_7_2001.pdf>. Similarly, the 1992 Rio Declaration on the Environment and Development concluded that states 'should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.' Principle 14, <http://www.unep.org/documents.multilingual/default.asp?documentid=78&articleid=1163>.

[55] *Responsibilities and Obligations of States with Respect to Activities in the Area*, Advisory Opinion, 1 February 2011, International Tribunal for the Law of the Sea ('ITLOS') Reports 2011, para. 117.

[56] Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, International Law Commission, Commentary to Art. 3, 'Prevention,' para. 11. 'The higher the degree of inadmissible harm, the greater would be the duty of care required to prevent it.' *Ibid*, para. 18.

[57] C Perrow, *Normal Accidents: Living with High Risk Technologies* (Princeton University Press, 1999), p. 36 (referring to the dangers of nuclear power plants).

[58] Ultra-hazardous activities require the adoption of 'ultra-prevention' measures to avoid harm. Scovazzi, 'Some Remarks on International Responsibility in the Field of Environmental Protection,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, p. 211.

change over time.[59] Thus, the due diligence obligation requires states and manufacturers to keep abreast of scientific and technological advances concerning autonomous functions and to accept responsibility when they do not.[60]

In the environmental context, the 'due diligence' of states includes the exercise of administrative control over public and private entities.[61] This implies that domestic laws and measures must be consistent with guidelines and recommendations of international technical bodies.[62] Should an international technical body one day determine standards for the development and use of autonomous weapon systems, compliance with such standards should form part of the due diligence practices of states and manufacturers.

In its Advisory Opinion concerning 'The Legality of the Threat or Use of Nuclear Weapons,' the International Court of Justice concluded that '[t]he existence of the general obligation of states to ensure that activities within their jurisdiction and control respect the environment of other states or of areas beyond their national control is now part of the corpus of international law relating to the environment.'[63] It would be absurd to not extend a similar legal duty of due diligence to states in their development and use of other sophisticated weapons, particularly those with lethal autonomous functions.[64]

---

[59] Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, Commentary to Art. 3, 'Prevention,' para. 11.

[60] *Ibid.* Peter Margulies contends that as a matter of state responsibility, autonomous weapon systems must include mechanisms for the regular update of artificial intelligence software and the information databases on which the software relies. 'The duty to update is arguably a state obligation under human rights law, which bars the arbitrary taking of human life.' 'Making Autonomous Weapons Accountable: Command Responsibility for Computer-Guided Lethal Force in Armed Conflicts,' in J Ohlin (ed.) *Research Handbook on Remote Warfare* (Northampton: Edward Elgar Press, forthcoming 2016), <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2734900>.

[61] Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, para. 197.

[62] *Ibid.*

[63] Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, para. 29.

[64] Indeed, the preventive/due diligence principle already finds expression in international treaty law concerning weapons control. State parties to the Convention on Certain Conventional Weapons, for example, are 'encouraged to take generic preventive measures aimed at minimizing the occurrence of explosive remnants of war, ….' Art. 9, 'Generic Preventive Measures,' Protocol on Explosive Remnants of War (Protocol V), 21 December 2001. Moreover, art. 5 of the Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-

Thus, in the context of international humanitarian law,[65] the preventive principle naturally demands a comprehensive legal review of new autonomous weapons and methods of warfare. Failure to perform an adequate legal review will be grounds for a state's responsibility in case of damage ensuing from failure of the weapon.[66] But the duty of prevention should not stop at 'Article 36 reviews.' Due to the extraordinary complexity of these weapon systems, the obligation must also include, inter alia, constant monitoring of the system(s) to ensure that the component systems interact with each other in appropriate ways[67] and that human machine interfaces work effectively in the field. This duty to monitor is extremely important as new technologies may interact and produce results that their inventors did not predict or consider.[68]

Finally, the preventive principle also includes a duty to prevent harm within a state's own jurisdiction.[69] For example, Article 24 of the African Charter on Human and Peoples' Rights requires state parties to 'take reasonable and other measures to prevent pollution and

---

Traps and Other Devices as Amended on 3 May 1996 (Amended Protocol II), requires state parties to take all feasible measures 'to prevent the unauthorized removal, defacement, destruction or concealment of any device, system or material use to establish the perimeter' of an area where anti-personnel mines other than remotely delivered mines are stored.

[65] Article 35(3) of API illustrates the reasonableness of applying, by analogy, principles of international environmental law to state responsibility for violations of international humanitarian law: '[i]t is prohibited to employ methods or means of warfare which are intended, or may be expected, to cause wide-spread long-term and severe damage to the environment.'

[66] ICRC Commentary to Art. 36, para. 1476 - 1478. States are not required to analyse or predict all possible misuses of a weapon, as nearly every weapon can be used unlawfully. *Ibid*, para. 1469.

