

Unmanned Warfare Devices and the Laws of War: The Challenge of Regulation

Andrea Bianchi and Delphine Hayim*

Abstract: Unmanned warfare devices may change the way wars are fought and perceived. Conflicts may no longer be man-to-man battles but become more and more robotized. The current trend toward developing technology in the field of robotic warfare will undoubtedly continue. As of today, there is no specific international treaty or conventional provision prohibiting or regulating the use of unmanned means and methods of war. Without a rapid evolution of the legal framework, there will be a real hiatus between the laws and the reality of conflicts. This article examines the core regulatory challenges triggered by the emergence of new types of autonomous or semi-autonomous warfare devices. Robots present some unquestionable advantages, but also entail great risks regarding their potential capacity to create collateral damages among civilian populations. Besides the crucial question whether robots will be able to respect the IHL principles of distinction and proportionality, the issue of accountability and responsibility for breaches of the laws of war must also be a priority for lawmakers and regulators. The increasing dehumanization of war, coupled with the uncertainty on the ethical and legal limits applicable to the design, development, acquisition, transfer and deployment of military robots, makes regulation of unmanned warfare devices a compelling necessity.

Keywords: Unmanned warfare devices, military technology, law of armed conflict, proportionality, responsibility, ethics
Unbemannte Waffen, Militärtechnologie, Kriegsvölkerrecht, Proportionalität, Verantwortung, Ethik

Unmanned warfare devices may change the way wars are fought and perceived. Conflicts may no longer be man-to-man battles but become more and more robotized. The level and nature of casualties and damages during warfare would be dramatically different, if it becomes possible to wage a war and conduct hostilities almost without any human intervention. The trend toward developing unmanned warfare will undoubtedly continue.¹ The constant growth of unmanned warfare – triggered by the need to secure constant surveillance against terrorist threats after 09/11 and by the propensity of these arms to ‘undertake dull, dirty and dangerous roles’² – and the increasing dehumanization of armed conflicts will most likely entail a paradigm shift in military and political strategies. Inevitably, technological innovation will soon prompt the need for the laws of war to adjust to such new realities.

Throughout history every new method of warfare or any new weapon has led to new regulations. Without a rapid evolution of the legal framework, there will be a real hiatus between the laws of war and the reality of conflict. Forty-five nations are now building, buying and using military robots.³ The US army possesses 7000 unmanned aerial systems and 12000 unmanned ground vehicles. By 2015, one third of

US military systems and vehicles could be robotic.⁴ First generation military robots are generally operated under direct human control (drones), but military systems tend toward increased autonomy.⁵ The regulation of autonomous military robots is delicate, as the deployment of these weapons in the field is not yet a reality, although some weapons in use are programmed to respond automatically to threats, have some antipersonnel functions and are in some case designed to be offensive.⁶ Law is reluctant to prohibit or restrain the use of weapons which have not shown their real effects and consequences.⁷

Technology in the field of robotic warfare has undertaken major changes in the past fifty years, and States inject more and more money into the development of this new generation of weapons.⁸ There are many types of unmanned or robotic

4 The US has published several plans for unmanned aircraft vehicles, ground vehicles and naval vehicles, as well as long-term roadmaps. See Office of the US Secretary of Defense, *Unmanned Aircraft Systems Roadmap 2005-2030* (2005); United States Air Force, *United States Air Force Unmanned Aircraft Systems Flight Plan 2009-2047* (2009); Pentagon, *Joint Robotics Program Master Plan FY 2005 Defense System/ Law Warfare and Munitions*, Washington (2005); Department of the Navy, *The Navy Unmanned Undersea Vehicle Master Plan* (2004); and US Department of Defense, *Unmanned Systems Roadmap 2007-2032* (2007) and *Unmanned System Integrated Roadmap 2011-2036* (2011). Note that President Obama launched the National Robotics Initiative in 2011 in order to foster the development and the use of robots in the US.

5 Autonomy can be here understood as “the capacity to operate in the real-world environment without any form of external control for extended periods of time.” George Bekey, *Autonomous Robots: From Biological Inspiration to Implementation and Control* (Cambridge: MIT Press, 2005), 102.

6 Human Rights Watch, *Losing Humanity – The Case against Killer Robots* (2012): 3. Available at: <http://www.hrw.org/reports/2012/11/19/losing-humanity-0>, accessed 26 February 2013.

7 The 1995 Protocol on Blinding Laser Weapons, Protocol IV of the 1980 Convention on Certain Conventional Weapons, represents an exception, as blinding laser weapons had been rarely used in battlefield at the time of the adoption of the Protocol.

8 The 2013 US budget provides for \$3.8 billion only for unmanned air systems. See the Budget of the Department of Defense, available at <http://comptroller.defense.gov/budget.html>, accessed 25 February 2013. Between 2007 and 2012, the US Department of Defense spent approximately 6 billions annually on research and development of unmanned systems for war. See US Department of Defense, *Unmanned System Integrated Roadmap FY 2011-2036* (2011): 13.

