

Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects

19 April 2021

Original: English

Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System

Chairperson's Summary^{1*}

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* Submissions of the Member States in Annex III are produced without any editing with light formatting only.



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I. Background and context

1. The mandate of the Group of Governmental Experts on emerging technologies in the area of Lethal Autonomous Weapons Systems, ahead of the Sixth Review Conference of the Convention on Certain Conventional Weapons, is to consider:
 - (i) the guiding principles, which it may further develop and elaborate;
 - (ii) the work on the legal, technological and military aspects;
 - (iii) the conclusions of the Group, as reflected in its reports of 2017, 2018 and 2019, and use them as a basis for the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems.
2. Due to the impact of the global COVID-19 pandemic, it was not possible for the group to develop and agree on a substantive report for submission to the Meeting of High Contracting Parties of the Convention on Certain Conventional Weapons.
3. Nonetheless, the Group has, over the years, gone a great distance to gain greater granularity in key aspects of the Group's work. For instance, in what autonomy means — that it may be viewed as a spectrum, with difficulties delineating between such concepts of automation, semi- or fully-autonomous — and that the term covers a wide range of technical capabilities. All but the simplest of weapon systems, are made up of subsystems, which may themselves be technically sophisticated and used during targeting. This makes it difficult not only to characterize LAWS in technical terms, but also to fully understand how autonomy may impact the ability of parties to a conflict to apply the principles and requirements of IHL, notably, the rules of distinction, proportionality in attack and precautions in attack. This is also true in properly understanding how a weapon's assigned tasks, its intended targets, scope of movement and operational environments affect the type and degree of human involvement required to ensure compliance with IHL. A critical issue remains what is required of States, parties to conflict — ultimately, humans — to comply with their legal obligations in carrying out attacks that may involve these new technologies.
4. The group was still able to carry forward its substantive work in 2020, despite significant but objective obstacles, pursuant to its mandate, including through: meetings and consultations held in hybrid and virtual formats; consideration of its agenda and programme of work; commentaries on the operationalization of the guiding principles at the national level, which were summarized in a commonalities paper prepared under the authority of the previous Chair;² and working papers submitted by delegations. Complementary processes — such as the “Rio Seminar” convened by Brazil and the “Berlin LAWS Forum” convened by Germany, as well as the webinars convened jointly by the United Nations Institute for Disarmament Research and the United Nations Office for Disarmament Affairs — also contributed to advancing the deliberations of the group.
5. The Chair submits this summary, under his sole authority, with the intention of capturing his understanding of the key elements drawn from all substantive work carried out and inputs received throughout 2020, to inform the work of the group in 2021. The summary's structure follows the agenda used by the group to organise its work, including its final item: “consensus recommendations in relation to the consideration, clarification and development of aspects of the normative and operational framework.” Under each of the first four substantive items, the Chair provides: (i) a summary of discussions and inputs; (ii) possible elements for consensus recommendations; and (iii) areas for possible future work with a view to arriving at additional elements for consensus recommendations. Given the insufficient time devoted to discussions on the fifth and sixth items, a summary is provided of the discussions and inputs, drawing on the work of the group from past years as well as this year, and areas for possible future work with a view to arriving at additional elements for consensus recommendations.

² Ambassador Janis Karklins of Latvia, who served as Chair of the Group until 18 September 2020.

II. Summary

A. An exploration of the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to international humanitarian law

1. Summary of inputs and exchanges

6. International humanitarian law (IHL) applies to emerging technologies in the area of lethal autonomous weapons systems (LAWS), as affirmed in guiding principle (a). Autonomous weapons can pose challenges to compliance with IHL rules since predictability and context-specific human decisions are necessary to ensure compliance, especially bearing in mind current technological limitations. However, it continues to be disputed whether LAWS would be incompatible with IHL and whether (certain types of) autonomous weapon systems that cannot be used in compliance with IHL, in all or some circumstances, should be prohibited in an international instrument. The lack of actual data on the performance of such systems provides an impediment to the conclusive evaluation of these claims by all parties and to what extent existing IHL is sufficient to deal with the concerns posed by LAWS. In this connection, it could be useful to further clarify how IHL requirements apply to the use of emerging technologies in the area of LAWS. Such clarification could also facilitate the exchange of information on national experiences with ensuring IHL compliance when using weapon systems with autonomous features.

7. Guiding principles (b) and (d) are largely viewed as essential to build substance for the normative and operational framework on emerging technologies in the area of LAWS. This framework could be based on the widely held view that IHL requires human control, involvement or judgement over weapons and the use of force. This framework could also be based on the view that human responsibility and accountability cannot, under any circumstances, be transferred to machines and therefore must be maintained throughout the entire life-cycle of any weapon system based on emerging technologies in the area of LAWS. Another perspective is that the concept of maintaining human control, involvement or judgement over weapons and the use of force does not derive from existing IHL. There is an emerging consensus that fully autonomous weapon systems beyond human control cannot be used in accordance with IHL and that limits on emerging technologies in the area of LAWS are required in order to ensure compliance with IHL and other applicable law. Further work is needed to articulate the type and extent of human control, involvement or judgement and any operational constraints that may be required to ensure compliance with IHL.

8. An effective response to the risks posed by autonomous weapon systems, thus, may require consideration of *what* "quality and extent" of human control/involvement/judgement is necessary and *how* "human responsibility" and "accountability" are ensured. Measures aimed at ensuring human control/involvement/judgement, responsibility and accountability may inform boundaries of acceptability on autonomous weapon systems.

9. Some States have already enacted national legislation to ensure a human is always accountable for decisions on the development and use of weapons. On guiding principle (d), various measures could promote accountability, including rigorous testing and training, establishing procedures and doctrines, and using the weapon system in accordance with established training, doctrine and procedures. On guiding principle (b), there may be a need to establish individual legal accountability or liability in cases when use of a weapon system results in a breach of applicable law, in particular international criminal law, as machines cannot be held liable for actions they effect. Notions of accountability could be relevant across the entire life-cycle of a weapon system and thus principles (b) and (d) could also be relevant for developers and manufactures of weapon systems. The group could elaborate principles (b) and (d) by articulating relevant good practices.

10. National legal reviews of new weapons are essential to ensuring that emerging technologies in the area of LAWS can be used in compliance with applicable rules of international law, including IHL. However, such weapon reviews may not offer a sufficient response to concerns raised by LAWS, including because of the lack of international

uniformity in their implementation. Some States expressed the view that, in reviewing the legality of weapons systems based on emerging technologies in the area of LAWS, States should consider key challenges in the regulation and nature of the systems through a regular evaluation process based on a set of criteria relevant for LAWS and applied across the life-cycle of a weapon system. An agreed legal norm on autonomous weapon systems might ensure States reach the same conclusions in their review of any such systems.

11. An exchange of good practices on weapons reviews could be beneficial. Several States have already shared information on their national implementation of weapon reviews. Useful measures to develop could include a joint definition of best practice and a mechanism for exchanging such information, which could be established under the Convention as a confidence-building measure. A few commentaries identified some elements that could be a basis for development of good practices in the conduct of weapon reviews, including through the involvement of relevant expertise and with inputs from developers and users. Emerging technologies in the area of LAWS may present particular challenges to the weapon review process, including because of their possible unpredictability and self-learning capabilities. These difficulties should be discussed further. It should also be recalled that States are not obliged to share the results of their reviews.

12. The potential for emerging technologies in the area of LAWS to improve compliance with IHL can also be further considered, pursuant to guiding principle (h). Such technologies can possibly support the implementation of IHL by, inter alia, reducing human-related errors and risks, improved precision and accuracy, as well as possibly incorporating self-destruct, self-deactivation or self-neutralization mechanisms. It cannot necessarily be assumed that such benefits would be obtained from emerging technologies in the area of LAWS. However, some level of assurance of such benefits could be provided through weapon reviews, the formulation of military strategies and plans and the conduct of military operations. The group could further examine the potential contribution of emerging technologies in the area of lethal autonomous weapons to verification of arms control instruments.

13. Other rules of international law, including International Human Rights Law, the law on State Responsibility and International Criminal Law could also be relevant to addressing issues related to emerging technologies in the area of LAWS. The Martens clause, reflected in the Preamble of the CCW, might also be relevant, although States hold different views about its interpretation and implications.

14. A compilation of applicable law and building of shared understandings of its interpretation, possibly to be undertaken by a network of legal experts, could be created. The creation of such a compilation could also lead to the identification of legal gaps.

2. Possible elements for consensus recommendations

15. Taking into account the guiding principles and the conclusions of the group on agenda item 5 (a) of its report CCW/GGE.1/2019/3, paragraphs 17 (a) to (i), the group considered, inter alia, the following elements as a possible basis for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems:

(a) IHL imposes obligations on States, parties to armed conflict and individuals, not machines;

(b) States, parties to armed conflict and individuals remain at all times responsible for adhering to their obligations under applicable international law, including IHL;

(c) IHL requirements and principles must be applied through a chain of responsible command and control by human operators and commanders;

(d) Comprehensive, context-based human judgement is essential in order to ensure that the potential use of weapons systems based on emerging technologies in the area LAWS is in compliance with international law, and in particular IHL;

(e) Legal reviews, at the national level, in the study, development, acquisition or adoption of a new weapon, means or method of warfare are a useful tool to assess nationally

whether potential weapons systems based on emerging technologies in the area of LAWS would be prohibited by any rule of international law applicable to that State in some or all circumstances;

(f) The use of weapon systems, including those based on emerging technologies in the area of lethal autonomous weapons systems, that cannot reliably or predictably perform their functions in accordance with the intention of a human operator and commander to comply with IHL requirements and principles, including, *inter alia*, distinction, proportionality and precautions in attack, is inherently unlawful;

(g) It is unlawful to use weapon systems, including those based on emerging technologies in the area of lethal autonomous weapons systems, with effects that cannot be limited in accordance with IHL or that cannot otherwise be used in accordance with IHL;

(h) States must ensure individual responsibility for the employment of means or methods of warfare involving the potential use of weapons systems based on emerging technologies in the area of LAWS in accordance with their obligations under IHL;

(i) States shall ensure a human operator or commander exercises judgement over the operational context, including through constraints on, *inter alia*, tasks, target profiles, time-frame of operation, and scope of movement over an area and operating environment, applied in individual attacks; in other words, constraints applied to the weapon system, the parameters of the weapon system's use and the required interaction between human and weapon system;

(j) States shall ensure that national documents, procedures, doctrines and training for relevant personnel are updated to ensure new technologies that enter into service are used strictly in compliance with IHL;

(k) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law. Weapons systems based on emerging technologies in the area of LAWS that cannot be used in compliance with IHL should be specifically prohibited;

(l) States are encouraged to engage in a voluntary exchange of best practices on the conduct of legal reviews on emerging technologies in the area of LAWS.

3. Areas for possible future work with a view to arriving at additional elements for consensus recommendations

16. The group could explore whether existing international law is sufficient to address concerns for ensuring compliance with international humanitarian law related to the use of emerging technologies in the area of LAWS.

17. The group could explore any potential aspects in which emerging technologies in the area of LAWS might improve compliance with IHL, as well as whether any such benefits might be overridden by moral or ethical concerns, specifically within an IHL framework of consideration.

18. The group could articulate how to assess whether the combined impact of several elements — such as (i) of weapon system characteristics, including predictability and reliability; (ii) of human operator understanding of the system's characteristics; (iii) of environmental constraints; and (iv) of operational constraints — is deemed sufficient for a decision by human operators or commanders to exercise the judgement required to assess that use of force is in compliance with IHL and, hence, be held accountable for such decisions.

B. Characterization of the systems under consideration in order to promote a common understanding on concepts and characteristics relevant to the objectives and purposes of the Convention

1. Summary of inputs and exchanges

19. There continue to be various views on the utility of a common working definition of LAWS. On the one hand, such a definition could be useful and may be an eventual outcome of deliberations. On the other hand, such a definition may not be necessary for the group to continue its work. It is also possible that the intent and manner of use of a weapon system would determine whether it was a lethal autonomous weapon system. Ultimately, a technology-neutral approach, focusing on the human element in the use of force, could be more fruitful than taking forward detailed discussions on technical characteristics.

20. It also remains possible that the articulation of characteristics of LAWS could serve the purpose of increased common understanding. Relevant characteristics could include autonomy in a weapon system's critical functions, the degree of autonomy, and the predictability of a system. However, the concept of autonomy being a spectrum, the difficulty of defining a clear point between semi- and fully autonomous systems was underlined. Similarly, there continues to be various views on whether the group should focus specifically on "lethal" autonomous weapon systems; it may also be the case that this discussion has served its purpose and is not worth further attention.

21. There are concerns that data bias may have potentially negative implications for compliance with IHL, including the possibility that the data sets used in algorithm-based programming relevant to emerging technologies in the area of LAWS, may diminish, perpetuate or amplify social biases, including gender and racial biases.

22. On the question of the importance of characteristics from the perspective of IHL and the CCW, delegations highlighted aspects such as: self-learning and evolution, that is, the ability to redefine missions or objectives independently; nature of communications links with human operator or chain of command; whether intervention in the system's operation would be possible once activated; reliability and predictability; and the ability to impose operational constraints on a weapon-system. Concerning autonomy: should it be considered a function of a system or something that can exist or not in different functions of a system, delegations addressing the issue emphasized that autonomy could reside in one function, such as navigation or sensors, and not another, such as target selection.

23. Given the dual use nature of the technologies under consideration, any policy responses should not hamper civilian applications. Many commentaries expressed the view that regulating LAWS would not necessarily hinder peaceful civilian applications of relevant technologies, in line with guiding principle (j) and following the experience of other disarmament treaties. Legally binding restrictions addressing the security and humanitarian challenges posed by LAWS could obviate the imposition of trade restrictions and export controls that might otherwise hamper peaceful applications. There continues to be concerns that a ban on these weapons would reduce research and development both in civilian and military contexts.

24. It remains important to achieve gender balance and incorporate appropriate technical expertise in the work of the group.

2. Possible elements for consensus recommendations

25. Taking into account the guiding principles and the conclusions of the group on agenda item 5 (b) of its report CCW/GGE.1/2019/3, paragraphs 19 (a) and (b), the group considered, inter alia, the following elements as a possible basis for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems:

(a) Certain characteristics of emerging technologies in the area of LAWS require specific and explicit consideration in national and military policies and procedures, such as: self-adaption; predictability; explainability; reliability; ability to be subject to intervention;

ability to redefine or modify objectives or goals or otherwise adapt to the environment; and ability to self-initiate. Such requirements should be considered throughout the weapon lifecycle;

(b) In implementing agreed measures, States shall not hamper progress in or access to civilian and military research and development and use of emerging technologies in the area of LAWS. Research and development of related technologies should not be restricted based on the sole rationale that such technologies could be used for weapons systems. At the same time, given the dual use nature of the underlying technologies in the area of lethal autonomous weapons systems, it is important to promote responsible innovation and use of such technologies.

3. Areas for possible future work with a view to arriving at additional elements for consensus recommendations

26. The group could seek improved understanding of the ramifications of possible biases in data sets used in algorithm-based programming relevant to emerging technologies in the area of LAWS, including through engagement with civilian technology experts.

C. Further 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

1. Summary of inputs and exchanges

27. States should ensure that the use of force must reflect human agency and human intention and that the judgements required to authorize the use of armed force must be made by humans. Context-specific human decisions are necessary to ensure compliance with IHL. Human operators, particularly in the chain of command and control, must have sufficient knowledge and understanding of a system to be confident that it will function as intended in a particular attack.

28. Human-machine interaction has consistently been highlighted by many as a cornerstone on which to build a future operational and normative framework. Many commentaries considered that guiding principle (c) was of primary importance to the work of the group. Several viewed that this principle necessitated further work to determine the type and extent of human involvement required in the use of emerging technologies in the area of LAWS. There may not necessarily be a "one size fits all" set of parameters for human-machine interaction; the requirements for such interaction may instead be dependent on the operational context and the weapon system's characteristics and may need to be determined on a case by case basis. One possible objective of human-machine interaction could be to ensure that humans retain control of the weapons they deploy and operate and the consequences that result. The elaboration of good practices with human-machine interaction that could strengthen compliance with IHL could be valuable. Human-machine interaction may need to be considered at every stage of a weapon system's lifecycle.

29. There was significant discussion of the importance of the concept of "human control". Measures based on a concept of human control could require considerations based on the specific characteristics of a weapon, on the operational environment, on the time-frame of autonomous operation, scope of movement over an area and on human-machine interaction. Such measures could also specify: the degree of predictability required in a weapon system's behaviour; the required degree of training and understanding of a weapon system; and the ability of a human to deactivate or override the operation of a weapon system. A deactivation requirement, however, may go beyond what States require in currently deployed weapons. Effective human control, involvement or judgment may not necessarily equate to direct, manual control but rather contextual factors including boundaries placed on the weapon and environment of use, and requirements for human-machine interaction. Further work is needed within the Group to understand various aspects of human control, including the type and extent required for compliance with IHL across all stages of a weapon system's life cycle.

The exchange of domestic policies and best practices relevant to this principle could be useful.

30. The ability to constrain a system through setting boundaries on, among other things, its duration of operation, range of operation and the functions that can operate autonomously, and hence determine whether the weapon-system's use could be lawful, was considered as relevant by several delegations. Human operators and commanders need a sufficient understanding of the machines they operate and the algorithms that control the machines' functioning to exercise appropriate judgement and ensure that the use of weapon systems is consistently within applicable international law; hence, control may need to be fully informed to be effective. There also needs to be an understanding of the operational environment. Human control/involvement/judgement might be contingent on the ability to intervene in the operation of a weapon, once activated, though there might also always be a point after which human intervention in a weapon's operation was not possible. Finally, it was noted that human control/involvement/judgement needed to be reasonably temporally proximate to an attack, to remain valid.

2. Possible elements for consensus recommendations

31. Taking into account the guiding principles and the conclusion of the group on agenda item 5 (c) of its report CCW/GGE.1/2019/3, paragraph 21, the group considered the following elements as a possible basis for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems:

(a) Human responsibility for the use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems can be exercised in various ways across the life-cycle of these weapon systems and through human-machine interaction.

3. Areas for possible future work with a view to arriving at additional elements for consensus recommendations

32. The group could pursue further work on the development of criteria on human control necessary to ensure that the use of emerging technology in the area of LAWS can be limited as required by IHL, including through: (i) operational constraints on the weapon system, (ii) environmental and temporal constraints bounding the operation of the weapon system, and (iii) standards of human-machine interaction, to ensure that all uses of force are meaningfully directed by human operators and commanders.

33. The group could examine methods for assessing the adequacy of constraints and safeguards for ensuring effective human control, involvement or judgment over the employment of weapons based on emerging technologies in the area of LAWS.

D. Review of potential military applications of related technologies in the context of the Group's work

1. Summary of inputs and exchanges

34. The group discussed the possible military benefits of emerging technologies in the area of LAWS and whether these benefits made their development inevitable. The sharing of best practices could be helpful, including in relation to national ethical guidelines for the military use of artificial intelligence.

35. Many stressed the importance of ensuring military documents and training for military personnel are updated to ensure compliance with IHL as new technologies enter into service. Legal advisers have a valuable role in this connection. On guiding principle (g), High Contracting Parties could be called upon to ensure that strict verification, assessment and validation procedures are in place in order to ensure a weapon system's reliability. They could also ensure the adequate training of operators and commanders and carry out risk assessments to inform the development of their military doctrines and policies. The group could catalogue potential risks and mitigation measures that should be considered in the

design, development, testing and deployment of weapon systems based on emerging technologies in the area of LAWS.

36. The group explored the potential security implications of emerging technologies in the area of LAWS, including the possibility that these technologies could lower the threshold for armed conflict and lead to unintended escalation. The risk of proliferation to or hacking by non-State actors were possible concerns in this regard. High Contracting Parties could seek measures to prevent the diversion of emerging technologies in the area of LAWS to unauthorized users. Dialogue on related technologies in appropriate export control bodies could also be pursued. The exchange of domestic policies and best practices relevant to this could also be pursued.

2. Possible elements for consensus recommendations

37. Taking into account the guiding principles and the conclusions of the group on agenda item 5 (d) of its report CCW/GGE.1/2019/3, paragraphs 23 (a) to (c), the group considered the following elements as a possible basis for consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems:

(a) During the design, development, testing and deployment of weapons systems based on emerging technologies in the area of LAWS, the risks inter alia of civilian casualties, as well as precautions to help minimize the risk of incidental loss of life, injuries to civilians and damage to civilian objects must be considered. Other types of risks should be considered, as appropriate, including but not limited to the risk of unintended engagements, risk of loss of control the system, risk of proliferation, and risk of acquisition by terrorist groups;

(b) Risk mitigation measures can include: rigorous testing and evaluation of systems; legal reviews; readily understandable human-machine interfaces and controls; training personnel; establishing doctrine and procedures; and circumscribing weapons use through appropriate rules of engagement.

3. Areas for possible future work with a view to arriving at additional elements for consensus recommendations

38. The group could compile national good practices in managing and mitigating risks associated with the use of autonomy in weapon systems.

E Possible options for addressing the humanitarian and international security challenges posed by emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the Convention without prejudging policy outcomes and taking into account past, present and future proposals

39. There have been several concrete policy options considered by the Group for addressing the challenges raised by emerging technologies in the area of lethal autonomous weapons systems:

(a) Negotiation of a legally binding instrument containing prohibitions, regulations, positive obligations or a combination of these — possibly centred around a norm to ensure human control over the critical functions in weapon systems — that could take the form of a CCW protocol or a standalone treaty; a call for a moratorium on the development and use of autonomous weapons in the interim was also made;

(b) Negotiation of a political declaration containing important principles such as the necessity of human control in the use force and the importance of human responsibility and accountability, and also possibly including elements on transparency and technology reviews, non-binding commitments, possibly based on the Guiding Principles, and possibly leading to a non-binding code of conduct;

(c) Negotiation of a non-legally binding technical outcome comprising a compilation of existing applicable international law and identifying associated good practices and information sharing for States, which could follow the approach of the 2008 Montreux Document regarding private military and security companies during armed conflict, possibly involving an annual review mechanism through the CCW; such an outcome may have similarities to the proposed code of conduct mentioned previously;

(d) Recognition that no further legal measures are needed, if the view is that IHL is fully applicable and sufficiently clear to deal with any possible challenges raised by LAWS.

40. These policy options are not necessarily mutually exclusive. The CCW remains a suitable forum for considering the implications of emerging technologies in the area of LAWS.

F. Consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems

41. In its work, the Group considered the Guiding Principles, which it may further develop and elaborate.

(a) The Eleven Guiding Principles, which were adopted by consensus and articulate a number of fundamental concepts with respect to emerging technologies in the area of LAWS, represent important areas of international consensus, are intrinsically interdependent and form a cohesive framework with each principle reinforcing others. Still, various views persist on their status and role;

(b) The guiding principles may serve only to provide guidance for the work of the group, in which case they would not be an end in themselves in fulfilling the mandate of the group. They may also guide the consideration and development of the normative and operational framework on emerging technologies in the area of LAWS. The work of the group need not be based solely on the guiding principles;

(c) It is also possible that the guiding principles could be operationalized at the national level, including by being taken into account in the design and implementation of national law, regulations and policies. They may be viewed to contribute to an IHL compliant development, deployment and use of emerging technologies in the area of LAWS. The guiding principles can also be further developed, elaborated and refined, without reopening any for negotiation.

42. In its work, the Group considered the work on the legal, technological and military aspects:

(a) Technical, military, and legal expert working groups could be established to share best practices for responsible use and development, and for using those expert inputs to continue developing, refining, and elaborating the eleven Guiding Principles;

(b) Along the lines of working groups, and in discussing the future work of the Group, a broader notion of discrete working groups or work streams was explored. Work to define discrete legal, technological and military work streams, bearing in mind ethical considerations, could have utility, also considering the need for cross-fertilization across the three areas and the necessity of each stream incorporating distinct technical expertise.

43. In its work, the Group considered elements in relation to the clarification, consideration and development of aspects of the normative and operational framework:

(a) Possible elements that address the normative aspects of the framework can provide clarity regarding how principles and rules of applicable international law, including IHL, apply to emerging technologies in the area of lethal autonomous weapons systems. These could include: the applicability of IHL to States, parties to armed conflict and individuals and their responsibility for adhering to obligations under IHL; the necessity to

apply IHL requirements and principles through a chain of command by humans; the necessity for comprehensive, context-based human judgement to ensure compliance with IHL; the applicability of legal reviews of new weapons to emerging technologies in the area of lethal autonomous weapons systems; the specification that it is inherently unlawful to use weapon systems that cannot reliably or predictably perform their functions in accordance with the intention of a human operator and commander to comply with IHL requirements and principles; and that weapon systems based on emerging technologies in the area of LAWS that cannot be used in compliance with IHL should be specifically prohibited;

(b) Possible elements that address the operational aspects of the framework can specify how States should implement principles and rules of IHL with respect to emerging technologies in the area of lethal autonomous weapons systems, as well as how they should cooperate towards this end, could include: ensuring individual responsibility for the employment of weapons systems based on emerging technologies in the area of LAWS; ensuring that a human operator or commander exercises judgement over attacks, including through certain operational constraints on weapon characteristics and environment of use, and requirements for human-machine interaction; ensuring that national documents are updated to ensure new technologies that enter service are used strictly in compliance with international law; engaging in the voluntary exchange of information on legal reviews of new weapons; specifically and explicitly considering certain characteristics of LAWS in national and military policies and procedures throughout the weapon lifecycle; avoiding the hampering of progress in or access to civilian research and development, avoiding restrictions on technologies on the sole basis of their possible use in weapon systems; ensuring human responsibility for the use of weapon systems through various ways across the life-cycle of weapon systems, including through human-machine interaction; and considering inter alia the risks of civilian casualties during the design, development, testing and deployment of weapons systems based on emerging technologies in the area of LAWS and implementing certain risk mitigation measures.

Annex I

Guiding Principles

[English only]

It was affirmed that international law, in particular the United Nations Charter and International Humanitarian Law (IHL) as well as relevant ethical perspectives, should guide the continued work of the Group. Noting the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to IHL, the following were affirmed, without prejudice to the result of future discussions:

- (a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems.*
- (b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system.*
- (c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole.*
- (d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control.*
- (e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law.*
- (f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered.*
- (g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems.*
- (h) Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations.*
- (i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized.*
- (j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies.*
- (k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.*

Annex II

Ambassador Karklins' "Commonalities Paper"

[English only]

1. This paper is provided by the Chair of the 2020 group of governmental experts on emerging technologies in the area of lethal autonomous weapons systems (GGE LAWS), under his own authority. On 24 March 2020, on behalf of the Chair, High Contracting Parties were invited to submit commentaries on the operationalization of the guiding principles at the national level. This paper attempts to identify commonalities in the submitted commentaries in order to contribute to the furthering of the work of the GGE LAWS.

2. The views expressed in the commentaries can be grouped into two categories: (i) views on the status and role of the guiding principles and (ii) views about the operationalization of the guiding principles, including information on relevant national practice. Without prejudice to the position of any High Contracting Party, this paper summarizes elements from the commentaries, with a view to highlighting possible commonalities.

Status and role of the guiding principles

3. High Contracting Parties reaffirmed the value of the 11 guiding principles, which were adopted by consensus and articulate several fundamental concepts with respect to emerging technologies in the area of lethal autonomous weapons systems. There was however a variety of views on their status and role.

4. Many considered that the guiding principles should be seen as providing guidance for the work of the Group. In this connection, some emphasized that the guiding principles were not an end in themselves and were not sufficient to fulfil the mandate of the Group, which the 2016 CCW Review Conference tasked "to explore and agree on possible recommendations on options" relating to emerging technologies in the area of lethal autonomous weapons systems.¹ Several specified that the principles should guide the consideration and development of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems. The view was also expressed that the work of the Group should not be based solely on the guiding principles.

5. Some considered that the guiding principles could be operationalized at the national level, including by being taken into account in the design and implementation of national law, regulations and policies. The view was also expressed that the further consideration of the definition of lethal autonomous weapons systems would be useful in the operationalization of the guiding principles.

6. Several considered that the guiding principles may be further developed, elaborated and refined. Some cautioned that they should not be reopened for negotiation. Several argued that the work of the Group should not focus on the operationalization of the guiding principles, but rather recommended it look at the clarification, consideration and development of aspects of the normative and operational framework, such as a legally binding instrument, a political declaration or a compilation of best national practices.

¹ "Report of the 2016 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)," 10 June 2016, CCW/CONF.V/2. <https://undocs.org/CCW/CONF.V/2>

Operationalization of the guiding principles at the national level

7. On guiding principle (a),² submissions recognized that international law, including international humanitarian law, regulates emerging technologies in the area of lethal autonomous weapon systems. Many commentaries stressed the importance of ensuring military documents and training for military personnel are updated to ensure compliance with international humanitarian law as new technologies enter into service. The value of legal advisers to militaries in this connection was noted. There was a call for the establishment of a network of legal experts on lethal autonomous weapons systems to, inter alia, identify applicable law and possible gaps in the normative framework.

8. Some expressed a view that lethal autonomous weapons systems would be incompatible with international humanitarian law and therefore with guiding principle (a). It was argued that autonomous weapon systems that cannot be used in compliance with the provisions of international law, notably international humanitarian law, should be specifically prohibited. Many considered that human control must be retained to ensure compliance with international law, including international humanitarian law, and to respond to ethical concerns. It was suggested that the GGE LAWS could further clarify international humanitarian law requirements applicable to the use of emerging technologies in the area of lethal autonomous weapon systems, including by clarifying if existing international humanitarian law is sufficiently specific.

9. Many commentaries addressed guiding principles (b)³ and (d)⁴ together, noting that while they do deal with distinct issues, they are inextricably linked. Several viewed that responsibility and accountability necessitate a degree of human control, which should be exercised throughout a weapon system's life cycle. A High Contracting Party noted that its existing national legislation already ensured a human was always accountable for decisions on the development and use of weapons. On guiding principle (d), a commentary noted that various measures could promote accountability, including rigorous testing and training, establishing procedures and doctrines, and using the weapon system in accordance with established training, doctrine and procedures.

10. On guiding principle (b), one commentary noted a lack of clarity over whether it called for States to establish new forms of liability or confirmed the applicability of existing norms for intentionally wrongful acts with respect to lethal autonomous weapons systems. It was suggested that the GGE LAWS could elaborate principles (b) and (d) by articulating relevant good practices to ensure human responsibility and accountability. Several emphasized that it was also important to consider the implications of principles (b) and (d) for developers and manufacturers.

