The International Process to Limit Autonomous Weapon Systems: Significance for Israel

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Autonomous weapon systems are unmanned systems or robots that can operate without human intervention or with minimal human involvement to carry out military missions, including the use of lethal force. Their development has been debated since 2014 by the countries that signed the UN Convention on Certain Conventional Weapons (CCW) in 1980, but the discussion is still in the early stages. One of the difficulties has been to reach agreement on defining what constitutes autonomous weapon systems, and even more so, on the need to ban or regulate the use of these systems, partly because their implications for a whole range of issues within and beyond the context of weapons control are not yet clear.

This article describes the attempt to achieve international regulation of these systems and the challenges that have ensued, and examines the implications for Israel. The article recommends the policy Israel should adopt at this stage, such as joining forces with countries that share similar interests in the international process. Israel should also be rigorous in using the various systems in line with normative standards and accepted rules of warfare, in order to preempt any criticisms of its use of these systems, and maintain its freedom of action in this field to prevent any harm to its security and economic interests.

Autonomous Weapon Systems

Definition of the term Autonomous Weapon Systems (AWS or LAWS[1]) has prompted a wide debate in the scientific and legal communities. Much of the debate centers on the degree of human involvement required to operate the

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systems. However, there is a fairly broad consensus that autonomous systems are characterized by the ability to execute one or more missions without human intervention, relying on actions based on the interaction between computer software (which is part of the system) and the environment.[2]

According to a simpler definition from the International Red Cross – one of the organizations seeking to limit these systems – AWS are systems that can seek, identify, and attack targets independently, without human input.[3] One of the ways to distinguish between the various systems refers to their level of independence.[4] Conversely, autonomous weapons can be defined according to the level and type of human involvement.[5]

Many countries began to identify the potential of unmanned systems for security needs in the early 21st century. Significant advances were made in technology, particularly in the field of artificial intelligence (AI), which is a central component of such systems, and these countries have taken various steps to acquire and develop the systems independently. The leading countries in the field are the United States, Israel, Britain, and France;[6] in recent years China, Brazil, Iran, Russia, and others have also taken an interest. Consequently, there are fears of a global AWS arms race.[7]

In fact, most operational military systems currently in use are manned or remotely controlled, and require major human involvement. Moreover, due to various constraints, including the need to examine the efficiency, reliability, and safety of new systems as well as legal and other issues, at present even systems with complete autonomous capabilities are not generally operated entirely without human involvement in the operating loop. This tends to vary according to the countries that use them.[8]

Although the field is still in the early stages, a number of autonomous systems have already been tried in operational situations, including air defense systems such as the American Patriot or the Israeli Iron Dome. In spite of their high level of autonomy, most of them require a human operator to open fire, due to a decision in principle by the countries that use them.[9] Along with these systems, there are also systems with limited, non-lethal autonomy, such as self-driving vehicles (carrying weapons that are remotely operated by a human operator),[10] autonomous water-borne[11] and underwater craft (some with autonomous firing capability),[12] and aircraft with autonomous takeoff, landing, and refueling capabilities such as the X47-B,[13] as well as loitering munitions such as the Harop – an air system able to fly, hover, locate, track, and attack targets with no human intervention, for example, by homing in on radar signals.[14]

Based on various studies seeking to predict technological feasibility in this field, it appears that completely autonomous vehicles will be technologically possible within two decades, and it is therefore highly probable that they will become more important to modern armies.[15] In addition, last year saw a number of operational-technological advances in the field. Kalashnikov Concern, for example, announced the development of a system that uses a neurous network to enable weapon systems to make "fire or don't fire" decisions.[16] Another example was given by the US Department of Defense, which demonstrated the autonomous action of a swarm of 103 drones whose flight paths were synchronized in real time by an advanced algorithm.[17] These are just two examples from a variety of developments.

International Reservations regarding Armed Autonomous Systems

As autonomous weapon systems become more developed and widespread, growing numbers of questions arise concerning their legal and moral aspects. While such issues are relevant in areas where autonomous systems operate, the military area is particularly sensitive because it involves life or death decisions. One of the main fears about AWS is that they are "indiscriminate."[18] The use of "indiscriminate" devices is forbidden under international law, and in November 2012, these and other concerns led to the publication of the *Losing Humanity* document by the Human Rights Watch organization, calling for a ban on the use of "killer robots," thus making the use of armed autonomous systems illegal.[19] That same year, Campaign to Stop Killer Robots was established; members of its steering committee include several NGOs working for human rights, weapons restrictions, and so on.[20]

Since 2014, after various elements succeeded in bringing the matter to international awareness, the countries that signed the CCW Convention have held discussions on the possibility of adopting a new protocol that will ban or at least regulate the use of AWS. Notwithstanding international activity in this field, at the start of 2018 there was still no legal restriction on the development or use of AWS, and as long as their use complies with standards that do not contravene the accepted laws of war, it is legal.