* Andrea Bianchi is Professor of International Law, The Graduate Institute, Geneva, Delphine Hayim is Post-Doctoral Fellow, Faculty of Law, University of Geneva. This article is double-blind peer-reviewed.

1 Attempts to build up remotely operated weapons have been undertaken since the end of the 19th century and have continued throughout the 20th century, especially during the two World Wars. For an overview, see Mark E. Peterson, “The UAV and the Currents and Future Regulatory Construct for Integration into the National Airspace System”, *Journal of Air Law and Commerce* 71 (2006): 535 and seq.

2 US Department of Defense, *Unmanned Aircraft System Roadmap 2007-2030* (2007): 38. See also Robert K. Ackerman, “Persistent Surveillance Comes into View”, *Signal Magazine* (May 2002): 18.

3 USA, Germany, Canada, France, Australia, Israel, South Korea, Switzerland, the United Kingdom, Russia and China, among others.

warfare devices: unmanned air vehicles, unmanned ground vehicles and unmanned underwater vehicles. They can be used to support field operations, gather information, undertake reconnaissance or surveillance operations, or to take pictures of the battlefields. Some are utilized to kill and can be equipped with lethal weapons.⁹

Robots can be fully autonomous or semi-autonomous and can be operated by remote control functions (wireless modem or Internet-controlled by a human).¹⁰ As of today, there is no agreed legal definition of unmanned warfare devices.¹¹ The use of terms, such as autonomy, autonomous or robots varies among militaries, politicians, civilians and academics. There is no specific international treaty or conventional provision prohibiting or regulating the use of unmanned warfare devices. The law often has to adjust to new societal developments, and international humanitarian law (IHL) is no exception. As no international instrument regulates the use of unmanned weapons, one needs to refer to existing laws and regulations to assess their legality (both treaty law and customary law). It is of note that Article 36 of Additional Protocol I to the Geneva Convention imposes on States that the use of any new weapon respect the requirements of IHL.¹² The review of weapons should take place at the earliest stage and continue throughout their development and practical deployment.¹³

1. The Pros and Cons of Unmanned Warfare Devices

Unmanned weapons are not inherently inhuman or indiscriminate weapons.¹⁴ They are not illegal per se, but can breach principles of IHL depending on their actual use in the battlefield. Obviously, malfunctioning and bugs can occur and some unselective and unpredictable damages can be inflicted on innocent populations, but the same is true for any attack launched by a human being. Military robotized technology is subject to heavy criticism mainly directed to the terrible consequences of mismanagement or mistakes. The ethical and legal stakes underlying research and development in this area are obviously very high.

The most compelling issue seems to be the extent to which unmanned warfare devices, including robots, can actually respect the core IHL principles of distinction and proportionality.¹⁵ Is a robot able to discriminate between a soldier and a civilian? Can it differentiate between a wounded, retreating or surrendering soldier and a fighting soldier, or between a child and a mercenary? This evaluation is even more complex with the emergence of new types of conflicts, for instance guerrilla war, as non-uniformed insurgents' main strategy may consist of blending in with civilian population.¹⁶

Could an artificial intelligence-guided machine undertake an assessment of the military advantage and the expected collateral damage? Some authors firmly believe that one day it will be possible to inculcate in robots some ethical codes and

9 For an overview of the evolution of unmanned warfare devices, see Brendan Gogarty and Meredith Hagger, "The Laws of Man over Vehicles Unmanned: The Legal Responses to Robotic Revolution on Sea, Land and Air", *Journal of Law, Information and Science* 19 (2008): 85-93; also Brendan Gogarty and Isabel Robinson, "Unmanned Vehicles: A (Rebooted) History, Background and Current State of Art", *Journal of Law, Information and Science* 21(2) (2011): 21-34.

10 Some research has been made on a novel military technology, whereby soldiers could control robots via a direct neural connection. This new area is called neurowarfare. For more information, see Stephen E. White, "Brave New World: Neurowarfare and the Limits of International Humanitarian Law", *Cornell International Law Journal* 41 (2008): 177-210; Nicholas Evans, "Emerging Military Technologies: A Case Study in Neurowarfare", in *New Wars and New Soldiers*, ed. Paolo Tripodi et al. (Farnham/Surrey: Ashgate Publishing, 2011), 105-116.

11 "Autonomous weapon system is a computerized system that does not rely on a human controller in order for it to undertake its day-to-day operations." Definition given by Jason Borenstein, "The Ethics of Autonomous Military Robots", *Studies in Ethics, Law and Technology* 2(1) (2008):2.

