

## Emerging Technologies Challenge International Humanitarian Law: Mapping the Issues

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### **Abstract**

The shared understanding of the rules and the premise of International Humanitarian Law (IHL) is challenged by the accelerated development of new military technologies. Is the existing IHL framework robust enough to protect civilians, combatants and the environment in the face of new military technologies? The judicial remedy of IHL, which is one aspect of law, is oriented to the past in the sense that its main task is to resolve cases that have already occurred. Therefore, it also tends to *ex post* relief, as is typical for paying “compensation” for damages. The challenge posed is to address the questions about what may happen in a risk society today. This paper addresses the question of how existing and emerging technologies impact IHL rules in order to consider how legal challenges posed will be responded to in the future.

## Introduction

Since the St. Petersburg Declaration of 1868,<sup>1</sup> states have worked to reduce the harm done by armed conflicts. It is an established rule agreed among states that the right of states to choose methods or means of warfare is not unlimited.<sup>2</sup> Means of warfare refer to weapons and weapon systems used during the conduct of hostilities while methods of warfare refer to the way they are used. Today, International Humanitarian Law (IHL), which is reflected in customary law and general principles of law as well as in treaties, explicitly regulates means and methods of warfare.<sup>3</sup> Weapons as means of warfare are allowed to be used by combatants against adversary combatants as legitimate targets<sup>4</sup> during the conduct of hostilities. The most comprehensive legal instrument governing methods and means of warfare today is the Additional Protocol to the Geneva Conventions of 12 August 1949, relating to the Protection of Victims of International Armed Conflicts (API).<sup>5</sup>

The shared understanding of the rules and the premise of IHL are challenged by the accelerated development of new military technologies. Information technologies, for instance, have improved the capabilities of data processing and analysis, biotechnologies have opened the door for gene editing, while nanotechnologies focus on atoms and molecules, in which a nanoscale machine could assemble macroscale products. These existing and emerging technologies have been used for military purposes and, therefore, are known as “dual-use” technologies. They all impact the ability of IHL to regulate new weapons and key concepts constituting IHL as well.<sup>6</sup> What is observed is not entirely new as, toward the end of 19<sup>th</sup> century, scholars of international law also faced “manifold regulatory challenges” that were mostly due to “changing technology”.<sup>7</sup> However,

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<sup>1</sup> St. Petersburg Declaration of 1868 states that the “only legitimate object” during war is to “weaken the military forces of the enemy” and it is “sufficient to disable the greatest possible number of men” for this purpose. Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight. Saint Petersburg, 29 November / 11 December 1868. At <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Article.xsp?action=openDocument&documentId=568842C2B90F4A29C12563CD0051547C>.

<sup>2</sup> Article 22, Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land. The Hague, 18 October 1907. Article 35.1, Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (API), 8 June 1977, 1125 UNTS 3.

<sup>3</sup> ICJ stated that “[T]hese fundamental rules are to be observed by all States whether or not they have ratified the conventions that contain them, because they constitute intransgressible principles of international customary law.” *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996*, p. 257. para 79.

<sup>4</sup> Article 48 and 52.2, *supra* note 2. Meanwhile, Article 52.2 defines “objects” as military objectives as those “which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralisation, in the circumstances ruling at the time, offers a definite military advantage.”

<sup>5</sup> With regard to the universality of API, 174 states are parties to API to date but US, India, Pakistan and Israel who have strong military capabilities are not party to the protocol. However, as mentioned before, ICJ pointed out that fundamental rules of IHL are “to be observed by all States whether or not they have ratified the conventions” In fact, those states not party to API recognise many of the provisions as reflective of the customary law. For instance, Michael Matheson, Deputy Legal Adviser of the US Department of State, gave a few examples of basic principles contained in API that “should be observed and in due course recognized as customary law.” Michael Matheson, “Customary Law and Additional Protocol I to the Geneva Conventions for Protection of War Victims: Future Directions in Light of the U.S. Decision Not to Ratify,” *Proceedings of the Annual Meeting (American Society of International Law)*, Vol. 81 (April 8-11, 1987), pp. 29-31.

<sup>6</sup> ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts – Recommitting To Protection In Armed Conflict On The 70th Anniversary Of The Geneva Conventions* (ICRC, 2020), p.26.

<sup>7</sup> Miloš Vec, “International Lawyers’ Failing: Outlawing Weapons as an Imperfect Project of the Classical Laws of War,” *History of Global Arms Transfer*, Vol 10 (2020), p. 107.

development of new means and methods of warfare that rely on emerging technologies seems to be increasing rapidly.

How do scientific technologies, emerging technologies in particular, impact on existing rules of IHL? Can weapons embracing new technologies comply with existing rules of IHL? Is the existing IHL framework robust enough to protect civilians, combatants and the environment? How should legal challenges to IHL be addressed? In the 1990s, Jean-Marie Henckaerts and Louise Doswald-Beck<sup>8</sup> compiled for the International Committee of the Red Cross (ICRC) a comprehensive study on customary international humanitarian law to identify what they call a common core of IHL. The results of the study were published in 2005. Stuart Casey-Maslen<sup>9</sup> provided an excellent analysis on how rules governing the conduct of hostilities work in armed conflicts in the context of the use of nuclear weapons while Michael Schmitt gave close consideration to the relationships between war, technology and the law of armed conflict.<sup>10</sup> Hitoshi Nasu and Robert McLaughlin<sup>11</sup> gave a comprehensive study on how weapons embracing certain emerging technologies impact IHL.

Based on this earlier research, this paper addresses the question of how existing and emerging technologies impact existing IHL rules in order to consider how these legal challenges will be responded to in the future. In this paper, Section 1 explains the basic structure of IHL and gives a brief overview of the development of military technologies. Section 2 considers how IHL is challenged by those military technologies. Section 3 looks at how legal challenges posed today can be responded to while Section 4 considers ways forward.

## 1. IHL and Emerging Technologies

### A. Basic Rules of IHL

As the International Court of Justice (ICJ) pointed out in 1996, the use of weapons is legally assessed with two “cardinal” rules of IHL: the rule of distinction and the rule of prohibiting unnecessary suffering.<sup>12</sup> The rule of distinction requires that in their military operations parties to armed conflict always distinguish civilians and civilian objects from combatants and other military objectives and target only the latter.<sup>13</sup> The rule of prohibition of unnecessary suffering prohibits superfluous injury or unnecessary suffering to combatants

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<sup>8</sup> Jean-Marie Henckaerts and Louise Doswald-Beck (eds), *Customary International Humanitarian Law* (Cambridge University Press, 2005).