The subject came up for discussion at the UN in 2014 in the framework of the CCW, and in 2016, following a number of meetings, the decision was taken to set up a Group of Governmental Experts (GGE). This step indicates how seriously CCW member states take the need to prevent or at least regulate the use of AWS, because the Convention is general and

its protocols regarding various weapon systems are only binding on the countries that sign the specific protocol. The establishment of the GGE was evidence of the chances for a new protocol. The first GGE meeting took place in November 2017, after a meeting planned for August was cancelled for financial reasons.[21] The GGE also met in April 2018, but has not yet managed to formulate an accepted definition of autonomous weapons or reach other significant agreements.

The discussions are proceeding slowly, compared to the pace of technological developments.[22] Moreover, it is not clear whether the countries will eventually reach agreement on the addition of a protocol to the CCW that will be binding only on the countries that have joined the protocol, or alternatively, whether they will reach an understanding that the international debate already includes the norms that require human engagement in the operation of weapons, and then the matter can be treated as binding usage law that applies to all countries, even those that are not a party to the Convention.[23] However, the CCW is limited to issues concerning weapon systems, and in view of the dual use (military-civilian) of the artificial intelligence that underlies machine autonomy, imposing a military-only ban could be problematic as well as ineffective.[24]

One of the main challenges to the UN process is the absence of agreement over the definition of the term "autonomous." However, there is general agreement based on the accepted norm that "it is immoral to allow machines to make life or death decisions." The lack of agreement on the definition hinders the regulation process. Moreover, the status of the concept "meaningful human control"[25] that was introduced by Article 36 of the Human Rights Organization[26] and became one of the most accepted concepts in discussions of the subject has recently declined for various reasons such as its linguistic simplicity (which made it easy to adopt but also led to practical problems), political reasons, and the objections by some countries to having the debate led by human rights organizations.[27] In any event, the struggle over terminology hampers the process.

The Leading Countries in this Field

Notwithstanding the opposition by various parties to the use of AWS, it appears that the ability to impose and enforce a ban on their use (an international arms control regime) is limited. There are two main reasons for this: first, the CCW mandate deals with restrictions on conventional weapons only, largely in view of International Humanitarian Law (IHL),

which refers primarily to issues such as the treatment of combatants, prisoners, and civilians in wartime, and is not readily able to take other subjects into account. The second reason is that countries that are leaders in the technological field do not support limitation or even regulation. Protocols of the 2015 discussion show that many countries do not seriously consider the option of an international regime in this field, and this suggests how they might vote on any future protocol.[28] In fact, so far only 26 countries[29] have declared support for a preemptive ban proposed by Campaign to Stop Killer Robots.[30] Most of these countries are not technological leaders or powerful in other ways. Meanwhile, the most prominent countries in the field of armed autonomy, including the United States, Russia, Britain, France, and Israel, oppose any discussion about changes in international law on the matter.[31]

In its 2017 statement to the GGE, the United States argued that it does not believe in the need to adopt a specific working definition of autonomous weapon systems. Instead, it supports promoting a general understanding of the features of these systems, and believing that laws of warfare provide a strong framework for regulating use of weapons, is convinced that the GGE can discuss potential issues deriving from the use of AWS.[32] At the same time, the United States is the country that regulated the use of these systems internally with an administrative directive, in which the US Department of Defense instructed its various units not to purchase or make use of weapon systems that did not involve humans in their operating loop.[33]

Russia likewise does not support the process, and claims that the main problem with the discussion is that the work of the GGE "is done in the light of speculative debate, cut off from reality, deriving from a deficiency of knowledge in the real operation of autonomous weapon systems and general understanding with reference to working definitions and their basic functions at present."[34] It appears that two of the strongest countries in the arena, the United States and Russia, are opposed to any regulation, and they will not rush to assist in the process, which could delay future efforts to raise the support and resources to oversee and enforce any restrictions. This is particularly a problem in view of the history of security regimes, which shows that the support of most and in some cases all world powers is essential in order to establish, maintain, and achieve the objectives of such regimes.[35]

Significance for Israel

Israel is a signatory to the CCW Convention, attends the discussions on the subject of AWS, and also presents its position on the matter. In its most recent statement in Geneva in April 2018, Israel disagreed with the reference to autonomous weapons as systems that "make decisions by themselves." Its position is that all weapons, including autonomous weapons, are operated by human beings, and that autonomous systems should not be classified as "deciding" by themselves. According to Israel, at the research and development stage, human beings have to take account of operational scenarios and obey the laws of warfare, and at the operational planning and operating stage, the commander is responsible for ensuring that their use complies with international law, and if necessary, limit the use of the systems if they conflict with the law.

