Chart-2

Consideration of the human element in the use of lethal force; aspects of human-machine interaction in the development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems

Regional Groups/ Country	Views/suggestions
NAM	**Source: WP.1 at 2018 April session of the GGE** **https://www.unog.ch/80256EDD006B8954/(httpAssets)/E9BBB3F7ACBE8790C125825F004AA329/$file/CCW_GGE_1_2018_WP.1.pdf** NAM is pleased that a general sense has developed among High Contracting Parties that all weapons, including those with autonomous functions, **must remain under the direct control and supervision of humans at all times**, and must comply with international law including International Humanitarian Law and International Human Rights Law.
Argentina	**Source: WP. 2 at 2018 April session of the GGE** https://www.unog.ch/80256EDD006B8954/(httpAssets)/CBEC4BBE57288083C1258266002E980D/$file/CCW_GGE.1_2018_WP.2.En.pdf Develop a robust mechanism from a more "preventive" perspective to be able to tackle, minimally, the technical analytical deficiencies. In this sense, the scope of the term "preventive" should fully guarantee that the basic principles of IHL are faithfully protected. For this, it is a priority to make the most "guarantee-based" interpretation possible of **the values of humanity (protect human lives and the environment)** against military necessity when applying IHL. Especially, in the absence of technical training on how to reduce collateral damage to civilians in the event of the weapon malfunctioning. **Source: Argentina's statement at 2017 meeting of HCPs to the CCW** In this sense, we consider that next year's debate on the characterisation of these systems, **with the delimitation of the human factor,** will allow to aproach positions and clarify the objectives for the next stage.
Belgium	Source: Belgium's working paper **WP.3 at 2017 GGE on LAWS** **http://undocs.org/ccw/gge.1/2017/WP.3** In Belgium's view, the following **characteristics** or constitutive elements regarding the notions of **autonomy, intentionality with lethal consequence**, **control and unpredictability** should be considered in the framework of a strictly conceptual exercise aiming at defining LAWS: (a) Total autonomy in the lethal decision-making process, i.e. LAWS that would be able to switch to lethal mode – or to a mode in which they could inflict wounds to a human person – **without any previous or marginal human decisio**n; (b) **Full independence from human intervention, at any stage, in the ability to identify and select targets with the intent to maim or kill;** (c) An unclear or uncertain division of authority between the **human** agent and the **machine** in the intentionality with lethal consequence, as

	well as a division of authority that would not be subjected to a precise criteria based assessment; (d) The impossibility to bring, at any time and upon **human** decision, LAWS working in autonomous mode back to remotely controlled mode, or to deactivate them; (e) The openness (i.e. uncertain, unpredictable or unreliable character) or the limited knowledge of the entirety or only one of the potential behaviors of LAWS; (f) LAWS' ability to redefine by themselves the criteria according to which they would be able to operate in terms of environment, targeting or mission among others
France & Germany	Source: **WP.4 at 2017 GGE on LAWS** http://undocs.org/ccw/gge.1/2017/WP.4 Reaffirming that **humans** should continue to be able to **make ultimate decisions** with regard to the use of lethal force and continue to exert sufficient control over the lethal weapons systems they use; Discussing the possibility of an all-encompassing regulation is premature and could be reconsidered at a later stage, as the technology of LAWS does not exist to date. State Parties would first need to consider a set of acceptability criteria for the development and use of future LAWS in order to be able to describe the characteristics of the systems they would be ready to regulate. These criteria could be based on technological parameters **and/or on the degree of human involvement**." This political declaration should affirm that State parties share the conviction that **humans** should continue to be able to make **ultimate decisions** with regard to the use of lethal force and should continue to exert sufficient control over lethal weapons systems they use.
France	**Source:** 2016 French NonPaper on Characterization of LAWS **https://www.unog.ch/80256EDD006B8954/(httpAssets)/5FD844883B46FEACC1257F8F00401FF6/$file/2016_LAWSMX_CountryPaper_France+CharacterizationofaLAWS.pdf** -Remotely operated weapons systems and supervised weapons systems should not be regarded as LAWS since a **human operato**r remains involved, in particular during the targeting and firing phases. Existing automatic systems are not LAWS either. -LAWS should be understood as implying a **total absence of human supervision**, meaning there is absolutely no link (communication or control) with the military chain of command. -The delivery platform of a LAWS would be capable of moving, adapting to its land, marine or aerial environments and targeting and firing a lethal effector (bullet, missile, bomb, etc.) **without any kind of human intervention or validation**.
Poland	Source: **WP.3 at 2018 April session of the GGE** https://www.unog.ch/80256EDD006B8954/(httpAssets)/DD887E725A1AF8B3C125825F004AF1E3/$file/CCW_GGE.1_2018_WP.3.pdf Poland welcomes the ongoing deliberations on lethal autonomous weapons systems (LAWS). We should continue to build common understanding of this complex multi-dimensional issue, such as the broad agreement that **human control must be retained over weapons systems and the use of force".**