<sup>9</sup> Stuart Casey-Maslen, “The use of nuclear weapons under rules governing the conduct of hostilities,” Gro Nystuen, Stuart Casey-Maslen and Annie Golden Bersagel (eds.), *Nuclear Weapons under International Law* (Cambridge University Press, 2014), pp. 91-127.

<sup>10</sup> Michael Schmitt, ‘War, technology and the law of armed conflict’, in Antony Helm (ed.), *War in the 21st Century: Weaponry and the Use of Force*, Naval War College Studies: International Law Studies, Vol. 82, 2006, pp. 137-182.

<sup>11</sup> Hitoshi Nasu, Robert McLaughlin (eds.), *New Technologies and the Law of Armed Conflict* (ASSER PRESS, 2013).

<sup>12</sup> *I.C.J. Reports 1996*, *supra* note 3, p. 257, para. 78.

<sup>13</sup> Article 48, 51 and 52, *supra* note 2.

when trying to achieve a legitimate military goal.<sup>14</sup> In the light of these two basic rules,<sup>15</sup> weapons are prohibited, as “means of warfare” if they, by nature, are inevitably incapable of observing the two basic rules of IHL. On the other hand, weapons are not prohibited as means of warfare but remain regulated by the rules applied for “methods of warfare” if they are deemed to be compatible with the two basic rules of IHL. In addition to the two rules, the protection of the natural environment is also a basic rule of IHL today although there are arguments over the extent of damage that is allowed and prohibited.<sup>16</sup>

In the course of the conduct of hostilities, “incidental” damage to civilians and civilian objects caused by attacks on military targets might be permitted as collateral damage. However, such damage should not be expected to be excessive in relation to the concrete and direct “military advantage anticipated.”<sup>17</sup> Proportionality in attacks which restricts collateral damage is established as a norm of customary international law<sup>18</sup> and, as with the rule of distinction, is also a norm of *jus cogens*.<sup>19</sup> Precautions in attack<sup>20</sup> and precautions against the effects of attacks<sup>21</sup> are also required to protect civilians and civilian objects.

Attention needs to be paid here to the point that weapons as means of warfare during the conduct of hostilities shall be used against combatants as legitimate targets but not against civilians,<sup>22</sup> which is basis of rule of distinction. Rosalyn Higgins made it clear that it is “absolutely prohibited to attack civilians” with any weapons.<sup>23</sup> Those rules governing the conduct of hostilities are applied from the beginning of any armed conflict to the end of the general close of military operations in the territory of states to the conflict.<sup>24</sup>

However, the rapid pace of technological innovation has produced weapons and devices such as robots and unmanned combat vehicles. Outer space<sup>25</sup> and cyber space are contemplated as potential or new battlefields. The essential question arising today is whether IHL provides sufficient legal guidance to protect civilians, combatants and the environment in the face of rapid innovation of weapons brought about by the application of

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<sup>14</sup> Article 35.2, *supra* note 2.

<sup>15</sup> With regard to those two rules, Article 8.2 (b)(xx) of Rome Statute of the International Criminal Court stipulates that employing weapons, projectiles and material and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering or which are inherently indiscriminate in violation of the international law of armed conflict, provided that such weapons, projectiles and material and methods of warfare are the subject of a comprehensive prohibition and are included in an annex to the Statute, by an amendment in accordance with the relevant provisions set forth in articles 121 and 123. Rome Statute of the International Criminal Court, 17 July 1998, 2187 UNTS 3.

<sup>16</sup> Article 55, *supra* note 2.

<sup>17</sup> Article 51.5(b), *supra* note 2.

<sup>18</sup> Henckaerts and Doswald-Beck, *supra* note 7, p. 46.

<sup>19</sup> Casey-Maslen, *supra* note 8, p. 96. International Law Commission (ILC) defines *jus cogens* as “a norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.” Report of the International Law Commission, 71st Session, UN Doc. A/74/10 (2019), p. 142.

<sup>20</sup> Article 57, *supra* note 2.

<sup>21</sup> Article 58, *supra* note 2.

<sup>22</sup> Article 51.2 and 52.1, *supra* note 2.

<sup>23</sup> Dissenting Opinion of Judge Higgins, *I.C.J. Reports 1996*, p. 363, para. 12.

<sup>24</sup> Article 3, *supra* note 2.

<sup>25</sup> Schmitt pointed out that operations like those taking place in Afghanistan and Iraq would be “unimaginable” without space-based communications, navigation, surveillance, reconnaissance and weather system. Schmitt, *supra* note 9, p. 145.

scientific technologies. The following considers this question by looking at how such weapons embracing certain emerging technologies impact the rules of IHL.

## B. Development of Military Technologies

Looking back at history, scientific technologies have been transforming the ways people live and the world in which they live.<sup>26</sup> This also applies to the domain of military affairs. Modern technologies have generated an enhancement of destructive capabilities (e.g., nuclear weapons), launch capabilities (e.g., intercontinental ballistic missiles) and delivery capabilities (e.g., remotely piloted aircraft and nuclear-powered submarines). All of these developments have brought about significant change in military strategies. It is unavoidable that weapons evolve as scientific technologies evolve, as history has all too ably demonstrated.

Today, certain emerging technologies are deemed to have the potential to change the landscape of military strategies built up on the already achieved capabilities of destruction, launch and delivery over the years. In 2018, the US Department of Commerce identified 14 categories of emerging technologies “essential to U.S. national security...because they have potential conventional weapons, intelligence collection, weapons of mass destruction, or terrorist applications or could provide the United States with a qualitative military or intelligence advantage.”<sup>27</sup>

The rapid development of information technologies has led to the development of artificial intelligence (AI), as data processing and analysis have dramatically improved. Thus, the operational capabilities of weapons such as targeting and firing have expanded exponentially. This has generated international debates over the issue of Lethal Autonomous Weapons Systems (LAWS)—sometimes referred to by civil society groups as “killer robots” —and other automated weapons such as unmanned combat vehicles (UCVs) including “drones”.<sup>28</sup>

Similarly, biotechnologies which alter human genes can enhance the capabilities of soldiers by increasing mental acuity and physical ability. Such enhanced genetically modified soldiers are sometimes termed “super soldiers”. They are capable of producing super human abilities that most humans cannot generate. They are expected to possess a variety of super human capabilities that were “once considered totally fictional.”<sup>29</sup>

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<sup>26</sup> Anthony Giddens, “Risk and Responsibility,” *Modern Law Review*, Vol. 62, No. 1 (January 1999), p. 1.