[67] Given that autonomous weapon systems are actually 'systems of systems,' unexpected interactions of these complex systems are inevitable, resulting in a higher probability of accidents. Perrow, Normal Accidents: Living with High Risk Technologies, pp. 7 – 23 and 330. Furthermore, testing of the interaction between opposing autonomous weapon systems will be virtually impossible and, therefore, these interactions will be 'totally unpredictable.' Remarks of Steven Goose, Human Rights Watch, to Informal Meeting of Experts on Lethal Autonomous Weapon Systems, Convention on Conventional Weapons, Geneva, 12 April 2016.

[68] E Barth Eide, Member of Managing Board of World Economic Forum, Remarks to 'Private Sector Perspectives on the Development of Lethal Autonomous Systems,' Geneva, 12 April 2016. Indeed, private entities may develop autonomous technologies for very benign reasons, only to see them 'reincarnated' on the battlefield. A Fursman, Remarks to 'Private Sector Perspectives on the importantly for the application of the Development of Lethal Autonomous Systems,' Geneva, 12 April 2016.

[69] Sands, Principles of International Environmental Law, p. 201.

ecological degradation….'[70] Moreover, in 2004, the Inter-American Court of Human Rights found that Belize was responsible for damage to Maya lands and communities because the state failed to adopt adequate safeguards and mechanisms regarding logging activities.[71] In addition, the state failed to ensure that the state had sufficient personnel to make certain that logging in these areas would not cause further environmental damage.[72] Logically, then, the preventive principle should also function as a theory of state responsibility for the application of international human rights law to the use of autonomous weapon systems during law enforcement activities. Within national jurisdictions, the preventive principle, by analogy, should also impose due diligence requirements on manufacturers and exporters of autonomous weapon systems to ensure that their 'products' function as designed.

B. The Precautionary Principle

Scientific certainty about certain activities often arrives too late to design effective environmental responses. Thus, the 'precautionary principle' creates a duty to respond to potential environmental threats, instead of waiting for certain scientific proof.[73] The precautionary principle and the preventive principle are related and overlap.[74] For example, in the European Union: '[c]ommunity policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the

---

[70] Social and Economic Rights Action Center (SERAC) and Center for Economic and Social Rights (CESR) / Nigeria, 155/96, African Commission on Human Rights, 27 October 2001, para. 52, <http://www.achpr.org/files/sessions/30th/comunications/155.96/achpr30_155_96_eng.pdf>.

[71] Maya Indigenous Communities of the Toledo District v Belize Report No. 40/04, Case 12.053, 12 October 2004, para. 147.

[72] *Ibid.*

[73] Environmental Principles and Concepts,' Organization for Economic Co-operation and Development, OECD/GD(95)124, Paris 1995, para. 44; Art. 2 (5) (a), United Nations Convention on the Protection and Use of Transboundary Water Courses and International Lakes, Amended 28 November 2003. Put differently, the precautionary principle requires that where scientific uncertainty exists about the impact of an activity, assess the situation 'in the light of prudence and caution.' *Southern Bluefin Tuna Cases (New Zealand v. Japan; Australia v. Japan*, Separate Opinion of Judge Treves, ITLOS, Order of 27 August 1999, para. 8.

[74] See for example, the Preamble to the Multilateral International Convention on Oil Pollution Preparedness, Response and Cooperation, No. 32194, Concluded at London on 30 November 1990: 'MINDFUL of the importance of precautionary measures and prevention in avoiding oil pollution in the first instance, ….'

Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, ….'[75] Moreover, the state parties to the 1992 Climate Change Convention agreed to :

> '… take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost-effective so as to ensure global benefits at the lowest possible cost.'[76]

In addition to extra-territorial matters, international human rights courts have recognized that the precautionary principle creates responsibilities for states within their national jurisdictions. In Tatar v. Romania, for example, a mining company used sodium cyanide to extract gold at a mine and this process allegedly contaminated the environment and damaged human health. The European Court of Human Rights held that although the existence of a causal link between exposure to sodium cyanide and certain conditions was unproven, the state still bore a duty to assess the risks and to take appropriate measures to reduce them. Romania, therefore, breached the precautionary principle, 'according to which the absence of certainty with regard to current scientific and technical knowledge could not justify any delay on the part of the State in adopting effective and proportionate measures.'[77]

---

[75] Consolidated Version of the Treaty Establishing the European Community, 25 March 1957, Art. 174 (*ex Art. 130r*), <http://www.refworld.org/docid/3ae6b39c0.html>. The Stockholm Convention on Persistent Organic Pollutants recognizes the preventive and the precautionary approach to environmental protection. Preamble and art. 1, 22 May 2001.