11. Most commentaries considered that guiding principle (c)⁵ was of primary importance to the work of the Group. Many stressed that international humanitarian law requires context-specific judgment by humans, and that human-machine interaction must ensure that humans retain control of the weapons they deploy and operate. A number found that this principle necessitated further work to determine the type and extent of human involvement required in the use of emerging technologies in the area of lethal autonomous weapons systems. There

² *International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;*

³ *Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system*

⁴ *Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control*

⁵ *Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole*

was also a call for an exchange of domestic policies and best practices relevant to this principle.

12. A number of submissions argued for further work to determine the nature of human control necessary across a weapon system's life cycle to ensure compliance with international law, including international humanitarian law. Some also noted that the practical implementation of these parameters for human-machine interaction is dependent on the operational context and the weapon's characteristics and may need to be determined on a case-by-case basis.

13. On guiding principle (e),⁶ several commentaries recalled information shared previously on the national implementation of legal weapon reviews. Many continued to stress the relevance and utility of weapon reviews for addressing concerns raised by emerging technologies in the area of lethal autonomous weapons systems. A few noted that weapon reviews are not by themselves sufficient to regulate autonomous weapons, including because of the lack of international uniformity in their implementation.

14. Some considered that the exchange of good practices on weapons reviews would be beneficial. One commentary promoted the joint definition of best practices. A few suggested that a mechanism for exchanging such information could be established within the CCW as a confidence-building measure. It was also noted that States are not obliged to make the results of their reviews public. A few commentaries identified some elements they viewed as good practices in the conduct of weapon reviews in general, including involvement of relevant expertise and independence from developers and users. Several viewed that emerging technologies in the area of lethal autonomous weapons systems present particular challenges to the weapon review process, including because of their possible unpredictability or self-learning capabilities, and that these difficulties should be discussed further.

15. On guiding principle (f),⁷ the need for High Contracting Parties to adopt measures to prevent the diversion of emerging technologies in the area of lethal autonomous weapons systems to unauthorized users was noted. It was suggested that dialogue on related technologies in appropriate export control bodies could be pursued. A call was made for an exchange of domestic policies and best practices relevant to this principle.

16. On guiding principle (g),⁸ High Contracting Parties were called upon to ensure that strict verification, assessment and validation procedures are in place in order to ensure a weapon system's reliability. The importance of training operators and commanders, as well as conducting of risk assessments informing doctrine were also underlined. It was suggested that the GGE LAWS should catalogue potential risks and mitigation measures that should be considered in the design, development, testing and deployment of weapon systems based on emerging technologies in the area of lethal autonomous weapons systems.

17. On guiding principle (h),⁹ several commentaries argued that emerging technologies in the area of lethal autonomous weapons systems can support the implementation of international humanitarian law due to, inter alia, the reduction of human-related errors and risks, improved precision and accuracy and the ability to incorporate self-destruct, self-deactivation or self-neutralization mechanisms. Others argued that this outcome was not assured and should not be assumed. One commentary viewed that this principle should be implemented during the legal review of new weapons, the formulation of military strategies and plans and the conduct of military operations. A call was made for further examination of

⁶ *In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law*

⁷ *When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered*

⁸ *Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems*

⁹ *Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations*

the potential contribution of emerging technologies in the area of lethal autonomous weapons to verification of arms control instruments.

18. Several commentaries underscored that guiding principle (i)¹⁰ reaffirmed that weapons can only ever be tools lacking agency and legal personality. It was further noted that machines are not moral agents. As such, policy measures must always address humans.

19. Many commentaries expressed the view that regulating emerging technologies in the area of lethal autonomous weapons systems would not necessarily hinder peaceful civilian applications of relevant technologies, in line with guiding principle (j).¹¹ Some who held this view pointed to the experience of other disarmament treaties in this connection. Many also argued that legally binding restrictions addressing the security and humanitarian challenges posed by emerging technologies in the area of lethal autonomous weapons systems would avoid the imposition of trade restrictions and export controls that might otherwise hamper peaceful applications. The view was also expressed that a ban on these weapons would reduce research and development in related fields. It was recalled that the distinction between lethal autonomous weapons systems and emerging technologies in the area of lethal autonomous weapons systems was important; while the latter are integral elements of the former, they can be employed lawfully. The inclusion of the private and academic sectors in the work of the Group was considered useful for ensuring this principle is achieved.

20. Many commentaries affirmed that the CCW is an appropriate forum for discussing emerging technologies in the area of lethal autonomous weapons systems, as expressed in guiding principle (k).¹² Some also noted the relevance of other UN bodies, including the Human Rights Council. A few called for enhanced involvement of representatives from private industry.

Commonalities

21. Several particular commonalities emerge from this summary:

(a) Overall, international law, including international humanitarian law, regulates emerging technologies in the area of lethal autonomous weapon systems;

(b) The guiding principles are applicable for considerations of every stage of the life cycle of weapon systems employing emerging technologies in the area of lethal autonomous weapons systems;

(c) Further work is required to determine the type and extent of human involvement or control necessary to ensure compliance with applicable law, notably international humanitarian law, and respond to ethical concerns in the use of emerging technologies in the area of lethal autonomous weapons systems;

(d) National measures are needed to ensure compliance with applicable law, in particular international humanitarian law, including training of relevant military personnel to achieve clear understanding of the technical and operational characteristics of weapon systems, as well as applicable legal frameworks. The exchange of national good practices in a variety of areas of relevance to emerging technologies in the area of lethal autonomous weapons systems would be beneficial;

(e) In conducting legal weapons reviews, which are a legal obligation for parties to Additional Protocol I to the Geneva Conventions, governments must pay close attention

¹⁰ *In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized*

¹¹ *Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies*

¹² *The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations*

to the particularities of emerging technologies in the area of lethal autonomous weapons systems;

(f) Continued and focused engagement on emerging technologies in the area of lethal autonomous weapons systems is necessary within the framework of the Convention on Certain Conventional Weapons, which is considered to be an appropriate existing framework to further work on the topic, including on aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems.

Annex III**Commentaries on the 11 guiding principles**

[English only]

Australia

1. Australia is a strong supporter of the Convention on Prohibitions or Restrictions on the use of Certain Conventional Weapons which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (generally referred to as the Convention on Certain Conventional Weapons — CCW). The CCW has broad support from all regions across the globe, and is the appropriate forum to discuss issues related to lethal autonomous weapons systems (LAWS).

2. In 2016, a United Nations Group of Governmental Experts (GGE) was established in Geneva to examine emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the CCW. The discussions on LAWS reflect a recognition that emerging technology, such as driverless cars, can bring many benefits but pose challenges — and a GGE could conduct balanced discussions with subject matter experts on the implications of potential incorporation of LAWS into military capabilities.

3. Systems with advanced artificial intelligence (AI) and enhanced autonomous functions are becoming increasingly prevalent in both civilian and military sectors. These developments are not new or surprising. Australia recognises the potential value and benefits that AI brings to military and civilian technologies.

4. Militaries throughout the world are incorporating ever more automation into their systems. These systems can: reduce civilian casualties or collateral damage; improve the accuracy of weapons; reduce the risk to defence personnel; and provide enhanced situational awareness. In the civilian sector, emerging technologies are being used in numerous areas including medical analysis, genomics, logistics, automotive and aerospace manufacturing.

The Challenge of Defining LAWS

5. Australia calls for CCW High Contracting Parties to be realistic and pragmatic when discussing emerging technology such as LAWS. The LAWS-GGE has not yet reached consensus on a definition of LAWS. This does not suggest that the task of defining LAWS is insurmountable but reflects that this is a difficult and constantly evolving area of policy involving dual-use technologies with inherent complex technical and legal considerations. Autonomous technology originating from, or designed for, civilian use, may easily be converted for military use and vice versa.

6. Where governments were previously at the forefront of technological breakthroughs in support of military or civilian applications, private companies are now leading in many areas.

7. Australia contends that it is important to ensure that the discussion on LAWS is not inadvertently conflated with automated or remotely operated weapons systems. Not all automated weapons systems should per se be classified as LAWS.

System of Control over Weapon Systems

8. Australia believes that it is important to look at the lifecycle of a weapon or weapons system when examining the issue of control. As our paper, “Australia’s System of Control and applications for Autonomous Weapon Systems” (CCW/GGE.1/2019/WP.2/Rev.1) makes clear, a substantial degree of control already exists through the design, development

and use of weapons systems. This includes setting parameters, conducting tests, carrying out legal reviews, training operators, setting rules of engagement, taking the decision to deploy them, evaluating their effectiveness after use and taking the decision to decommission them.

9. The discussion on control should not be narrowed or restricted to requiring the presence of a human in the loop to make "trigger-pull" decisions. Australia welcomes the recognition by the GGE that control should be considered across the entire life cycle of a weapons system. This approach enables discussions on LAWS to be more grounded in the realities of the military context, including how control is exercised by responsible modern militaries.

Article 36 Reviews — Additional Protocol I to the Geneva Conventions of 12 August 1949

10. Australia believes that an aspect of the current system of international law – embodied in Article 36 of Additional Protocol I to the Geneva Conventions of 12 August 1949 contributes to the robust framework for regulating weapons systems, including those with autonomous functionality. Australia’s approach to Article 36 Reviews was described in detail in the paper “The Australian Article 36 Review Process” (CCW/GGE.2/2018/WP.6).

11. Article 36 reviews provide an important mechanism for States Parties to test whether the development or acquisition of weapons systems complies with international humanitarian law (IHL). As a party to Additional Protocol I, Australia adheres to the obligation to undertake a review of any new weapon, means or method of warfare, to determine whether its employment would, in some, or all circumstances, be prohibited by IHL or other applicable international law.

12. Australia’s national system of control embodies a suite of laws, regulations, processes, orders and doctrine that ensures all weapons intended for use by the Australian Defence Force during an armed conflict are capable of being used in compliance with Australia’s legal obligations.

13. Strengthening compliance with existing IHL, including through Article 36 reviews, is the most effective way to manage new weapons systems, including the potential development of LAWS. Australia encourages other nations to undertake weapons reviews, even if they are not a party to Additional Protocol I. States should ensure accountability for developing, deploying and using emerging weapons systems through appropriate review systems, in accordance with applicable domestic and international law.

14. In this context, Australia has consistently argued that discussions concerning a treaty banning LAWS are premature in the absence of an agreed definition and understanding of the technology — including the benefits it may provide. Australia believes that it is neither necessary nor desirable to ban or create new legal frameworks to regulate LAWS, as this technology may provide many benefits including minimising incidental harm to civilians and reducing risks to military personnel. Instead, we suggest that compliance with existing IHL, including the conduct of Article 36 reviews, may serve to mitigate many of the concerns voiced by some CCW States Parties and interest groups.

Operationalising 11 Principles that have been affirmed by the LAWS-GGE

15. Australia will continue to participate constructively in the LAWS-GGE process. We note that broad areas of convergence have emerged in relation to policy options for the way forward. The Group has affirmed eleven guiding principles in relation to the potential development and use of LAWS. Australia welcomes the affirmation that IHL continues to apply fully to all weapons systems, including LAWS. High Contracting Parties have also acknowledged that human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines.

16. In his letter of 29 May 2020, the Chair of the Group of Governmental Experts on Lethal Autonomous Weapons Systems called for submissions on how the guiding principles might be operationalised. We provide some ideas below.

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;

17. States should continue to emphasise in their military doctrine and manuals the importance of compliance with International Humanitarian Law (IHL). While high level documents such as these are often technology agnostic, it is crucial that an understanding of IHL, and the need for compliance, is established in such foundational documents. The importance of compliance with IHL should be reinforced and incorporated into Law of Armed Conflict (LOAC) training for all military personnel. As new technology is introduced into service, documents, such as rules of engagement, targeting directives and standard operating procedures, will provide clarity regarding how such weapons systems are to be used in compliance with IHL.

18. The Australian Department of Defence, through the Indo-Pacific Centre for Military Law (IPCML) offers courses including the "Command and Staff Operations Law Course", the "Cyber Law and Other Emerging Technology Course" and the "Rules of Engagement Course". The mission of the IPCML is to "promote respect for the rule of law and compliance with international law in military operations through training, international engagement and related activities with partners from the Indo-Pacific region". While the focus of the IPCML is on Australia's regional partners, enrolment in IPCML courses is open to military personnel from all States.

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system;

19. As mentioned above, States should continue to ensure appropriate national accountability mechanisms for the use of force in armed conflict including in the future should LAWS be developed and deployed.

(c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole;

20. Please refer to comments above on Article 36 Reviews and Systems of Control.

(d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control;

21. States should continue to ensure accountability for developing, deploying and using emerging weapons systems through appropriate national control systems, in accordance with applicable domestic and international law.

(e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law;

22. As consistently mentioned throughout GGE discussions, Australia is a strong supporter of Article 36 Reviews.

23. States should conduct weapons reviews in accordance with their international legal obligations in order to ascertain whether use of a new weapon, means or method of warfare would be prohibited under international law.

24. Australia, through the previously mentioned Indo-Pacific Centre for Military Law, offers two courses which include sessions focussed on the conduct of weapon reviews; the "Commanders and Staff Operations Law Course" and the "Cyber Law and Other Emerging Technology Course". While these courses have not been run during 2020 due to travel restrictions and social distancing requirements necessitated by the COVID-19 pandemic, the intent for 2021 is to once again welcome enrolments from military personnel from all States.

- (f) **When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered;**

25. All military capability should be secured to the appropriate level.

- (g) **Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems;**

26. Please refer to comments above on Article 36 Reviews and Systems of Control.

- (h) **Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations;**

27. States should consider how technological advances in weapons systems, such as autonomous systems, may help enhance compliance with IHL, increase precision, and support commanders to fulfil their obligations under IHL on the battlefield.

- (i) **In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized;**

28. Australia supports this Guiding Principle.

- (j) **Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies;**

29. Australia supports the aim of this Guiding Principle. States should consider the potential benefits of using emerging technologies in terms of the ability to better comply with IHL and other applicable international law.

- (k) **The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.**

30. Australia agrees that the CCW is the appropriate forum to continue discussions on LAWS.

Austria, Belgium, Brazil, Chile, Ireland, Germany, Luxembourg, Mexico, and New-Zealand

The following joint general comments aim to contribute to the work of the GGE LAWS and are issued without prejudice to each State's national positions.

I. Introductory Remarks

1. The 2019 Meeting of High Contracting Parties to the Convention on Certain Conventional Weapons (CCW) saw the adoption, by consensus, of eleven guiding principles as affirmed by the Group of Governmental Experts on Lethal Autonomous Weapons Systems (GGE LAWS). In its final report, the 2019 Meeting of High Contracting Parties also stated that the GGE LAWS is to consider those guiding principles which it may further develop and elaborate, and use them, among other elements, "as a basis for its recommendations in relation to the clarification, consideration, and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems".

2. In our view, the guiding principles do not in any way constitute the end point of the work of the GGE. We consider them a useful and valuable starting point to build substance towards a normative and operational framework. Four principles in particular are of relevance to building substance towards a normative and operational framework. These are: guiding principles (a), (b), (c), and (d).

3. Although each of these four principles can be discussed on its own merit, they are clearly interconnected and, together with ethical standards, help to form a coherent approach to understanding and addressing the challenges posed by weapons systems based on emerging technologies in the area of LAWS.

II. Comments on Guiding Principles

(a) International humanitarian law continues to apply fully to all weapons systems including the potential development and use of lethal autonomous weapons systems.

4. It is indisputable that all weapons systems must be developed, deployed, and used, in conformity with International Humanitarian Law (IHL). International Law encompasses the key requirements of state responsibility and individual accountability. These obligations entail that States and individuals are responsible and accountable for applying the law and are the ones that must be held accountable for violations.

5. Application of and compliance with key IHL rules and principles in the conduct of hostilities – such as the principles of distinction, proportionality, and precautions in attack, the prohibition of indiscriminate attacks, as well as the Martens Clause – require context-specific value-based judgment by a human, which, with respect to emerging technologies in the area of LAWS, must not be substituted by autonomous machines or systems. Human control must therefore be retained in order to allow compliance with IHL.

6. The key question under guiding principle (a) lies thus in clarifying whether existing IHL is sufficiently specific to address issues arising from the potential use of weapons systems based on emerging technologies in the area of LAWS.

7. Questions indeed arise around the precise degree and nature of human control over weapons systems based on emerging technologies in the area of LAWS required for ethical acceptability and to comply with IHL rules notably, to limit attacks strictly to military objectives, to assess the civilian harm and military advantage expected from an attack, to refrain from launching a disproportionate attack, to 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 civilian harm, and to uphold the principles of humanity and dictates of public conscience (Martens clause).

8. In the development of a normative and operational framework the following elements, inter alia, should also be considered:

- The necessity of sufficient predictability and reliability of the weapons system (cf. black box concern);
- The necessity of ensuring that the weapons system responds as intended by the developer and user to the operational specificities of pre-planning and dynamic targeting;
- The avoidance of data bias and programming shortfalls in complex systems;
- The necessity of ensuring the weapons system's adaptability to a change in circumstances, including the possibility to cancel or suspend an attack including if it becomes apparent that the objective is not a military one or is subject to special protection or that the attack 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;
- The necessity of ensuring that weapons reviews are conducted with a full understanding of the weapons' capabilities and limitations, and sufficient confidence about its effects in the expected circumstances of use.

9. To address these specific issues, an appropriate normative response requires a transparent, process-oriented framework based on a set of criteria for evaluation. Such a framework could help to ensure that weapons systems based on emerging technologies in the area of LAWS are developed, deployed, and used in full conformity with International Law and, in particular, IHL. The criteria upon which this framework would be based are detailed below in our comments on guiding principle (c) on human-machine interaction.

10. Weapons reviews, including art. 36 reviews, will continue to play an important role in weapons development. Nevertheless, in the evaluation of weapons systems based on emerging technologies in the area of LAWS, key challenges in the regulation and the nature of the systems should be considered, through a regular evaluation process, which should take into account the criteria detailed under guiding principle (c) below and be applied across the life cycle of a weapons system.

- (c) **Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole.**

11. Guiding Principle (c) on human-machine interaction is a key principle to build substance for a future normative and operational framework on weapons systems based on emerging technologies in the area of LAWS. In our view, one of the main tasks of the GGE LAWS will be to elaborate a common understanding of the type and degree of human-machine interaction that will be needed to ensure compliance with International Law and, in particular, IHL.

12. Human-machine interaction provides an entry point for setting out the building blocks of human control over such weapons. It recognises the necessity of retaining human control over the weapons systems and is a critical element in ensuring that there is no accountability gap in the design, development, deployment and use of weapons systems based on emerging technologies in the area of LAWS. Human control, responsibility and accountability are also intrinsically linked to the important ethical and moral considerations that should form part of the GGE's work. Fundamentally, guiding principle (c) on human-machine interaction should take into account that human control over the critical functions of such a weapons system requires control throughout the life-cycle of the weapon.

13. Guiding Principle (c) recognises that human-machine interaction may take various forms and be implemented at various stages of the life cycle of a weapon. It also states that

a range of contextual (operational context) and technical considerations (characteristics and capabilities of the weapon) should be considered in determining the extent and quality of that interaction.

14. As mentioned in section II(a) above, the process-oriented normative and operational framework should therefore be based on the following criteria:

Contextual considerations:

(a) Whether the weapons system is capable of reading the operational context correctly and whether it demonstrates a sufficient level of situational awareness (i.e. its ability to adequately perceive and react to changing circumstances). These elements should be made sufficiently transparent to the human agent;

Technical considerations:

(b) Whether adequate limits on tasks and types of targets are in place to allow the weapons system to be operated with sufficient degrees of reliability and predictability in the identification, selection and engagement of targets;

(c) Whether adequate environmental limits, including spatial and temporal limits, are in place to ensure that the decisions, made at the planning stage, including legal assessments, are respected throughout the execution stage;

Forms of human-machine interaction:

(d) Whether meaningful human control is exerted and retained over the critical functions of a weapons system — i.e. in the identification, selection and engagement of targets — to ensure the necessary context-specific value judgment required in the application of IHL rules and principles;

(e) Whether the degree of human control allows for human supervision and intervention, where adequate, in order to prevent redefinition of the weapons system's mission without human validation and to interrupt or deactivate the carrying out of autonomous functions if needed.

15. In order for weapons systems based on emerging technology in the area of LAWS to be operated in conformity with IHL, the following three challenges need to be considered when designing, deploying and using such weapons systems:

(f) Cognitive limitations of the system (lack of common sense and human judgement);

(g) Epistemological limitations (i.e. the system making judgments based on data that are biased, incomplete, or not fully appropriate to the situation);

(h) Algorithmic bias.

- (b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system.**

AND

- (d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control.**

16. While acknowledging that they are distinct principles, given the commonalities that exist between guiding principles (b) and (d), and in an attempt to avoid repetition, this section of the joint-commentary will address principles (b) and (d) together. Both guiding principles are essential to build substance for the normative and operational framework on emerging technologies in the area of LAWS.

17. Given that human responsibility and accountability cannot, under any circumstances, be transferred to machines, a normative and operational framework will need to reflect that

human responsibility and accountability are maintained throughout the entire life-cycle of any weapons system based on emerging technologies in the area of LAWS.

18. During discussions at the GGE, the terms "responsibility" and "accountability" have, at times, been used interchangeably. Yet, it is important to recall that they refer to related but distinct concepts. "Human Responsibility" can be considered as encompassing moral and ethical considerations as well as legal obligations and expected conduct. "Accountability" can be considered to relate to legal liability and legal consequences. The concepts are mutually reinforcing with clear and distinct lines of responsibility improving the accountability and attribution process.

19. International Law, particularly International Humanitarian Law, International Human Rights Law, and International Criminal Law, including the rules of attribution and responsibility applicable in a given case, apply fully to any weapons system. Thus, in our view, both human responsibility and accountability apply throughout the design, deployment and use of any weapons system.

20. In terms of scope, it is also important to stress that in International Law, responsibility and accountability apply at State and individual levels. A human chain of command and control must always be ensured during the deployment and use stages of the life cycle of such weapons systems.

21. The starting point in interpreting guiding principles (b) and (d) is that such systems must not be designed, deployed or used without a clear line of responsibility and full accountability. This highlights the necessity of maintaining human control of the systems to ensure responsibility and accountability, and underscores the importance of developing a common understanding of guiding principle (c).

22. A key issue reflected in guiding principles (b) and (d) is the recognition that an increasing level of autonomy in weapons systems may pose challenges in the attribution of conduct to individuals and holding them to account. Issues including, but not limited to, mens rea, recklessness, negligence, or misconduct in the deployment and use of weapons systems based on emerging technologies in the area of LAWS may be particularly difficult to assess.

23. The ultimate goal in including guiding principles (b) and (d) in a normative and operational framework is to prevent any ambiguities or inconsistencies in the attribution of responsibility and accountability that may arise from the design, deployment or use of such systems since any ambiguity would increase the risk of impunity and undermine confidence in the efficacy of the framework. It is essential that responsibility for the use and for the consequences of the use of a weapons system can be clearly assigned.

24. With advances in artificial intelligence and machine learning, predictability is another complicating factor that merits further attention. For instance, it may be necessary to take precautions to ensure that a weapons system is not capable of changing certain mission parameters without human validation. It must also be ensured that commanders and operators are informed about any new characteristics, functions and parameters of weapons systems and are trained accordingly before the deployment or use of such systems in the field.

25. A State that deploys or uses weapons systems based on emerging technologies in the area of LAWS must and will be accountable for the consequences of its use. Including these principles in the normative and operational framework aims to ensure that relevant actors, particularly those in the chain of command, have sufficient understanding of weapons systems based on emerging technologies in the area of LAWS under their control.

III. Concluding Remarks

26. Considering all the issues developed above, we are of the view that a normative and operational framework should ensure that human control is exerted and retained over critical functions of any weapons system based on emerging technologies in the area of LAWS.

27. The nature and degree of human control may vary during the life cycle of a weapons system. There is also no accountability without human control in all phases such as design, development, deployment and use of any weapons systems.

28. Human control, responsibility and accountability are furthermore intrinsically linked to the important ethical and moral considerations that should form part of the GGE's work and apply across the development, deployment and use stages of a weapons system. In developing a normative and operational framework, it will be necessary to consider the implications of guiding principles (b) and (d) with respect to developers and manufacturers as well, as they bear responsibility in the design and programming stages of the weapon. This is particularly relevant for issues related to data bias, which can impact targeting, and malicious or careless programming.

Austria

1. The Chair of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (GGE LAWS) 2020 encouraged State Parties to the Conventional Weapons Convention (CCW) to share views on national operationalization of the Guiding Principles agreed and subsequently adopted by States Parties of the CCW. Austria appreciates the opportunity to share and exchange understandings of international law, including human rights law and international humanitarian law.

2. However, it has to be mentioned that the guiding principles agreed in the GGE LAWS, represent Guiding Principles developed initially in 2018 with the intention affirmed in their preamble that “international law, in particular the United Nations Charter and international humanitarian law (IHL) as well as relevant ethical perspectives, should guide the continued work of the Group. Noting the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to IHL.”

3. In line with the mandate given by the Meeting of High Contracting Parties of the CCW to the GGE in 2019, which reads

“The Group is to consider:

- the guiding principles, which it may further develop and elaborate
- the work on the legal, technological and military aspects
- the conclusions of the Group, as reflected in its reports of 2017, 2018 and 2019

and use them as a basis for its consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems”,

4. Austria wishes to seize this opportunity to share its views on guiding principle a) *“International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems.”*

5. Over years of discussions in the GGE, it has become all the more evident that rapid progress of technologies, particularly in the area of autonomous weapons and artificial intelligence (AI) will impact armed conflict, the application of international law (IL), including international humanitarian law (IHL) and human rights law (HRL), and might even change the future of warfare with potential global impact. History has also demonstrated that particularly sophisticated weapon systems, once developed, do not remain confined to a single county, but are also strived for by others, be it through development, acquisition or proliferation. It is Austria’s understanding that the complexity of the issues, rapid technological advances, and their potential legal, humanitarian, security and — last but not least — ethical challenges led to the establishment of expert work in the CCW on emerging technologies in the area of LAWS in 2014.

6. The notion of reaffirming the applicability of the international legal order to emerging technologies in the area of LAWS is important. Yet, given the enhanced technological capabilities, which are difficult to predict in their entirety today, but which potentially include the notion of transferring control over (lethal) weapon systems to machines, make the question of meaningful human control all the more important. In Austria’s view it is not only about a legal, humanitarian, security and ethical imperative, but also a question of accountability, responsibility and ultimately political responsibility and control of how hostilities are conducted in the future. In our view, these questions cannot be fully answered in the context of existing norms, but require further clarity to prevent unintended consequences in the long run.

7. The underlying basis of the GGE’s work is the reaffirmation that IL and IHL in particular, apply to LAWS and that the choice of means of warfare is not unlimited. While there is consensus, as i.a. expressed in guiding principle a), that the international legal order applies to emerging technologies in the area of LAWS, the main question remains if there is a need to specify certain elements given the substantively new capabilities of emerging

technologies in the area of LAWS. Never before has it been more urgent to address specific issues, e.g. safeguarding human control over selecting and engaging the target, triggering a multitude of responsibilities and obligations under international law. The human element is critical to IL and IHL compliance. Now, the key question is to determine the type and degree of human control necessary to ensure compliance with IL, IHL, the core principles of IHL and customary IL, such as the dictates of public conscience. Legal obligations, responsibility and accountability can, by definition, not be outsourced to machines as international legal norms are based on humans.

8. The assessment of compliance with the existing standards and rules under IHL has to be considered in a contextual manner in light of concrete circumstances. Circumstances on the battlefield are of an evolving nature and human control of a weapon and human judgement are necessary prerequisites.

9. Among a multitude of obligations and responsibilities, there are at least two dimensions noteworthy to IL and IHL compliance: First, the legality of a weapon per se and second, the question of lawful use of a certain weapon. In Austria's view, the level of autonomy, particularly in the selection and engagement of targets, is decisive for determining the legality of a weapon per se as well as the potential of legal use of a weapon system.

10. First, means and methods of war are not unlimited. In Austria's view, with increasing levels of autonomy of weapon systems, the question of legality of a weapon per se deserves particular attention. During the development of new technologies, states must ensure that any potential weapon would per se be capable to be used in respect of IL and its basic principles such as distinction, proportionality and precautions in attack. If a weapon is by its mere design not compatible with IL, it must not be developed. IL recognizes the concept of weapons that are indiscriminate by nature, due to their unacceptable humanitarian harm, and thus must not be developed. However, this evaluation is subject to weapon reviews, which will be addressed at the end of this paper.

11. Second, when exploring the limits of the acceptable, the question of possible lawful use of a certain weapon system is another key consideration. It is noteworthy that lethality per se is not a concept in IHL. In other words, a weapon that delivers lethal effects might very well be used in compliance with IHL. The same reasoning is valid for autonomy, but it is a question of the level of autonomy. It is important to consider the key challenges autonomous weapons systems without meaningful human control over critical functions would pose to IHL. IHL compliance is highly context-dependent, which is particularly sensitive when it comes to emerging technologies with autonomy in critical functions. Any use of a new weapon needs to comply inter alia with the three fundamental IHL principles, namely the principle of proportionality, distinction and precaution in attack. In this context we wish to recall Austria's 2015 working paper on meaningful human control.

12. The principle of precaution, requiring that an attack must be cancelled or suspended if it becomes apparent that the objective is not a military one or is subject to special protection or that it would violate the rule of proportionality, is also challenged by the potential development of LAWS. There needs to be a possibility for humans to override the system.

13. In the context of LAWS, ethical considerations deserve particular attention. The appropriate legal framework is provided for inter alia by the dictates of public conscience and the principles of humanity, as referred to in the Geneva Conventions, but also in the CCW preamble. IHL is grounded on the basic values of humanity shared by all civilizations. The Martens clause demands the application of "the principle of humanity" in armed conflict.

14. Ensuring meaningful human control requires a multidimensional approach, which also relates to the level of predictability and reliability required to ensure human control and the necessary required human legal and situational judgement. An important question remains the unpredictability of machine learning algorithms, especially considering their underlying data. Setting boundaries — or operational constraints — in the operation of an autonomous robotic system — for example, on the task, time-frame of operation, scope of movement in or over an area, and operating environment — can contribute to increasing predictability. Predictability and reliability are crucial for IHL compliance as both contribute to the ability to estimate the expected effects and results of a particular weapon use.