<sup>27</sup> 14 categories of emerging technologies include: (1) Biotechnology, (2) Artificial intelligence (AI), (3) Position, Navigation, and Timing (PNT) technology, (4) Microprocessor technology, (5) Advanced computing technology, (6) Data analytics technology, (7) Quantum information and sensing technology, (8) Logistics technology, (9) Additive manufacturing, (10) Robotics, (11) Brain-computer interfaces, (12) Hypersonics, (13) Advanced Materials, (14) Advanced surveillance technologies. Bureau of Industry and Security, Department of Commerce, “Review of Controls for Certain Emerging Technologies,” *Federal Register*, Vol. 83, No. 223. At <https://www.govinfo.gov/content/pkg/FR-2018-11-19/pdf/2018-25221.pdf>.

<sup>28</sup> A study of SIPRI also pointed out the necessity of an international discussion on the opportunities and risks posed by the military use of AI particularly in the nuclear capability-related context. Vincent Boulanin (ed.), *The Impact of Artificial Intelligence on Strategic Stability and Nuclear Risk*, Vol I (SIPRI, 2019), p. xii.

<sup>29</sup> Christopher Sawin, “Creating Super Soldiers for Warfare: A Look into the Laws of War,” *Journal of High Technology Law*, Vol. 17, No. 1 (2016), p. 109.

As for nanotechnologies, which deal with atoms and molecules, these can also lead to development of nano-weapons. Nanotechnologies could be applied for preventing and deterring bioterrorism, which help enhance defensive capabilities. It could also increase offensive capabilities if nano-sized missiles or robots could attack with enhanced accuracy and increased destructive capabilities.

From the IHL perspective, the legality of weapons is assessed either as “means of warfare” or as “methods of warfare” in light of the rule of distinction and the rule of prohibiting unnecessary suffering. There is no doubt that this formulation applies to advanced technological weapons. Therefore, the test of their legality will be determined in terms of their compatibility with IHL rules.

## 2. Legal Challenges Posed

### A. Information Technologies and Weapons

The development of information technology enables precision-guided attacks and stand-off attacks. As mentioned before, drones are already in operation on or over battlefields. Research shows 12 states are believed to have used armed drones to conduct lethal strikes between 2001 and 2019 and another 27 states have used them without lethal strikes.<sup>30</sup> LAWS is another concern in relations to IHL while its definition itself is at issue<sup>31</sup>. According to the ICRC, LAWS is defined as “Any weapon system with autonomy in its critical functions...a weapon system that can select (i.e. search for or detect, identify, track, select) and attack (i.e. use force against, neutralize, damage or destroy) targets without human intervention.”<sup>32</sup>

It is understood that drones<sup>33</sup> and autonomous weapon systems<sup>34</sup> must be in compliance with the rules of IHL. The IHL rules impose legal obligations for parties to conflict who use weapons during the conduct of hostilities to respect the IHL rules and to bear liabilities in

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<sup>30</sup> New America, “World of Drones: Who Has What: Countries with Drones Used in Combat.” At <https://www.newamerica.org/international-security/reports/world-drones/who-has-what-countries-that-have-conducted-drone-strikes/>.

<sup>31</sup> For instance, see the summarised debates around the distinction between “highly automated weapon systems” and “fully autonomous weapon systems” in the following report. ICRC, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons*, Expert meeting, Versoix, Switzerland, 15-16 March 2016, p. 71.

<sup>32</sup> ICRC, *Views of the ICRC on autonomous weapon systems*, paper submitted to the Convention on Certain Conventional Weapons Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), 11 April 2016. At <https://www.icrc.org/en/document/views-icrc-autonomous-weapon-system>. Neil Davidson, “A legal perspective: Autonomous weapon systems under international humanitarian law,” *Perspectives on Lethal Autonomous Weapon System*, UNODA Occasional Papers No. 30 (2017), p. 5.

<sup>33</sup> Drones are not specifically mentioned in weapon treaties or other legal instruments of international humanitarian law. However, as Peter Maurer pointed out the use of any weapon system, including armed drones, in armed conflict situations is “clearly subject to the rules of international humanitarian law.” Peter Maurer, *The use of armed drones must comply with laws*, interview of ICRC President on 10 May 2013. At <https://e-brief.icrc.org/wp-content/uploads/2016/09/15-The-use-of-armed-drones-must-comply-with-laws.pdf>.

<sup>34</sup> Draft Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (GGE LAWS), CCW Doc. CCW/GGE.1/2019/CRP.1/Rev.2, August 2019, pp 1-14, Annex IV, p. 13.

case of any violations.<sup>35</sup> Combatants also bear individual criminal responsibility according to International Criminal Law (ICL).<sup>36</sup> Because of these legal architectures, it is not only the state but also the combatant as a human being who is ultimately responsible for respecting fundamental legal obligations during the conduct of hostilities and this individual criminal responsibility cannot be readily transferred to a weapon or weapon system.

It may be expected that precision-guided attacks help compliance with the rule of distinction.<sup>37</sup> However, it has been debated whether the use of drones working without combatants at the site of a battlefield can actually observe the IHL rule.<sup>38</sup> In fact, cases of errant bombings by drones which killed civilians have been reported<sup>39</sup> while the number of drone strikes in some countries has been declining.<sup>40</sup> It is legally possible to trace responsible actors in case of violation of the rules of IHL as long as UCVs are operated by human beings on or off the battlefield. Human intervention is still there.

With regard to the issue of LAWS, however, it has been debated whether LAWS are capable, in law and in practice, of observing the rules of IHL. Moreover, responsibility in case of the violation of the rules of IHL becomes an important question as the subject of responsibility is ambiguous.<sup>41</sup> What happens if fully autonomous weapon systems which require no human intervention become more widespread? This is one of the foci of recent debates although it is also important to avoid being either too alarmist or too speculative.<sup>42</sup>

## B. Biotechnologies and Weapons

According to a study of the US Army Combat Capabilities Development Command Chemical Biological Center in 2019, the following four vignettes are relevant to military needs and are technically feasible by 2050 or earlier: ocular enhancements to imaging, sight, and situational awareness; restoration and programmed muscular control through an optogenetic bodysuit sensor web; auditory enhancement for communication and protection; and direct neural enhancement of the human brain for two-way data transfer.<sup>43</sup> These

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<sup>35</sup> Article 86, 87 and 91, *supra* note 2.