	This is in the name of efficiency, benefits and strategic technical superiority that **make human involvement an option and not a must**. The underlying assumption here, **however, is that humans are central actors and not mere factors that may or may not be included in the process of the use of LAWS**. This is due to **distinctively human characteristics that LAWS do not have, namely the human ability for ethical reasoning and ethical conduct which are inherent to life-and-death decisions**. From the practical point of view, any view of LAWS as systems that are isolated and independent of human beings is unrealistic. All robotic and weapon systems are made and deployed by humans to a varying degree. The very need to remind of the human involvement is not so much due to the absence of humans in the LAWS framework as due to the **increasing disregard for the human being as suc**h. We argue here that the debate on LAWS should be conducted **with humans and not machines at the center** in a way it acknowledges the distinctiveness and complexity of human ethics and related human characteristics rather than dismisses or oversimplifies them. II. **The role and responsibility of humans in the use of LAWS**. The discussion on ethical dimension of LAWS inevitably implies a question of responsibility. Hypothetical situations when **humans are so far removed in time and space** from the acts of **selecting and attacking targets** that **human decision-making** could be **substituted** with **computer-controlled processes** raise ethical questions about the role and responsibility of **humans** in the use of force. The idea of any weapon system, that places the use of force **beyond human control, is not acceptable and moral responsibility for decisions to kill and destroy cannot be delegated to machines.** The **type and degree of human control** needs to be evaluated to establish limits on autonomy in weapons systems. In this process we should take into account that **humans should remain fully responsible for decisions to use force**. In other words, it is **humans** who should take responsibility for ethical conduct rather than expect autonomous systems to pursue this difficult task.
Russia	**Source**: **WP.6 at 2018 April session of the GGE** Link:https://www.unog.ch/80256EDD006B8954/(httpAssets)/FC3CD73A32598111C1258266002F6172/$file/CCW_GGE.1_2018_WP.6_E.pdf The Russian Federation proceeds from the premise that the existing military systems with a high degree of automation/autonomy should not be classified as LAWS. The practice of actual use of such existing systems shows that it is the high automation/autonomy degree enables them to operate in a dynamic combat situation and in various environments with a **high level of efficiency often not available to humans**. Meanwhile, the proper selectiveness is secured, and, as a result, their compliance with the norms of international humanitarian law. In other words, in such systems **the machine plays the role of an indispensable aide, coping with the entrusted functions more effectively than a human controller**. Therefore, such systems should be maintained. In ensuring these functions the states should rely on **their own standards** in this sphere. Attempts to develop certain universal parameters of the so-called "critical functions" for both existing highly automated war systems and future LAWS– aim identification and hit command, maintaining "**significant" human control**– can hardly give practical results. For example, it is doubtful whether criteria to determine a due level of "significance" of **human control over the machine** could be developed.