[76] Art. 3 'Principles,' (3), United Nations Framework Convention on Climate Change, 1992. Furthermore, the language of the 1975 bilateral treaty between Argentina and Uruguay incorporates the spirit of the precautionary approach. Arts. 35 – 37, Statute of the River Uruguay, Signed at Salto on 26 February 1975.

[77] *Tatar v. Romania*, Judgment, Application No. 67021/01, ECtHR, 27 January 2009, Press Release available at <file:///Users/danielsaxon/Downloads/003-2615810-2848789%20(2).pdf>. Moreover, in *Giacomelli v. Italy*, the European Court of Human Rights concluded that the precautionary principle required states to perform appropriate investigations and studies 'in order to allow them to predict and evaluate in advance the effects of those activities which might damage the environment and infringe individuals' rights and to enable them to strike a fair balance between the various conflicting interests at stake.' Judgment, ECtHR, Application, No. 59909/00, 26 March 2007, para. 119. More recently, in *Di Sarno and Others v Italy*, the same court concluded that the precautionary principle obliged states to establish regulations adapted to the features of the activity in question, particularly with regard to the level of risk potentially involved. 'They must govern the licensing,

Similarly, in the Kaliña and Lokono Peoples v. Surinam, the InterAmerican Court of Human Rights ruled that before a state grants a concession to private entities to carry out activities in the territory of indigenous peoples, it must complete environmental impact statement to assess 'the possible damage or impact that a development project or investment might have on the property and community in question.'[78] This reasoning is consistent with the precautionary principle.

The seven due diligence recommendations described above in part II represent general preventive and precautionary measures relevant to the design, development and use of autonomous weapon systems. In addition to international legal obligations for states, these recommendations should be implemented in domestic legislation to ensure the exercise of due diligence on the part of arms manufacturers and exporters. The need for more specific measures would depend on the kinds of new autonomous technologies developed, their capacity, and their particular use in the field.

C. *The Polluter Pays Principle*

This concept requires states to ensure that in cases where the environment has been or will be polluted, the responsible individual or entity bears the costs resulting from the prevention or removal of the pollution.[79] By allocating the costs of preventive or remedial actions to the polluters, they incur a substantial incentive to avoid future conduct detrimental

---

setting-up, operation, security and supervision of the activity and must make it compulsory for all those concerned to take practical measures to ensure the effective protection of citizens whose lives might be endangered by the inherent risks.' *Case of Di Sarno and Others v Italy*, Application Application No. 30765/08, 10 April 2012, para. 106.

[78] 25 November 2015, para. 214. In 1999, the Peruvian Ministry of Energy and Mines imposed administrative sanctions on Proaño Mining Company for 'not implementing a precautionary and control program in the Mayoc sludge dump.'[78]

[79] Beyerlin & Marauhn, *International Environmental Law* (Hart Publishing: Oxford, 2011), p. 59; Sands, Principles of International Environmental Law, p. 228; *Environmental Principles and Concepts*, OECD/GD(95)124, Paris,1995, p. 33.

to the environment.[80] The polluter pays principle is reflected in multi-lateral and bilateral instruments,[81] as well as national jurisprudence.[82]

Professors Beyerlin and Marauhn argue that, in a normative sense, the concept of 'polluter pays' is neither a general principle of law nor a rule of customary international law. They contend that it fulfills the functions of a legal rule rather than a general principle, binding on states within the framework of the European Union and the Organisation for Economic Cooperation and Development ('OECD').[83] However, we saw in chapter three that when many international conventions express a particular rule, '… it can be deemed an incontestable principle of law at least among enlightened nations.'[84] Given the multiplicity of international instruments that recognize the 'polluter pays' concept, it is more accurate to describe it normatively as a 'general principle' of international environmental law.[85]

[80] Beyerlin & Marauhn, p. 58.

[81] Art. 5 (b), United Nations Convention on the Protection and Use of Transboundary Water Courses and International Lakes. The Treaty on European Union stipulates that 'environmental damage should as a priority be rectified at the source and that the polluter should pay.' 7 February 1992, ("Treaty of Maastricht,') Art. 130r. The Rio Declaration on Environment and Development supports 'the approach that the polluter should, in principle, bear the cost of pollution, ….' Principle 16, June 1992, <http://www.unep.org/documents.multilingual/default.asp?documentid=78&articleid=1163>; Art. III, International Convention on Civil Liability for Oil Pollution Damage, 1992, <http://www.transportrecht.org/dokumente/HaftungsUe_engl.pdf.> Art. 42, Statute of the River Uruguay (Uruguay and Argentina), signed at Salto on 26 February 1975, <http://www.internationalwaterlaw.org/documents/regionaldocs/Uruguay_River_Statute_1975.pdf>.