12 *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (hereafter Protocol I)*, 8 June 1977, Article 36 – New weapons: "In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party." The ICRC Commentary on Article 36 highlights autonomous weapons as an area of concern. It makes it clear that High Contracting Parties are obliged to determine the legality or illegality of the use of any new weapon and that this obligation only concerns the normal or expected use of the weapon at the time of the evaluation. See Commentary on Protocol I, available at <http://www.icrc.org/ihl.nsf/COM/470-750045?OpenDocument>, accessed 25 February 2013.

13 International Committee of the Red Cross, *A Guide to the Legal Review of New Methods, Means and Methods of Warfare: Measures to Implement Article 36 of Protocol I* (2006): 4.

14 One of the underlying principle of the law of armed conflict is the principle of humanity, which had been expressed in the so-called Clause de Martens, a clause that was included in the Hague Conventions of 1899 and 1907 by Friedrich von Martens. It has since then been included in many other treaties. A modern version of that clause can be found in Article 1, paragraph 2 of Additional Protocol I, which reads as follows: "In cases not covered by this Protocol or by other international agreements, 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." The International Court of Justice noted: "The Court would likewise refer (...) to the Martens Clause, which was first included in the Hague Convention II with respect to the Laws and Customs of War on Land of 1899 and which has proved to be an effective means of addressing the rapid evolution of military technology." International Court of Justice, *Legality of the threat or use of nuclear weapons*, Advisory Opinion, 8 July 1996, ICJ Reports 1996, § 78.

15 The principle of distinction lies at the heart of IHL. Article 48 (Basic Rule) of Protocol I explicitly stipulates: "In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives." A disproportionate attack is defined as "an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated", Article 51 (5) (b), Protocol I.

16 The following solutions were suggested in order to bypass the issue of distinction: (1) robots should be allowed to target only weapons and other robots; (2) robots should only operate in heavy fighting zones from where civil population has fled; (3) robots shouldn't have any lethal power. See John Canning, American Society of Naval Engineers, *Proceedings of Engineering the Total Ship Symposium, Weaponized Unmanned System: A Transformational War fighting opportunity, Government Role in Make it Happen* (September 2008) and Noel Sharkey, "Grounds for Discrimination: Autonomous Robots Weapons", *RUSI Defense Systems* 11(2) (October 2008): 86-89.

to make them respect laws.¹⁷ The majority of commentators, however, agree that this kind of evaluation requires some rational reasoning, which takes into consideration the external environment, the enemy's intention and other factors relevant to the situation. Only a human being is able, for the moment, to undertake this mental, highly-subjective balancing exercise.¹⁸ IHL rules are often very complicated and need to be interpreted and enforced in the light of the context on the ground, changing circumstances and the consequences of particular acts or omissions.¹⁹ For the time being, robots do not possess the capacity to make such multiple-factor assessments, even though scientists and engineers are working towards the creation of software and programmes integrating these dimensions. Admittedly, imprecise rules, often replete with exceptions, as well as unpredictable combat scenarios can hardly be transformed into algorithms and effectively programmed in advance.²⁰ One may oppose to this argument that human soldiers must also deal with unforeseen situations and that also they are not always able to take the right decision. Military robots' opponents assume that it will never be possible to design a perfect and totally reliable machine. The current state of research and development shows that a robot will never act exactly as a human being. But is this sufficient to condemn the use of unmanned warfare in every situation? In certain circumstances, machines can be more efficient than a soldier and better at preventing needless loss of life.²¹

It is clear that unmanned weapons present some advantages. They reduce the costs in terms of human life. Human lives

can be spared not only on the side of the high-tech state, as robots replace human soldiers in the battlefield, but also on the side of the enemy state, as unmanned warfare are supposed to permit more accuracy in targeting.²² They may also reduce economic costs, as robotic systems will become cheaper, and training costs could decrease through the use of simulation. Robots are force multipliers, fewer soldiers are needed for a given mission and an individual soldier can do all alone a job that now requires many soldiers. Robots could intervene in humanitarian crises, in post-conflict situations and in peacekeeping operations. The use of unmanned systems permits the extension of the battle space to previously inaccessible areas and expands the fighter's reach, by allowing the soldier to see or strike farther.²³ Furthermore, these weapons are supposed to be very precise and could, therefore, better than humans identify, track and discriminate among potential targets.²⁴ Aerial vehicles can fly at a lower altitude and can be equipped with robotic sensors. They also enhance real-time aerial surveillance possibilities, thus allowing exercising a greater precaution in attacks.²⁵ Robotic systems have the capacity to integrate a lot of information coming from multiple sources, which can be useful to evaluate the necessity and the proportionality of an attack.

In a strictly IHL perspective, one could argue that, since robots can be more precise and accurate than other weaponry, belligerents possessing this type of warfare devices would have the obligation to use them, as IHL prescribes that all feasible measures to reduce collateral damage must be taken.²⁶ Consequently, as a matter of military necessity, high-tech states are subject to stricter standards in verifying targets and taking precautionary measures than belligerents with traditional weapons.²⁷ This example shows that any military robotics 'revolution' would alter the fundamental tenets of IHL, including the principle of equality of the parties, and entail a major impact on the interpretation and application of the rules of IHL.