15. While some weapon systems developed in the past were automated, e.g. based on a binary if-then function (e.g. defensive weapons with pre-defined targets such as specific missiles in a specific area), the question of how compliance with international law, in particular international humanitarian law and its principles, can be ensured in the context of potentially merely algorithm-driven selection or engagement of targets, remains broadly unanswered by the international community. The general notion that the international legal order applies can be helpful in this regard. Some countries have published doctrines on national legal and ethical limits to weapon development. Yet, if there is no common understanding of different states applying the currently nonspecific rules of international law, including international humanitarian law and human rights law, to the particular case of LAWS, the international legal acquis risks to become subject of mere national understandings and interpretations of the broadest guidelines and legal obligations of international law, including international humanitarian law and human rights law.

16. The legal weapon review outlined in Article 36 of the Geneva Additional Protocol of 1949 requires that “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.*” Yet, the procedure makes it very clear that the responsibility lies with the State itself to determine, if in the particular State’s point of view a weapon or for the purpose of this GGE a weapon system would be compatible to be operated within the applicable existing legal norms. This is closely linked to the challenge of how States interpret existing norms (including IL, IHL and the dictates of public conscience). In the absence of a specific legal norm, States could differentiate in their assessment, if a weapon system is compatible with IL, potentially opening the door to uncertainties in the application of norms by using different standards. For reasons that go well beyond this paper, it is clear that detailed information of weapons development, including potential capabilities, is unlikely to be shared in real time with the broader international community. History shows that detailed insight into weapon reviews is provided, if ever, only years after a particular weapon system was considered for development. In the light of emerging technologies advancing at an unprecedented pace, such insights would be possibly shared at a stage when the information exchange might be too late to influence policy decisions in other states.

17. Therefore, Austria considers the necessity of developing specific international law in the context of autonomous weapon systems without meaningful human control over the selection and engagement of a target as an urgent matter to be dealt with by the international community. In our view, it is key to preserve human moral dignity, the rule of law and international security as a whole. The absence of clear legal norms regulating LAWS might ultimately challenge many of the previous achievements in international law, international humanitarian law, the ethical principles enshrined as a minimum standard in the Martens clause and human rights law. In the past, in cases where states felt the need to further clarify international law, more specific regulations were adopted. Under the CCW, the Protocol IV is a case in point, where states given the potential gravity of such weapons being developed, recognized that blinding laser weapons should be prohibited preemptively. In Austria’s view the GGE should urgently intensify focus and efforts on minimum requirements for human control, with a view to adopting a legally binding norm.

Brazil

(Issued as [CCW/GGE.1/2020/WP.3](#) and [CCW/GGE.1/2020/WP.4](#))

China

1. The current “Eleven Guiding Principles” are positive results of arduous discussions, and reflect the consensus of all parties concerned. These principles are also the expression of the rationale enshrined in the UN Charter, International Humanitarian Law and other universally recognized legal and ethical concepts, and therefore could serve as basic guidelines for countries to regulate the military applications of Artificial Intelligence (AI). This achievement also shows clearly that the international community has both the will and the ability to address all possible issues caused by LAWS, and that the UN Convention on Certain Conventional Weapons (CCW) is the appropriate framework to deal with LAWS-related issues.

2. China is of the view that the “Eleven Guiding Principles” has laid a useful foundation for GGE’s further discussions. This hard-won achievement should be cherished and not advisable to reopen for discussion. In the future, parties concerned may add new guiding principles on the basis of consensus and in line with the development of AI technologies. Meanwhile, the GGE should continue to discuss definition, technologies, military applications, policy options and other related issues according to the mandate of the Fifth Review Conference of the High Contracting Parties to the Convention with a view to negotiating a legally binding international instrument when conditions are ripe.

3. As for the operationalizing of the principles, countries may take further specific measures to implement them within their existing legal and military regulatory regime in line with the requirements of these Principles. These measures may include the development of industry norms, ethical declarations and guideline for action so as to strengthen guidance to and oversight of the development of related technologies. China encourages countries to actively conduct international exchanges and share best practices on a voluntary basis.

4. China pays high attention to the security and ethical challenges posed by emerging technologies. In July 2017, China released the New Generation Artificial Intelligence Development Plan, which made some proposals on laws, regulations and ethical norms for the development of AI, including building a framework for the development of AI, formulating a code of conduct for product developers, and enhancing assessment of potential threats. In June 2019, the National Governance Committee for the New Generation Artificial Intelligence put forward eight principles and guidelines for the responsible development of development of AI, including Harmony and Human-friendly, Fairness and Justice, Inclusion and Sharing, Respect for Privacy, Safety and Controllability, Shared Responsibility, Openness and Collaboration, Agile Governance. In July 2019, the Chinese government established the National Ethics Committee on Science and Technology, which will guide and regulate the dual-use application of science and technology including AI through legislation, law enforcement and review.

Besides, the Chinese academia, scientific research community and relevant associations have also made active efforts in promoting self-discipline. “Chinese Young Scientists’ Declaration on the Governance and Innovation of Artificial Intelligence”, “Six AI Principles”, “Beijing AI Principles”, “Shanghai Initiative for the Safe Development of Artificial Intelligence” were released successively, which made it clear that the fundamental purpose of AI technologies should be to benefit mankind and the moral principles, dignity and human rights of all mankind and the moral principles, dignity and human rights of all mankind should be safeguarded. This fully demonstrates China’s responsible approach to participate in ethics building in the global governance of AI.

5. China will continue to participate in the GGE work on LAWS in an active and constructive manner, and to share China’s policies and best practices in order to make positive contributions to properly solving the concerns caused by LAWS.

Colombia

1. Colombia recognizes the work of the Governmental Group of Experts (GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (LAWS) within the Convention on Certain Conventional Weapons (CCW) as a space for dialogue to discuss the eventual challenges that represent Lethal Autonomous Weapons Systems LAWS) and to continue forward on the discussion about the creation of effective policies and measures that lead towards international peace, stability and security.
2. This work also underscores the importance of the 11 guiding principles of the GGE LAWS as a reference framework for the construction and development of rules of international law, as well as a regulatory framework and a national operation.
3. At national level, the operationalization of the 11 guiding principles may have several administrative and financial implications, thus the National Government will have to determine how they will be implemented, not only as a short or medium term policy, but as public policy that may last in time and progresses as its institutions do so.
4. Considering the operational commitments acquired by the Colombian State, specially by its public force, the adaptability of the principles on the internal normative framework, likewise and its application obey to the whole state structure.
5. For its operationalization, it is necessary to take on account that, according with articles 9, 93 and 214 (section 2) of Colombian Political Constitution (1991), the State has to analyse the opportunity, convenience and conductivity on which these types of international rules adhere to the national legal framework in order.
6. Once the 11 guiding principles became part of the national constitutional bloc, the Military Forces — part of the executive branch — under protection of Article 217 of the Political Constitution, would guide their efforts towards the full compliance of all military orders product of the adaptation process of national interest and state policies.
7. From the Military Forces' view, it is necessary that the 11 guiding principles turn into the required normative process in order to become an integral part of the Decision Making Military Process (PMTD in Spanish) as well as the Command Procedure to convey them in all the Strategic, Operational and Public Force's Tactical levels.
8. It is important that the 11 guiding principles are based on the spirit of International Human Rights Law and International Humanitarian Law, whose international conventions “make part, in generic sense, of the normative body of Human Rights, given that, both human rights treaties in strict sense and Humanitarian Law conventions are *ius cogens* norms that seek to protect human dignity above all.”
9. Colombia pays special attention to the approach of the guiding principles related to the interaction between human being and the machine in the life cycle of lethal autonomous weapons systems (principles b and c), in view of such, it is considered that humans must determine the use of force through the means available to it, and always with the understanding of superfluous damage or unnecessary injury relief.

Costa Rica

1. The Permanent Mission of Costa Rica to the United Nations Office and other international organizations in Geneva presents its compliments to the 2020 Chair of the Group of Governmental Experts related to emerging technologies in the area of lethal autonomous weapons systems GGE LAWS of the Convention on Certain Conventional Weapons, and avails itself of this opportunity to refer to the communication sent by UNODA on behalf of the Chair of GGE on LAWS, dated 14 July, 2020, and other previous communications (18 March and 24 March, 2020).
2. In this respect, the Permanent Mission of Costa Rica recognizes the importance of the work of the GGE LAWS and its mandate, particularly in the context of the limitations posed by the pandemic of the COVID-19, to hold sessions of the Group as previously scheduled.
3. Also, as stated in our note verbal to the Chair of the GGE LAWS dated 31 March, 2020, and as expressed during previous formal sessions of the GGE, our delegation values the common understandings reached so far, and considers the guiding principles as a good basis to deepen our discussions, particularly as it relates to the element of human control.
4. Furthermore, our delegation has cautioned against stirring the work of the GGE solely based on the guiding principles, as they do not constitute an end in themselves, nor enjoy any legal status. Noting the above, we refer herein to some elements to which our delegation attaches great importance, in the context of the GGE mandate. We also reiterate, that Costa Rica has reserved its position as to further comment on the scope and methodology of work chosen by the Chair of the GGE to seek substantive inputs from the delegations, as well as it regards to any other aspects included in related communications.
5. For Costa Rica, international law, including international human rights law, international humanitarian law, and ethical and moral considerations, must be taken into account as the GGE carries on its discussions for addressing the humanitarian and international security challenges posed by emerging technologies in the area of lethal autonomous weapons systems, including for considering and developing an international normative framework. The weaponization of technologies continues to advance at a rapid pace, including in the field of autonomous weapon systems (AWS), which urgently calls for an international agreement that limits the development and use of said weapon systems, and in light of humanitarian, legal and ethical concerns. This call has been echoed by the United Nations Secretary General in his Agenda for Disarmament: securing our common future.
6. The GGE has stated, in accordance with international law and the principles of international humanitarian law (IHL), that humans must retain and exercise responsibility for the use of weapon systems and the use of force. In practical terms, measures of meaningful human control shall be applied to the life cycle of AWS, so that individual and State responsibility and accountability can be asserted. Furthermore, autonomy in weapon systems cannot be unlimited, and current instruments do not regulate or limit said autonomy, creating a vacuum for effective governance and risk mitigation.
7. The unpredictability of AWS as it relates to the changing environment in which they operate, provide for these weapon systems to pose serious risks for civilians and civilian objects, which must be addressed. As elaborated by the International Committee of the Red Cross (ICRC) and the Stockholm International Peace Research Institute (SIPRI), among others, controls on the weapon system's parameters of use (e.g. allowing for deactivation and fail-safe mechanisms), controls on the environment (e.g. excluding the presence of civilians and their objects, temporal and spatial constraints, etc.), controls through human-machine interaction (e.g. allowing the user to supervise the AWS and to intervene in its operation where necessary, including through the overriding, abortion or deactivation of tasks or mission) could help reduce and/or compensate for the unpredictability inherent in the use of AWS and its potential risks. Even more so, control measures must be conceived and combined, to help ensure legal compliance, ethical and moral acceptability and operational utility of the AWS.
8. From an artificial intelligence perspective, AWS lack fundamental human characteristics that take relevance when making decisions about the lives of others; whereas

self-learning, multiple data and algorithmic bias, insufficient reliability and the possibility of being hackable, may pose additional challenges for compliance with international law and the thresholds for the use of armed force. On the other hand, Costa Rica recognizes the importance of technological developments and their application for peaceful purposes.

9. Finally, Costa Rica underscores that proposals for a political declaration, code of conduct, and other voluntary and confidence building measures, including national weapons review processes, are not exclusive but complementary. The aforementioned shall not preclude the development of an international binding agreement stipulating prohibitions and regulations on AWS.

10. The Permanent Mission of Costa Rica avails itself of this occasion to restate to the 2020 Chair of the Group of Governmental Experts related to emerging technologies in the area of lethal autonomous weapons systems GGE LAWS of the Convention on Certain Conventional Weapons, our disposition to engage in a constructive and inclusive dialogue to advance the works of the GGE LAWS, and reiterates the assurances of its highest consideration.

Cuba

1. Cuba does not possess nor develop lethal autonomous weapon systems. Since the beginning of the discussions on this matter, it has maintained a consistent position on that category of weapons, which has been registered and recorded at the meetings of the Groups of Government Experts on Emerging Technologies in the Field of Lethal Autonomous Weapons Systems.
2. Our country has actively and constructively participated in the negotiations of the Group of Governmental Experts. With regard to the 11 guiding principles adopted by said Group, we believe that they constitute a starting point for identifying and clarifying common understandings and that they could serve as a basis for the negotiations and subsequent developments of a regulatory framework.
3. While these principles can be further developed, they cannot by themselves curb the threat posed by lethal autonomous weapons systems, nor do they replace the need for a strict, legally binding international regulatory framework that includes a ban on weapons not subject to human control.

Principles (a) and (h)

4. The lack of a definition and primarily of a regulation on these weapons systems in the context of international humanitarian law imposes new challenges and higher stakes on States. It is expected that this intelligent weaponry will be able to seek out and attack military targets and people, using lethal force without human intervention.
5. We have defended, in all the relevant multilateral forums, that all autonomous weapons which cannot comply with the provisions of international law and international humanitarian law should be banned, even before they begin to be produced and deployed on a large scale. This is a preventive approach, based on the principle of precaution.
6. The use of lethal autonomous weapons would not be able to ensure compliance with and observance of the rules and principles of international law.
7. Fully autonomous weapons could be used in contravention of the principles of sovereignty and territorial integrity of States, which are enshrined in Article 2 of the United Nations Charter. The sovereignty and territorial integrity of States has already been violated through the use of weapons systems with a certain degree of autonomy, in order to carry out espionage or commit extrajudicial killings, among other actions. Under no circumstances is the violation of the principles of sovereignty and territorial integrity acceptable. Even when the prescribed use of these weapons is for non-military purposes, the State in which they are used must have given its consent prior to the fact.
8. Based on the available information and technology, we believe that the use of these weapons could not guarantee compliance with and observance of the basic principles of international humanitarian law, such as the distinction between civilians and combatants, proportionality, and others.
9. We have therefore advocated for a legally binding instrument within the framework of the Convention on Certain Conventional Weapons that would prohibit LAWS.
10. Although we do not have programs associated with the development of this type of weaponry, Cuban national legislation regulates aspects directly related to the observance of the principles of international humanitarian law and, therefore, to the operationalization of these two guiding principles.

Principles (b), (c) and (d)

11. Autonomous lethal weapons are not capable of making complex decisions. They have a limited capacity to perceive the overall conflict environment as well as to adapt to unexpected changes, and they cannot effectively determine human intentions.

12. Consequently, Cuba has expressed its concern over the possible use of these weapons systems aimed at dehumanizing conflict, and, in this sense, we believe that machines cannot replace human beings in the most important decisions of war, and in no event can they decide on people's lives. All autonomous weapons that do not maintain human control over these aspects (aspects such as selecting the target and attacking it) must be banned. The degree of autonomy and lethality are the basic characteristics that should guide the prohibition or regulation of autonomous weapons. The greater the autonomy and lethality, the stricter the framework that regulates them should be.

13. We advocate for the adoption of a legally binding international instrument that bans the manufacture, possession, and use of fully autonomous weapons and establishes specific regulations for the use of semi-autonomous weapons.

14. In order to move forward in the discussions, an agreed definition of autonomous weapons is of vital importance. We regret that this important issue has been left aside.

15. A definition of these weapons should consider both fully autonomous and semi-autonomous weapons.

16. Fully autonomous weapons should be understood as those that act without human supervision once they have been deployed.

17. Semi-autonomous weapons should be understood as those that have the supervision of a human controller, at least in their critical functions, e.g. for target selection and attack.

18. With the use of fully autonomous weapons, the responsibility of a State for internationally wrongful acts, or violations of international law, could not be effectively assessed. The very characteristics of autonomous weapons render it difficult or even impossible to attribute responsibility to a State or an individual in the event of illicit acts involving the use of these weapons.

19. Any State or individual which is responsible for illicit acts involving the use of autonomous lethal weapons should be held accountable.

20. To be able to assess and assign responsibility is one of the elements that reinforce the need for human control. Any programmer who intentionally programs an autonomous weapon to commit war crimes should also be held accountable.

21. In Cuban national legislation, articles 5, 42, 43, 44, and 45 of Act No. 22, "Military Crimes Act", of February 15th, 1979, provide dispositions for aspects related to the military chain of command and the individual responsibility of combatants. Said provisions relate to the operationalization of these three guiding principles.

Principle (e)

22. It is an obligation of States to ensure that their weapons comply with the rules and principles of international law, including international humanitarian law. New technologies have to comply with international law as well. Article 36 of Protocol I Additional to the Geneva Conventions of 1977 clearly states that when a High Contracting Party studies, develops or acquires or adopts a new weapon, means or method of warfare, it has an obligation to determine whether its use would, under certain conditions or in all circumstances, be prohibited by that Protocol or by any other rules of international law applicable to that High Contracting Party.

23. However, national reviews of new weapons are not, in themselves, a sufficient measure to regulate autonomous weapons. National reviews should be understood as a complement to a specific new international standard that is necessary for this new category of weapons. The lack of uniformity of national measures for the review of these new standards is another element that reinforces the need for a specific international rule specific to autonomous weapons.

Principles (f) and (g)

24. Everything that runs on software can be attacked or hacked by State and non-State actors. Lethal Autonomous weapons do not escape this phenomenon, as they are complex emerging systems that will never be completely immune to the vulnerabilities identified in traditional weapon systems. Due to their nature, autonomous weapon systems will be especially vulnerable to cyber operations.

25. We cannot rule out the possibility that the interactions these weapons withstand in the field during military operations, could damage both their software and hardware and, since they are totally autonomous and lack human monitoring and control, there would not even be the possibility of aborting an operation which has already been carried out by one of these defective weapons. This type of technical damage to which any machine is exposed to could lead, in this particular case, to major disasters and considerable losses, both human and material.

26. Fully lethal autonomous weapons with long deployment times raise cyber-security concerns because, the longer such a system is deployed, particularly if it is out of communication, the more time an "adversary" will have to discover and exploit vulnerabilities, all the while remaining undetected. If a vulnerability related to security were to be identified in a fully autonomous object operating in environments with limited communications, we would have to wonder whether it would be possible to remotely correct the vulnerability, recover the object or at least initiate a fail-safe shutdown mode. Hence, the importance of maintaining human control over this type of weapon.

Principles (i), (j) and (k)

27. The importance of the peaceful use of intelligent autonomous technology is not unknown, nor is it denied. There is a general agreement on the fact that progress and access to the peaceful uses of these technologies should not be hindered. However, the goal is to engage, as soon as possible, in setting limits on the development of lethal autonomous weapons and to regulate the use of intelligent autonomous technologies for military purposes, in particular by prohibiting their use for the manufacture and development of autonomous weapons.

28. The apparent tactical benefits resulting from the use of lethal autonomous weapons may cause possessor States to stop considering armed conflict as a last resort. In doing so, they could increase international conflicts and thus their casualties. The possession of these weapons by unauthorized non-state actors would also represent a danger to governments and civilian populations.

29. We recognize the work of the Group of Governmental Experts on Emerging Technologies in the Field of Lethal Autonomous Weapons Systems and support its mandate, within the framework of the Convention on Certain Conventional Weapons, to achieve concrete strategies to address the security, ethical and humanitarian challenges posed by emerging technologies in the field of lethal autonomous weapons systems.

30. We favor the advancement of this important issue within the framework of the United Nations. The impasse we are facing in the Convention on Certain Conventional Weapons is regrettable. It is also understandable that States and civil society that support an instrument banning these weapons are seeing their actions and aspirations paralyzed in the GGE and are trying to bring the issue before the General Assembly. We do not favor the initiation of a negotiation process outside the UN system.

Ecuador

Ecuador would like to acknowledge and appreciate all the efforts undertaken by the Chair of the Group of Governmental Experts on Lethal Autonomous Weapon Systems (GGE LAWS) in 2020 to achieve progress in the discussions of the Group. In this regard, Ecuador would like to submit the following comments in relation to the idea of operationalization of the guiding principles at the national level:

- Ecuador considers that the adoption of the guiding principles implies an important advancement in the work of the GGE LAWS. Nevertheless, it emphasizes that they do not constitute an aim in themselves; they serve rather as a base element to guide the future work of the Group.
- In this regard, the fact that they have been characterized as guiding, and not principles per se, indicates the necessity for further discussions on their content in order to arrive at a common understanding on their meaning and specific implications in the case of lethal autonomous weapon systems (LAWS).
- Furthermore, Ecuador also does not consider them to represent a comprehensive set of principles. They are a result of the minimum common denominator among those elements of discussion, where agreement has been possible until now.
- They are therefore, incomplete and, by themselves, far from sufficient to solve the ethical, moral, technical, security and legal issues raised by the use of emerging technologies in the area of LAWS.
- Attempting to examine the interpretation or implementation of these guiding principles at the national level is therefore, in Ecuador's opinion, premature, as no common understanding on their full meaning has been reached, and insufficient, as many other ethical, moral and legal issues of crucial importance would be left out.
- The GGE LAWS could rather focus its work on reaching a common understanding on crucial elements of those guiding principles, such as the type and extent of human control required (guiding principles c and d), the means to assure accountability (guiding principle b) and the specific ways in which rules of international humanitarian law (IHL) should be interpreted and applied in the case of LAWS (guiding principle a), among others.
- Clarifying these aspects, together with the consideration of other indispensable elements, such as the implications on LAWS of compliance with other applicable international law, including international human rights law¹, as well as with ethical and moral acceptability (and its implication on the need for additional regulations and prohibitions related to the use of emerging technologies in the area of LAWS), among others, would allow the Group to determine where gaps in the current international normative framework exist.
- This should then be followed by the development of the lacking and clarifying elements in the international legal framework, including through the negotiation of a legally binding instrument with regulations and prohibitions on the use of emerging technologies in the area of LAWS, as well as an international operational framework that address the issues identified.
- Only after the development of such a normative and operational framework, should national implementation or operationalization be considered. This does not imply in

¹ To this end, one must consider that although IHL and international human rights law are distinct and have evolved separately, albeit in parallel, IHL is applicable in times of armed conflict, while international human rights law is applicable in both, times of armed conflict and times of peace, operating in a complementary manner to IHL in the context of armed conflict.

Furthermore, it is possible that some countries might consider the use of LAWS in national policing activities in which the principles of international human rights law apply fundamentally, including basic principles, such as the right to life, the right to reparation and the right to dignity.

any way that sharing of national legislation, policies and best practices is not useful in the development process of such an international framework.

Finland

I. Introduction

1. At the request of the GGE LAWS Chair, H. E. Ambassador Janis Karklins, Finland is pleased to contribute to the discussion on the operationalisation of the 11 guiding principles at national level.
2. In this paper, an attempt is made to present a basic framework for defining the required level of human involvement in different phases of operational use of LAWS. Of the guiding principles, focus is particularly on elements of human-machine interaction (c), accountability (d), and risk assessment and mitigation measures (g).

II. Rationale

3. Discussions on LAWS often come back to the question of what autonomous features and functions should be restricted or banned in the case of LAWS. It is also often argued that computative control of LAWS cannot ever achieve the qualitative capabilities needed to comply with IHL requirements, even with human-defined tasking within strict operational restrictions and boundaries.
4. In this paper, the issue is approached from an alternate angle: What would constitute an ethically sustainable and IHL compliant way to overcome the justified concerns regarding LAWS, supposing that the required level of technological sophistication is reached one day?
5. Why is this approach relevant? Increasing capabilities of machine autonomy are already visible in civilian applications and will continue to be developed in the coming years regardless of military use. A quantum leap in computing could be just around the corner. In weapons systems, higher precision and distinction is pursued for military purposes, but can also support humanitarian objectives. However, the easier an advanced technology is to apply, the easier it will be to use it for harmful purposes. In the near future, we might well see armed autonomous civilian capabilities used for military purposes.
6. The most efficient way to ensure that future LAWS comply with IHL is to define a framework for their legitimate use. At the same time, putting in place measures that enable the responsible use of new technology will have obvious benefits also for the implementation of IHL.

III. Framework for human involvement

7. As concluded in the GGE, the core question is how to guarantee an appropriate level of human involvement both during the entire life-cycle of LAWS, and in an operative use-cycle. In the following, a simplified five-phase framework for the appropriate level of human involvement required to ensure compliance with IHL in operational use is presented. The process is cumulative; each phase needs to be completed before proceeding to the next.

Phase 1. Weapons review

8. A rigorous weapons review, in line with Article 36 of the first Additional Protocol to the Geneva Conventions, is essential for determining the legality of any new means or method of warfare. In the area of emerging technologies, such as artificial intelligence and machine autonomy, the review needs to be critical, wide in scope, multidisciplinary, and detailed with regard to the intended use-cases. The level of admissible autonomy depends on the context and its constraints, i.e., on the complexity of the operative use-case and the sophistication of the cognitive skills of the weapons system. Integration of the weapons review process in the entire lifecycle of LAWS, from early concept design to later phases, is essential, as software is updated and evolves in design.

Phase 2. Doctrine, organisation and training

9. All personnel involved in the operative planning and use of LAWS need to receive the necessary training and education to enable them to fully understand the dimensions and complexity of the particular LAWS in question. The easier the systems are to use for multiple purposes, the more comprehensive training and education is needed for users to understand the limitations of the system and the responsibilities of humans as its users. Military doctrines and their operational and tactical implementation need to comply with IHL in their entirety, including the use of LAWS. Responsibility and accountability of the chain of command must be ensured throughout the organisation in all situations.

Phase 3. Mission planning and defining the box-of-operation

10. The mission planning and tasking phase includes the task(s) given to LAWS by a human, e.g., a military planner, or the commander of a mission. Detailed instructions to describe the mission, specific tasks with attached priorities, criteria for accomplishment, and mission-specific constraints to abort the tasks are described for the LAWS in this phase. In operative use, the functioning of LAWS can be unexpected for the adversary, and still remain legal. At the same time, friendly forces and non-combatants need to be able to trust that the system works in a predictable and safe manner, if encountered.

11. To enable planning and governance of the autonomous functioning of LAWS, clear pre-defined boundaries need to be set. These include geographical coordinates, the allowed time window, and environmental conditions for authorised operation, but also system specific limitations, preconditions, rules of engagement, etc.

12. Consequently, some of the limitations are permanent by nature, while others are system/platform specific, or derive from the requirements and context of the particular mission and its subtasks.

13. Combined, these limitations form a multidimensional matrix of parameters, a kind of virtual box-of-operation for the LAWS in question. A self-assessment system is needed to continuously monitor that the requisite conditions are met and the mission remains within the set limits. Self-diagnostic features are vital in order for the system to maintain the integrity of the planned operation.

14. If the box-of-operation is “broken” in any dimension, it will affect the choice of functions available for the operation. As a result, the level of autonomy may need to be altered, which would affect the execution of the task and could lead to the abortion of the mission and returning to base; or continuing to perform non-lethal tasks only; or the weapons system would need to request new plans. Depending on circumstances, changes in the allowed functions can be dynamic: if original parameters set for the mission are resumed, the full range of functions may again become available.

Phase 4. Launch and the point-of-no-return

15. Justified use of military force always requires contextual assessment, assessing a wide variety of risks and other aspects, including the fundamental rationale for the military necessity of the operation. If deemed legitimate and justified, the deliberative human decision will follow to launch the system on its mission, with the specified degree of freedom and limitations.

16. After launching the weapon, i.e., activating or sending the system to execute the given task, there may still be a possibility for cancelling or re-parametrizing the action. But as in any weapons system, at a certain moment a point-of-no-return will be reached, after which adjustment or cancellation of the action are no longer possible for the operator — like in long-range artillery fire, where it may take tens of seconds before the projectiles hit their target. However, integrated contextual intelligence could enable the LAWS to rectify human errors by analysing information during the execution of the task, checking it against the box-of-operation, and if needed, adapting its conduct accordingly.

Phase 5. Monitoring the mission and ending it

17. A communication link between the command centre (the officer in charge) and LAWS should always be maintained if the intended use enables communication. However, if the lack of communication in an off-the-loop use-case has been taken into account in all the previous phases, pre-planned or unexpected loss of communication will not cause harm. Communication channels may be deliberately cancelled due to operative reasons (to maintain radio silence), or they may be lost as a result of jamming, interference, or physical battle damage. By definition, autonomy is about self-sustainability and the ability to cope with the specified mission without external assistance. If on-the-loop communication is required for using a weapons system, then the system is not autonomous in its critical targeting and attack functions, i.e., it does not qualify as LAWS.

18. The mission ends once the task has been executed or the mission is aborted either by the system itself or ultimately by the user in charge. Sensitive on board self-diagnostics and careful specification of the box-of-operation are indispensable parts of human-machine interaction. These should enable the LAWS to self-abort when needed. However, regardless of precautions, an unexpected situation could still require to abort an off-the-loop mission. For such emergencies, both the technical systems design and the operative planning have to include several alternative and independent methods to halt the operation of LAWS.

IV. Conclusion

19. International law continues to apply in full regardless of technological developments. Any weapons system, whether with or without autonomous features, must be used in accordance with international humanitarian law. At the same time, military practice has to adapt to reflect the reality of increasing cognitive capabilities of machine autonomy. In any situation, humans remain fully responsible for the use of military force and its consequences.

20. A careful, comprehensive and contextual weapons review process can form the basis for the legal use of a hypothetical LAWS, assuming that the cognitive capabilities of the system match the intended use-case. Profound understanding of the issues at hand is required of anyone entrusted with the use of LAWS, so that they are able to plan the mission and define the restrictions attached to it. For machines, recognising contextual changes is very challenging. Even a slight change in circumstances may alter the context significantly, turning a legitimate military task into a war crime. Detailed definition of the intended use-cases, combined with careful tuning of the box-of-operation, is of vital importance.

21. In the final decision to launch an operation, military necessity, risks, and potential benefits have to be carefully judged. This requires full understanding of the complexity of the task and high human ethical standards.

France

1. The Group of Governmental Experts on “Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (LAWS)” mandated by the Convention on Certain Conventional Weapons (CCW) endorsed eleven guiding principles by consensus. These guiding principles are intrinsically interdependent and derive from international humanitarian law (IHL) which, as recalled by the first guiding principle “*continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems*”.