[82] *The Queen v. Secretary of State for the Environment, Minister of Agriculture, Fisheries and Food, Ex parte: H.A. Standley and Others Case* C-293/97, 29 April 1999 (holding that the polluter pays principle should be applied proportionaly, so that each polluter provides compensation only for the pollution they contribute).

[83] Beyerlin & Marauhn, International Environmental Law, p. 59. Oddly, a number of the instruments that Beyerlin & Marauhn mention describe the 'polluter-pays' idea as a 'principle.' See, for example, 'Guiding Principles, (a) Cost Allocation: the Polluter-Pays Principle,' in 'Guiding Principles Concerning the International Economic Aspects of Environmental Policies,' Recommendation of the Council on Guiding Principles Concerning International Economic Aspects of Environmental Policies,' 26 May 1972 – C(72)128. Subsequently, however, in 1995, the OECD described the polluter-pays principle as 'a principle of economic policy rather than a legal principle, ….' Environmental Principles and Concepts, OECD/GD(95)124, para. 33.

[84] *The Paquete Habana*, 175 U.S. 677, 707 (citing Ignacio de Megrin, *Elementary Treatise on Maritime International Law* (1873)).

[85] Thus, the preamble to the 1990 Multilateral International Convention on Oil Pollution Preparedness, Response and Cooperation, refers to 'the "polluter pays" principle as a general principle of international environmental law,' No. 32194, Concluded at London on 30 November 1990.

Nevertheless, this issue of normative qualification is essentially academic, as the concept receives widespread support.[86] In the context of efforts to reconcile economic development with environmental protection 'new norms have to be taken into consideration, and … new standards given proper weight, not only when States contemplate new activities but also when continuing with activities begun in the past.'[87] At a minimum, therefore, the polluter pays principle serves as an important guide for parties and tribunals in the resolution of claims for damages.

In cases of environmental harm, the 'polluter,' of course, is often a private company as opposed to a state agent or institution.[88] In the context of autonomous weapon systems, the arms manufacturer assumes the role of the private 'third party' at fault for harm. Given the lack of international rules attributing responsibility to corporations for weapons malfunctions, the polluter pays principle, by analogy, can fill this gap in international law to ensure that victims of harm attributable to corporate negligence and/or malfeasance in the design, development and sale of autonomous weapons receive compensation.

The complexity of modern weapon systems (actually 'systems of systems') creates challenges for a proportionate distribution of fault under the polluter pays principle. For example, the latest generation human-piloted fighter jet, the F-35, is developed by a 'partnership of countries,' including the United States, Great Britain, Italy, the Netherlands,

[86] Similarly, the precise legal status of the precautionary principle remains uncertain. However, the principle contributes to the interpretation of international instruments so as to protect the environment in cases of scientific uncertainty with respect to the impact of a particular activity. Sands, Principles of International Environmental Law, p. 228.

[87] Iron Rhine Railway Award in the Arbitration Regarding the Iron Rhine ('Ijzeren Rijn') Railway Between the Kingdom of Belguim and the Kingdom of the Netherlands, para. 59, (citing Gabčíkovo-Nagymaros (Hungary/Slovakia), Judgment, para. 140.

[88] States will not incur (or accept) legal responsibility for harm caused by third parties, unless it can be established that the state had an obligation to prevent the conduct and failed to fulfill its duty. Scovazzi, 'Some Remarks on International Responsibility in the Field of Environmental Protection,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, pp. 215 – 216.

Turkey, Canada, Australia, Denmark and Norway.[89] Although the 'Major Contractor' for the airplane is Lockheed Martin of the United States,[90] more than 1400 suppliers from around the world provide the 300,000 individual parts that make up the plane.[91] During the final assemblage, robots assemble parts of the aircraft, adding another dimension of 'autonomy' to the process, as well as additional questions concerning the attribution of fault.[92] Situations may arise, therefore, where the identification of the component of an autonomous weapon system that caused a particular failure or an 'unintended engagement'[93] is in dispute.

To ensure compensation to injured parties, it will be most efficient to hold the Major Contractor liable for civil damages caused by their weapon system(s),[94] and then permit the Major Contractor – through litigation -- to assign fault more specifically to one of her suppliers. This policy lies close to the problematic concept of strict liability, discussed in chapter seven with respect to international criminal law. A system of strict liability for manufacturers of dangerous weapons, however, entails financial compensation as opposed to imprisonment and the restriction of an individual's liberty. Furthermore, the corporation can pass on these compensation costs to the consumers or other entities who purchase the weapon systems. Thus, a principle or rule that the 'Major Contractor pays' for damages caused by