Robots possess the ability to act conservatively, they do not need to protect themselves in cases of low certainty of target identification, and they can be used in a self-sacrificing

17 Ronald C. Arkin, *Governing Lethal Behaviour in Autonomous System* (Broken Sound Parkway: Taylor and Francis, 2009). Ronald Arkin thinks that it will be possible in the near future to construct an ethical governor, namely an autonomous robotic system architecture that is capable of using force ethically. The main objective of Arkin is to develop "A class of robots that not only comply with restrictions on international law, but in fact outperform human soldiers in their ethical capacity under comparable circumstances." Ronald C. Arkin, "The Case for Ethical Autonomy in Unmanned Systems", *Journal of Military Ethics* 9 (December 2010): 10. See also, John McGinnis, "Accelerating AI", *North-western University Law Review* 104 (2010); Peter Asaro, "Modelling the Moral User", *IEEE Technology and Society* 28 (2009). See the very interesting report by Patrick Lin, Keith Abney and George Bekey, "Autonomous Military Robotics: Risk, Ethics and Design" (December 2008), http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1001&context=phil_fac, accessed 7 February 2013.

18 Noel Sharkey, "Grounds for Discrimination: Autonomous Robots Weapons", *RUSI Defense Systems* 11(2) (October 2008): 89; Jason Borenstein, "The Ethics of Autonomous Military Robots", *Studies in Ethics, Law and Technology* 2(1) (2008): 7; Tony Gillespie and Robin West, "Requirements for Autonomous Unmanned Air Systems set by Legal Issues", *The International C2 Journal* 4(2) (2010): 4; Markus Wagner, "Taking Humans Out of the Loop: Implications of International Humanitarian Law", *Journal of Law, Information and Science* 21(2) (2011-2012): 163; Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Farnham, Surrey: Ashgate, 2009), 99.

19 For example, there is no consensus on the definition of direct participation in hostilities, which would permit to clearly distinguish between civilians and combatants. An attempt can be found in the *Interpretive guidance on the notion of direct participation in hostilities under international humanitarian law*, ICRC publication (2009), available at <http://www.icrc.org/eng/resources/documents/article/review/review-872-p991.htm>, accessed 2 March 2013. It is also very difficult to define proportionality and the exact relation between military advantage and collateral damages, as well as to exactly determine what constitutes unnecessary sufferings. See David Kennedy, *Of War and Law* (Princeton, Princeton University Press, 2006), 144: "How should we evaluate the irreducibly imaginary quality of the promise that costs and benefits will be weighed, that warfare will be proportional, its violence necessary?"

20 Noel Sharkey, "Automated Killers and the Computing Profession", *Computer* 40(11) (2007): 122. The author recognizes the difficulty to pre-program a machine to handle the infinite number of scenarios it might face.

21 Ronald C. Arkin, "Governing Lethal Behavior: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture", *Technical Report* (2007), <http://www.cc.gatech.edu/ai/robot-lab/online-publications/formalizationv35.pdf>, accessed 27 February 2013

22 Andy Myers, "The Legal and Moral Challenges Facing the 21st Century Air Commander", *Royal Air Force Power Review* 10 (2007): 89. The author argues that the increased precision of unmanned vehicles make attacks more proportional by reducing collateral damages and civilian deaths.

23 "Battlefields have been replaced by battlespaces." Michael N. Schmitt, "War, Technology and the Law of Armed Conflict", in *The Law of War in the 21st Century: Weaponry and the Use of Force*, ed. Anthony Helm (Newport: Naval War Law College, 2006), 149.

24 Jack M. Beard, "Law and War in the Virtual Area", *American Journal of International Law* 103 (2009): 415.

25 Articles 57 and 58 of Protocol I explicitly define the principle of precaution.

26 Article 57 (2) (a) (ii) of Protocol I states: "With respect to attacks, the following precautions shall be taken: (ii) take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects..."

27 "How should the US military itself react to the escalating public demand that it wage war without collateral damage – or the tendency to hold the military to an ever higher standard as its technologies capabilities increase?" David Kennedy, *Of War and Law* (Princeton: Princeton University Press, 2006), 8; see also Michael N. Schmitt, "War, Technology and the Law of Armed Conflict", in *The Law of War in the 21st Century: Weaponry and the Use of Force*, ed. Anthony Helm (Newport: Naval War Law College, 2006), 137 and seq.

manner if needed.²⁸ An additional asset is that robots are not moved by emotions and can act without feelings of fear, stress, revenge or compassion. Unmanned systems do not possess sentiments that can alter behaviour or judgement and result in anger or frustration. Moreover, machines do not suffer from fatigue. Human feelings can cloud a soldier's judgement in ways detrimental to the observance of IHL.²⁹ Furthermore, the spirit of comradeship and solidarity shared by troops may lead soldiers to cover their mates when they commit abuses or behave improperly. Robots could serve as monitoring and accountability mechanisms as they can exert a constant surveillance and record any act or omission which violates the laws of war.³⁰