2. It is thus from this general guiding principle (“a”) which recalls the obligations of States as regards IHL that stem two main principles for addressing more specifically the challenges posed by weapons systems based on emerging technologies in the area of LAWS:

- the use of such systems should remain the responsibility of the human command, which must remain accountable in the event of serious violations of international humanitarian law, as highlighted by the guiding principles “b” and “d”.
- Human-machine interaction should be maintained in order to ensure that the use of future weapons systems, including weapons systems based on emerging technologies in the area of LAWS, remains compliant with international humanitarian law and remains under human command (see guiding principle “c”). This human-machine interaction may take various forms and be implemented at various stages of the life cycle of a weapon. It can, for example, take place:
 - (i) in the development phase of the system (legal review; technical certification; confirmation of commissioning following experimentation and tests),
 - (ii) in the phase of appropriation of the weapon system by the armed forces (drawing up a doctrine of use; training on the system and the system itself; training on using AI-based command systems; training on keeping the system operational; staff training; feedback on training),
 - (iii) in the deployment phase (planning an operation using the system by setting out a framework for it; running an operation within this framework; feedback on operations; maintaining operational conditions).

3. Therefore, the measures aimed at operationalizing the eleven guiding principles must above all be based on the general principle of applying existing IHL: setting out the application of existing IHL for the weapons systems based on emerging technologies in the area of LAWS must remain the main focus of our discussion. It is for this reason that the Convention on Certain Conventional Weapons (CCW) — whose work is based on the principles of IHL and the purpose of which is to ensure its effective implementation — remains the most appropriate forum for responding to both ethical and legal issues raised by the systems based on emerging technologies in the area of LAWS (as recalled in guiding principle “k”).

4. In concrete terms, in order to ensure that IHL is fully applied to weapons systems based on emerging technologies in the area of LAWS – in compliance with guiding principle “a” and in line with their existing obligations– High Contracting Parties (HCPs) should, for the purposes of operationalizing the eleven guiding principles at national level:

(a) not develop or use lethal weapons systems that would be fully autonomous, i.e. systems capable of acting without any form of human supervision or dependence on a command chain by setting their own objectives or by modifying, without any human validation, their initial programme (rules of operation, use, engagement) or their mission framework. Such systems would run contrary to guiding principles “b” (human responsibility for the use of weapons systems), “c” (human-machine interaction) and “d” (accountability);

(b) implement, in compliance with guiding principle “e”, a national procedure to review the legality of weapons systems that they develop or acquire, including those based on emerging technologies in the area of LAWS, in line with their international obligations, in particular under IHL, and in compliance with the provisions of Article 36 of Additional Protocol I to the Geneva Conventions;

(c) define and implement, in compliance with guiding principle “g”⁷, strict verification, assessment and validation procedures to ensure the reliability of the weapons systems based on emerging technologies in the area of LAWS which they develop, acquire or use. HCPs should also undertake to train operators and the human command in using weapons systems based on emerging technologies in the areas of LAWS which they develop, acquire or use;

(d) ensure, in compliance with guiding principles “b”, “c”, “d” and “g”, that humans will remain responsible for designing, programming, defining and validating the rules of engagement, the rules for use and the operating rules of weapons systems based on emerging technologies in the area of LAWS;

(e) ensure that when using a weapon system based on emerging technologies in the area of LAWS, the human command remains in a position to assess, in accordance with guiding principle “c”, compliance with the rules and principles of IHL within the framework of and with regard to the specific circumstances of each attack. To this end, HCPs should, at national level, commit to ensuring that:

- i. human command will continue to take critical decisions with regard to the use of lethal force, remaining in charge of the decision to deploy a weapons system based on emerging technologies in the area of LAWS to launch an attack, as well as to define and validate missions assigned to it;
- ii. they will provide lethal weapons systems featuring autonomy with a specific mission framework, which must be limited in time, space and by determined objectives. These restrictions must be set by the human command in such a way as to ensure, more specifically, compliance with the principles of distinction and proportionality established by IHL;
- iii. they will implement all possible measures, in compliance with the principle of precaution, to spare the civilian population and civilians objects while using weapons systems based on emerging technologies in the area of LAWS. Provided they are feasible, these measures can take several forms, such as: warning populations; technical measures enabling the deactivation, self-destruction or ending of these systems’ missions under certain circumstances; or maintaining sufficient communication capabilities, even intermittent ones, between human command and the system;

(f) Investigate, in compliance with principles “b” and “d”, the allegations of war crimes potentially perpetrated by their armed forces and nationals, or on their territory, or by any person under their authority, through a weapon system based on emerging technologies in the area of LAWS and, where appropriate, to prosecute the suspected perpetrators;

(g) HCPs should also be encouraged, for the purposes of the operationalization of the eleven guiding principles at national level, to:

(h) join, if they have not yet done so, Additional Protocol I to the Geneva Conventions, and exchange information on their national legal review procedures as well as to jointly define best practices, while prioritizing those which would be most pertinent for weapons systems based on emerging technologies in the area of LAWS;

(i) adopt and implement, in compliance with guiding principle “f”, measures to prevent the diversion of weapons systems based on emerging technologies in the area of LAWS to unauthorized end-users, including terrorist groups, by regulating in their respective territories the production, acquisition and transfer of these systems, in compliance with their national control mechanisms and relevant international instruments to which they are parties. HCPs could require that these activities only take place with government authorization and under its control;

(j) step up national discussion on ethical and legal issues linked to military applications for emerging technologies in the area of LAWS.

Germany

1. Introductory comment: Germany considers lethal autonomous weapons systems (LAWS) to be weapons systems that completely exclude the human factor from decisions about their employment. Emerging technologies in the area of LAWS need to be conceptually distinguished from LAWS. Whereas emerging technologies such as digitalization, artificial intelligence and autonomy are integral elements of LAWS, they can be employed in full compliance with international law. In Germany's view, the Guiding Principles aim at contributing to an IHL compliant development, deployment and use of emerging technologies in the area of LAWS.

(a) **International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;**

2. IHL governs primarily the conduct of hostilities in armed conflicts. The basic rules and principles of IHL, based particularly on the Geneva Conventions and customary international law relevant in the context of LAWS, are the prohibition of indiscriminate, including excessive, attacks and the principle of precaution, aimed at preventing indiscriminate attacks by requiring precautionary measures. These rules are effect-based, and thus do not address specific weapons systems, but apply to all weapons, means and methods of warfare without distinction.

3. Although IHL focuses primarily on the regulation of the concrete use of weapons during armed conflicts, there are certain provisions applicable already in peacetime. Particularly relevant is Art. 36 AP I, which addresses the acquisition and development of weapon systems. It obliges States to conduct legal reviews and to determine whether the use of the weapon system under consideration would in some or all circumstances be prohibited by applicable international law. This provision, reflected in Guiding Principle (e), is of utmost importance to potential legal challenges posed by emerging technologies in the area of LAWS.

(b) **Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system;**

4. In Germany's view, this Guiding Principle is meant to address potential future accountability gaps. Legal responsibility is norm-based and can vary across legal orders (national or international) and types of responsibility (administrative law, criminal law, civil law). Since international law does not provide means to purport liability to machines, weapons systems or technologies in the context of autonomy, it is not clear whether this principle contains a call upon States to establish a new form of liability, or whether this principle rather aims at confirming the applicability of the general norms of responsibility of States, international and national criminal law, civil liability and/or other forms of accountability for internationally wrongful acts.

5. Germany holds the view that machines have no capacity of discernment and that this will likely remain the case with regard to emerging technologies in the area of LAWS. In any case, machines cannot be held liable for the actions they effect – neither morally, politically nor legally. As machines are developed, created, activated, and operated by human beings, humans remain responsible for the actions they effect throughout the entire life cycle. As multiple human actors will be involved in the different phases of a weapons system's life cycle, the ultimate responsibility needs to be further elaborated.

6. This is necessary in order to establish individual legal accountability/ liability in cases of a breach of applicable law, in particular international criminal law. This may vary between a joint responsibility and the responsibility of a single human operator.

- (c) **Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole;**

7. Germany's position is that the human-machine interaction in future weapons systems needs to be designed in such a way that weapons systems remain subordinate to the humans deploying and operating it. The design needs to allow human decision makers and operators to have sufficient knowledge about the systems' operation and actions, the operating environment and the likely interaction between these factors. Humans have to be continuously able to exercise control over the weapons systems and must remain the essential element in this interaction bearing the overall responsibility.

8. This does not necessarily mean that human intervention is required or humans must exercise physical control at all times. Rather, human control means the following: humans must have, at all times, sufficient assurance that the weapons system, once activated, acts in a foreseeable manner in order to determine that its actions are entirely in conformity with applicable law, rules of engagement, and the intentions of its operator(s)/ commander(s). If necessary, the weapons system will de-activate itself, or can be deactivated by humans. No weapons system may, on the strength of its algorithms, entail the risk of overriding a human de-activation command.

9. The required level of human control depends on the operational context and the characteristics and capabilities of a weapons system. Human control can be ensured by an appropriate design, by a sufficient degree of predictability (ensured through a set of given parameters within which the system must be operating as well as rigid testing and review), and by a commander's and operator's sufficient understanding of the weapons system, including its autonomous functions, which enable the commander and operator to predict (prospective focus) and explain (retrospective) the behavior of the weapons system. Temporal and spatial restrictions or limits need to be applied to the operation of any such weapons system.

10. Military capability development with regard to future weapons systems must not aim at removing the human from the decision making process. Rather, it should enable the human to take decisions wherever necessary to exert and maintain a sufficient level of control. Any definition of military requirements with regard to the use of autonomy in weapons systems has to reflect a clear understanding of the human-machine relation in order to ensure that any research and development activities are geared towards weapons operating under sufficient levels of human control.

- (d) **Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control;**

11. In Germany's view, this Guiding Principle specifies Guiding Principle (b). Whereas Guiding Principle (b) notes in general terms that humans must remain responsible for the acts and omissions of a machine, Guiding Principle (d) requires to exercise oversight, not further specified regarding quantity or quality, over a weapons system during its entire life-cycle with the aim to ensure that its action and effects are in compliance with applicable international law. The integration of the respective handlers of the machine within a responsible chain of command is an essential element to ensure compliance with international law.

12. The German armed forces employ the doctrine of command responsibility. A commander must consider the applicable (international) legal framework when issuing orders and instructions or establishing procedures or delivering training and must take steps to prevent or report violations as well as initiate disciplinary action where necessary. Accordingly, should a violation of IHL result from the operation of a weapon or weapons

system, processes are in place to conduct appropriate investigations and, if applicable, hold individuals accountable.

- (e) **In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law;**
13. Germany reaffirms that Guiding Principle (e) underlines the importance of human responsibility during the phases preceding the deployment of a weapon system.
14. Particularly for highly complex systems with autonomous functions, the development phase is of crucial importance since the configurations determining the behavior of the systems originate in this phase.
15. Guiding Principle (e) reflects Article 36 AP I to which Germany is bound. Germany implements this provision. The procedure of the weapons reviews is formalized in the armed forces' central service regulation. Central elements guaranteeing the quality of the review are 1) the inclusion of qualified legal, technical and military-operational experts and 2) at least a hierarchical independence of the reviewing authority from the developer and the military user. The benchmark is public international law as it stands. However, this does not prevent States from integrating other considerations such as ethical or "law in development".
16. In the context of emerging technologies in the area of LAWS, specific attention needs to be paid to modifications. Whenever modifications of a given system, for example in programming, are likely to change the behavior of the system in a way that affects the application of international law, a new weapon review is necessary.
17. In addition, the specific role of training data should be considered, when "AI"/machine learning is applied in the target selection and engagement since the data base or the way the algorithm interprets the data will substantially impact the predictability and reliability of the weapon system.
- (f) **When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered;**
- (g) **Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems;**
18. A joint commentary is offered for Guiding Principles (f) and (g):
19. In Germany, all current and future development and procurement projects of weapons systems run in accordance with a detailed guideline. In line with this guideline, material solutions and services are provided in the form of projects. Project elements are the different areas in which a project is processed or the use of a product is controlled. "Physical security" and "non-physical safeguards" are important project elements of every project work. They are considered in the development and procurement process of each project. Appropriate concepts (e.g. on information security) are being developed in this context in order to mitigate possible risks.
- (h) **Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations;**
20. This principle reaffirms that the use of emerging technologies in the area of lethal autonomous weapons systems should serve to improve the respect for international law by increasing, inter alia, precision and by mitigating the risk of human error during attack.

21. An area that merits further attention is the potential contribution of emerging technologies to enhancing arms-control instruments, verification methods in particular, including the use of open source intelligence.

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized;

22. Policy measures aimed at regulating emerging technologies in the area of lethal autonomous weapons systems must always address human actors as the responsible agents for implementing rules and constraints. The content of any policy measure must not place inherently human characteristics on machines.

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies;

23. The CCW process on LAWS is geared towards contributing to an IHL compliant development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems. Peaceful uses of intelligent autonomous technologies are outside the scope of the CCW.

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.

24. Given the unique composition of the CCW's GGE on LAWS as a forum that brings together diplomatic, military and scientific expertise from the CCW's 125 High Contracting Parties and which allows for participation of representatives from civil society and industry the CCW is ideally placed to build understanding and formulate options for policy measures ensuring an IHL compliant development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems.

Guatemala

1. Guatemala appreciates the efforts of the chairman of the Group of Governmental Experts (GGE) on “Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (LAWS)” and the call to present comments on the operationalization of the guiding principles on LAWS. In that sense, Guatemala, as a country compromised with international peace and security, takes this opportunity to present some initial comments on the issue.
2. Regarding the eleven principles of the GGE, which were adopted by consensus, it is important to highlight the common agreement that International Humanitarian Law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems.
3. Therefore, the provisions of article 91 of Additional Protocol (I) to the Geneva Conventions must be taken into account, specifically in regards to responsibility. The aforementioned article establishes that responsibility falls on the party in conflict who violates the provisions of the Conventions and of Additional Protocol (I). However, it indicates that it will be the persons forming part of its armed forces whom will be responsible. Hence, the current international law evidently provides the means to prosecute persons but not machines.
4. The current international legislation is not yet adapted to the challenges posed by a possible use of LAWS and for that reason Guatemala favors the adoption of an international legally binding instrument that provides for the prohibition of lethal autonomous weapons systems to fulfill the existing accountability gaps.
5. Furthermore, the potential security risks or unforeseen malfunctions of these types of weapons might leave a significant gap in a scenario where there will be no person to hold accountable. If an autonomous weapon violates or excludes the human factor from decision making, the potential risks would be disastrous, especially because of the disproportionality of force of these weapons in their ability to kill, with an extreme advantage for the weapon, and the complexities of operationalizing the principle of distinction. Not to mention the risks of these weapons falling into the wrong hands of non-state actors.
6. Discussions should continue on the topic of LAWS and they have to be examined, as stipulated in Article 36 of Additional Protocol (I) of 1977, in order to review whether they comply with two basic principles of IHL: that said weapons do not act by themselves indiscriminately and that it does not cause superfluous damages and unnecessary suffering.
7. With the technological advancements for the use and deployment of lethal autonomous weapon systems, there is a risk of perverting international humanitarian law. The ethical and moral obligations revolving around the subject have to be taken into account. Derived from the aforementioned, Guatemala considers important the negotiation of an international multilateral agreement, which would complement the efforts of individual national legislations on the regulation on LAWS.
8. Guatemala reserves its right to further comment as the discussions on LAWS continue.

Israel

1. Responding to the call of the Chairman of the Group of Governmental Experts (GGE) for submission of commentaries on the operationalization at the national level of the eleven Guiding Principles adopted by the GGE on emerging technologies in the area of lethal autonomous weapons systems (LAWS) and endorsed by High Contracting Parties to the Convention on Certain Conventional Weapons (CCW), Israel would like to present below its considerations.

2. This paper does not attempt to present a comprehensive framework regarding the potential development and use of emerging technologies in the area of LAWS, but rather some general considerations relevant to the eleven Guiding Principles.

3. Israel's general view is that the law of armed conflict, or international humanitarian law (IHL), applies to the potential development and use of emerging technologies in the area of LAWS; that human judgment will always be an integral part of any process regarding emerging technologies in the area of LAWS, and will be applied during their life-cycle; and that humans will always be responsible for the use of LAWS.

4. Moreover, in Israel's view, it is important to be aware that besides the potential risks that may be associated with LAWS, there are also operational advantages to the use of LAWS as well as clear advantages from the humanitarian perspective.

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems.

5. Existing IHL provides the applicable framework for regulating the use of weapons systems based on emerging technologies in the area of LAWS, as with any other weapon system. In this regard, the rules relating to distinction, proportionality and precaution in attack fully apply to the use of emerging technologies in the area of LAWS.

6. Therefore, Israel believes that the measures aimed at operationalizing the eleven Guiding Principles should be based on the general principle of applying existing IHL to the potential development and use of weapon systems based on emerging technologies in the area of LAWS.

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system.

7. This principle affirms that human responsibility and associated human accountability continue to apply to the decision on the use of weapons systems, including weapons systems based on emerging technologies in the area of LAWS.

8. Thus, Individuals continue to be responsible for their decisions to use such weapons systems and are to be held accountable for IHL violations in this context, in accordance with the applicable rules of international law. It is also clarified that human responsibility is considered in relation to the entire life cycle of the weapon system in a holistic manner.

(c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole.

9. This guiding principle recognizes the need for human-machine interaction to help ensure compliance with IHL. This principle also recognizes the need to consider human-machine interaction during the life cycle of the weapon system in a holistic manner, rather than focusing only on a particular stage while not providing adequate attention to human judgment and input that have already been, or will be, injected to the process in other phases.

10. In a practical sense, human-machine interaction should aim to provide sufficient assurance that the weapons system, once activated, acts in a foreseeable manner, so as to ensure that its actions are in conformity with applicable law, rules of engagement, and the intentions of its users.

11. In this regard, weapon systems based on emerging technologies in the area of LAWS should be examined on a case by case basis. The appropriate type and level of human-machine interaction will be determined by the characteristics and capabilities of the particular system in question, vis-a-vis the operational circumstances and the mission's requirements. In other words, there is no "one-fits-all" set of requirements that every weapon system needs to meet, but rather, these requirements may be adapted appropriately. Accordingly, for example, temporal and spatial restrictions may be applied to the operation of the system – during its development, deployment or before specific uses (depending on the case) – as necessary in order to ensure lawful use in the intended circumstances of use.

12. In this context, Israel believes that human judgment will always be an integral part of any process regarding LAWS, and will be applied during their life-cycle. Weapons systems based on emerging technologies in the area of LAWS will operate as designed and programmed by humans.

- (d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control.**

13. This Guiding Principle has to be read together with Guiding Principle (b). Whereas Guiding Principle (b) notes in general terms the issue of accountability and its link to human responsibility, Guiding Principle (d) focuses and elaborates on the issue of accountability. It affirms that the applicable rules of existing international law regarding accountability will continue to apply to the development, deployment and use of any weapons systems based on emerging technologies in the area of LAWS, as they apply with regard to any other weapon system. It also reflects that commanders may bear command responsibility, as this term is understood in the applicable rules of international law, for decisions of their subordinates regarding the use such systems.

- (e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law.**

14. During the GGE meeting of 11-15 April 2016, Israel presented its own domestic process for legal review of new weapons. Notwithstanding that Israel is not party to the First Additional Protocol to the Geneva Conventions and as such is not bound by Article 36 of that Protocol, Israel is of the view that applying legal reviews to new weapons is a useful instrument for a State to ensure that it uses only lawful means of warfare during armed conflicts. The understanding regarding the usefulness of this tool was shared by a consensus of member States in the GGE meeting of 21-20 August 2019 (CCW/GGE.1/2019/3).

- (f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered.**

15. This principle stresses the importance of ensuring that weapons systems based on emerging technologies in the area of LAWS will not fall into the hands of terrorist groups.

- (g) **Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems.**

16. In our view, risk assessments and mitigation measures constitute relevant tools for addressing uncertainty associated with emerging technologies. In particular, improving reliability and predictability relevant to autonomous functions of weapons systems will assist with ensuring that the potential use of LAWS will be in compliance with applicable international law.

- (h) **Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations.**

17. This principle reaffirms that the use of emerging technologies in the area of lethal autonomous weapons systems should serve to improve the respect for international law by increasing, inter alia, precision and by mitigating the risk of human error during attack.

18. This principle considers that weapons systems based on emerging technologies in the area of LAWS may serve to advance adherence to existing IHL, as technology may allow improving compliance with IHL. These may include better precision of targeting which would minimize collateral damage and reduce risk to combatants and non-combatants.

- (i) **In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized.**

19. This principle expresses the idea that technologies in the area of LAWS are merely tools in the hands of humans, designed and used by the latter to effectuate human intent. This is consonant with the notion that humans are responsible for the use of such technologies. Accordingly, these technologies or weapon systems must not be addressed, factually nor legally, as equivalent to humans, for example by referring to their "decision-making" or as having their own independent judgment. Considering technologies and weapons as tools in the hands of humans serves as a premise for the whole discussion in relation to LAWS, and to any potential policy measure.

- (j) **Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies.**

20. The CCW process on weapons systems based on emerging technologies in the area of LAWS concerns the development and use of LAWS in the IHL-context to which the CCW applies. This principle recalls that the issue under discussion revolves on a certain type of technology, and that this technology has numerous uses that most of which do not relate to the CCW. It clearly expressed that any discussions and outcomes in the CCW should not prevent progress or access to peaceful uses of this technology. This principle reaffirms the need to show modesty and prudence in dealing with such an issue — a technological subject of a dominant futuristic nature and far-reaching implications — and refrain from uninformed and unripe decisions.

- (k) **The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.**

21. Israel believes that the CCW continues to be the appropriate forum for international dialogue on the issue of emerging technologies in the areas of LAWS, as a professional, and non-politicized framework for relevant IHL issues in this field, which balances between military necessity and humanitarian considerations. In this regard, it is important to remain within the agreed mandate for discussion and stick to the objectives and purposes of the CCW.

Italy

1. Building on the excellent in-depth work carried out by the Group of Governmental Experts on Emerging Technologies in the area of Lethal Autonomous Weapons Systems (LAWS) so far, as well as on the Chairman's request to provide national comments on the operationalization of the eleven guiding principles, Italy would like to make the following remarks:

(a) Firstly, in our opinion, the development, deployment and use of any weapons system, including possible lethal autonomous weapons systems, must comply with the rules and principles of International Humanitarian Law (IHL), as highlighted by the guiding principle "a". That is why — in view of the unique characteristics of the LAWS — we believe that further expert discussions on the application of existing IHL is needed, as highlighted by the guiding principle "h".

(b) Secondly, in compliance with the guiding principle "e", the level of predictability and reliability of a weapon system must be assessed in the phases of testing, verification and certification, given that autonomous functions must be defined *ex ante*, starting from the stage of requirement, analysis and procurement. This encompasses, also, the obligation to conduct legal reviews of weapons, means and methods of warfare, in accordance with art. 36 of Additional Protocol I to the Geneva Conventions. In this regard, we believe that there is great value in pursuing further exchanges in the Convention on Certain Weapons (CCW) — which we believe it is the most appropriate framework for dealing with the issue of emerging technologies in the area of LAWS, as highlighted by the guiding principle "k" — , concerning national policies and practices on the development and use of weapons with autonomous functions. Such exchanges — that should be conducted with due respect for national security needs and industrial property rights — could help identify good practices, challenges and related possible solutions. In addition to providing useful, practical input, exchanges on national experiences in legal reviews could also help build confidence among High Contracting Parties on the continued conformity of emerging weapons systems with International Humanitarian Law.

(c) Thirdly, human control is fundamental to ensure that all weapons systems are developed, deployed and used in compliance with IHL. To ensure such compliance, there should be the option to deactivate a launched command and/or the automatic defense response modality of a weapon system, in order not to run contrary to guiding principles "b", "c", and "d". Indeed, we believe it fundamental to maintain the possibility to modify mission's objectives or, in emergency situations, to abort the mission. In our view, it would be useful to further explore and possibly arrive at a shared definition of the type and level of human control that would be necessary to ensure that the development and use of systems with increasing autonomous function comply with IHL.

(d) Lastly, we deem it necessary for the decisions to use lethal force and to produce lethal effects to remain in the hands of human beings, in compliance with guiding principle "b" and "d". This is due to two main reasons: first, entrusting human operators with the responsibility to activate weapons guarantees the respect of IHL; second, because only human judgment can perform the necessary assessments relating to the application of the IHL principles of distinction, proportionality and precautions. That is why human control, in the form of supervision, must be applied in all phases of a weapon's life cycle, as highlighted by guiding principle "c": human operators must be responsible for the validation of selection of objectives (targeting and, in some cases, re-targeting) and/or for the activation/deactivation of the autonomous mode of the relevant system. In order to do that, it is essential that — for the purposes of operationalizing the eleven guiding principles at national level — High Contracting Parties provide LAWS with a specific set of limitations in time, space and determined objectives, thus, making human control more meaningful.

2. Finally, and in compliance with the guiding principle "j", we remain of the view that our efforts should not impact negatively on progress in civilian research, development and use of dual-use technologies. That is why Italy actively encourages all relevant actors to spare no effort in developing an agreed understanding of what — ultimately, and most importantly — LAWS are.

Japan

1. This commentary from Japan is preliminary, and without prejudice to Japan's position on further discussion.
- (a) **International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;**
2. Principles of international humanitarian law (IHL) must be upheld in the development and operations of all weapons systems including LAWS.
 3. Compliance with international law, especially IHL, is essential in armed conflict. The same is true for LAWS. It should be used in compliance with the principles upon which IHL is based, including the principles of distinction between civilians and combatants, the principles of proportionality, and precaution against military objectives.
 4. Regarding the definition of LAWS, it is necessary to deepen discussion on the lethality and form of human control.
- (b) **Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system;**
5. Any violation of IHL by using autonomous weapons systems should be attributed to States or individual persons as is the case with conventional weapons systems.
 6. In general, if there is a violation of IHL caused by autonomous weapons systems belonging to a State, it would be assumed that such violation would be attributed to the State. There might also be cases where such illegal action is attributed to individual persons. In any case of a violation of IHL by using autonomous weapons systems, a State or individual person should be held responsible as is the case with conventional weapons systems.
- (c) **Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole;**
7. With regard to the relationship with international law and ethics, principles of IHL must be upheld in the development and operations of all weapons systems including LAWS. Any violation of IHL by using autonomous weapons systems should be attributed to States or individual persons as is the case with conventional weapons systems.
 8. Regarding the form of human control, it is indispensable that a lethal weapon system be accompanied with meaningful human control by securing proper operation and be operated by persons with sufficient information on such weapons systems.
 9. Some argue that meaningful human control should be incorporated in the whole process of weaponization, ranging from political instruction in the pre-development phase, research and development, testing, evaluation and certification, deployment, training, command and control, use and abort, and post-use assessment. On the other hand, there is a wide range of views on where and how much meaningful human control is necessary in the life-cycle of weapons systems. Therefore, it would be necessary for stakeholders to further explore such questions taking into account the trends of emerging technologies. The machine element in the term "human-machine interaction" in the principle requires thorough discussions because the machine element cannot be decisively categorized with a uniform definition, but rather varies with diverse factors as operational environment, performance and characteristics, including the constrainability, of weapons systems.

(d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control;

10. Compliance with international law, especially IHL, is essential in armed conflict. The same is true for LAWS. It should be used in compliance with the principles upon which IHL is based, including the principle of distinction between civilians and combatants, the principle of proportionality, and precaution against military objectives.

11. With regard to the relationship with international law and ethics, principles of IHL must be upheld in the development and operations of all weapons systems including LAWS. Any violation of IHL by using autonomous weapons systems should be attributed to States or individual persons as is the case with conventional weapons systems.

12. Regarding the form of human control, it is indispensable that a lethal weapon system be accompanied with meaningful human control by securing proper operation and be operated by persons with sufficient information on such weapons systems.

13. Some argue that meaningful human control should be incorporated in the whole process of weaponization, ranging from political instruction in the pre-development phase, research and development, testing, evaluation and certification, deployment, training, command and control, use and abort, and post-use assessment. On the other hand, there is a wide range of views on where and how much meaningful human control is necessary in the life-cycle of weapons systems. Therefore, it would be necessary for stakeholders to further explore such questions taking into account the trends of emerging technologies.

(e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law;

14. This principle is considered stipulating substantially the same provision as that of Article 36 of the Additional Protocol I of the Geneva Convention on August 12, 1949. Article 36 can be interpreted as obligating each High Contracting Party, in its research, development, acquisition or adoption of a new weapon, means or method of warfare, 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. Introducing an implementation mechanism of weapons review into the annual report of the CCW may work as one of confidence building measures.

(f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered;

15. Taking measures for cyber-security, among others, is important, considering various risks including the possible serious impact of breach of IHL resulted from malfunction of autonomous weapons systems caused by manipulation of programming.

16. With regard to non-proliferation, the emergence of new technologies is spurring a growing potential for private sector technologies to be used for military applications, increasing the proliferation risk of weapons that pose a threat and of related materials and technologies. Against this backdrop, it is important that maintaining and strengthening international non-proliferation frameworks and rules, taking appropriate non-proliferation measures domestically, and working on non-proliferation policy that prioritizes close coordination with and capacity building support for other nations.

(g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems;

16. It is important to improve the predictability and reliability of weapons systems that exercise emerging technologies by assessing their various effects and seeking risk-reduction measures in their life-cycle, especially in their designing, development and testing stages.

(h) Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations;

17. Principles of IHL and other applicable international legal obligations must be upheld in the development and operations of all weapons systems including LAWS.

18. Compliance with international law, especially IHL, is essential in armed conflict. The same is true for LAWS. It should be used in compliance with the principles upon which IHL is based, including the principle of distinction between civilians and combatants, the principle of proportionality, and precaution against military objectives.

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized;

19. Any violation of IHL by using autonomous weapons systems should be attributed to States or individual persons as is the case with conventional weapons systems.

20. Regarding the form of human control, it is indispensable that a lethal weapon system be accompanied with meaningful human control by securing proper operation and be operated by persons with sufficient information on such weapons systems. It would be necessary to deepen discussion on where and how much meaningful human control is necessary in the life-cycle of weapons systems.

21. Meaningful human control should be incorporated in the whole process of weaponization, ranging from political instruction in the pre-development phase, research and development, testing, evaluation and certification, deployment, training, command and control, use and abort, and post-use assessment.