[89] 'F-35 Joint Strike Fighter (JSF),' Department of Defence Programs, p. 34, <http://breakingdefense.com/wp-content/uploads/sites/3/2014/01/2013DOTE_F-35_report.pdf>.
[90] *Ibid*, p. 35.
[91] 'Building the F-35: Combining Teamwork and Technology,' F-35 Lightning II, Lockheed Martin, <https://www.f35.com/about/life-cycle/production>.
[92] *Ibid*, 'The F-35 Factory.'
[93] This phrase is the euphemism used in the U.S. Department of Defence Directive 3000.09 to describe incidents where autonomous weapon systems injure civilians. 'Autonomy in Weapon Systems,' 21 November 2012, 4 (a) (1) (c).
[94] Again, making an analogy to the context of pollution in international environmental law, given the complexity of these weapon systems, it would be inequitable to require that an injured party demonstrate a causal nexus between a specific (design or manufacturing) activity and the ensuing harm. See Scovazzi, 'Some Remarks on International Responsibility in the Field of Environmental Protection,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, p. 218.

autonomous weapon systems will be within the realm of fairness and would encourage arms manufacturers to take greater care in their design and production of these systems.[95]

A number of states argue that the polluter pays principle applies at the domestic level but does not govern relations or responsibilities between states at the international level.[96] This is a pragmatic approach, reflecting the concept's dual function as a lever of national economic policy, as well as a legal principle.[97] However, when applied to damage or injury caused by autonomous weapon systems, this interpretation should not *per se* prevent a person or persons harmed by autonomous weapons in third countries from seeking compensation from the manufacturer or manufacturers of the system (in addition to a state, should fault lie with the state as well).[98]

D. *Application of These Principles to Autonomous Weapon Systems*

Autonomous weapon systems are extraordinarily complex and it is that complexity which magnifies their hazardous nature. Thus, by analogy, the essence of the

---

[95] 'A [state or non-state] operator that fails to take prompt and effective response action to environmental emergencies arising from its activities shall be liable to pay the costs of response action taken by Parties.' … *Liability shall be strict*.' 'Liability,' Art. 6 to Annex VI to the Protocol on Environmental Protection to the Antarctic Treaty: Liability Arising from Environmental Emergencies, (emphasis added). In certain situations, the Annex sets a maximum amount of liability. *Ibid*, art. 9.

[96] Sands, Principles of International Environmental Law, p. 229.

[97] The polluter pays principle constitutes the fundamental principle for allocting costs of pollution prevention and control efforts. 'Application of the Polluter-Pays Principle to Accidental Pollution,' in *The Polluter-Pays Principle: OECD Analyses and Recommendations*, Environment Directorate, Organisation for Economic Co-Operation and Development, Paris, 1992, para. 2, http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=OCDE/GD(92)81&docLanguage=En. >. The principle obliges operators of hazardous installations to pay for reasonable measures to prevent and control accidental pollution, whether in state-imposed fees, taxes, etc. Accordingly, the costs of these measures will be reflected in the costs of goods and services which cause pollution during production and/or consumption. Recommendations of the Council Concerning the Application of the Polluter-Pays Principle to Accidental Pollution, Organisation for Economic Cooperation and Development, C(89)88/Final, paras. 4 and 5, <http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=38&InstrumentPID=305&Lang=en&Book=False>.

[98] For example, states cannot abdicate their international responsibilities to private enterprises. Hence, nations cannot circumvent the rules of state responsibility by transferring powers, normally exercised by state officials, or by acquiescing to the assumption of such functions, to private entities. R Wolfrum, 'State Responsibility for Private Actors: An Old Problem of Renewed Relevance,' in Ragazzi, International Responsibility Today: Essays in Memory of Oscar Schachter, p. 43. Similarly, if a person or group of persons acts under the instructions or control of a state, the conduct of the individual or group is considered an act of the state. Art. 8, Draft Articles on Responsibility of States for Internationally Wrongful Acts with Commentaries.

preventive/precautionary principles and the polluter pays principle, are applicable to autonomous weapon systems. In situations where state responsibility for damage and/or injury caused by autonomous weapons is alleged, several questions should lie at the core of the dispute: 1) did the state or its agents intentionally violate international law in its design, development, use, or sale of the weapon systems? 2) if the state or its agents did not intentionally violate the law, did the state and/or its agents take sufficient preventive and precautionary measures in order to ensure the safe operation of the weapon system? and 3) were these measures adequate and sufficient in the circumstances at the time? Similarly, applying the 'polluter pays' principle to manufacturers and/or exporters of autonomous weapons, these enterprises can be held responsible for damage caused by a malfunctioning system.