<sup>36</sup> Article 25 and 28, *supra* note 14.

<sup>37</sup> Schmitt, *supra* note 9, p. 162.

<sup>38</sup> Schmitt pointed out that there is no scientific basis for concluding that human perception and judgement is necessarily "more acute or reliable than that of machines." Schmitt, *supra* note 9, p. 160.

<sup>39</sup> Ahmad Sultan and Abdul Qadir Sediqi, "U.S. drone strike kills 30 pine nut farm workers in Afghanistan," (Reuter, 19 September 2019). At <https://www.reuters.com/article/us-afghanistan-attack-drones/u-s-drone-strike-kills-30-pine-nut-farm-workers-in-afghanistan-idUSKBN1W40NW>.

<sup>40</sup> For instance, see the data of US air and drone strikes in Pakistan. At <https://www.newamerica.org/international-security/reports/americas-counterterrorism-wars/the-drone-war-in-pakistan>.

<sup>41</sup> For instance, ICRC report said that the "lack of control over and unpredictability" of autonomous weapon systems could make it "difficult to find individuals involved" in the programming and deployment of the weapon "criminally liable" for war crimes. ICRC, *Autonomous weapon systems: Technical, military, legal and humanitarian aspects*, Expert meeting, Geneva, Switzerland, 26-28 March 2014, p. 8.

<sup>42</sup> Anja Kaspersen and Chris King, "Mitigating the challenges of nuclear risk while ensuring the benefits of technology," in Vincent Boulanin (ed.), *The Impact of Artificial Intelligence on Strategic Stability and Nuclear Risk*, Vol I (SIPRI, 2019), p. 119.

<sup>43</sup> Biotechnologies for Health and Human Performance Council study group, *Cyborg Soldier 2050: Human/Machine Fusion and the Implications for the Future of the DOD*, (U.S. Army Combat Capabilities Development Command Chemical Biological Center, 2019). At <https://community.apan.org/wg/tradoc-g2/mad-scientist/m/articles-of-interest/300458>.

technologies are expected to offer capabilities beyond current military systems for the US military. They would make it possible to implant sophisticated machine technology into soldiers for enhanced performance capabilities such as super eyesight and advanced brain function for controlling unmanned drones and other weapons systems.

This raises a question about whether a soldier with such enhanced capabilities falls into the definition of combatants defined in IHL<sup>44</sup> as such a soldier may not already be deemed as a human being. In this context, the US study raised a question about whether such a soldier has the same protections under the Geneva Convention if s/he is caught and captured.<sup>45</sup> Or, should a super soldier be understood to fall into the “means of warfare” criterion due to the enhanced capabilities?<sup>46</sup> How are the basic rules of IHL, i.e. the rules of distinction and the prohibition of unnecessary suffering, applied to super soldiers?

### C. Nanotechnologies and Weapons

According to a report by the US Department of Defense in 2009,<sup>47</sup> the major international players in nanoscience research are the US, the European Union (EU), China, Japan, Singapore, South Korea, and Taiwan. The US stands at the forefront of nanoscience in terms of quantity and quality of research since the birth of the field. In the US, the National Nanotechnology Initiative (NNI) is a governmental research and development initiative established in 2001 involving the nanotechnology-related activities of 20 departments and independent agencies with funding cumulatively totaling nearly \$29 billion since the inception of the NNI in 2001.<sup>48</sup> Launched in 2002, the Institute for Soldier Nanotechnologies (ISN) is a team of Massachusetts Institute of Technology (MIT), army, and industry partners working together to discover and field technologies that dramatically advance soldier protection and survivability capabilities.<sup>49</sup>

It is not easy to define what nano-weapons are but they are very small mechanical devices or materials that could impact or damage human bodies or objects. Nano-weapons would encompass not only devices using nanotechnologies that would be designed or used for harming humans, but also those causing harmful effects at a nano-scale if those effects are lethal.<sup>50</sup> Although it is still speculative, such weapons could include conventional missiles with reduced mass and enhanced speed, small metal-less weapons made of nano-fibre

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<sup>44</sup> Article 43.2, *supra* note 2. It simply stipulates that “[m]embers of the armed forces of a Party to a conflict ... are combatants” and “they have the right to participate directly in hostilities.”

<sup>45</sup> Biotechnologies for Health and Human Performance Council study group, *supra* note 42, p. 13.

<sup>46</sup> Heather Harrison Dinniss and Jann Kleffner argued that the question hinges on the “question of whether and to what extent” human enhancement technologies “qualify as a weapon or means or method of warfare.” Heather Harrison Dinniss and Jann Kleffner, *Soldier 2.0: Military Human Enhancement and International Law*, *International Law Studies*, Vol. 92 (Stockholm Center for the Study of International Law, 2016), p. 437.

<sup>47</sup> Department of Defense, “Defense Nanotechnology Research and Development Program,” report to Congress (2009). At [https://www.nano.gov/sites/default/files/pub\\_resource/dod-report\\_to\\_congress\\_final\\_1mar10.pdf](https://www.nano.gov/sites/default/files/pub_resource/dod-report_to_congress_final_1mar10.pdf).

<sup>48</sup> The National Nanotechnology Initiative (NNI), “Supplement to the President’s 2020 Budget,” report prepared by Subcommittee on Nanoscale Science, Engineering, and Technology, and Committee on Technology of the National Science and Technology Council (2019). At [https://www.nano.gov/sites/default/files/pub\\_resource/NNI-FY20-Budget-Supplement-Final.pdf](https://www.nano.gov/sites/default/files/pub_resource/NNI-FY20-Budget-Supplement-Final.pdf).

<sup>49</sup> Institute for Soldier Nanotechnologies (ISM). At <https://isn.mit.edu/what-isn>.

<sup>50</sup> Hitoshi Nasu and Thomas Faunce, “Nanotechnology and the International Law of Weaponry: Towards International Regulation of Nano-Weapons,” *Journal of Law, Information and Science*, No 20 (2009-2010), p. 23.

composites, small missiles as well as artillery shells with enhanced accuracy guided by inertial navigation systems, and armour-piercing projectiles with increased penetration capability.<sup>51</sup> Further research could lead to the development of micro-combat robots, micro-fusion nuclear weapons, new chemical agents carried by nanoparticles, and new biological agents with self-replication capability.<sup>52</sup>

The low visibility of nanoparticles makes it hard to detect their development and use as weapons. Some of the offensive nano-weapons which would be nano in size but huge in destructive power might blur the distinction between conventional weapons and weapons of mass destruction. Thus, the characteristics of nano-weapons problematise the rules of distinction and the prohibition of weapons, means and methods of warfare of a nature to cause unnecessary suffering.