In other words, in Israel's opinion, human beings are responsible for ensuring that the use of AWS complies with the law. Israel argues it is a mistake to claim that no human judgment or control is involved in the operation of such weapon systems, or that "it is the weapon itself that makes the decisions." It believes that there has to be a suitable level of human input for weapon systems, including autonomous ones.[36] It therefore appears that in the case of some principles, Israel's views are similar to those of the United States, and to a certain extent also Russia, which takes exception to a speculative attitude toward future technologies.

Israel is a manufacturer and exporter of advanced weapon systems, including unmanned systems, and for part of the past decade it was the world's leading exporter of unmanned aerial systems.[37] Moreover, in the framework of its security needs, Israel often uses unmanned vehicles, but even its air defense systems such as Iron Dome, in spite of their autonomous capabilities, are operated in Israel in a way that requires human approval to fire (intercept), although the system operates against "materiel" and not against personnel.[38]

Israel also manufactures systems in the field of loitering munitions. These include the Israeli systems in the HERO family made by UVISION,[39] the Orbiter 1K MUAS system from Aeronautics,[40] and the Green Dragon,[41] the Harop, and the Harpy made by Israel Aerospace Industries. Most of these systems require human involvement in the selection of targets and the decision to attack. However, systems in the Harop and Harpy family, for example, have the technical ability to fly, loiter in the air, and locate a target autonomously, using sensors that home in on radar signals, and

also to "commit suicide" on a target and destroy it using the explosives that they carry.

According to foreign sources, countries that have purchased such systems from Israel include China, Germany, India, South Korea, Turkey, Uzbekistan, and Azerbaijan.[42] A Harop system was purportedly used by Azerbaijan in Nagorno-Karabakh and killed seven people, who were defined by official Armenian sources as "Armenian volunteers." Some consider them the first victims of a "killer robot," [43] though it is not known if the system was autonomously operated. While there is currently sweeping international consensus about such systems, the debate in the UN could lead to their being banned.

In addition, Israel is a world leader in the development of artificial intelligence and involved in advanced developments in the field of autonomous vehicles, and a partner to breakthroughs by IBM in the field of AI. Israel is also home to development centers of some of the world's largest companies in these fields. In view of these advantages and given the security challenges it faces, Israel will probably seek to maintain its right to develop and use various systems in self defense, including systems based on autonomy and AI. Moreover, the countries that have not signed the CCW include Lebanon and Iran, which are both in conflict with Israel – something that could result in substantial asymmetry if Israel agrees to bans that do not apply to its enemies. There is also the fear that even countries that have already signed the CCW will not join the new protocol.

Due to the security threats Israel faces, its place in the global industry, and the systems it develops, Israel has no incentive to support a preemptive ban. Nor does it have an incentive to support a restriction that could limit its actions in any future fighting, beyond the requirements of international law. Israel therefore has the same interests as other countries, whether because they are involved in fighting in other parts of the world, particularly against terror organizations, or because they purchase Israeli systems to build their own military deterrents. These countries include the United States, Britain, India, and South Korea.

It will be hard for Israel to adopt an official position that differs from that of most members of the CCW Convention, due to the vulnerability of its international status. However, it can join forces with other countries and through or with them influence an international arrangement. Israel should also follow countries that demonstrate an approach similar to its

own, such as Russia and the United States. If they decide to disagree with or withdraw from attempts at regulation, this could help Israel to do the same.

However, as long as the debate continues, Israel must be extremely careful to ensure, as it has done until now, that it operates the various systems at its disposal in accordance with international law and the accepted normative standards. It must be rigorous about maintaining transparency as far as possible, which can help obstruct elements that wish to limit these systems in a way that does not serve Israeli interests. In addition, as a technological and military leader, Israel could consider adopting official and public internal regulation on this subject, similar to that of the United States. This would demonstrate a proper attitude to the matter, a deep understanding of the inherent risks, and an attempt to avoid them, through suitable internal supervision.