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies;

22. The research and development activities on autonomous technology should not be restricted on the simplistic ground that such technologies could be diverted to lethal weapons systems.

23. It is necessary to carefully and cautiously discuss the rules, taking into account the potential chilling effect of restricting research and development and the risk of hindering technological development and innovation in the civil sectors.

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.

24. It is necessary to have further discussions among stakeholders in the CCW for sharing understanding about the matters mentioned above in a tenacious manner. Bearing in mind the concerns of States and civil society on LAWS and expectations for technological progress, it is preferable that autonomous technologies and AI be developed substantially without hindering international peace and security.

Mauritius

1. As regards “Identify factors to help determine the necessary quality and extent of human control over weapons systems and the Use of Force” the points brought forward by academics and diplomats can be grouped into the following:

(a) Ethical consideration

Those FOR Autonomous Weapons System (AWS) were mostly result-oriented stating that:

- (i) AWS potential Precisions and reliability might enable better respect for International Laws and human ethical values, hence fewer humanitarian adverse consequences.
- (ii) The AWS would be unable to comply with the Principles of distinction, proportionally, necessity and precaution which are set in the Humanitarian Law.
- (iii) The accountability and responsibility of decision to use force where the end result could cause death are moral responsibilities and accountability hence cannot be transferred to a machine or a Computer Program. These are human responsibilities both from the ethical and legal point of view.
- (iv) Weapons system development requires a chain of possible actors, namely manufacturers, military commanders and operators, who have different responsibilities and roles. Their limited decisions making role might give rise to defence against their responsibility in criminal prosecution. Therefore, with this accountability gap, it will be very difficult to ensure justice to the victims since it is unclear who will be responsible for the unlawful acts or individual criminal responsibility caused by AWS.
- (v) The principle of human dignity would dictate that decisions affecting the life, physical integrity and property of individuals involved in an armed conflict should be entirely reserved to humans and cannot be entrusted to an autonomous artificial agent.

(b) Operational Considerations

The AWS will cause elimination of human judgement, decision making and supervision hence there are high risks of disproportionate or collateral damages to infrastructure, be it civilians or military and also civilian casualties, in so far as the regular behaviour of artificial intelligence and robotic system is perturbed by unpredicted dynamic changes occurring in the warfare environment.

(c) Technological Consideration

Case For AWS

Some defence weapons systems are already Autonomous and are being used by countries since long time back. Some countries already have the AWS developed and installed in their Weapons System.

Case Against AWS

- (i) The AWS which are developed by means of advanced machines learning technologies have several times shown through tests and demonstrations that they are prone to unexpected, counter-intuitive and potential catastrophic mistakes, which a human operator would easily detect and avoid.
- (ii) A lack of predictability, whether inherent to the weapons system design or due to interaction with the environment, raises serious ethical and legal concerns owing to a lack of foreseeability of the consequences and associated risks, in particular for civilians.
- (iii) With the induction of Artificial Intelligence some countries are developing Weapon Systems with significant autonomy with the critical functions of

selecting and attacking targets. If left unchecked the world will enter a destabilised robotic arms race.

After due considering on the views above, it comes clearly that it is imperative that some Human Control is required over all weapon systems and their use.

However, the extent of the human-machine interaction or control needs to be decided. This could only be implemented if there is an existing treaty which could legally bind member States to develop legal instrument within which they have to operate, hence rendering them accountable for their uses and acts.

2. As regards “Express their preferred normative framework and its basic contents, be it legally binding ban instrument or another form of regulation”. The preferred type of Weaponry System should be partial instead of a fully AWS since in many Weapons Systems they are already incorporated with certain Autonomy.

This normative framework instrument or treaty must:

- (a) Be binding for member states to develop legal frameworks at country level;
- (b) Give member states the obligations to divulge their Research programmes being conducted in the field of Artificial Intelligence and Robotics in the Weapons Systems for control purposes;
- (c) Give member states the obligation for International Agencies to come and inspect weapon manufacturing Industries as and when required;
- (d) Give obligations for member states to divulge the number of AWS being produced yearly, for control;
- (e) Ensure that the AWS developed abides with Humanitarian laws;
- (f) Provide training to the Operators and decision-making agents;
- (g) Render the member states accountable; and
- (h) Provide obligations for member states to inform before the Lethal Autonomous Weapons Systems (LAWS) are being used.

3. Moreover, the studies and research in the field of Artificial Intelligence and Robotics are new sectors of development which can absorb unemployment and boost the economic sector in the future. Hence full banning of AWS will definitely reduce research and development in this field. Moreover, development in Artificial Intelligence and Robotics can not only be used in Weaponry but can be used in other sectors as well such as, manufacturing industries, medicals and astronomy sectors just to name a few.

Netherlands (the)

Preamble

1. The commentary below serves to provide an overview of the ongoing reflection process in the Netherlands regarding the implementation of the 11 Guiding Principles as identified by the GGE LAWS. This commentary should be seen as a working document, intended to contribute to the debate within the GGE LAWS, as our interpretation may further develop as technological developments advance and the debate regarding LAWS progresses.

Commentary

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;

2. The Netherlands considers this a key principle for the debate on LAWS and a clear acknowledgement that there is an existing legal and normative framework, which fully applies to LAWS. The normative framework that applies to LAWS incorporates not only the entire body of international humanitarian law (IHL) but also includes other relevant legal provisions of international law, including Human Rights Law.

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system;

3. See commentary under (c) and (d)

(c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole;

4. In the view of the Netherlands, a lethal autonomous weapons system may only be deployed under Meaningful Human Control. In such cases, humans make informed, conscious choices regarding the use of weapons, on the basis of their assessment of the information from all sources which is available to them at the relevant time. The Netherlands considers the concept of Meaningful Human Control to be relevant throughout the weapons systems' entire lifecycle, including the various stages of the targeting cycle.

5. In summary, in guaranteeing Meaningful Human Control, the following elements are important:

- Humans make informed, conscious decisions about the use of weapons;
- Humans have sufficient information to ensure that force is used in accordance with the requirements of international law, given what they know about the target, the weapon, and the context in which the weapon is deployed;
- The weapon is designed and tested in a realistic operational environment, and humans are properly trained, to ensure that the weapon is deployed in a judicious manner.

6. In current practice, Meaningful Human Control is implemented in existing processes, such as Air Control and the Targeting Process. In these processes, Meaningful Human Control is operationalized at various command levels and by means of a wide variety of tasks, procedures and decisions. The necessary type and degree of control is context-specific and may vary according to the specific environment in which the weapon is deployed as well as the type of weapon system itself.

(d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control;

7. Human-machine interaction and meaningful human control are vital, to ensure humans remain accountable for decisions about the use of force. The Netherlands recognizes the importance of appropriate and effective accountability mechanisms for decisions on the use of force, regardless of the type of weapons system. Accountability in connection with the development, deployment and decision-making concerning the use of LAWS must be retained and cannot be transferred to machines. In the view of the Netherlands, the existing legal regime is adequate to ensure accountability.

8. While there may be a shift within the responsible chain of human command and control on where accountability lies, there is no accountability gap as regards the deployment of LAWS, because the decision to deploy, taken in the framework of the targeting process, remains with humans. In the Netherlands, in accordance with the applicable legal framework on all levels of decision-making, the targeting process guides decisions about the selection and attack of targets.

9. At the moment, there is no reason to assume that there will be an erosion of the accountability under criminal law of commanders, subordinates or those in positions of political or administrative responsibility, nor is there a gap in state responsibility as regards the deployment of LAWS.

10. The Netherlands emphasizes the importance of training and education for military personnel who are responsible for the deployment of autonomous weapons systems. The Ministry of Defence already sets such training and education as a precondition for the operational deployment of weapons systems that operate with a high degree of autonomy, such as the shipborne Goalkeeper system and the Patriot surface-to-air missiles. The same will apply to future weapons systems.

(e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law;

11. The Netherlands is a State Party to Additional Protocol I of the Geneva Conventions (AP I) and has a standing legal review process for all new weapons, means and methods of warfare as well as for all modifications to existing weapons, means and methods of warfare already in use by the Netherlands armed forces. These legal reviews, in line with article 36 of AP I, are a legal obligation for the 174 States Party to AP I and provide a sufficient framework to determine whether a new weapons system, means or method of warfare can be used in compliance with international law. The low number of States that conduct legal weapons reviews is a concern and the Netherlands is of the view that increasing the number of States that fulfil their existing legal obligations in this context would be an important step in operationalizing this guiding principle.

12. Although the Netherlands recognizes that not all information gathered under the review procedure is suitable to be shared amongst international partners — i.a. for reasons of national security — the Netherlands is of the view that sharing information regarding the modus operandi and underlying principles of national Article 36 API procedures would be of added value.

(f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered;

13. In the Netherlands, the export of all military items as per the Common Military List of the Member States of the EU to non-EU Member States and non-NATO allies, as well as Australia, New Zealand, Japan and Switzerland, is subjected to a rigorous review procedure

in line with the 8 criteria of the EU Common Position on Arms Exports. The risk of the diversion of the goods or technology in question to an unauthorized recipient — including terrorist groups — is explicitly considered during this review procedure. In order to be able to issue an export license, Netherlands requires the exporter to submit an authorized end-user statement in which the intended end-user of the goods/technology inter alia declares that it will not re-export or divert the goods/technology to another actor.

(g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems;

14. Risk assessments and mitigation measures are part of verification, validation and certification reviews, including the robust article 36 API legal reviews conducted by the Netherlands, which is carried out throughout the procurement process of any weapons system.

15. The obligation to conduct an Article 36 procedure applies when a state intends to acquire or adopt a new method/means of warfare. The word “new” means “new for the State in question” whether or not bought from other States. Means/methods of warfare should also be subjected to a review procedure following modification, even if the method or means of warfare was previously approved. A weapon must be reviewed not only “as such”, but also in relation to its intended use, making the review of “methods of warfare” in relation to that weapon to be an integral part of the weapon review. However, it is of considerable importance that the review is limited to the normal, expected or intended use of the weapon. Almost all of the relevant sources identify the possibility of misuse or inventive abuse of any weapon and the review need not take all of those possible alternatives into consideration.²

(h) Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations;

16. States must ensure that the use of their weapons, means and methods of warfare are compatible with their obligations under international law. Prohibitions in treaty and customary law to employ certain weapons, means and methods of warfare and the obligation to respect and apply international law in good faith include an obligation to review (new) weapons, means and methods of warfare.

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized;

17. The Netherlands considers that it is not beneficial to the discussion to attribute human characteristics or behaviour to emerging technologies in the area of lethal autonomous weapons systems. Especially, since humans must remain accountable for the use of weapons systems, it is not helpful to ascribe human characteristics, such as conscious decision-making and judgement to emerging technologies in the area of lethal autonomous weapons systems.

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies;

18. The Netherlands is committed to the further development of autonomous technologies for peaceful and societally beneficial purposes, including in the field of humanitarian assistance, early warning-systems or sustainable agriculture.

² A more elaborated outline of our national position regarding the review procedure is contained in working paper CCW/GGE.1/2017/WP.5 submitted by the Netherlands and Switzerland.

- (k) **The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations;**

19. The Netherlands remains committed to continue discussions on the emergence of technologies in the area of lethal autonomous weapons systems under the CCW framework.

Panama

I. Introduction

1. During the 2019 Meeting of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (CCW), it was decided that the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS) is to consider the guiding principles, which it may further develop and elaborate; the work on the legal, technological and military aspects; and the conclusions of the GGE, as reflected in its reports of 2017, 2018 and 2019 and use them as a basis for its consensus recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework on emerging technologies in the area of LAWS.

2. Panama has actively and constructively participated in this debate, advocating for a legally binding instrument that establishes specific regulations and prohibitions related to LAWS.

3. At the request of the Chair of the GGE on LAWS, we are pleased to contribute to the process with our preliminary comments regarding the work of said Group, including the guiding principles and the way forward to the 2021 Sixth Review Conference.

II. Applicable international law

4. LAWS must comply with the legal requirements under all applicable international legal regimes, including but not limited to the UN Charter, customary international law, international humanitarian law, international human rights law, international criminal law, as well as the respect of the fundamental principles of distinction, proportionality and precaution in the attack.

5. Article 36 of the Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), provides a legal obligation to conduct legal reviews of new weapons. Additional constraints derive from ethical considerations, including the Martens Clause which requires the application of the principles of humanity and the dictates of public conscience.

6. Despite the far-reaching implications for human rights by the development and use of LAWS, in particular the rights to life and human dignity, the right to physical integrity, the right to be protected against inhuman treatment and the right to a fair trial and due process, a few delegations have opposed to the explicit reference of international human rights law as an applicable framework.

7. It is important to recall the well-established principle that international human rights law continues to apply during armed conflict in complementarity with international humanitarian law (*lex specialis*), as confirmed by international bodies and jurisprudence, inter alia the ICJ's Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons (1996) and on the Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory (2004).

III. Meaningful human control

8. Anthropomorphism of LAWS could be misleading in terms of the projection of a human onto a machine and vice versa, which in turn present a risk of dehumanising human by equating them with inanimate objects. They do not have agency, nor they have legal and moral obligations.

9. International humanitarian law provides, among other things, that the parties to the conflict must distinguish between combatants and non-combatants; that civilian casualties and damage to civilian infrastructure must not be excessive in relation to the anticipated

military advantage; and that all parties must take precautions to protect the civilian population. Clearly, the strict compliance of these norms and principles often demand a high degree of human judgement, common sense, understanding of the current environment and the intentions behind people's actions.

10. LAWS would not have the ability to make these assessments due to their mechanical intelligence. We cannot pretend that weapons resemble humans and have the same attributions. They should not replace human beings in the work of discernment and take decisions about their own use.

11. For these reasons, it is imperative that these weapons systems always maintain a meaningful human control in the critical functions to identify, select and engage targets.

IV. Accountability and responsibility

12. International law set norms and standards designed to minimize the impact of armed conflict on civilians, as well as the limits on the use of force. Individual criminal liability and State responsibility are essential to ensure accountability and reparations for violations of international humanitarian law and international human rights law.

13. The question of accountability should be addressed under international criminal law and the law of State responsibility. This is of particular relevance if we take into consideration the risk of a potential use of LAWS for the commission of war crimes, crimes against humanity and genocide.

V. Technical and security-related questions

14. There are several security implications associated with LAWS, which include the risk of a new arms race, proliferation, global and regional instability, the lowering of the threshold for the use of force, as well as illegal transfers and diversion to non-State actors. These emerging technologies would not only change the nature of warfare, but would also exacerbate the asymmetry of certain armed conflicts.

15. At the same time, LAWS are not immune to technical vulnerabilities, such as security flaws, malfunctions, disruption, cyber-attacks, hacking and spoofing, interference, detectability, the delay in calculating algorithms, as well as the inability to understand and adapt to unknown, complex and dynamic environments in which the system would operate (air, land, sea or outer space). Their behaviour may be undesired and unpredictable, especially in contexts as chaotic as armed conflict, and even more so when they interact with other autonomous systems.

VI. Algorithm bias and data inaccuracy

16. Technology is not neutral. If the AI systems and machine-learning algorithms are fed with data which replicates human biases and inaccurate profiling, then instead of making decisions in an objective manner they could reproduce and reinforce existing forms of discrimination, stereotypes and prejudices based on race, ethnicity, gender, disability, socioeconomic status and related grounds, as well as patterns of violent masculinities.

17. For these reasons, Austria, Belgium, Brazil, Chile, Costa Rica, Ireland, Luxembourg, Mexico and Panama, we submitted last year a joint proposal on the view that algorithm-based programming relevant to emerging technologies in the area of LAWS should take into consideration that data sets can perpetuate or amplify social biases, including gender and racial bias, with potential implications for compliance with international law. Developers of relevant technologies should also be mindful of the implications of incomplete or inaccurate data, in particular as data collection in conflict situations is challenging.

VII. Peaceful use of robotic technology and artificial intelligence (AI)

17. We cannot deny that peaceful applications of robotics and AI could have a positive impact in the civilian sphere, including health care and agriculture, among other sectors.

18. Nevertheless, the experience with previous disarmament treaties, such as the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the Biological Weapons Convention (BWC), the Chemical Weapons Convention (CWC), the Protocol IV of the CCW and the Treaty on the Prohibition of Nuclear Weapons (TPNW — once it enters into force) shows that the prohibitions and regulations of specific type of weapons did not curtail the research and development in the field of science and technologies for peaceful purposes (nuclear energy, biological and chemical agents, laser technology, etc.).

VIII. CCW as an appropriate forum

19. The international community must adopt a comprehensive and coherent approach to LAWS in order to avoid protection gaps. In this sense, the UN bodies dealing with disarmament and human rights, such as the CCW and the Human Rights Council (HRC), play a central role that should be recognized.

20. It is important to recall that, while the question of LAWS is unmistakably a disarmament issue, it has far-reaching implications for human rights, and therefore it also belongs to the human rights framework.

IX. The way forward — 2021 Sixth Review Conference

21. The guiding principles constitute a useful basis for the evolving deliberations in the GGE on LAWS. Notwithstanding, they were never supposed to be an end in themselves, as they are not sufficient to provide a timely response to ethical, legal, technical and security concerns, nor do they replace the urgent need for a legally binding instrument.

22. Against this background, Panama considers that the GGE on LAWS should proceed with its mandate and start the consideration and development of aspects of the normative and operational framework, instead of focusing on the operationalization of the guiding principles at national level.

23. In the face of the growing weaponization of AI, new measures are necessary to ensure compliance with international law, including but not limited to international humanitarian law and international human rights law, and that humans always maintain control over the use of force. All weapons systems which cannot fulfil these requirements should be banned.

24. Machines should not have the power to decide who should live and die. We must prevent this to happen before it may be difficult to reverse later. The international community should also draw the lessons learned from drones. At present, there are few investigations related to targeted killings and extrajudicial executions committed by drones, whereas accountability and the attribution of responsibilities are non-existent mainly due to the absence of a specific international framework to regulate these systems.

25. While a number of delegations stressed that they have no intention of developing or acquiring LAWS, history shows that when certain weapon provides an advantage over the adversary, initial self-restraints are often forgotten. It is almost difficult to determine how close we are to LAWS that are ready for use since much of their development is shrouded in secrecy.

26. In this context, Panama will continue to advocate for the adoption of a legally binding instrument that establishes specific regulations and prohibitions on the development, acquisition, trade, deployment and use of LAWS. Protocol IV of the CCW demonstrates that this disarmament forum can accommodate pre-emptive bans.

27. Also, States should declare and implement moratoria on at least the testing, production, transfer, acquisition, deployment and use of LAWS as an interim measure until such instrument has been concluded.

28. With this in mind, we hope that the outcome document of the 2021 Sixth Review Conference of the CCW would reflect these aspirations and strengthen the mandate of the GGE on LAWS in order to start negotiations on a new protocol of the CCW.

Poland

1. Responding to the call of the Chairman of the Group of Governmental Experts (GGE) Poland presents below its initial position on possible operationalization of the 11 guiding principles (11 GPs) of lethal autonomous weapons systems (LAWS) without prejudice to our national and international future discussions and regulations.
2. Poland perceives the lack of an agreed definition of LAWS as a fundamental challenge for successful operationalization of the 11 GPs.
3. Poland believes that further elaboration of the 11GPs would be a convenient way to achieve concise and well-focused base for final outcome of the GGE work based on the current mandate.
4. In our approach we assessed the viability of possible operationalization of the 11 GPs. It showed us that by regrouping some of the principles a greater clarity of addressed issues would be achieved. Some principles have also raised additional questions.

I. Principles (a), (e), (h) — relations between LAWS and IHL

- Even though it has been reiterated numerous times Poland would like to emphasize the importance of respecting international law, in particular international humanitarian law (IHL). In this regard it must also be underlined that the principles of distinction, proportionality and precaution in attack are the fundamental rules and principles of IHL. They set out legal limits on the conduct of hostilities. The Geneva Conventions enjoy universal acceptance and also many of their provisions, as well as those contained in the 1977 Additional Protocols, are today recognized as customary international law.
- Respect to and compliance with the fundamental principles of IHL guides the use of force by the Polish Armed Forces. The exploitation of LAWS, when acquired or developed, will be also a subject to those rules.

II. Principles (b), (d), (i) — human responsibility and accountability in development, deployment and use of LAWS

- Poland will keep humans accountable for the use of the systems equipped with AI, no matter of its degree of autonomy.
- No matter the status of the system, the accountability for its deployment goes according to the operational chain of command.
- There is possibility to adopt national LAWS definition and LAWS characteristics.
- New weapons are subject to the legal review accordingly to Article 36 of 1977 Additional Protocol I to the Geneva Conventions of 1949, Polish Armed Forces are instructed to fully comply with them.
- Poland supports the establishment of informal and voluntary mechanism in the framework of the CCW enabling information and best practices exchange on national legal reviews and possible regulations related to LAWS.

III. Principle (c) — human-machine interaction and control measures

- Human control over the weapons systems and the use of force must be maintained to ensure compliance with international law and to respond to ethical concerns.
- Poland takes into consideration the requirement for critical functions of LAWS to be designed in a way that allows its operator to control them, however, to the extent possible in a non-disruptive way for the mission conducted by the system.

- Every military chain of command has ethical component integrated. We should be aware that implementation of excessively intrusive human control can disturb mission effectiveness or its completion. It is important to keep the balance between the level of human control and the need to successfully perform tasks in the context of IHL.
5. Therefore, Poland came to some detailed questions and problems to be considered:
- Whether it might be possible and advisable to ensure continuous human control over the system on every stage of the mission?
 - Whether it might be possible and advisable to design deactivating or self-destructive mode in case of no communication with the system?
 - For the testing phase of the system it is important to build knowledge on system performance (predictability and reliability) gained by rigorous testing. It could include deliberately introducing disruptions (recreating in controlled way so-called “fog of war” conditions) while testing.

IV. Principle (f) — Risk of acquisition by terrorist groups and risk of proliferation

- LAWS should be considered as weapons of a very sophisticated nature and advanced capabilities. To this end they shall remain under special supervisory of all legal possessors.
- Taking into account many security risks that might be associated with future LAWS states should among others consider enhancing proliferation/exports controls over these systems.

V. Principles (j), (k) — international efforts on emerging technologies in the area of LAWS

- We expect that in the near future the attention of individual CCW States Parties will rather focus on elaborating national standards for autonomous systems and preparing a common position through regional organizations. Such bottom-up approach could support the work of the GGE.
- Further development of autonomous dual-use technologies makes continuation of work of the GGE LAWS indispensable/desirable.

Portugal

General Remarks

1. Welcoming an invitation by the Chair of the 2020 GGE-LAWS, Ambassador Jānis Kārklīņš, for the High Contracting Parties to submit national commentaries on the operationalisation of the Guiding Principles adopted by the 2019 GGE-LAWS and endorsed at the last Meeting of the High Contracting Parties to the CCW, Portugal shares below its interpretation of the Principles and its vision for their operationalisation and development.

2. The Guiding Principles provide a relevant overall guidance to the work of the GGE-LAWS and for the High Contracting Parties to take into account when designing and implementing internal law and policies on emerging technologies in the area of LAWS.

3. Portugal cautions that the Guiding Principles represent the lowest common denominator of consensus within the GGE-LAWS and should therefore not be interpreted as an end in themselves nor as a deliverable able to fulfil the mandate of the GGE-LAWS on its own. Furthermore, there may be issues concerning the regulation of LAWS that overstep the mandate of the GGE-LAWS. As such, and on the one hand, the GGE-LAWS does not exhaust all the international discussion on the development and use of these emerging technologies. On the other hand, for effectively pursuing its mission, the GGE-LAWS will need to research and discuss areas that, while not being the focus of its formal mandate, constitute vital auxiliaries to its completion. For example, and even from the point of view of the existing applicable law within the spirit of the CCW, areas other than International Humanitarian Law will have to be considered (e.g. International Human Rights Law and International Criminal Law).

4. Among other activities at the GGE-LAWS, Portugal once again stresses the need for an exercise towards a clarification, consideration and development of aspects of other normative and operational framework on emerging technologies in the area of LAWS. This exercise would be fully aligned with the mandate of the GGE-LAWS as provided in Decision 1 of the Fifth Review Conference of the High Contracting Parties to the CCW.

5. Certainly, simply agreeing that international law applies to LAWS is not enough. The GGE-LAWS must engage in a thorough discussion on identifying and interpreting those concrete international norms, enhancing legal certainty by building consensus on the existing normative framework applicable to LAWS and assessing the existing international law in order to find possible gaps that may call for an internationally binding instrument on LAWS. Moreover, ethical issues must also be the subject of deeper exchanges and prioritisation at the GGE-LAWS.

6. Having the Guiding Principles as background, this exercise would allow the GGE-LAWS to reach a consensual interpretation on the international law applicable to LAWS. Depending on its conclusions on the existing legal framework applicable to LAWS, the GGE-LAWS might need to explore the possibility of a new protocol to the CCW regulating the development and use of LAWS, either at a near future or at a later stage.

7. In addition to not fading attention from Portugal's calls for the abovementioned exercise, these commentaries are also without prejudice to the position of Portugal in current and future international discussions on the development and use of LAWS (or prohibition thereof), as well as to Portuguese internal and external policies on the matter.

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems;

8. As Portugal has continuously argued at the GGE-LAWS, new means or methods of warfare do not render International Humanitarian Law (IHL) — nor international law in general — obsolete. New technologies such as the emerging ones in the area of LAWS require a particular effort for identifying and interpreted applicable international law — also in order to verify whether existing norms are sufficient and adequate.

9. On this Guiding Principle, we would like to draw attention to two points on the application of IHL to LAWS that have mostly passed undiscussed.

10. Firstly, that IHL as applicable to LAWS will include not only obligations concerning wartime but also obligations that are enforceable during peacetime. This encompasses the obligation to disseminate the Geneva Conventions and their Additional Protocols and also obligations relating to the study, development, acquisition or adoption of new weapons — see our comment to Guiding Principle (e).

11. Secondly, that the GGE-LAWS should bear in mind that Article 2 of the CCW states that “Nothing in this Convention or its annexed Protocols shall be interpreted as detracting from other obligations imposed upon the High Contracting Parties by international humanitarian law applicable in armed conflict,” not making a distinction between treaty and customary IHL. Therefore, when discussing the use of LAWS in the spirit of the CCW, customary rules of IHL³ on the following topics should be taken into consideration⁴:

- Distinction between civilians and combatants (Rules 1, 2 and 6);
- Distinction between civilian objects and military objectives (Rules 7 and 10);
- Indiscriminate attacks (Rules 11 and 13);
- Proportionality in attack (Rule 14);
- Precautions in attack (Rules 15 to 21);
- Precautions against the effects of attacks (Rules 22 to 24);
- Attacks against persons hors de combat and against persons parachuting from an aircraft in distress (Rules 47 and 47);
- Use of weapons (Rules 70 and 71);
- Compliance with International Humanitarian Law (Rules 139 and 140);
- Enforcement of International Humanitarian Law (Rule 144);
- Responsibility for Violations of International Humanitarian Law and Reparations (Rules 149 and 150);
- Individual responsibility (Rules 151 to 154);
- War crimes (Rules 156 and 158).

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system;

12. Automation and artificial intelligence should be tools in assisting the human actors (enhancing human perception and human action) rather than being the (non-human) actors themselves — see our comment to Guiding Principle (i). The will and decision to use force must therefore always remain with a human being.

13. Especially during the deployment phase, considering that no weapon is developed without defect or possibility of malfunction, its human users must be trained and able to quickly act in order to avoid or minimise the negative consequences of a malfunctioning LAWS.

14. The use of force must be planned and executed in such a way that it can always be retraceable to the human being operating the machine, in order to prevent any accountability gaps for violations of international law — see our comment to Guiding Principle (d).

³ Following the ICRC’s ICRC’s study on customary IHL (originally published by Cambridge University Press in 2005).

⁴ This is without prejudice to the relevance of other rules in the context of the use of LAWS, in particular the rules concerning specifically protected persons or objects (e.g. protection of humanitarian relief personnel and objects, the protection of journalists, the protection of cultural property and the protection of the natural environment).

- (c) **Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole;**

15. The goal when discussing and designing human-machine interaction should be (at least) twofold: (i) to avoid unintended engagement by LAWS and (ii) to retain the human element in critical decisions concerning the use of force by LAWS, in compliance with international law (as well as with internal law and appropriate rules of engagement).

16. Critical decisions in the use of force encompass, in Portugal's reading, different decision levels pertaining to a mission's planning (strategic and tactical planning) and execution.

17. Portugal calls attention to the fact that some existing and used weapons today already perform some autonomous functions, within certain operative restrictions. The development and use of LAWS could draw inspiration for similar restrictions to ensure compliance with IHL — for example, restrictions (i) in possible tasks and target-selection/engagement (particularly in complex and/or ever-changing environments where human, restrictions on the situation/context (ii) when and where LAWS may be used (i.e. time and space restrictions) and (iii) in the very autonomy of LAWS during engagement [e.g. with a constant and effective post-deployment human-machine communication system, restricting as much as possible the “points-of-no-return” in the use of force; see our comment to Guiding Principle (h)].

- (d) **Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control;**

18. The CCW makes no direct mention to International Criminal Law (ICL) or its rules, neither do its annexed Protocols. Nevertheless, the development, deployment or use of LAWS in a manner incompatible with international law would give rise to individual or State responsibility — for example, in accordance with applicable customary IHL, see our comment to Guiding Principle (a).

19. Individual responsibility for the unlawful use of LAWS could include actions or omissions amounting to the crime of genocide (e.g. targeted killings of members of a national, ethnical, racial or religious group), crimes against humanity (e.g. murder) or war crimes (e.g. wilfully causing great suffering or serious injury to body or health). These crimes are defined by and punishable under the Rome Statute of the International Criminal Court, of 1998).

20. Determining the nature and scope of individual accountability could raise issues regarding the very development and/or manufacturing of LAWS, in addition to their deployment and/or use. In the case of armed conflict, superior responsibility concerning the use of LAWS would be of particular interest.

- (e) **In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law**

21. This Guiding Principle mimics much of the language used in Article 36 of Additional Protocol I (Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts).

22. Moreover, Portugal notes that this Guiding Principle echoes the Martens Clause as quoted in Paragraph 5 of the Preamble of the CCW: “(The High Contracting Parties) Confirming their determination that in cases not covered by this Convention and its annexed

Protocols or by other international agreements, the civilian population and the combatants shall at all times 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”.