#### **D. IHL Faced with Challenges**

All of the questions raised in this section focus on whether the existing rules of IHL provide sufficient legal guidance to protect civilians, combatants and environment in the face of new weapons that flow from emerging technologies. One of the critical questions posed is relevant to the premise of the rules of IHL that weapons are used by combatants against adversary combatants during the conduct of hostilities, and those rules are applied from the beginning of any armed conflict to the end of the general close of military operations in the territory of states to the conflict.

However, innovation of military technologies has already enabled unmanned attacks and has been exploring the possibilities of LAWS, and attacks, such as cyber operations, do not necessarily imply the use of physical force. The traditional categorisations of weapons might erode once micro-fusion nuclear weapons are developed. This raises the question as to whether such weapons should be prohibited preemptively in consideration of their potential dangers.

The questions are relevant not only in the sense that the innovation of military technologies enables the capabilities of destruction, launch, delivery and operation but also in the sense that they pose conceptual challenges against “means of warfare,” “methods of warfare,” “military attack,” “use of force,” “civilians,” “combatants,” and “battlefield” which constitute IHL today.

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<sup>51</sup> *Ibid.*, p. 28.

<sup>52</sup> *Ibid.*, pp. 28-29.

### 3. IHL, Arms Control and Disarmament Regimes in Response

#### A. Martens Clause and Article 36 of Additional Protocol I

How should the challenges against IHL be responded to? IHL provides certain provisions to address this question.

First, Article 1.2 of API stipulates that civilians and combatants remain under the protection and authority of the “principles of international law” derived from “established custom,” from the “principles of humanity” and from the “dictates of public conscience” in cases not covered by API or by other international agreements which are referred to as the Martens Clause.<sup>53</sup> The ICJ affirmed the importance of the Martens Clause “whose continuing existence and applicability is not to be doubted”<sup>54</sup> and stated that it “had proved to be an effective means of addressing rapid evolution of military technology.”<sup>55</sup> The ICJ also pointed out that the Martens Clause was “the expression of the pre-existing customary law.”<sup>56</sup>

A weapon which is not covered by the existing rules of IHL would be considered contrary to the Martens Clause if it is determined *per se* to violate the principles of humanity or the dictates of public conscience.<sup>57</sup> This general principle is important from the standpoint of preventing *lacunae in law* by providing flexibility in application of the rules of IHL.<sup>58</sup> It also works to give a link to the ethics underlying IHL and to open the way to look at International Human Rights Law to protect and promote human dignity.

Second, IHL applies to all means of warfare and methods of warfare. New weapons embracing emerging technologies are no exception in this regard. As Kellenberger pointed out, IHL is “designed to be flexible enough to adapt to technological developments” including those that could never have been anticipated at the time.<sup>59</sup> This point is explicitly stipulated in Article 36 of API,<sup>60</sup> according to which, in the study, development, acquisition or adoption of a new weapon, means or method of warfare, states parties are under an obligation to determine whether their employment would, in some or all circumstances, be prohibited by international law applicable to them. Article 36 is complemented by Article 82 of API, which requires that legal advisers be available at all times to advise military

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<sup>53</sup> Article 1.2, *supra* note 2. Meanwhile, Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects (CCW) also refers to Martens Clause in its preamble. 10 October 1980, 1342 UNTS 137.

<sup>54</sup> *I.C.J. Reports 1996, supra* note 3, p. 260, para. 87.

<sup>55</sup> *I.C.J. Reports 1996, supra* note 3, p. 257, para. 78.

<sup>56</sup> *I.C.J. Reports 1996, supra* note 3, p. 259, para. 84.

<sup>57</sup> ICRC, *A Guide to the Legal Review of New Weapons, Means and Methods of Warfare Measures to Implement Article 36 of Additional Protocol I of 1977* (ICRC, 2006), p. 17.

<sup>58</sup> *Vec, supra* note 6, p. 102.

<sup>59</sup> Jakob Kellenberger, *International Humanitarian Law and New Weapon Technologies*, Keynote address by President of ICRC delivered at the 34th Round Table on Current Issues of International Humanitarian Law, San Remo, 8-10 September (2011). At <https://e-brief.icrc.org/wp-content/uploads/2016/08/6-international-humanitarian-law-and-new-weapon-technologies.pdf>.

<sup>60</sup> Article 36, *supra* note 2.

commanders on IHL and “on the appropriate instruction to be given to the armed forces on this subject.”<sup>61</sup>

Article 36 of API can be the basis for the examination of the legality of new weapons, especially from the viewpoint of regulation of the use. This would not only strengthen IHL but would also contribute to the development of International Disarmament Law. However, there is a difference in view as to whether it can be applied to weapons other than conventional weapons due to the history of negotiations which assume that API was originally intended for regulating conventional weapons.<sup>62</sup> Article 36 of API is expected to play a pivotal role in regulating new weapons; however, one of the challenges arises from the composition of the state parties to the protocol as previously mentioned. How the implementation of Article 36 is ensured is also a challenge as it is respective state parties that ultimately have the right to interpret the provision for the implementation.

## B. Arms Control and Disarmament Regimes

International arms control and disarmament regimes have been formed, not only with reference to the principles and the provisions of IHL, but also in response to the challenges posed. International arms control and disarmament regimes, in addition to the use of weapons under the regulation of IHL during the conduct of hostilities, have regulated the development, test, production, manufacture, acquisition, possession, stockpiling and deployment of certain weapons in two ways.

First, there are multilateral legally binding instruments to specifically regulate weaponry for the purpose of arms control and disarmament. Yet such agreements among states have been formed rather reactively due to considerations of military interests and strategic stability. Looking at the history of arms control and disarmament, states have agreed to prohibit the use of: projectiles of a weight below 400 grams which are explosive or charged with fulminating or inflammable substances<sup>63</sup>; dum-dum bullets<sup>64</sup>; asphyxiating, poisonous or other gases<sup>65</sup>; biological weapons<sup>66</sup>; chemical weapons<sup>67</sup>; certain conventional weapons

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<sup>61</sup> ICRC, *supra* note 56, p. 5.