Unmanned warfare devices also imply some risks. They tend to increase the gap between technologically-advanced, rich countries and poor countries, potentially leading to more and more asymmetric wars. This might in turn prompt more frequent terrorist attacks in response, as well as recourse to perfidious strategies in flagrant contradiction with IHL, such as using human shields, pretending to have a protected status or hiding among the civilian population. This dynamic, inherent in any asymmetrical conflict, would inevitably lead to an escalation of violence and to widespread violations of IHL.³¹ It appears that respect for IHL works better when belligerent parties are on an equal footing and share the same values and military ethics. However, if a strong ideological opposition as well as huge discrepancies in terms of armament and technology, resources and logistics exist between the belligerents, the latter would tend to follow "the-eye-for-an-eye and a tooth-for-a-tooth" rule.

The use of drones and other unmanned vehicles may lead to anger and frustration among the targeted population,³² Bugs, errors, technical malfunctioning of robots, as well as their vulnerability to environmental factors might increase collateral damages among civilian populations. Identification of the chain of command would be difficult and accountability issues may arise, especially when the human is completely

out of the loop. Terrorists and other non-state actors might acquire such devices and use them to carry out attacks.³³ These robots are also vulnerable to hackers, who could reprogram them and have them carry out dreadful actions. This raises the problem of cyber-criminality and cyber warfare, two domains that are subject to debate among international lawyers.³⁴ One could also imagine that these warfare devices could be a great repressive tool at the service of dictatorships, authoritarian systems and rogue states. The development of any new military technology brings about legal and ethical challenges related to its use and raises the issue of its regulation, production, acquisition, and commercialisation.³⁵

2. The Quandary of Regulation

What could be the best solution in order to regulate the use of unmanned warfare devices? It is clear that some explicit regulation is required as the applicability of existing rules is often unclear. Moreover, IHL addresses human conduct and, in case of totally autonomous weapons, some new rules would be necessary to deal with robotic actions. Some authors recommend a total ban of unmanned warfare.³⁶ A complete prohibition seems unrealistic, as major military powers have already invested a large amount of money in the development of these devices, and states usually do not tend to prohibit arms they already possess. Others advocate some regulations, by way of either hard law (international convention or framework treaty) or soft law (codes of conduct) concerning the use, design, development, acquisition, transfer and deployment of unmanned weapons.³⁷ The issue of how to prevent the proliferation of unmanned warfare devices is also important, as terrorist and non-state actors can easily acquire them. One first useful step might consist of defining, or at least classifying what is considered to be an autonomous unmanned weapon and agree on its role and functions in warfare, as well as on the admissible level of lethal power unmanned devices could possess.

28 Ronald C. Arkin, "Governing Lethal Behavior: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture", *Technical Report* (2007), <http://www.cc.gatech.edu/ai/robot-lab/online-publications/formalizationv35.pdf>, accessed 27 February 2013.

It seems counter-productive to develop devices and robots without any sense of self-defence or self-preservation. Governments are investing billions of money to develop new means and methods of warfare. Self-defence capacities would be important to ensure some longevity to military robots and to protect them against capture and hacking.

29 A report of the US Surgeon General Office assessing the battlefield ethics and the mental health of soldiers and marines deployed in Operation Iraqi Freedom shows the negative impact of human emotions on IHL rules' observance. US Army, Office of the Surgeon General, Mental Health Advisory Team IV, *Final Report* (17 November 2006). The main results can be found at <http://www.defense.gov/News/NewsArticle.aspx?ID=33055>, accessed 25 February 2013.

30 "...flowing from persistent surveillance brings with it new expectations, together with unprecedented levels of transparency." Jack M. Beard, "Law and War in the Virtual Area", *American Journal of International Law* 103 (2009): 419.

31 Michael N. Schmitt, "Asymmetrical Warfare and International Humanitarian Law", *Air Force Law Review* 62 (2008): 13-15; Robin Geiss, "Asymmetric Conflict Structures", *International Review of the Red Cross* 88 (2006): 757-777.

32 On this issue, see "Living under drones: Death, Injury, and Trauma to Civilians From US Drone Practices in Pakistan", Stanford Law School and NYU School of Law (September 2002) accessed 10 February 2013, http://livingunderdrones.org/wp-content/uploads/2012/09/Stanford_NYU_LIVING_UNDER_DRONES.pdf.

The report points to the mental health impact of US drone strikes and the presence of drones on local populations in Pakistan, at pp. 80-88.

33 It is reported that Hezbollah and the FARC already possess some operative unmanned aircraft vehicles. See Elizabeth Quintana, "The Ethics and Legal Implications of Military Unmanned Vehicles", Occasional Paper, RUSI, (2008) available at http://www.rusi.org/downloads/assets/RUSI_ethics.pdf, accessed 15 February 2013: 11.