23. The Martens Clause is also quoted in international legally binding instruments of IHL, such as the 1899 Hague Convention II on the Laws and Customs of War on Land⁵ and the 1977 Additional Protocol II to the Geneva Conventions⁶. In Paragraph 78 of its 1996 Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, the International Court of Justice claimed that the Martens clause “(...) has proved to be an effective means of addressing the rapid evolution of military technology.”.

24. As for the employment of LAWS giving rise to situations where it would be prohibited by international law — and in addition to our previous comments concerning IHL — Portugal withstands that rules of International Human Rights Law (IHRL) must be considered.

25. The CCW makes no direct mention of IHRL or its rules, neither do its annexed Protocols. However, the principle of humanity under IHL has at its core elements compatible with IHRL and the relation between the legal frameworks of IHL and IHRL can be of extreme importance in certain scenarios of armed conflict — this relation is for example paramount to understand the legal framework applicable to situations of occupation.

26. Existing multilateral international treaties can be of importance when reflecting on IHRL as applicable to the use of LAWS. For example, the 1966 International Covenant on Civil and Political Rights (e.g. right to life) and the Convention on the Prevention and Punishment of the Crime of Genocide and the 1965 International Convention on the Elimination of All Forms of Racial Discrimination, bearing in mind the possibility of programming a LAW to distinguish and engage only targets with specific physical traits.

27. Finally, and given our interpretation on Guiding Principle (f), Portugal underlines that it sees Guiding Principle (e) as being applicable to all means of warfare, including hybrid warfare.

(f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered;”

28. Intelligent autonomous technologies are more often than not dual-use technologies (i.e. with both peaceful and non-peaceful uses). In this sense, civilian applications of automation and artificial intelligence may create grey areas where LAWS could be legally be made available for purchase by civilians (e.g. for self-defence of their person, family or property, in compliance with the internal law of a High Contracting Party).

29. Due to existing very strict national and international standards currently in force in Portugal regarding arms control, Portuguese authorities discard the possibility of weapons with characteristics such as those of LAWS being made available for non-military use (and particularly by civilians): they would necessarily belong in a category of military goods/technologies.

30. Moreover, LAWS should be expected to be acquired by hostile actors at some point. A solid legal and operational framework and network should be in place to lower the risk of acquisition or development of LAWS by hostile actors.

⁵ The Preamble of the 1899 Hague Convention II on the Laws and Customs of War on Land reads “‘Until a more complete code of the laws of war is issued, the High Contracting Parties think it right to declare that in cases not included in the Regulations adopted by them, populations and belligerents remain under the protection and empire of the principles of international law, as they result from the usages established between civilized nations, from the laws of humanity and the requirements of the public conscience.”

⁶ “In cases not covered by the law in force, the human person remains under the protection of the principles of humanity and the dictates of the public conscience.”

31. Indeed, a hostile actor — be it a State actor, a non-State actor or an actor by proxy — in the possession of LAWS may use them as an asymmetric tool/mean of warfare or of cyberthreat. For example, LAWS could be used for espionage actions, intrusion/infiltration activities or in attacks against persons, facilities or networks located abroad, in violation of international law and in an undercover fashion making detection and accountability difficult or even impossible.

32. The unpredictability and ambiguity that may be entailed in the use of LAWS could result in an erosion of the traditional dichotomies in defence and security narratives (internal v. external; non-combatant v. combatant; civilian v. military; armed conflict v. peace) upon which conventional means and methods of warfare are built. For these reasons, it is advisable to understand LAWS as possible hybrid tools of disruptive power and, as such, to expect them to gradually become a part of the conceptual and analytic framework of hybrid threats.

(g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems;

33. High Contracting Parties must take action — through internal law, military doctrine/policy and good practices on certification and monitoring of weapons systems — to ensure that effective risk assessment and mitigation measures are put in place during the planning, research and development, certification, use and monitoring of LAWS.

34. To optimise the effectiveness of such measures, while crafting and implementing national action on risk assessment and mitigation measures, High Contracting Parties should maintain constructive exchanges on emerging technologies in any weapons systems with other relevant stakeholders — e.g. other States, international organisations, academia and relevant industries (particularly defence and security industries and industries dedicated to advancing technology, particularly artificial intelligence). This is especially important when considering that emerging technologies in the area of LAWS and other weapons systems will rely on dual-use technology — see our comment to Guiding Principles (f) and (j).

(h) Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations;

35. The purpose of the CCW is to prohibit or restrict the use of certain types of weapons considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately. In its Preamble, the CCW alludes frequently to elements of the fundamental principles of IHL: humanity, distinction, proportionality and military necessity.

36. Advancing military capabilities with a view to enhance the accuracy and consistency of the means and methods and warfare and to minimise human suffering (or prevent it altogether) can be instrumental for bettering the compliance with those fundamental principles of IHL, as well as with obligations under IHRL. See our General Remarks and also our comments to Guiding Principles (a), (c), (d), (e) and (k).

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized;”

37. By reaffirming the need for a meaningful human control over LAWS at all stages of their life cycle, the GGE-LAWS is not merely translating into a principle several legal imperatives stated by IHL and other areas of international law. In addition to concerns on accountability, ethical and moral considerations preside over this and other Guiding Principles, addressing a fundamental problem where the use of lethal force by machines is involved: human life and human safety cannot be left to the autonomous decision/choice of a machine/algorithm.

38. Consequently, policymakers, lawmakers, armed forces and other persons responsible by crafting and implementing policies, doctrine and strategies on these emerging technologies must be aware that LAWS are mere tools and not actors themselves — see our comments to Guiding Principles (b) and (c).

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies;

39. High Contracting Parties taking part in the GGE-LAWS should focus on discussing issues regarding emerging technologies in the area of LAWS in the context of the CCW and, as such, for use in armed conflict.

40. Nevertheless, access to peaceful uses of intelligent autonomous technologies (such as emerging technologies in the area of LAWS) must be taken into consideration, given the dual-use characterising these technologies. See also our comments to Guiding Principles (f), (g) and (k).

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.

41. Multilateralism presents a unique platform for States and of International Organisations to discuss common solutions to common challenges. The development and use of artificial intelligence in warfare, counterterrorism and against other security threats is one such common challenge.

42. The mandate of the GGE-LAWS is to discuss the questions related to emerging technologies in the area of LAWS in the context of the objectives and purposes of the CCW. Such discussions face a number of challenges, one of them being the very nature of the CCW — which, as a chapeau convention, contains only general provisions; the prohibitions or restrictions on the use of specific weapons or weapon systems being the object of the Protocols annexed to it.

43. Consequently, the scope of the obligations of a High Contracting Party to the CCW will vary according to the specific Protocols that that it is bound to, as well as to whether it has ratified Amended Article 1 of the CCW (Scope of Application). Any research or reflection on the international legal framework created by or under the CCW must therefore consider that such framework is a complex and varied one and depends on an open exchange of views between the High Contracting Parties to the CCW.

44. So, in order to fully implement its mandate, the GGE-LAWS must seek ways to maximise the potential for consensus among the High Contracting Parties. It should reach both a consensual definition on LAWS and a consensual interpretation on the applicable international law, so that it can make informed recommendations on whether said norms are sufficient and adequate. A coherent and streamlined implementation of the Guiding Principles by the High Contracting Parties to the CCW depends on the further substantiation of the Principles, especially in the case of those mentioning that international law is applicable to LAWS — see our General Remarks and our comment to Guiding Principle (a).

45. Thus, Portugal understands the present exercise as an opportunity to gather different written comments and proposals from the High Contracting Parties to the CCW, with a view to possibly create useful outputs such as possible interpretative tools/materials useful for the operationalisation of the Guiding Principles at a national level — without prejudice to the non-binding nature of said tools/materials.

Russian Federation (the)

1. We commend the work of the Group of Governmental Experts of the States Parties to the Convention on Certain Conventional Weapons (CCW) on Lethal Autonomous Weapons Systems (GGE LAWS). We welcome two substantive reports of the GGE, adopted by consensus in 2018-2019, with 11 guiding principles on emerging technologies in the area of LAWS.
2. According to Article 15 (4) of the Constitution of the Russian Federation, "the universally-recognized norms of international law and international treaties and agreements of the Russian Federation shall be an integral part of its legal system." Strict compliance with the norms of international humanitarian law (IHL) in armed conflicts remains one of the priorities of the Russian Federation (guiding principles a), c), h)). In that connection, Russia's legislation takes full account of the guiding principles on emerging technologies in the area of LAWS.
3. IHL norms, including the obligation of commanders to comply with its provisions and demand their strict implementation from personnel, are reflected in the Russian legal system. In accordance with the Order of the USSR Defense Minister No. 75 dated 16 February 1990, all units of the Armed Forces of the Russian Federation shall be guided by four 1949 Geneva Conventions and their three Additional Protocols to which the Russian Federation is a Party. It stipulates "to take into account the requirements of these documents when conducting training sessions and exercises, as well as when drafting legislative acts, general military regulations, government decisions, orders, directives and other regulatory acts".
4. The relevant obligations are contained in the Internal Service Regulations of the Armed Forces of the Russian Federation (approved by Decree of the President of the Russian Federation No. 1495 dated 10 November 2007), Navy's Ship Regulations (approved by Order of the Commander-in-Chief of the Navy No. 350 dated 1 September 2001), Manual on International Humanitarian Law (approved by Order of the Defense Minister of the Russian Federation No. 360 dated 8 August 2001), Instructions for Legal Training in the Armed Forces of the Russian Federation (approved by Order of the Defense Minister of the Russian Federation No. 878 dated 7 December 2013).
5. The Manual on Legal Work in the Armed Forces of the Russian Federation (approved by Order of the Defense Minister of the Russian Federation No. 717 dated 2 December 2019) contains a significant body of norms on the need to comply with the IHL during combat operations, including provisions of Article 57 of the 1977 Additional Protocol I (AP I) (Precautions in Attack) to the 1949 Geneva Conventions, which are important in the context of emerging technologies in the area of LAWS. The document has the separate section titled "Legal Support for the Actions of Troops (Forces) in Armed Conflicts", according to which such legal support is provided through studying of IHL by personnel and counseling commanders on the application of IHL taking into account the performance of specific combat tasks.
6. The Russian Federation reaffirms its commitment to the need to maintain human control over the so-called LAWS, no matter how advanced these systems may be. It is human responsibility to ensure the compliance with IHL norms during the combat use of the so-called LAWS. This approach is crucial in the context of implementing guiding principles b) and d). According to the legislation of the Russian Federation, a responsible official is always accountable for decisions concerning development and use of weapons, including emerging technologies in the area of LAWS.
7. The Internal Service Regulations No. 1495 dated 10 November 2007 (Article 77) stipulate that in the course of performing combat missions the commander shall take measures to comply with IHL and hold accountable those responsible for its violations.
8. Under Article 73 of the Manual on Legal Work in the Armed Forces of the Russian Federation, in combat operations commanders are to lead by example of compliance with IHL norms, ensure compliance with them by personnel, and take measures to prevent violations of IHL. If such violations are identified, measures should be taken to stop them and prosecution of perpetrators should be considered.

9. Article 76 of the mentioned Manual stipulates that the commander's right to choose means (methods) and weapons of combat operations shall be limited by IHL norms.

10. In exercising control over the readiness for combat operations, the commander shall check the following (Article 77):

- Accuracy of the execution of the combat order and instructions as far as compliance with IHL is concerned;
- Compliance of decisions taken by subordinate commanders with IHL norms;
- Knowledge of IHL by personnel;
- Timeliness and quality of implementation of measures to avoid or minimize damage to persons and facilities protected by IHL.

11. In accordance with guiding principle e), the Russian Federation fully complies with its obligations under Article 36 of the API. We consider it a norm of customary international law. This Article has no provisions on how exactly legal reviews should be conducted, and does not impose an obligation on States to make their results public, nor to provide anyone with information on the subject. In the Russian Federation, the legal review of armaments is carried out within the framework of national procedures that help, on the basis of the existing legal and regulatory framework, ensure proper control over compliance with the requirements of Article 36 of the API.

12. Article 7 of the Federal Law No. 275-FZ dated 29 December 2012 "On the State Defense Order" includes, among the main responsibilities of the state customer, the organization and conduct of tests of prototypes (complexes, systems) of weapons, military and special hardware, military property, preparation of documents for their adoption, as well as approval of technical documentation required for their development and mass production. Prototypes are assessed for such characteristics as distinction, "no-excessive-damage", etc., which should guarantee potential compliance of future weapons with IHL norms.

13. In the context of the implementation of the guiding principles, of particular importance is the National Strategy for the Development of Artificial Intelligence (AI) for the period until 2030 adopted in 2019. As for principles g) and i), the Strategy sets out the need to identify and prevent any risks associated with the development of emerging technologies. In particular, it concerns the "inadmissibility of using AI for the purpose of deliberate infliction of harm to individuals and legal entities, as well as prevention and minimization of risks of negative consequences of using AI technologies" (paragraph 19B). 14. It emphasizes that the creation of universal AI, similar to a human being, can lead to negative consequences due to social and technological changes that accompany the development of AI technologies (paragraph 9).

15. The National Strategy also sets the objective to create a legal framework to regulate human-machine interaction, and ensure the security of data and new technologies (paragraphs 39, 50, 51). It noted the importance of avoiding hasty decisions that could hinder technological progress and undermine the ongoing research in the field of peaceful robotics and AI (paragraph 48). Accordingly, it is consistent with the principles c) and j).

16. The Russian Federation has an extensive legal and regulatory framework in place to ensure physical protection, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), and to prevent the risk of acquisition by terrorist groups and the risk of proliferation of armaments (principle f)). The need to comply with the international obligations of the Russian Federation in the area of military products export control is laid down in Article 4 of the Federal Law No. 114-FZ dated 19 July 1998 "On Military and Technical Cooperation between the Russian Federation and Foreign States". The National Strategy for the Development of AI for the period until 2030 also contains provisions to give effect to guiding principle f). For instance, Section V deals with the goals and objectives of AI development, one of which is the formation of a comprehensive security system for the design, development, introduction and use of AI technologies (paragraph 25E). The Criminal Code of the Russian Federation criminalizes such acts as the use of prohibited means and methods of warfare (i.e. direct violation of IHL), public calls to unleash

an aggressive war, development, production and sale of weapons of mass destruction prohibited by international treaties of the Russian Federation.

17. With regard to the guiding principle h), we confirm that the so-called LAWS can significantly reduce the negative effects of the use of weapons in the context of IHL. The existing complexes of a high degree of military autonomy in the Russian Federation significantly contribute to the compliance during hostilities with such key principles of IHL as proportionality and distinction. This is due to the fact that, in addition to their technological advantages (accuracy, speed, effectiveness), such weapons neutralize human-caused risks (operator's mistakes due to his or her mental or physiological state, ethical, religious or moral attitudes), and thus reduce the probability of unintentional attacks against civilians and non-military targets. GOST RV 15.203-2001, adopted as guidance for industrial enterprises for creation of special-purpose means (including the so-called prospective LAWS), takes into account the understandings adopted in the guiding principle h). For development of any new prototype, a list of normative guiding documents is made on the basis of operational requirements that necessarily include provisions on the need to comply with IHL norms and other applicable international legal obligations.

18. The Russian Federation is one of the most active States Parties to the CCW. We fully share the understanding laid down in the guiding principle k) that the CCW is the optimal platform for considering LAWS issues, given its unique nature that ensures a reasonable balance between humanitarian concerns and legitimate defense interests of States. We are deeply convinced that it is inadmissible to artificially divide weapons into "bad" and "good" basing on political preferences of individual States. We reaffirm our readiness to further discuss LAWS issues on the basis of the discussion mandate and agreed agenda of the relevant GGE.

19. We note the importance of involving experts and academics in discussions on IHL issues, including LAWS. To that end, the Expert Council on IHL Issues has been established and is functioning on a permanent basis within the State Duma of the Federal Assembly of the Russian Federation. It is used as a tool for legislative enforcement of IHL norms and rules in the Russian Federation. The LAWS issue is one of its focus areas.

20. The Council on the Methodology of AI and Cognitive Research has been established within the Russian Academy of Sciences with the aim of conducting and developing fundamental and applied research in the field of global intellectual systems and technologies, and information technology issues, and integrated monitoring of AI research, which also includes emerging technologies in the area of LAWS.

Thus, the Russian Federation fully implements the guiding principles on emerging technologies in the area of LAWS approved by the GGE on LAWS in 2018-2019. We call on the CCW States Parties to follow these principles responsibly and to continue exchanging information on specific practical measures for their national implementation in order to build confidence and increase transparency.

South Africa

General Remarks

1. The final report of the meeting of the High Contracting Parties (HCP) to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to have Indiscriminate Effects (CCW), states that the Group of Government Experts (GGE) on emerging technologies in the area of Lethal Autonomous Weapons Systems (LAWS) will conduct its work and adopt its reports by consensus, one of which is to be submitted to the meeting of the High Contracting Parties in 2020 and the other submitted to the 2021 Sixth Review Conference.

2. It further states that the GGE should explore and agree on possible recommendations on options related to emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention, taking into account all proposals (past, present and future) and in these discussions shall consider the legal, technological and military aspects. In order to contribute constructively to the discussions over the period, it is important for HCP to the CCW, to prepare sufficiently, which in the case of South Africa, could not be done, due to the disruptive impact of COVID-19.

South Africa also would like to make further comments on the following:

Humanitarian Objectives:

3. It is noted that the mandate of the GGE is to consider emerging technologies in the area of lethal autonomous weapons (LAWS). Within the context of the Certain Conventional Weapons Convention (CCW) the aim is to prohibit or restrict the use of certain types of weapons that could cause unnecessary suffering to combatants or have indiscriminate effects on civilians. From this point of view, South Africa continues to support the humanitarian objectives aimed at the regulation of lethal autonomous weapons in order to minimise the occurrence, effects and the potential risks posed by these weapons.

Possible Indiscriminate Effects

4. It is necessary to bear in mind the possible indiscriminate effects, especially on civilian populations, that LAWS may have, or their use in an armed conflict. When considering a ban or restriction on the production and use LAWS, it is therefore imperative to consider both their design and use.

5. A key question also relates to the purpose(s) of the design of these weapons. If they are not designed to be capable of identifying and engaging a specific single target object, they can be deemed to have the inherent risk of having indiscriminate effects.

Human Control

6. Another crucial question in the consideration in the operation of LAWS remains the point at which human activity, in the programming, activation or deactivation intervention, occurs.

Defining Emerging Technologies

7. A critical question that remains, is related to that of the so-called "emerging technologies". In South Africa's view, there can be no legally binding definition of this term at this stage, as it remains an open-ended concept.

Reconfirmation of the current mandate

8. Given the disruptive impact of COVID-19 and areas where further clarification would be required as stipulated above, South Africa is of the view that the current mandate of the GGE should be reconfirmed in 2020. South Africa considers the CCW as the most

appropriate forum for further clarification, consideration and development of aspects of the normative framework. South Africa further would like to advance that the issue of "emerging technologies", should be resolved and defined, failing to do that would pose serious challenges to obtaining agreement on any negotiating mandate.

Commentaries by the High Contracting Parties on operationalizing all eleven guiding principles at a national level

9. South Africa is of the view that the guiding principles were developed solely to guide the work of the GGE and not for operationalizing at the national level. The guiding principles and the debate around the guiding principles is still evolving and South Africa, like many other countries, is also still in the process of internal consultations. This entails the processing of the outcomes of the GGE through South Africa's internal structures, responding and providing feedback to the GGE process, all with the objective to clarify and to aid the process of developing its negotiating position. National positions are then fed into regional positions, and ultimately into the multilateral level. Unfortunately, this process could not take place due to COVID-19.

10. The GGE agreed that the guiding principles are also not exhaustive; it may be further developed, elaborated and refined. It would be therefore more prudent to agree on the operational and normative framework, before any discussion of implementation at national level could take place, otherwise it would lead to a "cart before the horse" situation. In the case of South Africa, such a discussion would in any case be superfluous, as implementation of any international agreement, is guided by South Africa's constitutional processes.

Spain

1. Spain is glad to meet the request from the President of the Group of Governmental Experts on LAWS about national views on the operationalization of the guiding principles at the national level in order to contribute to the discussion on the understanding and interpretation of these principles.
2. The main ideas that underlie the guiding principles are the commitment with IHL principles and the human responsibility in the compliance with those principles. At this point, Spain reiterates that the respect of IHL requires sufficient human control on all weapons systems, as well as an attribution of legal responsibility to the operator and the person who orders their use. As a general rule, each engagement decision must be taken under the authority of an accountable commander and the weapon system itself must be under the control of an accountable operator.
3. Besides, human control over a weapon system should not be limited to its deployment and use in the battlefield. Human beings are involved in different capacities throughout the life cycle of the weapon system, including the training of commanders and operators, research and development (R&D), as well as the weapon testing and certification. As a result, human control should be ensured across the weapon system's life-cycle, from initial planning, R&D and certification to deployment.

First phase: Planning and R&D

4. To start with, States should assess, through legal reviews of new weapons and new methods of warfare, whether the level of human involvement in the new system would violate IHL. In case a legal review identifies a use that might be problematic, doctrine and training are recommended to be drafted and implemented in such a way that they allow the weapon to be used properly and in compliance with IHL.
5. During the R&D process, systems should be conceived in a way that provides operators with a sufficient amount of human understanding in order to achieve adequate awareness of the situation-. This would also allow to obtain an account of the reasons why the machine is suggesting or going to take a specific course of action. Additionally, the design must take into consideration a function allocation procedure that allows each step in the targeting cycle to be identified and to specifically assign it to either a human or a machine.
6. Machines should be extensively tested during the R&D phase. Frequent feedback from actual users, in conditions close to real-life ones during system deployment is also crucial. Validation process should also be extensive in order to ensure that machines meet the required specifications and fulfill their intended mission. Additionally, systems need to be proofed against spoofing techniques and cyber or electronic attacks. Otherwise, they couldn't be deemed feasible from an operational perspective.

Second phase: Weapon use

7. Once the weapon has been certified for service, the High Command of the Armed Forces will decide on the limits and the way it can be used (with different levels of automation). In order to do so, the High Command of the Armed Forces relies on the assistance provided by its legal advisers. The definition of the limits and the way to use the weapon will depend on the nature of the overall mission, the type of tasks to be executed during the mission and the evolution of the mission's circumstances, resulting in a specific doctrine with potential operational modes, identification of exclusive control privileges for human operators and limits to the system usage in specific situations.
8. This operational guidelines must take into account the risks associated with system autonomy such as automation bias, low level of trust and out-of-the-loop problems. The operational guidelines must also foresee some provisions concerning the training of operators and work procedures, among other.

9. Once deployed, the system could potentially record every decision it takes. This allows for a post-use assessment by users.

10. Autonomy may serve very different capabilities in different weapon systems including mobility, targeting, intelligence, interoperability and health management. Some of them may not pose significant ethical or legal risks (e.g. navigation), while others, such as targeting, can be a source of concern. The targeting process requires a complex assessment to ensure that an attack takes place in compliance with the principles of IHL in the conduct of hostilities: distinction, proportionality and precaution in the attack.

Third phase: Modes of use

11. In order to identify which modes of use are appropriate according to the mission developed by the system and ensure the respect of IHL principles, it would be worthy to establish a set of rules that bridge the gap between these principles and the specific use of certain sorts of weapon systems. The type of human-machine shared control legally required should be established on each single use of a weapon system.

12. Spain privileges a human-in-the-loop mode of engagement as a general rule, especially during complex operational environments. These situations would require humans to remain as recipients of tactical information and to behave as decision-makers. These situations demand some qualitative assessments in order to ensure the compliance with the law. And these assessments cannot be reasonably conducted by a weapon system. In these tactical situations, the operator/commander must have sufficient understandable information to distinguish combatants from noncombatants, to determine that the military objectives outweigh harm or risks to noncombatants and civilian objects, and to respect all other applicable rules of International Humanitarian Law.

13. Loitering weapons are the only offensive type of weapon that is known to be capable of autonomously acquiring and engaging targets. However, loitering times, geographical areas of deployment as well as categories of targets to potentially be attacked are elements determined in advance by humans. Therefore, humans can exercise meaningful control.

14. Human supervision and veto level (human-on-the-loop) might be deemed as an acceptable level of control in the case of weapons systems with exclusively defensive functions. This is the case of certain strictly defensive systems, where human safety is at stake and where human reactions are too slow for an effective response. These include missile and artillery interception systems which defend human-inhabited vehicles or locations, such as Iron Dome, CIWS or Active Armor Protection Systems.

15. By enforcing meaningful human control on some of these modes of operation we can mitigate the risk that autonomy in weapon systems implies in the acceleration of the pace of war.

16. Human-out-of-the-loop weapons, capable of selecting targets and using the force without any human input or interventions, should be considered incompatible with the meaningful human control requirement. This type of weapons raises concerns about States or non-State actors that may take little consideration for International Law. Since they overlook collateral damage, they would be likely to embrace operational concepts where humans would have little control over the use of weapons.

17. Finally, regarding transparency and exchange of information, voluntary exchange of experiences and good practices regarding the control policy implemented in different weapon systems can be a measure towards better transparency and trust. Additionally, for a future political declaration and a politically binding code of conduct, the determination of a set of rules can be explored. These could establish which autonomous modes of use are appropriate in relation to the mission developed by the system, in order to ensure the respect of the IHL principles.

Sweden

1. The following comments, in response to the request of the Chair of the GGE on LAWS, are based on Sweden's understanding of the eleven Guiding Principles.

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems

2. This is a fundamental principle. In order for it always to be upheld, it is of utmost importance to train and exercise the personnel in national armed forces in international law applicable during armed conflict. Legal advisors specialized in international law play a valuable advisory role in military decision-making relating to the interpretation and application of IHL.

3. Further analysis would be welcome regarding the application of existing IHL on account of possible future autonomous weapons systems.

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system

4. The choice of military means and methods for a military operation must be compliant with the relevant rules and regulations on how military means can be used. In planning a military operation, a military commander and his/her staff must consider and assess the presence of civilians (distinction), the principle of proportionality, the principle of precautions in attack and the prohibition of causing unnecessary suffering and superfluous injury. The use of a weapon that cannot, or will fail to, fulfil these provisions of IHL may not be deployed or used.

(c) Human-machine interaction ... should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL

5. This is another fundamental principle. Preserving human control over the use of force is a key objective. Human-machine interaction can be seen as an important category of measures needed to ensure such control. Military decision-makers and operators need to be in control – both in terms of their understanding of the weapons systems and their ability and skill to control the systems. All weapons systems have to be predictable and reliable so that their human operators always can be certain that the systems will function in accordance with the intentions of the operator.

6. In a military context, rules, regulations and procedures should form a hierarchy of instructions for all operations involving weapons. They should cover, inter alia, the organization, procedures, safety, basic command concepts, control of risk and necessary training requirements. Manuals and training programs for all systems should accompany the regulations. Any complex system must have rigorous handling regulations, including methods for training and procedures for use.

7. Measures to ensure human control should be considered in the entire life cycle of a weapons system. The specific measures will be context dependent. A system's type of target as well as spatial and temporal limits are likely to be important factors.

8. In the development of regulations, procedures, manuals and training programs, the human-machine interaction and its limitations need to be taken into account. In the legal weapons review process ("Article 36"), an analysis must be performed to ensure that it will be possible to use a given weapons system in compliance with IHL. This analysis should include aspects of human-machine interaction and the ways in which they are addressed in manuals and training programs.

9. The more precise requirements of human control in various contexts still need to be analysed, understood in practical terms and agreed.

- (d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control**

10. See principles (a) and (b).

- (e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law**

11. States have an obligation under international law (article 36 of AP I) to determine whether the employment of a new weapon would be prohibited under international law. In Sweden, this is carried out by the Delegation for International Humanitarian Law Monitoring of Arms Projects. All defence-related authorities must, without delay, report to this delegation any proposed project that involves the study, development, procurement or modification of weapons or methods of warfare.

12. In a review in accordance with article 36, the characteristics of the weapons system are examined, as well as its planned use and other relevant aspects. In case of doubt or scientific uncertainty, the examining entity could request further information and/or apply further test methods. The examining entity is then to issue a decision that approves or rejects the weapons system or method under review. It could also issue strict requirements for modifications or limitations that would bring the system in line with the requirements of international law.

13. Information is available on a number of national legal review systems that could assist HCPs wishing to create a system for legal weapons reviews or to examine an existing system.

- (g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems**

14. Risk assessment and corresponding mitigation measures are part of the development of all advanced weapons systems. The processes of procurement, maintenance and use of such systems should be controlled by elaborate safety procedures. The procedures should be documented in handbooks on safety from different perspectives, ranging from questions about explosives and ammunition to software quality.

- (i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized**

15. Describing technical systems in a non-technical context is a challenging task. Using adjectives normally used to describe human behaviour easily causes confusion and a risk of drawing inaccurate conclusions about technical systems, that do not possess human qualities. To avoid this, only strictly technical terms should be used.

- (j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies**

16. Although peaceful uses of technology are not within the scope of the CCW, the following may be noted: The overlap between the civilian and military spheres regarding technology development is significant and appears to be increasing. This creates a mutual dependency. If a new technology is adapted for military use, the requirements for robustness and reliability of the system need to be set very high.

17. Technological progress in e.g. automation, autonomy, artificial intelligence and digitalisation/computerisation, is normally common to the military and the civilian spheres, although often driven by civilian (commercial) interests. The challenges of ensuring meaningful control are almost the same for technical systems that may be dangerous (civilian applications) and systems designed to be dangerous (weapons).

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems

18. The CCW offers an appropriate framework for the issues of emerging technologies in the area of lethal autonomous weapons systems for several reasons. The participation of experts from several relevant disciplines, as well as representatives from states, civil society and industry, provides a richness of perspectives. Looking forward, the work needed to increase the common understanding of the concept of human control in relation to legal, military and technological aspects is a challenge. Experts from all HCPs need to be part of the effort, including from the HCPs who possess the most advanced capabilities in this area.

Switzerland

1. Switzerland sees the eleven guiding principles as an important consolidation of basic understandings on emerging technologies in the area of LAWS among the High Contracting Parties (HCP). The principles can guide current and future work in the multilateral context, notably the consideration and development of the normative and operational framework in the GGE. In addition, HCP may consider their operationalization at the national level, notably in the context of complying with international humanitarian law (IHL) rules and satisfying ethical concerns in the context of these emerging technologies.