<sup>62</sup> For instance, Canada made a reservation to API at the time of ratification saying that “the rules introduced by Protocol I were intended to apply exclusively to conventional weapons.” At <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Notification.xsp?action=openDocument&documentId=172FFEC04ADC80F2C1256402003FB314>. ICJ said in 1996, “Nor is there any need for the Court to elaborate on the question of the applicability of Additional Protocol 1 of 1977 to nuclear weapons. It need only observe that while, at the Diplomatic Conference of 1974-1977, there was no substantive debate on the nuclear issue and no specific solution concerning this question was put forward.” I.C.J. *Reports 1996*, *supra* note 3, p. 259, para. 84.

<sup>63</sup> Declaration Renouncing the Use, in Time of War, of Explosive Projectiles under 400 Grammes Weight, Saint Petersburg, 29 November / 11 December 1868. At <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Article.xsp?action=openDocument&documentId=568842C2B90F4A29C12563CD0051547C>.

<sup>64</sup> Declaration (IV, 3) concerning Expanding Bullets, The Hague, 29 July 1899. At <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/385ec082b509e76c41256739003e636d/f1f1fb8410212aebc125641e0036317c>.

<sup>65</sup> Declaration (IV, 2) concerning Asphyxiating Gases, The Hague, 29 July 1899. At <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Article.xsp?action=openDocument&documentId=2531E92D282B5436C12563CD00516149>.

<sup>66</sup> Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, 10 April 1972, 1015 UNTS 163.

<sup>67</sup> Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction, 13 January 1993, 1974 UNTS 45.

such as booby traps, incendiary weapons and blinding laser weapons<sup>68</sup>; anti-personnel mines<sup>69</sup>; cluster munitions<sup>70</sup>; and most recently nuclear weapons<sup>71</sup>. Weapons embracing certain emerging technologies which would fall into the definition of those agreements would be regulated by the relevant instruments.

Second, the regimes for non-proliferation of certain technologies also provide an important international framework. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)<sup>72</sup> is a legally binding instrument which prohibits non-nuclear-weapon states from developing or acquiring nuclear weapons while obliging nuclear-weapon states not to transfer them or help others to develop or acquire them. There are non-legally binding frameworks whose purpose is to prevent the development and production of certain weapons, weapons of mass destruction in particular, through international cooperation by controlling the export of materials and technologies that can be used for such purposes. With regard to weapons of mass destruction, the Nuclear Suppliers Group (NSG)<sup>73</sup> and Zangger Committee (ZC)<sup>74</sup> seek to prevent nuclear proliferation by controlling the export of materials, equipment and technologies that can be used to manufacture nuclear weapons in order to fill perceived gaps in the NPT regulation, while the Australia Group (AG)<sup>75</sup> seeks to prevent the spread of chemical and biological weapons by controlling relevant materials, equipment and technologies. The Proliferation Security Initiative (PSI)<sup>76</sup> co-ordinates participating states' efforts to stop proliferation related to trade in weapons of mass destruction, related materials and delivery systems.

There are also regimes to prevent the proliferation of missiles and missile technologies: The Hague Code of Conduct against Ballistic Missile Proliferation (HCOG)<sup>77</sup> and Missile Technology Control Regime (MTCR)<sup>78</sup>. As for conventional weapons, The Wassenaar Arrangement (WA)<sup>79</sup> seeks to promote transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies, thus preventing destabilising accumulations. The aim is also to prevent the acquisition of these items by terrorists.

From the perspective of arms control and disarmament, legally binding instruments (hard law) and international cooperation frameworks for nonproliferation including political

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<sup>68</sup> Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects, 10 October 1980, 1342 UNTS 137. Protocols to the Convention cover non-detectable fragments; mines, booby-traps and other devices; incendiary weapons; blinding laser weapons; and explosive remnants of war.

<sup>69</sup> Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on Their Destruction, 3 December 1997, 2056 UNTS 211.

<sup>70</sup> Convention on Cluster Munitions, 30 May 2008, 2688 UNTS 39.

<sup>71</sup> Article 1(d), Treaty on the Prohibition of Nuclear Weapons (TPNW), 20 September 2017. At [https://treaties.un.org/doc/Treaties/2017/07/20170707%2003-42%20PM/Ch\\_XXVI\\_9.pdf](https://treaties.un.org/doc/Treaties/2017/07/20170707%2003-42%20PM/Ch_XXVI_9.pdf).

<sup>72</sup> Article 2, Treaty on the Non-Proliferation of Nuclear Weapons (NPT), 1 July 1968, 729 UNTS 161.

<sup>73</sup> Nuclear Suppliers Group (NSG). At <https://www.nuclearsuppliersgroup.org/en/>.

<sup>74</sup> Zangger Committee (ZC). At <http://zanggercommittee.org>.

<sup>75</sup> Australia Group (AG). <https://www.dfat.gov.au/publications/minisite/theaustraliagroupnet/site/en/index.html>.

<sup>76</sup> Proliferation Security Initiative (PSI). At <https://www.psi-online.info>.

<sup>77</sup> The Hague Code of Conduct against Ballistic Missile Proliferation (HCOG). At <https://www.hcoc.at>.

<sup>78</sup> Missile Technology Control Regime (MTCR). At <https://mtcr.info>.

<sup>79</sup> The Wassenaar Arrangement (WA). At <https://www.wassenaar.org>.

declarations (soft law) stand on the position of working complementarily in order to prevent weapons embracing certain emerging technologies. However, there is a concern that the ongoing rapid pace of innovation of military technologies may outpace these existing arms control and disarmament regimes. These are the reasons why new international regulations are called for with regard to weapons embracing certain emerging technologies, some of which do not still exist. Thus, the question here would be whether such weapons should be regulated or not, in some cases preemptively, and why. If the answer is yes, the next question would be to what extent the costs should be met for such a regulation in light of the characteristics of dual use of certain emerging technologies even when the harm is not present.

## 4. Ways Forward

### A. Possible Factors to be Considered in Discussions

When addressing the question as to the possible regulations of new weapons embracing certain emerging technologies, it should also be necessary to take into consideration military, political, societal and ethical factors as they shape norms in societies which provide the basis for regulations, either in the form of soft or hard law. The key question is why regulations on certain weapons embracing emerging technologies are necessary. This question interrogates the logic behind certain regulations. These can be grouped into three categories: lack of military necessity, humanitarian and human rights discourse, and risk management.