34 The issue of cyber criminality is outside the scope of this article. For an overview, see Fred Schreier, "On Cyberwarfare", *DCAF Horizon Working Paper 2015 Series 7* (2012), <http://www.dcaf.ch/Publications/On-Cyberwarfare>, accessed 25 February 2013; David Turns, "Cyber Warfare and the Notion of Direct Participation in Hostilities", *Journal of Conflict and Security Law* 17(2) (2012): 279-297.

35 Peter W. Singer, "Defending against drones: How our new favourite weapon in the War on Terror could soon be turned against us", *Newsweek* (8 March 2010).

36 Human Rights Watch, *Losing Humanity – The Case against Killer Robots* (2012), <http://www.hrw.org/reports/2012/11/19/losing-humanity-0>, accessed 26 February 2013; Sharon Weinberger, "Charity Battles Imaginary Killing Machines", *Wired Blog*, <http://www.wired.com/dangerroom/2008/03/charity-will-ba/>, accessed 27 February 2013.

37 One must take into consideration the fact that applying pre-existing rules to a new technology raises the issue of whether the rules are sufficiently clear in the light of the technology's characteristics. Keynote of Dr. J. Kallenberger, President of the ICRC, *International Humanitarian Law and New Weapon Technology*, Round Table on Current Issues of International Humanitarian Law, San Remo (September 2011). See also Jason Borenstein, "The Ethics of Autonomous Military Robots", *Studies in Ethics, Law and Technology* 2(1) (2008): 12; Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Farnham, Surrey: Ashgate, 2009), 89-117.

Another central question, and probably the most challenging, is the issue of responsibility for breaches of the laws of war. Unmanned warfare systems do not fit the traditional chain of command paradigms of the laws of war, which in turn creates a “responsibility gap”.³⁸ Who will be held responsible if a robot commits a violation or even a war crime? Would it be the manufacturer, the programmer or the software designer? Or would it be the commanding officer who authorized the operation, or the operator, or the politicians who decided to wage the war? The dilemma is even harder in relation to totally autonomous systems that are able to take decisions without any human intervention and could therefore act outside the bond of their initial programming. How can one imagine that a totally autonomous robot could be held accountable and punished for breaching the law?³⁹ Would military robots have the ability to disobey a supervisor’s command or would they be exclusively designed to follow orders as sheer executants? In addition to these interrogations, criminal responsibility requires a violation and intent; will it be possible in the future to prove a machine’s intent to kill or hurt?

As mentioned earlier in this paper, law has to adapt to new realities. The notion of legal personality must therefore also evolve, in order to take into consideration new subjects that fulfil functions that were previously the monopoly of human beings. In many cases, military unmanned vehicles still act on behalf of others, and this implies that legal responsibility falls on the person authorizing the machine to act.⁴⁰ However, lawyers must start thinking how to adjust the extant rules to the emergence of robots as subjects accountable at law. Let us assume for a moment that robots become duty-bearers: Does that entail that they will be entitled to hold personal rights? A recent paper from a MIT researcher suggests that humans should grant rights to robots, as we tend to create some emotional bond with them and treat them as peers.⁴¹ Legal systems already confer some “partial” rights to non-

human entities, such as animals or corporations, so why not considering robots as quasi-persons?⁴²

Most commentators tend to accept that there must always be a “human in the loop”: the decision to use a lethal weapon should always be taken by a responsible and rational human being endowed with qualities allowing him/her to understand other human beings and their intent.⁴³ Some authors include in the notion of “human on the loop” cases in which human control is exercised not in relation to each single action, but over the operation of the weapon as a whole.⁴⁴ Be that as it may, it remains crucial to establish a clear chain of responsibility; each individual involved in the process should take its responsibility and be aware that she/he has some legal obligations. Given that human intervention slows the pace of battle and that there are costs associated with having human beings controlling the machines, the will of states to keep human beings in the loop can aptly be doubted.

Another major issue is that by using robots, instead of human soldiers, violence and conflicts are somewhat depersonalized. In the case of drones, the operator sitting in front of its computer in Nevada and directing a missile toward a target in Pakistan is emotionally detached from the battlefield and sometimes does not fully realise that she/he is killing people. It is reported that, even if some operators are enduring huge amount of stress, some of them have the feeling of “playing a videogame”. They tend to lose sight of the value of human life and they seem no longer restrained by the natural human inhibition not to kill or hurt, which is usually triggered and even reinforced by the vision of horrors and deaths.⁴⁵ It must be conceded, however, “that close proximity between enemies is far from being a panacea against illegitimate killing”: one needs only think of Rwanda.⁴⁶

38 Andreas Matthias, “The Responsibility Gap: Ascribing Responsibility for the Actions of Learning Automata”, *Ethics and Information Technology* 6 (2004): 183.