To date, the most comprehensive state effort to define preventive and precautionary measures for autonomous weapon systems is U.S. Department of Defence Policy Directive 3000.09 ('Directive 3000.09' or 'the Directive'), entitled 'Autonomy in Weapon Systems.'[99] Although Directive 3000.09 nominally prohibits the development and use of lethal autonomous weapons, it permits the production and employment of such weapons with the approval of three high-ranking Pentagon officials.[100]

The individuals who prepared and drafted Directive 3000.09 considered that four principles should guide the development and use of autonomous weapon systems. First, the

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

[100] *Ibid*, Section 4 (d). The Directive 'does not establish a U.S. position on the potential future development of lethal autonomous weapons systems – it neither encourages nor prohibits the development of such future systems.' M Meier, U.S. Delegation Opening Statement to Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapon Systems, 13 April 2015, http://www.unog.ch/80256EDD006B8954/(httpAssets)/8B33A1CDBE80EC60C1257E2800275E56/$file/2015_LAWS_MX_USA+bis.pdf.

system must be capable of accomplishing the military mission.[101] Second, the system must be robust against failures and hacking.[102] Third, the system must be capable of lawful use. Fourth, the system must employ the proper balance of autonomy and human supervision vis a vis other criteria such as military professionalism, ethics, and the public perception of such systems. Significantly, the authors considered that the last principle should be applied more flexibly than the first three.[103]

One concern that led to the creation of Directive 3000.09 was that the absence of a clear United States policy concerning autonomous weapon systems might result in the development or deployment of weapon systems that are unsafe, illegal and/or unethical.[104] For example, in

[101] The Directive includes a series of technical testing and training requirements to ensure that the weapons and their autonomous functions will perform as designed. For example, new autonomous systems must receive rigorous hardware and software testing in realistic conditions to ensure that they perform 'as anticipated in realistic operational environments against adaptive adversaries.' *Ibid*, 'Policy,' 4 a (1) (a) and (b). Moreover, the validation and verification process must ensure that the new system will complete engagements in a timely manner 'consistent with commander and operator intentions and, if unable to do so, terminate engagements or seek additional human input before continuing the engagement.' *Ibid*, Enclosure 3, 1 a (2).

[102] To ensure such robustness, the Directive insists that the hardware and software of autonomous weapon systems must contain 'appropriate' safety and 'anti-tamper mechanisms' and '[h]uman machine interfaces and controls.' *Ibid*, 'Policy,' 4 a (2) (a) and (b). The term 'human-machine interface' is the system of communication and distribution of functions, responsibilities and expectations between computers and their human supervisors or operators. See generally M. Cummings, 'Automation and accountability in decision support systems interface design', 32 *Journal of Technical Studies*, 1 (2006), 10, <http://dspace.mit.edu/handle/1721.1/90321>. The manner in which humans and machines interface with each other is just as important as the kinds of machines that are developed. Statement by United States representative to 2016 Informal Expert Meeting on Lethal Autonomous Weapon Systems, Convention on Conventional Weapons, 12 April 2016. Thus, the Directive provides that the human machine interface should be easily understandable to trained operators, it should provide traceable information on the status of the weapon system and it should provide clear procedures for trained operators to activate and deactivate functions of the weapons system. 'Policy,' 4 a (3) (a) (b) and (c).

[103] Author Interview with Paul Scharre, coordinator of drafting process for Directive 3000.09, Washington, 9 April 2014; Directive 3000.09, 'Policy,' 4 a (3) (a) (b) and (c).

[104] *Ibid*. Furthermore, a second concern within the U.S. Department of Defence that motivated the production of Directive 3000.09 was perceived constraints to the research and development of new kinds of autonomous technologies. In the absence of government policy direction addressing the development and deployment of weapon systems with greater autonomy, researchers and developers were hesitant to develop autonomous functions that might be constrained by the complex legal, moral and ethical challenges presented by these systems. Author interview with Paul Scharre. Thus, the Directive's guidelines were intended to provide clarity and encouragement so that researchers and developers could incorporate autonomous functions in weapons system within legal and ethical boundaries. *Ibid*, Electronic mail message from P Scharre, 31 October 2014, copy in author's possession. Logically, a symbiotic relationship exists between modern armed forces, industry and academic research centres. For example, in an effort to better inform future investments into robotics technology and better focus industry efforts to create robotic vehicles suitable for military missions, the U.S. Department of Defence and a consortium of eighty defence contractors, 'non-traditional contractors' and universities signed an agreement which enabled the defence industry to participate in the Department of Defence

any combat environment, professional and well-trained commanders are expected to maintain and exercise control over their subordinate units in order to preserve discipline, efficiency and proper conduct. Fully autonomous weapon systems, therefore, would subvert the military need for commanders to monitor the progress of subordinates and maintain control.[105] Accordingly, the drafters of the Directive determined that the design of new autonomous weapon systems must permit commanders to retain control over autonomous weapon systems.[106] Therefore, it requires that autonomous weapon systems be designed with the capability to allow commanders and operators to exercise 'appropriate levels of human judgment in the use of force' and to employ systems with appropriate care and consistent with international humanitarian law, applicable treaties, weapons system safety rules and applicable rules of engagement ('ROE').[107]