2. Switzerland holds the view that human control is necessary to ensure IHL-conformity. Such human control can be applied at various stages of the life cycle of an autonomous weapon system (AWS), including the design phase. Switzerland is also of the opinion that the actual decision to deploy an AWS and the assessments and decisions regarding its use in a specific attack remain eminently critical touch points in the human-machine interaction and must be retained within a responsible (military) chain of human command and control with structures and processes that ensure IHL-conform decisions in the use of force, including AWS.

3. Switzerland holds that an AWS would run contrary to guiding principle A and would be unlawful: if 1) the outcomes cannot be reasonably predicted, or; 2) the effects cannot be limited in accordance with IHL or 3) the system otherwise cannot be used in accordance with IHL. In addition, Switzerland is of the view that it is persons, not machines, who must comply with IHL. While certain tasks relevant for IHL-conformity could be facilitated by increasing autonomy, that same technology might increase the demands on a human operator at the moment of the use of the weapon, notably by taking feasible precautions as required by IHL.

4. Notably, it is Switzerland's view that an AWS which would be able to define or modify its mission and its rules of engagement without human validation would run contrary to several guiding principles, including principles A, B and C. Such a system should be neither developed nor engaged.

5. As outlined below with regard to guiding principle C, and in order to ensure and facilitate compliance with IHL, Switzerland is convinced of the need for humans to retain control at various stages of the lifecycle of a weapon system, including in the use of force. We consider these to be key considerations to advance the debate and make recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework.

6. A number of technical and operational measures, including operational constraints regarding tasks, target profiles, time-frame of operation, and scope of movement over an area and operating environment, can be applied before the AWS's use. However, to ensure IHL-compliance and to satisfy ethical concerns, Switzerland stresses the relevance for human control and supports efforts to gain further clarity on the extent to which the characteristics of human control may evolve as technology develops, and what would be the appropriate degree of human involvement, whatever the level of technological maturity.

Switzerland's commentary on guiding principle A

7. As with any other means and method of warfare, the rules on the conduct of hostilities must be respected in all circumstances, whether force is used against persons or objects, whether in offense or in defense. Moreover, the requirement for the full compliance with IHL is not limited to the rules governing the conduct of hostilities. If AWS were to be used in relation to other activities governed by IHL, for instance guarding persons deprived of their liberty, additional specific rules need to be respected. The rules and principles of IHL apply independently of the military technology used; in that sense, IHL has a technologically-neutral approach.

8. While noting potential benefits of autonomy to reduce risks for both civilians and military forces, emerging technologies in the area of lethal autonomous weapons systems also pose various challenges with regard to ensuring compliance with IHL. The predictability

of AWS, contextual awareness, qualitative judgements or potential self-learning capabilities are cases in point. Against this background, Switzerland holds that AWS whose outcomes cannot be reasonably predicted or whose effects cannot be limited as required by IHL or that otherwise cannot be used in accordance with IHL would run contrary to guiding principle A and would therefore be unlawful. These elements imply a significant level of human control.

9. Generally, Switzerland is of the view that it is persons, not machines, who must comply with IHL. While certain tasks relevant for IHL-conformity could be facilitated by increasing autonomy, that same technology might increase the demands on a human operator at the moment of the use of the weapon, notably by taking feasible precautions as required by IHL.

10. Switzerland would see value in the CCW exploring the potential role of constraints in the design and functioning of AWS as well as operational constraints, for instance regarding tasks, target profiles, time-frame of operation, or scope of movement over an area and operating environment as mentioned in its commentary to guiding principle C in contributing to ensure and facilitate compliance with IHL. In addition, ensuring respect for IHL in the context of AWS may require additional or complementary legal or practical measures such as: training of the personnel developing and using AWS, giving and supervising orders and instructions, for instance with regard to operational constraints. The role of legal advisors could become even more relevant as autonomy increases.

Switzerland's commentary on guiding principle B

11. Given that AWS possess no agency or legal personality of their own, individual criminal responsibility focuses on the responsibility of humans that are involved as operators, commanding officers, programmers, engineers, technicians or in other relevant functions. In cases where the deployment of an AWS allegedly results in a serious violation of IHL, States must investigate and, if appropriate, prosecute the suspects.

12. In order to ensure human responsibility for decisions on the use of weapon systems a certain degree of human control must be exerted or embedded at the appropriate stages of the life cycle of the weapon. Human control can be exercised in various ways throughout different phases of the life cycle of a weapon system, and notably in the targeting-cycle. Those who design and procure a system must ensure that the system can be used in accordance with IHL, while those who deploy and employ an AWS must ensure an IHL-compliant use. Those actors must evaluate with particular scrutiny, under what circumstances, and with which parameters and safeguards, a system can be employed in compliance with IHL. As a general assumption, the more significant human involvement in a specific use of an AWS is, the easier it is to assign individual responsibility.

Switzerland's commentary on guiding principle C

13. While different terms have been used to characterize the human-machine interaction, it is largely uncontested that a certain type or level of control is indispensable whenever AWS are to be employed. The key question, when operationalizing principle C, is where and how limits for autonomy must be set, and, given the rapid technological developments, with which control options such limits can be drawn, notably to ensure that IHL is respected in all circumstances, including in unexpected situations.

14. Applying the requirements of lawful use to AWS is complex as many pivotal rules of IHL presume the application of evaluative decisions and value judgements. A key area for further work is to gain clarity on the extent to which the need for human control may evolve as technology develops, and what would be the appropriate degree of human involvement, whatever the level of technological maturity. Likewise, it is important to better understand to what extent the role of the human changes as a new quality of human-machine interaction is developed. In this context, and in accordance with principle K, the CCW is well placed to deepen the understanding of the potential necessary limits of autonomy in weapons systems, taking into account inter alia 1) the type of tasks to be carried out; 2) the complexity of the environment; 3) the complexity of the systems; and, 4) the cognitive abilities and workload

of the human supervisor. The appropriate parameters for the human-machine interaction are very likely to be context-dependent, system-specific and not generically definable.

15. Switzerland sees a number of possible factors that could be considered when assessing the necessary level of control. These include inter alia:

- i. Constraining the targets and tasks of the AWS, for instance by setting a narrow target profile, taking into account the operational environment;
- ii. Imposing temporal and spatial limits on the operation of the AWS, or let human control these parameters, notably in areas where civilians are present.
- iii. Maintaining the ability of human supervision, by using technology (for instance appropriate human-machine interfaces) to support the human cognitive involvement.
- iv. Maintaining the ability to intervene in any AWS operation during the course of an attack, preserving the possibility to deactivate an AWS, or to override the application of force, if necessary.
- v. Integrating fail-safe mechanisms which are triggered when the system operates outside defined mission parameters, or when it malfunctions.
- vi. Integrating "black box" systems able to record information collected by the AWS and allowing for the tracking of the systems actions and decisions.
- vii. Ensuring that self-learning algorithms do not evolve beyond established parameters.
- viii. Ensuring that AWS are fully integrated in military command and control structure.

16. This list of factors (i-viii) is not exhaustive. In accordance with principle K, Switzerland supports further work in the context of the CCW to determine, in more detail, the quality and extent of human control and the possible respective operational constraints.

Switzerland's commentary on guiding principle D

17. Accountability for developing, deploying and using any emerging weapons system can be ensured in various ways. Without prejudice to other forms of liability (e.g. under tort law) the responsibility of states for internationally wrongful acts and criminal responsibility of individuals are of particular importance.

18. States and humans must not escape international responsibility by a process of "delegating" certain tasks to AWS. States must remain legally responsible for violations of IHL as well as all acts committed by persons forming part of its armed forces. As mentioned with regard to guiding principle B individuals must remain responsible under international law for war crimes or other international crimes such as genocide or crimes against humanity when employing AWS. Rules governing omissions as well as the responsibility of the military commanders with respect to their subordinates and other persons under their control may also play an important role when using AWS.

Switzerland's commentary on guiding principle E

19. Switzerland would like to recall the obligation of all States to "respect and ensure respect" for IHL (see common Article 1 to the Geneva Conventions) and the prohibition to use means and methods of warfare in contradiction to IHL. Therefore, an implementation of IHL in good faith requires an assessment whether means and methods of warfare can be used in conformity with IHL prior to their employment in international as well as non-international armed conflicts.

20. As a State party to Additional Protocol I to the Geneva Convention (AP I) Switzerland's is directly bound by article 36 AP I to conduct legal reviews of new weapons. Switzerland's obligation under Art. 36 AP I has been integrated into national legislation. The

relevant ordinance and directives provide for legal review in three stages, requiring a positive declaration of conformity with international law during the initialization, before procurement and before the introduction of a new weapon system into the Armed Forces. This guarantees that no weapon system can be procured without legal clearance. In order to ensure that the competent authority is able to conduct an independent legal review, in Switzerland access is granted to all relevant information, in particular with regard to the military requirements and technical characteristics of the weapon system concerned. It may furthermore require extensive testing of a new weapon system and the involvement of experts to assess potential negative consequences on health or the environment. The predictability of an AWS in different operational environments, its accuracy and potential self-learning capabilities pose particular challenges for the legal review of such weapons. HCPs should discuss how these challenges could be addressed.

Switzerland’s commentary on guiding principle F

21. Irrespective of the level of autonomy involved, the development and/or acquisition of any weapons system by the Swiss Armed Forces goes through a dedicated and standardized process. At each step of this process, the entire life cycle management of the system is considered, including an assessment of the level of physical and non-physical security measures that have to be applied. The key criteria to determine the required physical and cybernetic security levels are the attractiveness of a system for unauthorized actors and the potential consequences of the systems misuse. The degree of autonomy of a system, in this regard, is one among several characteristics of a weapon system relevant when assessing the level of security required.

22. In addition to the security measures, Switzerland supports dialogue on AWS-relevant technology in appropriate export control bodies in order to prevent the illicit proliferation of relevant technologies.

Switzerland’s commentary on guiding principle G

23. In the development, testing and deployment of any new weapon system on behalf or by the Swiss Armed Forces, risk assessment is an integral part of the dedicated and standardized life cycle management process. The risk assessment process factors in both the risks associated with the use of a weapon and the system's intrinsic risks, such as the predictability of a system. It takes inter alia into account 1) the applicable legal norms 2) the type of tasks to be carried out; 3) the complexity of the environment; and 4) the complexity of the systems; and, 4) the cognitive abilities and workload of the human supervisor. Accordingly, the risk assessment shapes not only such elements as the deployment doctrine and training but also the testing regime to ensure required levels of predictability, cybersecurity etc. In this regard, the autonomous functions of a system are thoroughly taken into account in the risk assessment and factored in, when developing appropriate mitigation measures.

Switzerland’s commentary on guiding principle H

24. While emerging technologies in the field of autonomy have the potential to help individuals and states to facilitate compliance with IHL by incorporating international law standards in the design of weapon systems, nothing should be interpreted in a way to relativize guiding principles A, B or C.

Switzerland’s commentary on guiding principle I

25. AWS possess no agency or legal personality of their own; they remain a “tool”.

Switzerland's commentary on guiding principle J

26. Emerging technologies in the field of autonomy are dual-use technologies which have significant potential to advance humanity in various sectors. CCW HCP should make sure that any potential measure it adopts does not hamper peaceful uses of these technologies. In this regard, the inclusion of the private sector, alongside with the academic community, in the CCW discussions is of relevance.

Switzerland's commentary on guiding principle K

27. Against the backdrop of the centrality of principle A, and in the context of the IHL compliance approach which Switzerland has long advocated, the CCW is an appropriate framework to deal with emerging technologies in the area of LAWS. This is particularly the case given the fact that the CCW work aims to strengthen IHL, striking a balance between humanitarian concerns and military necessities. Switzerland also notes that the GGE's broad mandate allows for a comprehensive discussion including ethical and military aspects.

28. Notwithstanding the centrality of the CCW, there are other aspects related to new technologies such as artificial intelligence and robotics which are of relevance for international as well as human security dimensions and which deserve to be addressed in appropriate fora.

United Kingdom of Great Britain and Northern Ireland

Overall context

1. Firstly, the UK's position remains that it has no intention of developing systems that could unilaterally employ lethal force without human involvement (i.e. LAWS). It remains our view that International Humanitarian Law and the existing regulatory framework for the development, procurement and use of weapons systems remains more than sufficient to regulate new capabilities.

2. While many areas of discussion are outstanding, the eleven guiding principles affirmed by the GGE in 2019 represent important areas of international consensus. They provide an excellent basis from which to develop a normative and operational framework to address emerging technologies in the area of LAWS. The challenge is how these can be operationalised by states. The UK offers the following perspective on how this could be best achieved by the GGE, chiefly by using existing work on the lifecycle of a weapon as a framework for the creation and implementation of a compendium of good practice.

An instructive approach

3. The eleven interlinked guiding principles highlight many of the core tenets of the LAWS debate but alone offer limited guidance on how to progress the practical application of them. The activities and processes required to ensure the guiding principles are considered throughout the development, deployment and use of weapon systems need to be articulated and kept in the forefront of our minds.

I. The lifecycle of a weapon system: A framework for operationalising the guiding principles

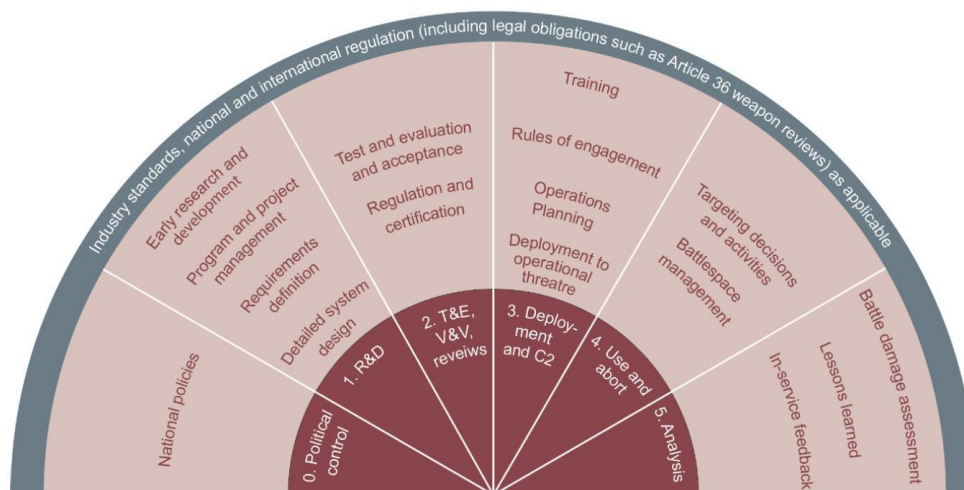
4. Within the report of the 2018 session of the GGE, six phases of a weapon lifecycle were identified:

- political direction in the pre-development;
- research and development;
- testing, evaluation and certification; deployment, training, command and control;
- use and abort; and
- post-use assessment.

5. The UK, among others⁷, built on this approach by describing the types of activities which are already implemented by the UK throughout the lifecycle of a weapon system. This framework is summarised in Figure 1 below.⁸

⁷ For example, the working paper submitted by Australia in 2019 titled "Australia's System of Control and applications for Autonomous Weapon Systems"

⁸ As published: CCW/GGE.1/2018/WP.8 Human Machine Touchpoints: The United Kingdom's perspective on human control over weapon development and targeting cycles. Submitted by the United Kingdom of Great Britain and Northern Ireland



Framework for considering activities throughout the lifecycle of a weapon system.

6. Rather than a strictly linear process this framework describes the various activities which contribute towards the responsible development and use of weapon systems. The process is largely cyclical, creating a loop of continual feedback and improvement. A framework like this helps to illustrate how principles can be translated into practice throughout the various stages of a weapon system lifecycle — it is a method we should continue to employ.

II. Compendium of good practice: Throughout the lifecycle of a weapon

7. As pointed out in the 2019 report of the GGE, exchange of good practice relating to key activities such as legal weapon reviews could be beneficial. We continue to believe this has merit and believe it not only to be an area worthy of focus, but one that should be extended: as well as a purely legal review, the identification and exchange of good practices relating to other key activities may provide added benefit. Activities and processes such as those detailed in figure 1 could form a potential starting point.

How could this help the operationalisation of the guiding principles?

8. A compendium of good practice mapped against a weapon lifecycle would provide a clear framework for the operationalisation of the guiding principles by states. Providing actionable guidance for policy, technical, and military stakeholders could encourage the adoption of national regulations designed to strengthen respect for international law and offer guidance for how this could be achieved throughout the weapon lifecycle.

9. This framework would clarify how the existing requirements of IHL apply to emerging technologies in the area of LAWS. It would help to ensure that human machine interaction takes place, retain human responsibility for decisions and provide accountability for developing, deploying and using systems – therefore ensuring IHL compliance.

10. Whilst the work of the GGE to date has already made significant progress in clarifying responsible behaviours and promoting multilateral collaboration, including valuable input from civil society, such a framework would provide the next step in its implementation at a national level.

11. As part of this, it would be beneficial for parties to share potential case studies of use to help provide further clarification at each stage of the lifecycle.

Stakeholder input: Industry involvement

12. A compendium would require input from multiple stakeholders across disciplines, including governments, industry and civil society. Dialogue between governments and industry is particularly important given the intersection with industry standards and the fact that investment in research and development by private technology companies tends to dwarf that of governments. Given the inclusive nature of the CCW GGE meetings, this will continue to be an appropriate format, but there might be mutual benefit in further promoting the involvement of representatives from private industry.

III. Human-machine interaction

13. Human control is an enabler of military effectiveness and can help avoid undesirable unintended consequences. It is not a simple concept — it can be distributed in nature, affected by context and must be considered across the lifecycle of the whole system. We believe discussions on this are central to the continued success of the group; they should be carried out in tandem with work on a compendium on good practice.

14. We believe this to be one of the most important areas of future focus for the group, and also one that may allow the group to make the most meaningful headway in the discussions on LAWS.

Next steps

15. The UK does not seek to predetermine the exact format of any GGE outputs relating to a normative and operational framework; as the delegation from the United States have pointed out, form must follow substance. However, the aforementioned compendium of good practice is not without precedent. For example, the Montreux Document is a non-legally binding intergovernmental document which recalls existing legal obligations of states and compiles good practices to help states take national measures to implement these. Likewise, the use of Best Practice Guidelines is a key tool used by the Wassenaar Arrangement to establish and encourage common behaviours amongst its members when assessing export licensing matters.

16. The UK is producing a separate working paper which explores what human-machine interaction means in more detail. The paper does not provide concrete answers — further discussion among parties is required first — but rather sets out initial thinking to stimulate debate and inform future discussions within the group.

17. 2020 has presented the GGE, and indeed the world, with an unprecedented situation in which to continue its work. Extensive progress in the area of LAWS has been made over the past few years — the UK wishes to emphasise the importance of the work undertaken by the GGE and believes it is essential we maintain momentum and continue discussions. We must be agile and work together; we look forward to continuing discussions within the group.

United States of America (the)

1. This paper provides U.S. commentaries on the eleven Guiding Principles adopted by the Group of Governmental Experts (GGE) on emerging technologies in the area of lethal autonomous weapons systems (LAWS) and endorsed by High Contracting Parties to the Convention on Certain Conventional Weapons (CCW).⁹

2. The guiding principles serve as a foundation for the GGE's future work and can also guide States in the responsible development and use of emerging technologies in the area of LAWS. The guiding principles are a cohesive framework with each principle reinforcing others.¹⁰

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems.

3. This guiding principle is a foundational one for the GGE's work. Understanding how IHL applies to the potential development and use of lethal autonomous weapons systems is critical for effectively implementing the other guiding principles, including guiding principles (c), (d), (e), and (h).

4. The GGE should build on its successful 2019 work on IHL by further clarifying IHL requirements applicable to the use of emerging technologies in the area of LAWS. What IHL requires often depends on how weapons or tools are being used. Thus, clarifying IHL requirements can be done by considering how militaries have used autonomous functions in weapon systems.

5. In its 2019 working paper, the United States described three general scenarios for the use of autonomous functions in weapon systems: 1) using autonomous functions to effectuate more accurately and reliably a commander or operator's intent to strike a specific target or target group; 2) using autonomous functions to inform a commander or operator's decision-making about what targets he or she intends to strike; 3) using autonomous functions to select and engage specific targets that the commander or operator did not know of when he or she activated the weapon system.

6. The United States proposes the following draft conclusions for the GGE's consideration.

1. Consistent with IHL, autonomous functions may be used to effectuate more accurately and reliably a commander or operator's intent to strike a specific target or target group.
 - a. The addition of autonomous functions, such as the automation of target selection and engagement, to weapon systems can make weapons more precise and accurate in striking military objectives by allowing weapons or munitions to "home in" on targets selected by a human operator.
 - b. If the addition of autonomous functions to a weapon system makes it inherently indiscriminate, i.e., incapable of being used consistent with the

⁹ The United States reaffirms its support for the GGE's relevant conclusions in previous years' reports and the views previously expressed in U.S. working papers to the GGE, which may elaborate on the points in this submission. See Implementing International Humanitarian Law in the Use of Autonomy in Weapon Systems, March 28, 2019, CCW/GGE.1/2019/WP.5; Human-Machine Interaction in the Development, Deployment and Use of Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, August 28, 2019, CCW/GGE.2/2018/WP.4; Humanitarian Benefits of Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, March 28, 2018, CCW/GGE.1/2018/WP.4; Characteristics of Lethal Autonomous Weapons Systems, November 10, 2017, CCW/GGE.1/2017/WP.7; Autonomy in Weapon Systems, November 10, 2017, CCW/GGE.1/2017/WP.6.

¹⁰ For example, further work on elaborating how international humanitarian law (IHL) applies to the potential development and use of lethal autonomous weapons systems (principle (a)), can assist States in conducting legal reviews of new weapons (principle (e)), and such legal reviews also provide an opportunity to consider good practices in human-machine interaction to ensure compliance with IHL (principle (c)), as well as risk assessments and mitigation measures (principle (g)).

principles of distinction and proportionality, then any use of that weapon system would be unlawful.

- c. The addition of autonomous functions to a weapon system can strengthen the implementation of IHL when these functions can be used to reduce the likelihood of harm to civilians and civilian objects.
2. Consistent with IHL, emerging technologies in the area of LAWS may be used to inform decision-making.
 - a. When making a decision governed by IHL, commanders and other decision-makers must make a good faith assessment of the information that is available to them at the time.
 - b. IHL generally does not prohibit commanders and other decision-makers from using tools to aid decision-making in armed conflict. Whether the use of a tool to aid decision-making in armed conflict is consistent with IHL may depend on the nature of the tool, the circumstances of its use, as well the applicable rules and duties under IHL.
 - c. Reliance on a machine assessment to consider a target to be a military objective must be compatible with the decision-maker's duty under IHL to exercise due regard to reduce the risk of harm to civilians and civilian objects. Such compatibility depends on the relevant circumstances ruling at the time, including:
 - i. how accurately and consistently the machine performs in not mischaracterizing civilian objects as military objectives (i.e., false positives);
 - ii. the decision-maker giving the machine assessment appropriate weight relative to other information relevant to whether the target was a military objective (e.g., operational context, intelligence reporting of the threat identified by the system); and the urgency to make a decision (e.g., whether the decision occurred in combat operations or in the face of an imminent threat of an attack, or whether more time could be taken before making a decision).
 3. Consistent with IHL, weapons systems that autonomously select and engage targets may be used where the human operator has not expressly intended to strike a specific target or group of targets when activating the weapon system.
 - a. The commander or operator could act consistently with the principle of distinction by:
 - i. Using weapon systems that autonomously select and engage targets in areas that constitute military objectives; or
 - ii. Using weapon systems that autonomously select and engage targets with the intent of making potential targets constituting military objectives (e.g., potential incoming projectiles in an active protection system) the object of attack, provided that the weapon systems perform with sufficient reliability (e.g., an active protection system consistently selecting and engaging incoming projectiles) to ensure that force is directed against such targets.
 - b. The expected loss of civilian life, injury to civilians, and damage to civilian objects incidental to the employment of weapons systems that autonomously select and engage targets must not be excessive in relation to the concrete and direct military advantage expected to be gained.
 - i. The expected loss of civilian life, injury to civilians and damage to civilian objects is to be informed by all available and relevant information, including information about: (i) the presence of civilians or civilian objects within the area and during the time when the weapon system is expected to be operating; (ii) the performance of the

weapon's autonomous functions in selecting and engaging military objectives; (iii) the risks posed to civilians and civilian objects when the weapon engages military objectives; (iv) the incidence of military objectives that could be engaged by the weapon system in the operational area; and (v) the effectiveness of any precautions taken to reduce the risk of harm to civilians and civilian objects.

- ii. The concrete and direct military advantage expected to be gained is to be informed by all available and relevant information, which may include information about how the employment of the weapon system: (i) threatens military objectives belonging to the adversary; (ii) contributes to the security of the operating forces; (iii) diverts enemy resources and attention; (iv) shapes or diverts the movement of enemy forces; and (v) supports military strategies and operational plans.
- c. Feasible precautions must be taken in use of weapon systems that autonomously select and engage targets to reduce the expected harm to civilians and civilian objects. Such precautions may include:
 - i. Warnings (e.g., to potential civilian air traffic or notices to mariners);
 - ii. Monitoring the operation of the weapon system; and
 - iii. Activation or employment of self-destruct, self-deactivation, or self-neutralization mechanisms (e.g., use of rounds that self-destruct in flight or torpedoes that sink to the bottom if they miss their targets).

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system.

7. This guiding principle reflects the fundamental importance of human responsibility in using machines. The GGE should elaborate on guiding principle (b) by addressing how well-established international legal principles of State and individual responsibility apply to States and persons who use weapon systems with autonomous functions. Such work could inform practical measures to promote accountability for such decisions, addressed under guiding principle (d).

8. The United States proposes the following conclusions for the GGE's consideration.
 1. Under principles of State responsibility, every internationally wrongful act of a State, including such acts involving the use of emerging technologies in the area of LAWS, entails the international responsibility of that State.¹¹
 2. A State remains responsible for all acts committed by persons forming part of its armed forces, including any such use of emerging technologies in the area of LAWS, in accordance with applicable international law.
 3. An individual, including a designer, developer, an official authorizing acquisition or deployment, a commander, or a system operator, is responsible for his or her decisions governed by IHL with regard to emerging technologies in the area of LAWS.
 4. Under applicable international and domestic law, an individual remains responsible for his or her conduct in violation of IHL, including any such violations involving emerging technologies in the area of LAWS. The use of machines, including emerging technologies in the area of LAWS, does not provide a basis for excluding legal responsibility.
 5. The responsibilities of any particular individual in implementing a State or a party to a conflict's obligations under IHL may depend on that person's role in the organization or military operations, including whether that individual has

¹¹ Adapted from Article 1 of the International Law Commission's Draft articles on Responsibility of States for Internationally Wrongful Acts.

the authority to make the decisions and judgments necessary to the performance of that duty under IHL.

6. Under IHL, a decision, including decisions involving emerging technologies in the area of LAWS, must be judged based on the information available to the decision-maker at the time and not on the basis of information that subsequently becomes available.
7. Unintended harm to civilians and other persons protected by IHL from accidents or equipment malfunctions, including those involving emerging technologies in the area of LAWS, is not a violation of IHL as such.
8. States and parties to a conflict have affirmative obligations with respect to the protection of civilians and other classes of persons under IHL, which continue to apply when emerging technologies in the area of LAWS are used. These obligations are to be assessed in light of the general practice of States, including common standards of the military profession in conducting operations.

(c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole.

9. This principle recognizes that human-machine interaction should ensure IHL compliance and as well as the need to consider human-machine interaction comprehensively, across the life cycle of the weapon system. The GGE should elaborate on good practices in human-machine interaction that can strengthen compliance with IHL.

10. The United States proposes the following conclusions on human-machine interaction for the GGE's consideration.¹²

1. Weapons systems based on emerging technologies in the area of LAWS should effectuate the intent of commanders and operators to comply with IHL, in particular, by avoiding unintended engagements and minimizing harm to civilians and civilian objects. This can be effectuated through the following measures:
 - a. Weapons systems based on emerging technologies in the area of LAWS should be engineered to perform as anticipated. This should include verification and validation and testing and evaluation before fielding systems.
 - b. Relevant personnel should properly understand weapons systems based on emerging technologies in the area of LAWS. Training, doctrine, and tactics, techniques, and procedures should be established for the weapon system. Operators should be certified by relevant authorities that they have been trained to operate the weapon system in accordance with applicable rules.
 - c. User interfaces for weapons systems based on emerging technologies in the area of LAWS should be clear in order for operators to make informed and appropriate decisions in engaging targets. In particular, interface between people and machines for autonomous and semi-autonomous weapon systems should: (i) be readily understandable to trained operators; (ii)

¹² These and other U.S. practices to ensure that the use of machines helps effectuate human intent are discussed in greater detail in the U.S. working paper, Human-Machine Interaction in the Development, Deployment and Use of Emerging Technologies in the Area of Lethal Autonomous Weapons Systems. These practices are reflected in U.S. Department of Defense Directive 3000.09, Autonomy in Weapon Systems, November 21, 2012 (updated May 8, 2017), available at www.esd.whs.mil.

provide traceable feedback on system status; and (ii) provide clear procedures for trained operators to activate and deactivate system functions.

(d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control.

11. This guiding principle recognizes that State and individual responsibility must be ensured through the effective implementation of accountability measures, including the military chain of command. Such implementation is an essential part of the responsible use of emerging technologies in the area of LAWS. The GGE should elaborate on guiding principle (d) by articulating good practices to help ensure accountability.

12. The United States proposes the following conclusions on human-machine interaction for the GGE's consideration.

1. The following general practices help ensure accountability in military operations, including operations involving the use of emerging technologies in the area of LAWS:
 - a. Conducting operations under a clear operational chain of command.
 - b. Subjecting members of the armed forces to a system of military law and discipline.
 - c. Establishing and using procedures for the reporting of incidents involving potential violations.
 - d. Conducting assessments, investigations, or other reviews of incidents involving potential violations.
 - e. Disciplinary and punitive measures as appropriate.
2. The following practices with respect to the use of weapons systems, including those based on emerging technologies in the area of LAWS, can promote accountability:
 - a. Rigorous testing of and training on the weapon system, so commanders and operators understand the likely effects of employing the weapon system.
 - b. Establishing procedure and doctrine applicable to the use of the weapon system, which provide standards for commanders and operators on responsible use and under which they can be held accountable under the State's domestic law.
 - c. Using the weapon system in accordance with established training, doctrine, and procedures and refraining from unauthorized uses or modifications of the weapon system.