39 Robert Sparrow, “Killer Robots”, *Journal of Applied Philosophy* 24(1) (2007): 72-74. One may doubt the deterrent effect of sanctions upon the robot, as well as the satisfaction of the victims seeking reparation.

40 Ronald Arkin is developing specific software called “Responsibility Advisor”, which could advise the commander on the lawfulness of the use of the robot in a particular situation: “Responsibility Advisor: This component forms a part of the human-robot interaction interface used for pre-mission planning and managing operator overrides. It advises, in advance of the mission, the operator(s) and commander(s) of their ethical responsibilities should the lethal autonomous system be deployed for a specific battlefield situation. It requires their explicit acceptance (authorization) prior to its use. It also informs them regarding any changes in the system configuration, (...) In addition, it requires operator responsibility acceptance in the event of a deliberate override of an ethical constraint that prevents the autonomous agent from acting.” Ronald C. Arkin, “Governing Lethal Behavior: Embedding Ethics in a Hybrid Deliberative/Reactive Robot Architecture”, *Technical Report* (2007): 8. <http://www.cc.gatech.edu/ai/robot-lab/online-publications/techinwar-arkin-final.pdf>, accessed 27 February 2013.

41 According to Kate Darling, robots do not need rights on par with humans, but due to the emotional connections humans can create with them, it may be beneficial to confer to them rights similar to those we have given to our pets. It is also a way to protect societal values and to promote socially desirable behaviours. Kate Darling, “Extending legal rights to social robots”, *We Robot Conference Miami* (23 April 2012). It is of note that South Korea is currently drafting a Robot Ethics Charter that covers standards for robotics users and manufacturers, as well as guidelines on ethical standards to be programmed into robots. Also on robots ‘rights’, Peter W. Singer, *Wired for War* (New York: The Penguin Press, 2009), 403-407.

42 Patrick Lin, Keith Abney and George Bekey, “Autonomous Military Robotics: Risk, Ethics and Design” (December 2008): 55 and seq. http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1001&context=phil_fac, accessed 7 February 2013.

43 Peter W. Singer, *Wired for War* (New York: The Penguin Press, 2009), 389; Robert Sparrow, “Robotic Weapon and the Future of War”, in *New Wars and New Soldiers*, ed. Paolo Tripodi et al. (Farnham/Surrey: Ashgate Publishing, 2011), 121; Elizabeth Quintana, “The Ethics and Legal Implications of Military Unmanned Vehicles”, Occasional Paper, RUSI (2008): 18. Available at http://www.rusi.org/downloads/assets/RUSI_ethics.pdf, accessed 15 February 2013.

See the official Statements of the US Department of Defense, *Unmanned System Roadmap FY 2011-2036* (2011): 17 and the UK Ministry of Defense, *UK Approach to Unmanned Aircraft System* (2011): 5-4, both acknowledging that decisions over the use of lethal force and the choice of targets will remain under human control. “...apart from some niche tasks, human intervention will continue to be required at key stages of an unmanned aircraft’s mission if it involves weapon-delivery.”

44 Robert Sparrow, “Robotic Weapon and the Future of War”, in *New Wars and New Soldiers*, ed. Paolo Tripodi et al. (Farnham/Surrey: Ashgate Publishing, 2011), 121; Peter W. Singer, *Wired for War* (New York: The Penguin Press, 2009), 123-124.

45 Widely known as « Playstation » mentality. See Noel Sharkey, “Saying No! To Lethal Autonomous Targeting”, *Journal of Military Ethics* 9 (2010): 372. On this issue, see also Philip Alston and Hina Shamsi, “A Killer above the law? Britain’s use of drones in war in Afghanistan must be in accordance with international law”, *The Guardian*, 8 February 2010; <http://www.cc.gatech.edu/ai/robot-lab/online-publications/formalizationv35.pdf>; Armin Krishnan, *Killer Robots: Legality and Ethicality of Autonomous Weapons* (Farnham, Surrey: Ashgate, 2009), 130; Elizabeth Quintana, “The Ethics and Legal Implications of Military Unmanned Vehicles”, Occasional Paper, RUSI (2008): 20, available at http://www.rusi.org/downloads/assets/RUSI_ethics.pdf, accessed 15 February 2013.

46 Robert Sparrow, “Robotic Weapon and the Future of War”, in *New Wars and New Soldiers*, ed. Paolo Tripodi et al. (Farnham/Surrey: Ashgate Publishing, 2011), 119.