First, it is probably difficult to disregard the dimension of military necessity or military interests in security as IHL stands on the balance between military necessity and humanitarian considerations. It is rational that weapons deemed to be lacking military necessity are abandoned. What, then, are military interests? There is a position to consider the military interests in relation to military purposes. For instance, the US said that a weapon that may cause great injury or suffering is not prohibited "if the use of the weapon is necessary to accomplish the military mission."<sup>80</sup> On the other hand, there is a position to consider not only the purposes of using the weapon but also its effects. Simon O'Connor said that when considering the rule on unnecessary suffering, even if a proportionality assessment balancing the suffering against military necessity must be made, "it is important to assess the effects."<sup>81</sup>

According to the former position, virtually any weapon can be used because it is difficult to consider the use of weapons not related to military purposes. On the other hand, if the effects of using a weapon is considered in relation to the military interests, it is possible to scrutinise which, among the effects of using the weapons, contribute to military benefit and which do not. If it is difficult to correlate the effects of the use of the weapon with military

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<sup>80</sup> Letter dated 20 June 1995 from the Acting Legal Adviser to the Department of State, together with Written Statement of the Government of the United States of America, p. 28.

<sup>81</sup> Simon O'Connor, "Nuclear weapons and the unnecessary suffering rule," in Gro Nystuen, Stuart Casey-Maslen and Annie Golden Bersagel (eds.), *Nuclear Weapons under International Law* (Cambridge University Press, 2014), p. 144.

benefits, then alternatives are to be considered.<sup>82</sup> This influences a determination as to whether weapons “in the study, development, acquisition or adoption” would be in compliance with IHL. Military necessity does not justify everything.

Second, the relationship between weapons and human beings—in terms of both combatants and civilians—need to be revisited. This point is crucial in the sense that accelerated innovation of military technologies has brought about challenges against some of the key concepts such as “combatant” and “means of warfare” constituting IHL today. As explained before, weapons are instruments used by combatants against adversary combatants as legitimate targets during the conduct of hostilities. It is premised that combatants as human beings are in a position to utilise or operate weapons as means of warfare. However, accelerated innovation of military technologies especially brought by AI technologies raises the question as to whether machines can be agents in the choice of targets they are attacking according to an “enemy algorithm” without human consideration and intervention. The Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (CCW/GGE LAWS) refers to “human-machine interaction” in the Guiding Principle adopted in 2019 in this regard.<sup>83</sup> This raises the subsequent question as to who is responsible for such decisions lacking human control. With regard to the question, it should be underscored that the CCW/GGE LAWS also says, “Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system.”<sup>84</sup> This point potentially relates to regulations on other automated weapons.

Although the basic rules of IHL give the basis for humanitarian discourse on the prohibition of certain weapons to protect civilians, it is also necessary for human rights to be considered as reference points in order to protect human dignity. International Human Rights Law (IHRL) does not address any weapon directly in the stipulations; however, it is potentially relevant to any determination of the legality of use of weapons under international law as it “clarifies, complements and may in certain instance supersede, certain provisions of IHL” in a situation of armed conflict.<sup>85</sup> There is no doubt that IHRL works in the same manner when addressing the question of new weapons. The test of their legality will also be determined in terms of their compatibility with IHRL rules.

Third, the relationship between science, technology and society needs to be examined in order to enable ethical considerations. Science and technology, which have been driving innovation of military technologies, do not emerge from nothing. They are born in a society by incorporating specific interests and values of people at a certain period, and thus are

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<sup>82</sup> In the context of the rule of prohibition of unnecessary suffering rule, Christopher Greenwood pointed out that the essence of the rule is that it involves a “comparison between different weapons.” Christopher Greenwood, “The law of weaponry at the start of the new millennium,” in Leslie Green and Michael Schmitt (eds.), *International Law Studies*, Vol. 71: The Law of Armed Conflict: Into the Next Millennium (Newport, RI: US Naval War College, 1998), p. 197.

<sup>83</sup> CCW Doc, *supra* note 33, p. 13.

<sup>84</sup> *Ibid.*, p. 13.

<sup>85</sup> Stuart Casey-Maslen and Sharon Weill, “The use of weapons in armed conflict,” in Stuart Casey-Maslen (ed.), *Weapons Under International Human Rights Law* (Cambridge University, 2015), p. 240.

closely related to the way the society is. Science and technology are not only born in a society, they also reshape it.<sup>86</sup> Science and technological innovations are crucial factors in implementing changes in society. They interact with each other.

Are science and technologies “neutral” in society and should they be free from the values of people which constitute the norms of the society within which they live? This question is especially relevant since how risk assessment, management and communication should be performed is a crucial question in “risk society”<sup>87</sup> today<sup>88</sup> where “manufactured risk”<sup>89</sup> is at issue. It is also relevant to another question of “dual-use” technologies over how the relationship between civil use and military use of technologies should be understood and addressed.

## B. Actors in International Policy Processes

All the factors mentioned above provide a good basis for discussions and should be reflected by stakeholders in international policy processes. In policy processes, various relevant actors can be involved as stakeholders in setting agendas, presenting measures and countermeasures, and selecting policies through deliberations and decisions in international forums. Who, then, are the stakeholders in such processes? And how are security-related policies formed? How should they be decided?

With regard to the stakeholders involved, there is some belief that highly diplomatic and security-related policy processes should be undertaken only by governments in international society consisting of sovereign states.<sup>90</sup> This is inextricably linked with the question of whether civil society actors can and should be involved in the security policy processes. There is no doubt that governments of sovereign states are major and principal actors in such processes in international society today.

However, what has been happening over the decades is a “growing interconnectedness of states,” “the emergence of a system of global governance,” and the “explosion of the movements, groups, networks and organizations” that engage in a global or transnational public debate, as Mary Kaldor argued.<sup>91</sup> In reality, it would be difficult for governments to

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<sup>86</sup> In this context, it is noteworthy that the 2017 Asilomar Conference proposed guidelines for AI researchers that the development of artificial intelligence (AI) should be guided by 23 principles. Principle 10 on value alignment says, “Highly autonomous AI systems should be designed so that their goals and behaviors can be assured to align with human values throughout their operation.” At <https://futureoflife.org/ai-principles/?cn-reloaded=1>.

<sup>87</sup> Ulrich Beck, *Risk Society: Towards a New Modernity* (Sage Publications, 1992). Niklas Luhmann, *Socziologie des Risikos* (Walter de Gruyter, 1991).

<sup>88</sup> In the past, risks were thought about in an essentially “prospective way,” in terms of a calculable exposure to hazard across a group, and insecurity was “avoided” by “using a variety of techniques.” Jenny Steele, *Risks and Legal Theory* (Hart Publishing, 2004), p. 55.