	However, in defining LAWS through the aim identification and hit command functions, we are thus sending a message that we want to retrieve these functions from **machines** and retain them exclusively with **humans**. It is hardly a promising approach. In our view, the core working LAWS definition should not be confined to such functions. In doing so, we "forget" that the automated aim identification and hit command functions are set to the **machine** by the **human** through certain algorithms. We do not doubt the necessity of **maintaining human control over the machine**. Thus, advanced as it may be, an autonomous **system** cannot perform its functions without a **human** behind it. Hence, **the responsibility for the use of LAWS should be with the human who operates or programms the robot system and orders to use LAW**S. In general, the Russian Federation presumes that the work on definition and basic functions should mainly be guided by the ultimate goal of LAWS discussion– i.e. explore possibilities to use this weapon type in a most adequate manner in future and **maintain a due level of human control over it**. At the same time, specific forms and methods of such control should remain at the discretion of States. **Source: Russian Working Paper at 2017 GGE on LAWS** **https://www.unog.ch/80256EDD006B8954/(httpAssets)/2C67D752B299E6A7C12581D400661C98/$file/2017_GGEonLAWS_WP8_RussianFederation.pdf** **Concept of "meaningful human control"** This concept, though poorly developed, is a potential element of consent. **The overwhelming majority of States agree on the inadmissibility of loss of meaningful human control of such weapons systems.** However, it should be recognized that it will be very difficult to develop criteria for the "meaningfulness" of such control without politicizing this issue. **Source: Statement by Russian delegation AT 2017 GGE** What about other technologically advanced weapons for which the concept of "**meaningful human control"** is also crucial?
Switzerland	**Source: WP.9 at 2017 GGE on LAWS** **https://www.unog.ch/80256EDD006B8954/(httpAssets)/6B80F9385F6B505FC12581D4006633F8/$file/2017_GGEonLAWS_WP9_Switzerland.pdf** This working paper has also put forward the notion that – given the current state of robotics and artificial intelligence – the relevant question is not whether a certain level of **human control** is called for, but what kind and level of **human** involvement in each of the different phases ranging from conceptualization, development and testing, to operational programming, employment and target engagement. At the heart of the issue is the question: **what is the right quality of the human-machine interaction to ensure and facilitate compliance with IHL**?

The Netherlands	**Source: WP.2 at the 2017 GGE on LAWS.** http://undocs.org/ccw/gge.1/2017/WP.2 Concept of **meaningful human control:** - Although **humans**, in the case of autonomous weapons under **meaningful human control**, do not decide upon an individual attack on a specific target, they do play a prominent role in: (a) programming the characteristics of the targets that are to be engaged, (b) the consideration of aspects such as target selection, weapon selection and implementation planning (time and space), an assessment of potential collateral damage, (c) the decision to deploy the weapon, and (d) the Battle Damage Assessment (BDA) after the attack, in which commanders can be held accountable for the effects of 'their' LAWS. - Under these circumstances, **humans are involved in the 'wider loop'** of the decision-making process. This means that humans continue to play a crucial role in the wider targeting process and exercise meaningful human control. - The **concept of meaningful human control** does not require immediate new or additional legislation, as the concept **should be regarded as a standard deriving from existing legislation and practices (such as the targeting process). In this respect, autonomous weapon systems do not give reason to additional ethical issues compared to other weapon systems as long as meaningful human control–within the wider loop – is exercised.** - **However**, in the Netherlands' view **it would be beneficial to further study and discuss the concept of meaningful human control. This could lead to the formulation of an interpretative guide**, clarifying, by e.g. best practices, the **current legal landscape with regard to the deployment of autonomous weapons under meaningful human control** as well as the role of **meaningful human control** in the Article 36 Procedure. **Fully autonomous weapon system, without meaningful human control** -**Fully autonomous weapons systems, without the possibility of meaningful human control in the wider loop of the targeting process (the decision-making process) do not yet exist.** It is considered unlikely that states would consciously choose to develop or commission such systems, as states want to retain control over their weapons. Even if it became technologically feasible, there seems to be no reason why a state would have the ambition to develop a weapon system that is intrinsically not under human control. - The Netherlands outright rejects the development and subsequent deployment of such fully autonomous weapon systems, but does