Internal regulation would be influential and beneficial, both internally and in the international arena. At the internal level, such an arrangement could help to outline the boundaries and provide guidelines for the industry that develops these systems, as well as providing clear and unambiguous guidelines for commanders who have to operate them in the field. Meanwhile, Israel could retain the right to cancel such guidelines as necessary, if events in the international arena oblige it to do so.

At the international level, by this action Israel would place itself in the same position as the United States, as a leader in the area of internal regulation and limitation. This must be done in parallel to the attempt to limit these systems at the international level, because the international process is long, complicated, and involves multiple interests, and could therefore fail. Although internal arrangements can more easily be cancelled or changed than international arrangements, it appears that in the current situation, they have better chances of exerting positive influence on the way autonomous systems are used than any international regulation, which at the moment appears difficult to achieve.

Conclusion

The important process taking place in CCW around autonomous weapons concerns ground-breaking technologies, which in some cases are not sustainable. It is therefore difficult to agree on the definitions needed for a binding move. Some of the leading countries in this field have reservations about the current process in the UN, believe it is necessary to wait and see how the technologies develop, and avoid decisions based on general assumptions.

Still, most of them agree that there should be human involvement at the stage of making life or death decisions.

Israel opposes any preemptive restriction on these weapon systems, even though like other countries, it supports maintaining the element of human judgment in the operation of the systems. In view of the security challenges Israel faces and the fact that it is a manufacturer and exporter of weapon systems, it must seek to maintain its freedom of action in this field as much as possible. It should therefore work together with countries that share its pragmatic approach and face similar constraints, be rigorous about operating its weapon systems in accordance with international law and accepted normative standards, and even adopt official, public internal regulation, as evidence of its responsible attitude and awareness of the challenges inherent in these systems.

Notes

1 LAWS – Lethal Autonomous Weapon Systems.

2 Andrew Williams, "Defining Autonomy in Systems: Challenges and Solutions," in *Autonomous Systems: Issues for Defence Policymakers*, eds. Andrew P. Williams and Paul D. Scharre (Norfolk: Capability Engineering and Innovation Division, Headquarters Supreme Allied Commander Transformation, 2014), p. 33.

3 "Autonomous Weapon Systems – Q & A," International Committee of the Red Cross, November 12, 2014, https://bit.ly/2ixib2p.

4 *Unmanned Systems Integrated Roadmap FY2011-2036*, U.S. Department of Defense, p. 46, https://fas.org/irp/program/collect/usroadmap2011.pdf.

5 *Losing Humanity: The Case Against Killer Robots*, Human Rights Watch, November 2012, p. 2, http://www.hrw.org/sites/default/files/reports/arms1112ForUpload_0_0.pdf.

6 Ibid.

7 Billy Perrigo, "A Global Arms Race for Killer Robots Is Transforming the Battlefield," *Time*, April 9, 2018, http://time.com/5230567/killer-robots.

8 The most striking example in this context is Directive 300.09 of the US Department of Defense.

9 *Losing Humanity*, pp. 11-12.

10 Boaz Zalmanowicz, Liran Antebi, and Gal Perl Finkel, "Unmanned Ground Vehicles in Development and Practice: Israel," in *Digital Infantry Battlefield Solution – Concept of Operations*, eds. Uis Romanovs and Mris Andns, DIBS project, Part II, Milrem in cooperation with Latvian Institute of International Affairs, Latvian National Defence Academy, August 2017, p. 56, http://liia.lv/en/publications/digital-infantry-battlefield-solution-concept-of-operations-part-two-629.

11 Ibid.

12 MBDA-Missile Systems Website, EXOCES SM39, Anti-Ship Missile, http://www.mbda-systems.com/product/exocet-sm-39/.

13 Kelsey D. Atherton, "Watch this Autonomous Drone Eat Fuel," *Popular Science*, April 17, 2015, http://www.popsci.com/look-autonomous-drone-eat-fuel-sky.

14 Dan Gettinger and Arthur Holland Michel, "Loitering Munitions," Center for the Study of the Drone at Bard College, 2017, http://dronecenter.bard.edu/files/2017/02/CSD-Loitering-Munitions.pdf.

15 Yoav Zacks and Liran Antebi, eds., *The Use of Unmanned Military Vehicles in 2033: National Policy Recommendations Based on Technology Forecasting – Expert Assessments*, Memorandum 145 (Tel Aviv: Institute for National Security Studies, 2014), https://bit.ly/2SsHhhd; and Paul Scharre, *Robotics on the Battlefield Part I: Range, Persistence and Daring,* Center for a New American Security, May 2014, https://bit.ly/2CIbrrb.