Probably the most controversial – and undefined – piece of the of the Directive is the standard requiring designs and modes of use that permit the exercise of *appropriate levels of human judgment over the use of force* by autonomous weapon systems. Absent in the Directive is a definition or explanation of this crucial guideline for the employment of lethal autonomous weapon systems. Nor does the Directive provide guidance as to how the appropriate levels of human judgment – if any - should be exercisable, and exercised, by

technology assessment process. *Unmanned Systems Integrated Roadmap FY2009 – 2034*, 6 April 2009, p. 3, <file:///Users/danielsaxon/Downloads/ADA522247%20(1).pdf>.

[105] Statement of France to Informal Meeting of Experts on Lethal Autonomous Weapon Systems, Convention on Conventional Weapons, Geneva, 12 April 2016, <http://www.unog.ch/80256EE600585943/(httpPages)/37D51189AC4FB6E1C1257F4D004CAFB2?OpenDocument>.

[106] *Ibid.* Indeed, the Directive requires that training and doctrine for autonomous weapons ensure that operators and commanders understand the functioning, capabilities and limitations of a system's autonomy. Directive 3000.09, 'Responsibilities,' section 8 (a) (6).

[107] *Ibid*, Enclosure 3, 'Guidelines for Review of Certain Autonomous or Semi-Autonomous Weapon Systems,' (1) (b) (1). In addition, Directive 3000.09 describes who shall be responsible for, *inter alia*, the lawful design of semi-autonomous and autonomous weapons, their experimentation strategies, human-machine interfaces, operational standards, doctrine, training, hardware and software safety mechanisms and employment against adversaries. *Ibid*, enclosure 4, 'Responsibilities,' parts 1–10.

military commanders and operators of autonomous weapon systems before, during and after the use of force by autonomous machines.

The authors of the Directive considered that this precautionary standard should be applied flexibly.[108] The drafters decided not to include an explicit definition of 'appropriate levels of human judgment over the use of force' in the document; nor did they treat this language as a precise concept. They believed that the 'appropriate' standard for levels of human judgment over the use of force requires the balancing of multiple interests, including military necessity. Thus, what is 'appropriate' – for the U.S. Department of Defence - will vary according to the circumstances,[109] such as the kind of weapon, the interaction between operators of weapon systems, the particular characteristics of the weapon and the environment in which it is used, and the mission objectives of the weapon system.[110]

Even with the best training of human operators, the challenge of maintaining 'appropriate' levels of human judgment and/or human-machine collaboration and teamwork will become increasingly difficult as decision-making cycles of autonomous weapon systems shrink to micro-seconds.[111] Indeed, it is not difficult to envision future generations of

[108] Author interview with Paul Scharre.

[109] *Ibid*, According to one of the authors of Directive 3000.09 – a leading international humanitarian law expert in the U.S. military - the drafters intended the language 'appropriate levels of human judgment' to refer to the levels of supervision required to ensure compliance with the standards prescribed by the law of armed conflict, i.e. 'distinction,' 'proportionality' and whether the autonomous weapon system is, by its nature, an indiscriminate weapon. 'We still expect military commanders employing a system with autonomous functions to engage in the decision-making process that is required by IHL.' Colonel R Jackson, Panel on 'Autonomous Weaponry and Armed Conflict,' Annual Meeting of American Society of International Law ('ASIL'), Washington D.C. April 2014.

[110] Statement by United States representative to 2016 Informal Expert Meeting on Lethal Autonomous Weapon Systems, Convention on Conventional Weapons, 12 April 2016.

[111] Colonel R Jackson, the Special Assistant to the U.S. Army Judge Advocate for Law of War Matters and a member of the DOD Working Group that drafted the Directive, described the challenge of balancing the speed of new autonomous technologies with the policy of maintaining appropriate levels of human supervision as 'a huge focus of our working group.' The drafters sought to alleviate risks of 'machine bias,' i.e. human over-reliance on a computer's decision-making ability, by emphasising proper training of operators as well as the strong 'validation and verification approach' during the acquisition phase of new autonomous weapon systems: 'These guidelines have been developed more broadly to make sure that we don't have the individual relying too much on the decision-making capability of the machine.' Jackson, Panel on 'Autonomous Weaponry and Armed Conflict.'

autonomous weapon systems that will communicate between each other much more quickly than with humans. Thus, it is important to recall that, depending on the conditions, the phrase 'appropriate levels of human judgment over the use of force' exercised by commanders and operators of autonomous weapon systems can include the exercise of no human judgment at all.[112]