(e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law.

13. This guiding principle reaffirms the principle in Article 36 of the 1977 Additional Protocol I to the 1949 Geneva Conventions. The United States is not a party to the Additional Protocol I and does not regard Article 36 as reflecting customary law, but engages in robust practice of conducting reviews of the legality of weapons. Such reviews are a good practice to facilitate the implementation of international law applicable to weapons and their use in armed conflict.

14. "Emerging technologies" are novel by definition and thus may be construed as "new" under this principle. The use of autonomy in weapon systems, however, is not necessarily new. There is substantial State practice in using autonomous functions and features in weapon systems for decades.

15. In that light, the United States proposes the following good practices for the legal review of weapons systems based on emerging technologies in the area of LAWS for the GGE's consideration.

1. Legal advisers should be consulted regularly in the development or acquisition process as decisions that could pose legal issues are being made so that legal issues can be identified and more in-depth reviews can be conducted where necessary.
 - a. A weapon system under modification should be reviewed to determine whether the modification poses any legal issues.
 - b. New concepts for the employment of existing weapons should also be reviewed, when such concepts differ significantly from the intended uses that were considered when those systems were previously reviewed.
2. The nature of the legal review and advice should be tailored to the stage of the process of developing or acquiring the weapon.
 - c. Providing legal advice early in the development or acquisition process allows IHL considerations to be taken into account early in the life cycle of the weapon.
 - d. At the end of the development or acquisition process, formal legal opinions can memorialize relevant conclusions and analysis while also being useful to consider in subsequent reviews.
3. The legal review should consider the international law obligations applicable to the State intending to develop or acquire the weapon system, including prohibitions or other restrictions applicable to specific types of weapons, and whether the intended or expected uses of the weapon system can be consistent with those obligations under IHL.
4. The legal review should consider whether the weapon is illegal per se, i.e., whether the use of the weapon is prohibited in all circumstances.
 - e. The legal review should consider whether the weapon is of a nature to cause superfluous injury or unnecessary suffering, or if it is inherently indiscriminate, or is otherwise incapable of being used in accordance with the requirements and principles of IHL.
 - f. Analyzing whether a weapon is “inherently indiscriminate,” should consider whether the weapon is capable of being used in accordance with the principles of distinction and proportionality.
 - g. In considering whether a weapon with new autonomous features or functions is consistent with the prohibitions against weapons calculated to cause superfluous injury or against weapons that are inherently indiscriminate, it may be useful to compare the weapon to existing weapons not falling under these prohibitions.
5. The legal review should advise those developing or acquiring the weapon system or its concepts of employment to consider potential measures to reduce the likelihood that use of the weapon will cause harm to civilians or civilian objects.
6. Persons conducting the legal review should understand the likely effects of employing the weapon in different operational contexts. Such expectation should be produced through realistic system developmental and operational test and evaluation.
7. Bearing in mind national security considerations or commercial restrictions on proprietary information, States should share good practices on weapons reviews or legal reviews of particular weapons where appropriate.

- (f) **When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered.**

16. The responsible development and use of new weapons systems based on emerging technologies in the area of LAWS should consider a variety of issues, including those not addressed specifically by IHL. In U.S. military practice, DoD Directive 3000.09 requires that in order to mitigate the potential consequences of an unintended engagement or loss of control of a system to unauthorized parties, “physical software and hardware will be designed with appropriate [...] safeties, anti-tamper mechanisms, and information assurance [...]”¹³

- (g) **Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems.**

17. Risk assessments and mitigation measures are useful tools to address the uncertainty in the anticipated pace and trajectory of the future development of emerging technologies. Risk assessments allow for a weighing of the benefits of the emerging technologies against potential risks and allow for adjustments to be made as further research and development occurs. Risk assessments can also support the training of commanders and operators by helping them understand the function, capabilities, limitations, and likely effects of using a weapon system.

18. The GGE should build on the work reflected in paragraphs 23(a) and 23(b) of its 2019 report by further cataloging potential risks and mitigation measures that should be considered in the design, development, testing, and deployment of weapons systems based on emerging technologies in the area of LAWS.

- (h) **Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations.**

19. This principle recognizes that emerging technologies in the area of LAWS can be used to provide benefits, such as strengthening the implementation of IHL and reducing the incidence of civilian casualties and other tragic outcomes in armed conflict that may occur even when all parties have complied with the law.

20. This principle should be implemented during legal reviews of new weapons, during the formulation of military strategies and plans, and during the planning and conduct of military operations. To facilitate such consideration and to encourage innovation that furthers the objects and purposes of the CCW, the GGE should develop examples of specific practices that those involved in these activities could consider. For example, the GGE could begin this workstream by cataloging examples of ways in which emerging technologies in the area of LAWS could be used to reduce risks to civilians in military operations, such as by:

1. incorporating autonomous self-destruct, self-deactivation, or self-neutralization mechanisms into munitions;
2. increasing awareness of civilians and civilian objects on the battlefield;
3. improving assessments of the likely effects of military operations;
4. automating target identification, tracking, selection, and engagement to improve speed, precision, and accuracy; and
5. reducing the need for immediate fires in self-defense.¹⁴

¹³ Id. at paragraph 4(a)(2)(a).

¹⁴ These practices are discussed in the U.S. Working Paper, Humanitarian Benefits of Emerging Technologies in the Area of Lethal Autonomous Weapon Systems, March 28, 2018, CCW/GGE.1/2018/WP.4. For a discussion of other potential humanitarian benefits, in addition to reducing the risk of civilian casualties in military operations, see paragraph 15 of the U.S. Working

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized.

21. Anthropomorphizing emerging technologies in the area of LAWS can lead to legal and technical misunderstandings that could be detrimental to the efficacy of potential policy measures. From a technical perspective, anthropomorphizing emerging technologies in the area of LAWS can lead to mis-estimating machine capabilities. From a legal perspective, anthropomorphizing emerging technologies in the area of LAWS can obscure the important point that IHL imposes obligations on States, parties to a conflict, and individuals, rather than machines. “Smart” weapons cannot violate IHL any more than “dumb” weapons can. Similarly, machines are not intervening moral agents, and human beings do not escape responsibility for their decisions by using a weapon with autonomous functions. Anthropomorphizing emerging technologies in the area of LAWS could incorrectly suggest a diminished responsibility of human beings simply by the use of emerging technologies in the area of LAWS.

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies.

22. Technology should not be stigmatized. Autonomy-related technologies, such as artificial intelligence (AI) and machine learning, have remarkable potential to improve the quality of human life with applications such as driverless cars and artificial assistants. The use of autonomy-related technologies can even save lives, for example, by improving the accuracy of medical diagnoses and surgical procedures or by reducing the risk of car accidents. Similarly, the potential for these technologies to save lives in armed conflict warrants close consideration, including potential applications to help uphold IHL as reflected in guiding principle (h). As a result, research and development on autonomy-related technologies should not be restricted based on the rationale that such technologies could be used for weapons systems. Moreover, although the use of technologies for the purpose of violating international law, must be condemned, the use of autonomy-related technologies for defensive or other beneficial purposes should remain unhindered.

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations.

23. The United States strongly supports the CCW GGE as the appropriate multilateral forum for States to address emerging technologies in the area of LAWS because States can use the GGE to engage in a substantive, non-politicized dialogue on IHL issues. The GGE allows States to send technical, legal, policy, and military experts as part of their delegations, submit working papers, and exchange State practice. The CCW GGE is open to all States, includes States with relevant practice, and develops its reports by consensus. Civil society participants can observe the proceedings and participate in the discussions. The High Contracting Parties to the CCW have successfully put this framework to use in their consideration of emerging technologies in the areas of LAWS as reflected in GGE’s substantive reports and the guiding principles.

Paper, Implementing International Humanitarian Law in the Use of Autonomy in Weapon Systems, March 28, 2019, CCW/GGE.1/2019/WP.5.

Venezuela (Bolivarian Republic of)

Introduction

1. The Final Report of the 2019 Meeting of the High Contracting Parties to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (CCW) states that the Group of Governmental Experts (GGE) on emerging technologies in the area of Lethal Autonomous Weapons Systems (LAWS) will conduct its work and adopt its reports by consensus, one of which is to be submitted to the meeting of High Contracting Parties in 2020, and the other submitted to the 2021 Sixth Review Conference.

2. It further states that the GGE is to explore and agree on possible recommendations on options related to emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention, taking into account all proposals (past, present and future) and the agenda items as reflected in paragraph 11 and annex I of the Report. Under each agenda item, the Group shall consider the legal, technological, and military aspects and the interaction between them, and bearing in mind ethical considerations.

3. The Final Report of the High Contracting Parties also states the GGE is to consider:

- the guiding principles, which it may further develop and elaborate,
- the work on the legal, technological and military aspects
- and the conclusions of the Group, as reflected in its reports of 2017, 2018 and 2019.

4. According to the report, the GGE must use these elements as a basis for its consensus recommendations concerning the clarification, consideration, and development of aspects of the normative and operational framework on emerging technologies in the area of lethal autonomous weapons systems.

5. Considering that the Final Report was a negotiated document, which represents the consensus of those of the High Contracting Parties, the elements contained in the mandate that will serve to present consensual recommendations to the Sixth Review Conference, must be treated equally.

6. Similarly, the guiding principles contained in the Report have also been adopted by consensus by the High Contracting Parties. Therefore, a subsequent addition or supplementation should not be allowed outside of the work of the CCW.

7. In the same way, and according to the established mandate, the guiding principles, the work on the legal, military, and technological aspects, and the previous conclusions of the Group, should be oriented to the clarification, consideration, and development of a framework that contains two functions: normative and operational.

On the operationalization of the guiding principles

8. The Bolivarian Republic of Venezuela welcomes the debate regarding the operationalization of the guiding principles as part of the mandate of the GGE and duly recalls that there is work to be done on the legal, technological and military aspects and the conclusions of the Group aimed at the clarification, consideration, and development of a normative framework.

9. The agreement on the guiding principles, as a result of the work during the CCW meetings, is important and useful as a basis for legal regulations, both international and national on those weapons systems. It is of utmost importance that international humanitarian law continues to fully apply to all weapons systems, particularly to the development and use of emerging technologies in the area of lethal autonomous weapons systems. Venezuela deplores the existence of such weapons.

10. In this sense, the Bolivarian Republic of Venezuela believes that the guiding principles and their potential operationalization are not sufficient to satisfy the need for a legally binding instrument that includes prohibitions and regulations regarding emerging technologies in the area of LAWS.

11. The guiding principles are only a good basis for the progress of laws and treaties on the matter, therefore they should not be taken as regulations for their national implementation. The eleven guiding principles are a referential framework to advance in the negotiation of an eventual treaty and could be considered by each State in its national capacity, to develop, complement or create laws that determine its own regulations on the matter.

12. The Bolivarian Republic of Venezuela recalls the Final Document of the Summit of Heads of State and Government of the Non-Aligned Movement (NAM), held in 2019 in Baku, which welcomed the efforts of the Non-Aligned States Parties to the CCW to advance their positions during the meetings of the GGE on LAWS, in particular, to the need for new legally-binding provisions for addressing the humanitarian and international security challenges posed by emerging technologies in the area of LAWS. They agreed that there is an urgent need to pursue a legally-binding instrument on LAWS.

13. Likewise, the Bolivarian Republic of Venezuela recalls the Statements of the Group of NAM on Agenda Items: 7 and 8 for the 2018 and 2019 Meeting of the High Contracting Parties to the CCW, according to which in 2020, NAM looks forward to making progress towards the development of concrete policy recommendations including elements of a legally binding instrument stipulating prohibitions and regulations on LAWS.

14. In light of this background, the Bolivarian Republic of Venezuela would like to present the following comments related to the current mandate of the GGE on LAWS:

Potential challenges posed by emerging technologies in the area of Lethal Autonomous Weapons

- a. All weapons, including fully autonomous weapons or 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.
- b. Lethal autonomous weapons systems pose fundamental challenges to the principles of international humanitarian law, including the principles of distinction and proportionality. If the design of lethal autonomous weapons systems cannot ensure that the parties to a conflict can distinguish at all times between the population and the combatants, and disabled or surrendered combatants, as required by international humanitarian law, then neither can it ensure that these weapons can fully comply with international humanitarian law.
- c. Similarly, in terms of proportionality, the arms race associated with the development of this type of technology indicates that the States possessing this type of technology could have a strategic advantage, particularly against non-possessing States, and could cause excessive damage. In principle, only a human is capable of "human judgment" and of making the contextual and subjective assessments necessary to minimize "human suffering." At the same time, it is clear that a programming error derived from biased programming during the design could cause disproportionate harm.
- d. International law establishes that States are responsible for the actions of their military personnel in the conflict, including for the deployment of weapons that have led to violations of international humanitarian law. It should be prevented that States can argue the nature and possible levels of autonomy of lethal autonomous weapons systems to escape responsibility for decision-making that have resulted in violations of international law, in particular international humanitarian law.

- e. It must be guaranteed that international responsibility for acts that violate international humanitarian law can be ensured for those who design, produce, and/or deploy them, regardless of the forensic difficulties arising from their use.
- f. The provisions on the prevalence of international humanitarian law in the development of LAWS must constitute an ethical framework applicable, without distinction, to all technical aspects of its eventual development, since the responsibility of any intervening actor cannot be attenuated, by State or private actor.
- g. A legally binding instrument that establishes prohibitions and regulations for the design, development, and deployment of lethal autonomous weapons systems is essential to ensure compliance with international humanitarian law in the event of the deployment of these weapons.

Characterization of lethal autonomous weapon systems and the consideration of the human element in the use of lethal force

- a. Much has been discussed in the framework of the GGE's work regarding the nature of lethal autonomous weapons systems. In the opinion of the Bolivarian Republic of Venezuela, a legally binding instrument that establishes prohibitions or regulations to ensure compliance with international humanitarian law could help distinguish between the use of emerging technologies in the area of artificial intelligence for peaceful use and lethal autonomous weapon systems, including those completely autonomous from those semi-autonomous or with critical autonomous functions.
- b. The potential difficulties of attribution of responsibility in the case of malicious design, development, and deployment of these weapons, make a complete prohibition on their use desirable.
- c. Different regulations may be established for the design and development of certain types of semi-autonomous weapons, weapons with some autonomous functions or critical functions, and weapons that rely on artificial intelligence, to ensure the preservation of complete human control over the use of force, such as drones and other types of unmanned weapons, in all phases of design, development, and deployment.
- d. Likewise, negative obligations could be clearly and concretely established to prevent the imposition of unjust restrictions and obstacles to intergovernmental cooperation for development in the field of artificial intelligence. A legally binding instrument can recognize that broad sectors of innovation in artificial intelligence can positively impact public policies in health and education matters.

Possible military applications of related technologies in the context of the GGE

- a. Technological improvements in the field of weaponry, in general, have only served to increase the destructive potential and threat of these weapons. In this context, countries possessing technology in the matter of emerging technologies in the area of lethal autonomous weapons systems must offer models of negative security assurances in favor of countries that do not possess these weapons.
- b. The development of advanced weapons technology currently deployed has not reduced the suffering of civilians or military personnel in conflict. Therefore, there are no statistical indications that allow us to assume that the development of technology-based on artificial intelligence aimed at the development of lethal autonomous systems will reduce the suffering of armed conflict.
- c. In fact, certain types of drones, assisted by artificial intelligence technology functions, have been used and armed in recent years by State or non-State actors, and can nowadays strike deep into national territory, targeting individuals and public infrastructure, including civilian infrastructure, as reported in 2020, by of the Special Rapporteur of the

Human Rights Council on extrajudicial, summary or arbitrary executions (A/HRC/44/38).

Possible options for addressing the humanitarian and international security challenges

15. The Bolivarian Republic of Venezuela considers that the guiding principles, which can be further developed, the work on the legal, technological, and military aspects and the conclusions of the Group, as reflected in its reports of 2017, 2018, and 2019, can serve as the basis for recommendations for the development of aspects of the normative framework, as stated by the mandate of the GGE.

16. The Bolivarian Republic of Venezuela considers that to answer to the challenges mentioned above, the development of aspects for the normative framework can be recommended as the negotiation of a legally binding instrument aimed of prohibitions and regulations on emerging technologies in the area of lethal autonomous weapons systems to ensure compliance with international humanitarian law.

Venezuela (Bolivarian Republic of) on behalf of the Non-Aligned Movement

(Issued as [CCW/GGE.1/2020/WP.5](#))

International Committee of the Red Cross

1. The "Guiding Principles" agreed by the Convention on Certain Conventional Weapons (CCW) Group of Governmental Experts (GGE) on "Emerging Technologies in the Area of Lethal Autonomous Weapons Systems" provide a useful basis for orientating the future work of States towards agreeing an effective "normative and operational framework" to address autonomous weapon systems/
2. This commentary groups the Guiding Principles under three main themes that, in the view of the ICRC, deserve States' focused attention.

1. International humanitarian law limits the development and use of autonomous weapon systems

It was affirmed that international law, in particular the United Nations Charter and International Humanitarian Law (IHL) as well as relevant ethical perspectives, should guide the continued work of the Group. Noting the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to IHL, the following were affirmed, without prejudice to the result of future discussions.

3. The ICRC welcomes States' unequivocal affirmation that both international law and ethical perspectives should guide the work of the GGE. The development and use of autonomous weapon systems is limited by international law, in particular the general rules of IHL governing the choice of means and methods of warfare and the specific treaty and customary rules prohibiting or restricting certain weapons.¹⁵ Additional constraints may derive from ethical considerations, including from the principles of humanity and the dictates of public conscience.¹⁶

(a) International humanitarian law continues to apply fully to all weapons systems, including the potential development and use of lethal autonomous weapons systems

4. IHL regulates the conduct of armed conflict and seeks to limit its effects. It protects people not taking part in hostilities (such as civilians) and those who are no longer doing so (such as wounded or surrendered combatants). During an armed conflict, IHL governs the use of weapons, means and methods of warfare in the conduct of hostilities, including autonomous weapon systems. Outside armed conflict, the use of weapons is primarily governed by international human rights law, which is applicable at all times.
5. In the view of the ICRC, autonomous weapon systems raise challenges for compliance with IHL. The rules on the conduct of hostilities, notably the rules of distinction, proportionality and precautions in attack, already set limits on the use of autonomous weapon systems, although many legal questions require clarification, and ethical concerns may demand limits that go beyond those found in existing law.¹⁷
6. The key question is not whether IHL applies to autonomous weapon systems in armed conflict, but how IHL is applied, that is, how IHL rules are and should be interpreted and implemented in practice, and whether new legally binding rules, policy standards or best practices are needed.¹⁸

¹⁵ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*. Report to the 33rd International Conference of the Red Cross and Red Crescent, October 2019, Section 2 B, pp. 29–31.

¹⁶ CCW/GGE.1/2018/WP.5

¹⁷ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, 2019, op. cit.

¹⁸ ICRC, *States must address concerns raised by autonomous weapons*, Statement to the Meeting of the High Contracting Parties to the CCW, 14 November 2019; ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, 2019, op. cit.; ICRC, *Statement under agenda item 5e*. CCW GGE on LAWS, Geneva, 25–29 March 2019; Boulanin, V., Davison, N., Goussac, N. and Peldán Carlsson, M., *Limits on Autonomy in Weapon Systems*, ICRC & SIPRI, June 2020, Chapter 4, Recommendations 3 & 4.

(e) In accordance with States' obligations under international law, in the study, development, acquisition, or adoption of a new weapon, means or method of warfare, determination must be made whether its employment would, in some or all circumstances, be prohibited by international law

7. States Parties to 1977 Additional Protocol I to the Geneva Conventions have a legal obligation to conduct legal reviews of new weapons.¹⁹ In the ICRC's view, the requirement to carry out legal reviews also flows from the obligation to ensure respect for IHL. Besides these legal requirements, all States have an interest in assessing the lawfulness of new weapons.²⁰ Effective legal reviews are critical to ensuring that a State's armed forces comply with IHL in light of rapid technological developments. However, in the view of the ICRC, they are not sufficient alone to address the concerns raised by autonomous weapon systems given the complex legal and ethical questions involved, which require common understandings at the international level.²¹

8. Implementation of legal reviews of autonomous weapon systems raises practical challenges and questions, especially given the difficulties in foreseeing the likely consequences of use of autonomous weapon systems.²² In conducting reviews, particular attention should be given to measures needed to ensure human control over weapons and the use of force.

(h) Consideration should be given to the use of emerging technologies in the area of lethal autonomous weapons systems in upholding compliance with IHL and other applicable international legal obligations

(f) When developing or acquiring new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, physical security, appropriate non-physical safeguards (including cyber-security against hacking or data spoofing), the risk of acquisition by terrorist groups and the risk of proliferation should be considered

(g) Risk assessments and mitigation measures should be part of the design, development, testing and deployment cycle of emerging technologies in any weapons systems

9. Under IHL, all parties to armed conflict have a legal obligation to respect and ensure respect for IHL. This entails a duty to ensure that all weapons, means and methods of warfare, including autonomous weapon systems, are capable of being used, and are in fact used, in compliance with IHL and with other applicable international legal obligations (Guiding Principle (h)). These obligations, as well as additional obligations for States Parties to specific treaties, also demand consideration in the transfer of weapons (Guiding Principle (f)).

10. Risk assessments and mitigation measures during the design, development, testing and deployment of new weapons may be required to ensure compliance with these legal obligations (Guiding Principle (g)), including as part of obligations to conduct legal reviews of new weapons (Guiding Principle (e)).

2. Human control is central to the legal compliance and ethical acceptability of autonomous weapon systems

(c) Human-machine interaction, which may take various forms and be implemented at various stages of the life cycle of a weapon, should ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with applicable international law, in particular IHL. In determining the quality and extent of human-machine interaction, a range of factors should be considered

¹⁹ ICRC, *A Guide to the Legal Review of New Weapons, Means and Methods of Warfare*, January 2006.

²⁰ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, 2019, op. cit., Section 2.E, pp. 34-35.

²¹ ICRC, *Statement under agenda item 5e, op. cit.*

²² Ibid.

including the operational context, and the characteristics and capabilities of the weapons system as a whole

11. For the ICRC, Guiding Principle (c) — together with Guiding Principles (b) and (d) — reflect the main risks posed by autonomous weapon systems: loss of human control over weapons and the use of force; diffusion, or abdication, of human responsibility for the consequences of their use; and practical challenges in ensuring accountability for violations of international law that may result.

12. Measures pertaining to human control, responsibility and accountability — including but not limited to measures concerning "human-machine interaction" and implemented throughout weapon development and use — are critical to ensuring compliance with applicable international law, in particular IHL, as well as ethical acceptability.²³

13. Based on humanitarian, legal, and ethical considerations, as well as military operational realities, a recent report co-published by the ICRC and SIPRI proposes a combination of three types of control measures on autonomous weapon systems needed to satisfy legal obligations and ethical considerations: 1) controls on weapon parameters; 2) controls on the environment of use; and 3) controls through human-machine interaction.²⁴ These measures should be considered in the use of autonomous weapon systems, as well as in their study, research, development and acquisition (Guiding Principle (e)).²⁵

14. These types of control measures can inform internationally agreed limits on autonomous weapon systems, whether in the form of new legally binding rules, policy standards or best practices:²⁶

15. Controls on weapon parameters can inform limits on types of autonomous weapon systems including the targets they are used against, as well as limits on their duration and geographical scope of operation, and requirements for deactivation and fail-safe mechanisms.

16. Controls on the environment can inform limits on the situations and locations in which autonomous weapon systems may be used, notably, in terms of the presence and density of civilians and civilian objects.

17. Controls through human-machine interaction can inform requirements for human supervision, and ability to intervene and deactivate autonomous weapon systems, and requirements for predictable and transparent functioning.

(b) Human responsibility for decisions on the use of weapons systems must be retained since accountability cannot be transferred to machines. This should be considered across the entire life cycle of the weapons system

(d) Accountability for developing, deploying and using any emerging weapons system in the framework of the CCW must be ensured in accordance with applicable international law, including through the operation of such systems within a responsible chain of human command and control

18. Legal obligations under IHL rules on the conduct of hostilities must be fulfilled by those persons who plan, decide on, and carry out military operations. It is humans, not machines, that comply with and implement these rules, and it is humans who can be held accountable for violations. Whatever the machine, computer program, or weapon system

²³ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, 2019, op. cit.; ICRC, *Statement under agenda item 5a*. CCW GGE on LAWS, Geneva, 25–29 March 2019; ICRC, *Statement under agenda item 5c*, CCW GGE on LAWS, Geneva, 25–29 March 2019; CCW/MSP/2018/WP.3; CCW/GGE.1/2019/WP.7; ICRC, *Ethics and autonomous weapons systems: An ethical basis for human control?*, op. cit.; ICRC, *Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons*, August 2016; ICRC, *Autonomous Weapon Systems: Technical, Military, Legal and Humanitarian Aspects*, March & November 2014.

²⁴ Boulanin, V., Davison, N., Goussac, N. and Peldán Carlsson, M., *Limits on Autonomy in Weapon Systems*, op. cit. Chapter 4, Recommendation 1.

²⁵ Ibid., Chapter 4, Recommendation 5.

²⁶ Ibid., Chapter 4, Recommendation 2.

used, individuals and parties to conflicts remain responsible for their effects.²⁷ Nevertheless, the way in which autonomous weapon systems function — i.e. independently selecting and applying force to targets without human intervention — raises questions about the about the practical possibility of holding parties to conflict and individuals legally accountable for the consequences of their use, including for violations of IHL.²⁸

19. The rules on the conduct of hostilities — notably the rules of distinction, proportionality and precautions in attack — require complex assessments based on the circumstances prevailing at the time of the decision to attack, and during an attack. Commanders or operators must retain a level of human control over weapon systems sufficient to allow them to make context-specific judgments to apply the law in carrying out attacks.²⁹

20. From an ethical perspective, human control is required to preserve human agency and uphold moral responsibility in decisions to use force. This requires a sufficiently direct and close connection to be maintained between the human intent of the user and the eventual consequences of the operation of the weapon system in a specific attack. Weapons, as inanimate objects, do not have moral agency and nor can they meaningfully be held responsible or accountable.³⁰

21. Measures aimed at ensuring human control, responsibility and accountability are outlined under Guiding Principle (c).

3. Towards an effective multilateral response to autonomous weapon systems

(k) The CCW offers an appropriate framework for dealing with the issue of emerging technologies in the area of lethal autonomous weapons systems within the context of the objectives and purposes of the Convention, which seeks to strike a balance between military necessity and humanitarian considerations

22. In the view of the ICRC, the CCW — and the GGE on "Emerging Technologies in the Area of Lethal Autonomous Weapons Systems" — offers an appropriate framework to address the risks posed by autonomous weapon systems falling within its scope. This is without prejudice to consideration of such risks in other relevant fora.

23. In light of humanitarian, legal and ethical concerns, the ICRC reiterates its call to States at the GGE to urgently agree international limits on autonomous weapon systems. Rapid technological advances and military-doctrinal developments in a number of States indicate that the window for preventive action is fast closing.³¹

24. As Guiding Principles (b), (c) and (d) imply, an effective policy response to the risks posed by autonomous weapon systems requires consideration of what "quality and extent" of human control is necessary and how "human responsibility" and "accountability" are ensured. Measures aimed at ensuring human control, responsibility and accountability can inform international limits on autonomous weapon systems.

(i) In crafting potential policy measures, emerging technologies in the area of lethal autonomous weapons systems should not be anthropomorphized

²⁷ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, 2019, *op. cit.*

²⁸ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*. Report to the 32nd International Conference of the Red Cross and Red Crescent, October 2015, Section VII D ii), p. 46.

²⁹ ICRC, *International Humanitarian Law and the Challenges of Contemporary Armed Conflicts*, *op. cit.*

³⁰ ICRC, *Ethics and autonomous weapons systems: An ethical basis for human control?*, *op. cit.*; Boulanin, V., Davison, N., Goussac, N. and Peldán Carlsson, M., *Limits on Autonomy in Weapon Systems*, *op. cit.*, Chapter 2, Section III.

³¹ ICRC, *States must address concerns raised by autonomous weapons*, *op. cit.*; ICRC, *Statement under agenda item 5e*, *op. cit.*

Legal obligations and ethical responsibilities rest with humans. Weapons, as inanimate objects, do not hold such obligations or responsibilities, and it should not be implied that they do (see also Guiding Principle (b)).

(j) Discussions and any potential policy measures taken within the context of the CCW should not hamper progress in or access to peaceful uses of intelligent autonomous technologies

25. Even the strictest measures taken to address the concerns raised by autonomous weapon systems can be crafted so as not to hamper progress in or access to relevant technologies for peaceful purposes. For example, the CCW Protocol IV prohibition of blinding laser weapons has not hampered progress in laser technology, nor have the Biological Weapons Convention or the Chemical Weapons Convention hampered progress in the peaceful uses of biology and chemistry.

Annex IV

Links to complementary events & civil society commentaries

[English only]

<i>Title</i>	<i>Link</i>
UNODA/UNIDIR webinars (26-28 October 2020)	https://meetings.unoda.org/meeting/laws-webinars-2020/
Summary of webinar on Technological Aspects	https://documents.unoda.org/wp-content/uploads/2021/01/Technological-aspects.pdf
Summary of Webinar on Military Aspects	https://documents.unoda.org/wp-content/uploads/2021/01/Military-aspects.pdf
Summary of Webinar on Legal Aspects	https://documents.unoda.org/wp-content/uploads/2021/01/Legal-aspects.pdf
Berlin Forum on Lethal Autonomous Weapons Systems (1-2 April 2020)	https://rethinkingarmscontrol.de/conference-material/ https://undocs.org/CCW/GGE.1/2020/WP.2
Rio Seminar on Autonomous Weapons Systems (20 February 2020)	http://www.funag.gov.br/index.php/en/news/3072-registrations-open-for-the-rio-seminar-on-autonomous-weapons-systems
Civil society commentaries on the guiding principles:	
Campaign to Stop Killer Robots	https://documents.unoda.org/wp-content/uploads/2020/07/20200605-Campaign-to-Stop-Killer-Robots.pdf
International Panel on the Regulation of Autonomous Weapons (iPRAW)	https://documents.unoda.org/wp-content/uploads/2020/09/iPRAW_Commentary_GuidingPrinciples.pdf