Wars seem to be far away from the general public and the media, and the lack of major human involvement in combat contributes to the misleading perception that no real war is being fought. Wars become less bloody and more acceptable for public opinion, and thus easier to wage.⁴⁷ Hence, the use of robots can affect *jus ad bellum* by lowering the incentives to limit recourse to the use of force.⁴⁸ This war-dehumanizing tendency is favoured by the aura of confidentiality and secrecy surrounding drones and other unmanned devices campaigns. The recent hearing of John Brennan before the US Senate on Obama counter-terrorism policy attests to this trend.⁴⁹ Some military circles fear that extensive use of robots will completely change the human role in warfare and affect military virtues such as chivalry, sacrifice and courage, usually seen as factors restraining soldiers' misbehaviour.⁵⁰

3. Conclusion

A rapid response to the advances of military technology in the domain of unmanned warfare devices is warranted. The laws of armed conflict were designed for men-to-men wars. Robots and unmanned devices were clearly not included.⁵¹ In particular, the issue of legal accountability for their use under the laws of war seems the most urgent question to be tackled. Beside legal challenges, military robots pose a real ethical dilemma that needs to be broached. Not surprisingly, many commentators look at this moral dimension and at the ways to introduce ethical standards and considerations that can be made relevant to the use of these devices.⁵² The fear that robots will one day take over power and defeat humanity is not new and has been a recurrent theme in the works of filmmakers and novelists.⁵³ The main question is how to control and set up limitations on robotics technology. The actual lack of legal regulation proposals allows morality

to dominate the debate.⁵⁴ We are trying to build machines with increasing capabilities and to make robots similar to humans. Scientists are working on developing artificial intelligence. The risk that robots become totally autonomous and act without any human intervention is not a chimera. All relevant stakeholders must realize this reality and proceed to reasonable risks assessments.

As regards potential outcomes in regulating the use of unmanned warfare devices, a first step could consist of drafting a soft law instrument. A set of guiding principles or a code of conduct concerning the use, design, development, acquisition, transfer and deployment of unmanned weapons should be developed by all stakeholders, ranging from states and international and non-governmental organizations to scientists and the military industry. These guiding principles or code of conduct could also address the issues of ethical restraints and accountability and provide a tentative definition, or at least a shared understanding, of unmanned warfare devices for the purposes of regulation. Any new form of regulation should take into consideration actual or potential advantages, disadvantages, capabilities and impact of robotized weapons. In a changing world also international law-making processes should show some potential for flexibility and creativity – all the more as regards the advent of such potentially radical changes in military technology that might prove to be no less than revolutionary for future warfare.⁵⁵

47 Michael Byers, *War Law: Understanding International Law and Armed Conflict* (New York: Grove Press, 2005), 120; Michael Ignatieff, *Virtual War* (New York: Picador, 2001), 179-180; Robert Sparrow, "Killer Robots", *Journal of Applied Philosophy* 24(1) (2007); Peter W. Singer, *Wired for War* (New York: The Penguin Press, 2009), 319.

48 See Philip Alston, "Lethal Robotic Technologies: The Implications for Human Rights and International Humanitarian Law", *Journal of Law, Information and Science* 19(1) (2011): 21.

49 For example, the recent release by NBC news of a confidential Memo of the Justice Department, which concludes that the American government can order the killing of their citizens if they are believed to be "senior operational leaders" of al-Qaida or "an associated force" – even if there is no intelligence indicating they are engaged in an active plot to attack the U.S" attests of the search for truth about drones campaigns. The full text of the Memo can be found at http://msnbcmedia.msn.com/i/msnbc/sections/news/020413_DOJ_White_Paper.pdf, accessed 25 February 2013.

50 Joel Garreau, "Bots on the Ground: In the field of battle (or even above it), robots are a soldier's best friend", *The Washington Post*, 6 May 2007; Steven M. Silver, "Ethics and Combat: Thoughts for Small Unit Leaders", *Marine Corps Gazette* 90(11) (2006): 76-78.

51 "Certainly, the law will need to respond to a new form of intelligence- that is robotic, rather than human, for the first time in history." Brendan Gogarty and Meredith Hagger, "The Laws of Man over Vehicles Unmanned: The Legal Responses to Robotic Revolution on Sea, Land and Air", *Journal of Law, Information and Science* 19 (2008): 144.

52 "The moral reality of war is not fixed by the actual atrocities of soldiers but by the opinions of mankind." Michael Walzer, *Just and Unjust Wars*, 3rd Edition (New York: Perseus Books Group, 2000), 15.

53 See for instance Artificial Intelligence, a movie directed by Steven Spielberg in 2001, which depicts the catastrophic scenario of humanity's extinction and its replacement by robots; see also the works of Stanley Kubrick and the I Robot short stories written by Isaac Asimov.

54 Andy Myers, "The Legal and Moral Challenges Facing the 21st Century Air Commander", *Air Power Review* 10(1) (2007): 88.

55 "Revolution in robotics is forcing us to re-examine what is possible, probable, and proper in war and politics. It is forcing us to reshape, re-evaluate, and reconsider what we thought we knew before. That is the essence of a revolution." Peter W. Singer, *Wired for War* (New York: The Penguin Press, 2009), 430. On the relation between technology and law, see William H. Boothby, *Weapons and the Law of Armed Conflict* (Oxford: Oxford University Press, 2009), 363 and seq.