16 Kyle Mizokami, "Kalashnikov Will Make an A.I.-Powered Killer Robot," *Popular Mechanics*, July 19, 2017.

17 U.S. Department of Defense, News Release, "Department of Defense Announces Successful Micro-Drone Demonstration," January 9, 2017, https://bit.ly/2r5DMSt.

18 The systems are unable, for example, to distinguish combatants from civilians; the outstanding example is that of landmines.

19 *Losing Humanity*, pp. 11-12.

20 Campaign to Stop Killer Robots Website, https://www.stopkillerrobots.org/about-us.

21 United Nations, "2017 Group of Governmental Experts on Lethal Autonomous Weapons Systems (LAWS)," UNOG website, https://bit.ly/2zTebkJ.

22 Summary of the discussions during GGE on LAWS, April 2018, UNOG Website, https://bit.ly/2D7hAhJ.

23 United Nations, Weekly schedule of the Conference on Disarmament (1st part of the 2018 session), UNOG Website, https://bit.ly/2CL1wB1.

24 Liran Antebi, "Controlling Robots: It's Not Science Fiction," in *Arms Control and National Security: New Horizons*, eds. Emily B. Landau and Anat Kurz, Memorandum No. 135 (Tel Aviv: Institute for National Security Studies, April 2014), pp. 65-80. In this context, some entities, including the Future of Life Institute, have experience of trying to increase awareness and international action on the challenges posed by artificial intelligence in general. This organization, founded by businessman Elon Musk and others, is also active in the field of limiting autonomous weapons and has published documents and videos on the subject and collected signatures on various petitions, gaining extensive media exposure and reinforcing the effect on international public opinion.

25 The full term as stated in the document is "meaningful human control over individual attacks."

26 "Key Elements of Meaningful Human Control," *Article 36*, Digital Edition, April 8, 2016, https://bit.ly/1oOAvBW.
27 Kevin Neslage, "Does 'Meaningful Human Control' Have Potential for the Regulation of Autonomous Weapon Systems?" *National Security & Armed Conflict Law Review* VI: 151 (2015-16): 151-77, https://nsac.law.miami.edu/wp-content/uploads/2015/11/Neslage-Final.pdf.
28 For the declarations by the countries, see https://www.un.org/disarmament/geneva/ccw/2014-meeting-of-experts-on-laws.
29 Among these 26 countries, the campaign also refers to the Palestinian Authority as the State of Palestine.
30 "Country Views on Killer Robots," Campaign to Stop Killer Robots Website, April 13, 2018, https://bit.ly/2KP4pl5.
31 Tucker Davey, "Lethal Autonomous Weapons: An Update from the United Nations," Future of Life Institute, April 30, 2018, https://futureoflife.org/2018/04/30/lethal-autonomous-weapons-an-update-from-the-united-nations.
32 United States of America, "Characteristics of Lethal Autonomous Weapons Systems," CCW/GGE Protocol, November 10, 2017, https://bit.ly/2i4sgBh.
33 U.S. Department of Defense Directive Number 3000.09, November 21, 2012 , https://www.hsdl.org/?abstract&did=726163.
34 The Russian Federation, "Russia's Approaches to the Elaboration of a Working Definition and Basic Functions of Lethal Autonomous Weapons Systems in the Context of the Purposes and Objectives of the Convention," CCW/GGE protocol, April 4, 2018, https://bit.ly/2SpYcRu.
35 Antebi, "Controlling Robots: It's not Science Fiction," pp. 76-77.
36 Maya Yaron, statement presented at the Convention on Certain Conventional Weapons (CCW) GGE on Lethal Autonomous Weapons Systems (LAWS), United Nations, Geneva, April 11, 2018, https://bit.ly/2EXW0xA .
37 Gili Cohen, "Israel is the World's Largest Exporter of Drones," *Haaretz*, May 19, 2013, https://www.haaretz.co.il/news/politics/1.2023735.
38 The international debate distinguishes between defensive weapon systems "against materiel" such as air defense systems against rockets or missiles, or defense systems against tanks such as Trophy, and autonomous weapon systems that are more likely to injure people.
39 Loitering Munitions Technology, UVision Air Website, https://uvisionuav.com/our-technology/.
40 Orbiter 1K, Aeronautics Website, https://aeronautics-sys.com/home-page/page-systems/page-systems-orbiter-1k-muas/.
41 Green Dragon, Israel Aerospace Industries Website, https://bit.ly/2AvlkHg. This system loiters autonomously but any attack involves human instructions.
42 Gettinger and Michel, "Loitering Munitions."
43 Perrigo, "A Global Arms Race for Killer Robots Is Transforming the Battlefield."