	currently not support a moratorium on the development of fully autonomous weapon systems. Such a regulatory framework would be unfeasible given the intrinsic dual-use nature of artificial intelligence technology. The question very quickly becomes: a moratorium on what? **-Future deployment of autonomous weapon systems under meaningful human control** Autonomous weapon systems under meaningful human control may have key military advantages. For example, computers often respond faster and more accurately than humans, which may reduce risks to friendly units and the civilian population. These systems are often also able to operate in environments that are dangerous to humans, or difficult to reach. It is therefore to be expected that such weapon systems will be developed around the world over the next few decades and deployed for offensive and defensive tasks. - Without question, deployment of such systems always needs to be under **meaningful human control in the wider loop of the decision-making process**. It is therefore **not to be expected that autonomous weapon systems will entirely or substantially take over the role of humans on the battlefield.** The nature of modern conflicts, which often take place in predominantly civilian areas, complicates the deployment of these weapon systems. It is likely that autonomous weapon systems under meaningful **human** control will be deployed for specific tasks alongside military personnel and will complement existing weapon systems and other military and civilian technology.
United Kingdom	**Source: UK Ministry of Defence (MOD) Joint Doctrine Publication 0-30.2 (JDP 0-30.2), dated August 2017** **https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/673940/doctrine_uk_uas_jdp_0_30_2.pdf** An autonomous system is capable of understanding higher-level intent and direction. From this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state. It is capable of deciding a course of action, from a number of alternatives, **without depending on human oversight and control, although these may still be present.** Although the overall activity of an autonomous unmanned aircraft will be predictable, individual actions may not be.
United States	**Source: WP.4 at 2018 April session of the GGE** **https://www.unog.ch/80256EDD006B8954/(httpAssets)/7C177AE5BC10B588C125825F004B06BE/$file/CCW_GGE.1_2018_WP.4.pdf** Many types of missiles or bombs have “lock-on-after-launch” functions that allow the projectile to guide itself autonomously to targets after being launched by the **human operator**. The projectile has sensors that allow it to identify the target that the **human operator** intends to hit, and computers and guidance systems that allow it to select and engage that target. For example, the AIM-120 Advanced Medium-Range, Air-to-Air Missile (AMRAAM) incorporates an active radar in connection with an inertial reference unit and microcomputer system, which allows the missile to use its active radar to guide it to intercept its target. The use of robotic and autonomous systems can reduce the need for immediate self-defense fires by reducing the exposure of human beings to hostile fire. For example, remotely piloted aircraft or ground robots have been used to scout ahead of forces conducting patrols in environments where they might be surprised by enemy ambushes or roadside bombs. Robotic and autonomous systems can provide a

	greater standoff distance from enemy formations, allowing forces to exercise tactical patience to reduce the risk of civilian casualties. **Source US Working Paper at the 2017 GGE on LAWS** https://www.unog.ch/80256EDD006B8954/(httpAssets)/A4466587B0DABE6CC12581D400660157/$file/2017_GGEonLAWS_WP7_USA.pdf **Seeking to define the sophistication of the machine intelligence would incorrectly focus on the machine, rather than understanding what is important for the law —how human beings are using the weapon and what they expect it to do**. For example, it is irrelevant under the law of war whether a rocket engine is powered by a solid fuel or a liquid propellant. Rather, the law of war is concerned with how that power is used in combat. Similarly, focusing on the sophistication of the "analytical engine" powering a weapon (e.g., what type of algorithm or method of machine learning is employed) risks ignoring the focus of the law—**how humans will use that weapon** (e.g., using the machine to select and engage targets without further intervention by a **human operator**). Lastly, focusing on the machine also could stimulate unwarranted fears that are more the product of science fiction and popular imagination than fact. **Source: US DoD Directive3000.09 of 2012** https://cryptome.org/dodi/dodd-3000-09.pdf Autonomous Weapon System: A weapon system that, once activated, can select and engage targets **without further intervention by a human operator**. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation.
OTHERS	
International Committee of the Red Cross (ICRC)	**Source: ICRC Working Paper CCW**/GGE.1/2018/WP.5 https://www.unog.ch/80256EDD006B8954/(httpAssets)/42010361723DC854C1258264005C3A7D/$file/CCW_GGE.1_2018_WP.5+ICRC+final.pdf **Ethics and autonomous weapon systems: An ethical basis for human control?** The fundamental ethical question is whether the principles of humanity and the dictates of the public conscience can allow human decision-making on the use of force to be effectively substituted with computer-controlled processes, and life-and-death decisions to be ceded to machines From the ICRC's perspective, the third approach focussing on human control and the human-machine interaction could be an effective way forward for the CCW, with efforts to strengthen national legal reviews to be pursued in parallel as a mutually reinforcing initiative. The framework of human control provides a useful baseline from which common understandings can be developed among States, and through which boundaries or limits on autonomy in weapon systems can be established. This is consistent with the broad agreement among States, experts and other stakeholders that there is a need to maintain human control over weapon systems and the use of force in view of legal