As a comprehensive national attempt to articulate preventive and precautionary standards for the development and use of autonomous weapons, and by its emphasis on compliance with international law, the Directive represents 'a demonstration of state responsibility to a degree that is unprecedented.'[113] The Directive is a statement of policy, however, rather than an expression of legal obligation. To borrow a phrase from Jan Klabbers, it creates 'twilight norms' (such as 'appropriate levels of human judgment') which conserve flexibility for future developments and decision-making.[114] Such unilateral state efforts to define policies concerning autonomous weapon systems, moreover, can clothe those countries with political legitimacy while simultaneously setting the agenda for legal interpretation(s).[115] Nevertheless, these national efforts, while reflecting self-interests of states, are a positive development because they illustrate an implicit acceptance of membership in an international 'constitutional order' that demands, inter alia, deeper thinking

[112] Indeed, Professor Cummings, an engineer and former U.S. Navy fighter pilot, bluntly observes that '[m]any controls engineers see the human as a mere disturbance in the system that can and should be designed out.' M Cummings, 'Man Versus Machine or Man + Machine?' unpublished draft, p. 12, copy in Author's possession. Thus, notwithstanding the Directive, at some point in the future, fully autonomous weapon systems will likely inhabit the battlefield (and may eventually become the predominant players) and will make decisions that we now believe require human intervention. E Jensen, 'The Future of the Law of Armed Conflict: Ostriches, Butterflies and Nanobots,' 35 *Michigan Journal of International Law* (Winter 2014), 253, 290.

[113] Jackson, Panel on 'Autonomous Weaponry and Armed Conflict.'

[114] *International Law* (Cambridge University Press, 2013), p. 45.

[115] The experience of the United States Government at the multilateral negotiations leading to the adoption of the Rome Statute of the IC, the Landmines Convention, the Convention on Climate Change and the Kyoto Protocol demonstrate that a dissident state – even the strongest – cannot assume it can dictate the outcome against the wishes of the majority. A Boyle & C Chinkin, *The Making of International Law* (Oxford University Press, 2007), p. 30. Consequently, the United States decided to be more proactive vis a vis the development and control of autonomous weapon systems so that it could control the narrative and outcome. Author Interview with Thomas Nash, 29 January 2016.

and effective constraints on the development of new weapon systems.[116] And, more importantly, they place the issue of the legality and morality of autonomous weapon systems squarely within this constitutional order.

In a legal sense, as an effort to develop preventive and precautionary measures and as an acknowledgment of state responsibility, Directive 3000.09 is a 'glass that is half full.' Whilst it emphasises that autonomous weapon systems must have the capability to comply with international law, the Directive does not mention the phrase 'human dignity.' Nor (crucially) does this instruction address whether it is (legally and morally) acceptable to delegate (previously) human decisions about complex values and warfighting to computers. In that sense, Directive 3000.09 leaves to another day important discussions about the impact of lethal autonomous weapon systems on human dignity, and how the legal compass of human dignity influences the responsibility of states for the design and use of these weapons.

IV. Conclusions

If, as I argue, human dignity is a Charter-based conceptual starting point of international law, then logically United Nations member states bear a responsibility to use human dignity as a guide to their application of international and national legal rules. The fact that states may differ as to the meaning and scope of the notion of human dignity does not alter their broader responsibility to assimilate the concept in their legal systems and decisions.[117] If my chosen definition of human dignity (respect for human rights and the realization of personal

[116] 'Constitutionalism … signifies not so much a social or political process , but rather an attitude, a frame of mind. Constitutionalism is the philosophy of striving towards some form of political legitimacy typified by respect for, … a constitution.' J Klabbers, 'Setting the Scene,' in J Klabbers, et. al. (eds.), *The Constitutionalization of International Law* (Oxford University Press, 2009), p. 10. For an argument that, due to its fragmented characteristics, international law lacks an identifiable constitutional structure, see Boyle & Chinkin, The Making of International Law, p. 100.

[117] 'The right to self-determination, human dignity and protection of human rights are issues that concern the international community as a whole and constitute an international responsibility and an international obligation, they cannot be reduced to any bilateral *diferenda*.' J Sampiano, President of Portugal, Address at the International Court of Justice, 30 October 1997, <http://www.icj-cij.org/presscom/index.php?pr=142&pt=1&p1=6&p2=1&PHPSESSID=5c407>.

autonomy) is accurate, then the design and use of autonomous weapon systems that restrict this development is inconsistent with the concept of dignity.' This reality, consequently, obliges states and non-state actors to ensure that their designs and use of autonomous weapon systems permit the exercise of human judgment in circumstances calling for assessments of complex values. Furthermore, in cases where harm caused by autonomous weapons may not have been deliberate, three principles common to international environmental law, the preventive, precautionary measures and polluter pays principles, provide a framework for attribution of responsibility to states and arms manufacturers.