<sup>89</sup> “Our relationship to science and technology today is different from that characteristic of early industrial society. ... We cannot simply ‘accept’ the findings which scientists produce, if only because scientists so frequently disagree with one another, particularly in situations of manufactured risk.” Giddens, *supra* note 27, p. 6.

<sup>90</sup> David Davenport said that it takes quite a “leap of logic” to conclude that NGOs should be setting standards and enforcing policies rather than one’s own national leaders, adding, “Unlike governments, ngos are really accountable to no one, which makes them potentially dangerous players in a political negotiation.” David Davenport, “The New Diplomacy,” *Policy Review*, No. 116 (Hoover Institution Press, December 2002 & January 2003).

<sup>91</sup> Mary Kaldor, “The Idea of Global Civil Society,” *International Affairs*, Vol. 79, No. 3 (May, 2003), p. 583.

meet all the public agendas, both in terms of their capacity and expertise. Also, monopolization of public values by governments is not desirable from a democratic perspective. Here, it is possible to find actors in civil society<sup>92</sup> involved in policy processes in order to contribute to the realisation of values that cannot be fully pursued and reflected by governments. Experts from the science and tech community, industry, academia as well civil society<sup>93</sup> can continue to play a significant role as they are capable of providing input into the development of policy processes with their professional knowledge and analysis.<sup>94</sup> That the above discussion does not apply to the policy processes concerning security-related policy seems to be empirically and theoretically unconvincing.<sup>95</sup>

## Conclusion

What is observed as the rapid pace of innovation of military technologies is not entirely new as explained before; however, the multiplication of new means of warfare and methods of warfare that rely on emerging technologies today seem exponential. The essential question arising today is whether the rules of IHL provide sufficient legal guidance to protect civilians, combatants and the environment in the face of rapid innovation of weapons brought by scientific technologies. The question is relevant not only in the sense that the innovation of military technologies enables the capabilities of destruction, launch, delivery and operation which weapons have to dramatically improve, but also in the sense that they bring about challenges against key concepts constituting IHL today.

These are the reasons why new international regulations are called for with regard to weapons embracing certain emerging technologies, some of which do not yet exist. Thus, the question here would be whether such weapons should be regulated or not, in some cases preemptively, and why. It is also followed by another tough question as to what extent regulatory costs should be paid for in light of the dual-use of certain emerging technologies even when the harm is not yet observed.

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<sup>92</sup> Civil society can be defined as the sector formed by actors who voluntarily act to realise public values which are distinct from those of governments in the governmental sector and companies in the market economy sector. Civil society organisations (CSOs) such as non-governmental organisations (NGOs) and non-profit organisations (NPOs), social movements and individuals act there as individuals and in networks, and their activities today impact international policy debates.

<sup>93</sup> There are global networks of CSOs seeking to achieve the prohibition of certain weapons such as International Campaign to Ban Landmines (ICBL), Cluster Munition Coalition (CMC), International Campaign to Abolish Nuclear Weapons (ICAN) and Campaign to Stop Killer Robots.

<sup>94</sup> For instance, the Report of the 2018 session of CCW/GGE LAWS said, "The valuable contribution of experts from the tech community, industry, academia and civil society to building awareness and understanding of the potential military applications of emerging technologies in the area of lethal autonomous weapons systems in the context of the Group's work was recognized. These inputs have been channeled mainly through experts participating in national delegations, panels put together at the invitation of the Chair, side events and open calls for contributions on the CCW website. They have ensured that the Group's policy consideration advances in step with developments in the technology field and a minimum degree of transparency regarding potential military applications is built up." CCW Doc. CCW/GGE.1/2018/3, p. 4.

<sup>95</sup> In this context, it is noteworthy that the TPNW in its preambular paragraph recognises the "efforts" undertaken by "non-governmental organizations, religious leaders, parliamentarians, academics and the hibakusha" as well as the United Nations, the International Red Cross and Red Crescent Movement, other international and regional organisations. C.N.476.2017.TREATIES-XXVI.9. At [https://treaties.un.org/doc/Treaties/2017/07/20170707%2003-42%20PM/Ch\\_XXVI\\_9.pdf](https://treaties.un.org/doc/Treaties/2017/07/20170707%2003-42%20PM/Ch_XXVI_9.pdf).

What IHL does is to address the questions about what has happened. The judicial remedy of IHL, which is one aspect of law, is oriented to the past in the sense that its main task is to resolve cases that have already occurred. Therefore, it also tends to *ex post* relief, as is typical for paying “compensation” for damages.<sup>96</sup> The challenge posed is to address the questions about what may happen in a risk society today. In such a society, the risk is more than just about uncertainty and ignorance. Rather, it has the characteristic that it is extremely difficult to grasp in advance the scale and magnitude of damage that impact society when a potential hazard becomes a harm in reality.<sup>97</sup> This may require further considerations beyond the existing rules of IHL in order to address the questions posed in the face of exponential innovation of military technologies, especially those that flow from emerging technologies.

The expansion of military power of the state in the hope of strengthening its security does not necessarily guarantee the increased sense of security. Weapons with more lethality and destructive power may not bring freedom from fear but in fact can amplify and deepen it as the logic of nuclear deterrence has proved. This bears upon the psychology of weapons driven by the unspoken logic of hostile confrontation. What is the point of the endless aspiration for the innovation of military technologies in the face of such a “security paradox”<sup>98</sup>? This is the crucial reference point when considering ways forward in the world where the existing peace and security architectures including IHL are faced with multiple challenges.

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<sup>96</sup> Article 91, *supra* note 2.

<sup>97</sup> In the context of nuclear weapons, Chair’s summary of the international conference on humanitarian impact of nuclear weapons said, “It is unlikely that any state or international body could address the immediate humanitarian emergency caused by a nuclear weapon detonation in an adequate manner and provide sufficient assistance to those affected. Moreover, it might not be possible to establish such capacities, even if it were attempted.” Espen Barth Eide, *Chair’s summary Humanitarian Impact of Nuclear Weapons*, The Conference on the Humanitarian Impact of Nuclear Weapons in Oslo 4–5 March 2013, at <https://www.regjeringen.no/en/historical-archival/Stoltenbergs-2nd-Government/Ministry-of-Foreign-Affairs/taler-og-artikler/2013/nuclear-summary/id716343>

<sup>98</sup> Jitsuro Tuchiya, *Anzenhoshou no Seijigaku* [International Politics on Security] 2<sup>nd</sup> edition (Yuhikaku, 2014), pp. 426-429.

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