	obligations, military operational requirements, and ethical considerations Ethical and legal considerations may demand some similar constraints on autonomy in weapon systems, so that meaningful human control is maintained –in particular, with respect to: human supervision and the ability to intervene and deactivate; technical requirements for predictability and reliability (including in the algorithms used); and operational constraints on the task for which the weapon is used, the type of target, the operating environment, the timeframe of operation and the scope of movement over an area. **Source: ICRC paper at MoE on LAWS April 2016** **https://www.unog.ch/80256EDD006B8954/(httpAssets)/B3834B2C62344053C1257F9400491826/$file/2016_LAWS+MX_CountryPaper_ICRC.pdf** Definition: Autonomous Weapon System: "Any weapon system with autonomy in its critical functions. That is, 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.**
iPRAW	Source: IPRAW report https://www.ipraw.org/wp-content/uploads/2017/08/2017-08-17_iPRAW_Focus-On-Report-1.pdf The panel's initial conclusion is that a potential definition and a regulation of LAWS should consider multiple aspects: The contexts of application, the relationship to **human command authorities**, and the limitations to algorithmic evaluation for further focus and analysis.
SIPRI	Source: Publication Mapping the development of Autonomy in Weapon Systems. https://www.sipri.org/sites/default/files/2017-11/siprireport_mapping_the_development_of_autonomy_in_weapon_systms_1117_1.pdf Human–machine command-and-control relationship For many systems, the limitations of Autonomous' or 'automated' target recognition (ATR) technology are not fundamentally problematic because the weapon systems are intended to operate as a decision aid and in an operational context where the presence of civilians and civilian objects is unlikely. Human-in-the-loop: ATR as a decision aid - Nearly one-third of the systems (50 of 154) identified by the SIPRI dataset as having autonomous targeting capabilities use **ATR as a 'decision aid' for human operators**. ATR software is mainly used in cases when a target is beyond the visual range of a human operator or moving too fast for a human to identify and track. Such ATR systems may be capable of detecting, tracking, prioritizing and selecting targets autonomously but **human operators retain the decision to engage the target.** In the terminology that Human Rights Watch (HRW) has developed to describe categories of autonomous weapon systems, these could be designated as 'human-in-the-loop' weapons. An additional 31 systems are known to use ATR as a decision aid, but it is unclear whether they engage autonomously. This category mostly includes air defence systems.

	ATR for **human-on-the loop and human-out-of-the-loop systems** Around one-third of the systems (49 out of 154) identified by the SIPRI dataset as having autonomous targeting capabilities have the capacity to **engage with targets without the direct involvement of a human operator**. Primarily, these are weapon systems that are intended to protect ships, ground installations or vehicles against incoming projectiles. **They are generally operated under human supervision** ('**human**-on-the-loop' weapons in the HRW terminology) and have different modes of engagement. They use the autonomous mode only in situations where the time of engagement would be too short for **humans** to be able to respond.
UNIDIR	Source: UNIDIR's Publication "The Weaponization of Increasingly Autonomous Technologies: Concerns, Characteristics and Definitional Approaches" http://www.unidir.ch/files/publications/pdfs/the-weaponization-of-increasingly-autonomous-technologies-concerns-characteristics-and-definitional-approaches-en-689.pdf Increased autonomy means by definition that a **human** has delegated some level of control/decision-making to an object. In CCW this approach of describing the role of the user is where we have heard talk of **human**s being in, on, or out of the loop, as well as emergence of the concept of "**meaningful human control**" or in the terms of the US Department of Defense directive "appropriate levels of **human judgement**". This approach is grounded in existing legal commitments and norms, and it is easier to participate in regardless of one's level of technological sophistication. A **human-centric** definitional approach: • provides a common language for discussion that is accessible to a broad range of governments and publics regardless of their degree of technical knowledge; • focuses on the shared objective of **maintaining some form of control** over all weapon systems; • is consistent with IHL regulating the use of weapons in armed conflict, which implicitly **entails a certain level of human judgment** and explicitly **assigns responsibility for decisions made**; and • is a concept broad enough to integrate consideration of **ethics**, **human-machine interaction** and the "dictates of the public conscience", which can be marginalized in approaches that narrowly consider just technology or just law.
Article 36	**Source: Discussion Paper on AWS** http://www.article36.org/wp-content/uploads/2013/06/Evaluating-human-control-1.pdf The central area of concern regarding the development of autonomous weapons systems (AWS) is the **depletion of human control** over the critical functions of identifying, selecting and applying force to targets. Without the necessary capacity for human control there may be a moral deficit in the use of force, such systems might not allow the proper application of legal rules or might drive interpretations of the legal framework that erode the protection of civilians and combatants, and could further jeopardize international stability.