Conclusions and Recommendations

A. Existing guiding principles

1. 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 weapon system.

c. 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.

d. 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.

e. 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.

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

g. 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.

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

i. 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.

j. 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.

B. Additional guiding principles

2. The following were also affirmed, without prejudice to the result of future discussions:
a. Human judgement is essential in order to ensure that the potential development and use of emerging technologies in the area of lethal autonomous weapons systems is in compliance with international law, and in particular international humanitarian law.

b. The extent and quality of human-machine interaction in the operation of a weapon system based on emerging technologies in the area of lethal autonomous weapons systems should be informed by a range of factors, such as the operational context, high-level direction and guidance, the characteristics and capabilities of the weapon system, the performance and reliability of specific functions in the weapon system, and how human-machine interaction has been implemented in other parts of the life-cycle of the weapon system.

c. Human-machine interaction may take various forms and may be implemented at various stages of the targeting and life cycles of a weapon. Human-machine interaction must ensure that the potential development and use of emerging technologies in the area of lethal autonomous weapons systems is consistent with applicable international law, in particular international humanitarian law.

d. Adherence to the IHL principles of distinction, proportionality and precautions in attack rely on qualitative judgements based on contextual knowledge that can only be made by humans.

e. It must be ensured that humans and States at all times remain responsible in accordance with applicable international law for their decisions on the development and use of emerging technologies in the area of lethal autonomous weapons systems.

f. It must be ensured that an individual, including a designer, developer, an official authorizing acquisition or deployment, a commander, and/or a system operator can be held responsible for his or her decisions regarding the development, deployment, and use of weapons, including any weapons systems based on emerging technologies in the area of lethal autonomous weapons systems.

g. In order to assess the balance between military necessity and humanitarian considerations related to emerging technologies in the area of lethal autonomous weapons systems, consideration should be given to the possible effects on: regional and global security and stability; thresholds for armed conflicts; and risks of an arms race.

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

3. On the agenda item “An exploration of the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to international humanitarian law” the Group further concluded as follows:

a. The potential development and use of emerging technologies in the area of lethal autonomous weapons systems must be in accordance with applicable international law, in particular international humanitarian law and its principles, including inter alia distinction, proportionality and precautions in attack.

b. International humanitarian law imposes obligations on States, non-State actors and individuals, not machines.

c. International humanitarian law requires that humans, through a responsible chain of command and control, make judgments in the use of force in armed conflict, including the
use of force with weapons systems based on emerging technologies in the area of lethal autonomous weapons systems.

d. In cases not covered by the CCW and its annexed Protocols or by other international agreements, the civilian population and the combatants shall at all times remain as a minimum under the protection and authority of the principles of international law.

e. A potential weapons system based on emerging technologies in the area of lethal autonomous weapons systems may not be used if it is of a nature to cause superfluous injury or unnecessary suffering, or if it is by nature indiscriminate, or is otherwise incapable of being used in accordance with the principles of international humanitarian law.

f. International humanitarian law regulates the conduct of States. Associated legal obligations, including the rules of distinction, proportionality and precautions in attack, apply to the human operators and human commanders who plan, decide on and carry out attacks, including any attacks involving emerging technologies in the area of lethal autonomous weapons systems.

g. Setting operational constraints on systems, regarding tasks, target profiles, time-frame of operation, and scope of movement over an area and operating environment, could increase predictability and thereby assist with compliance with IHL, but, in general, would not alone be sufficient to ensure IHL compliance. A weapon system that is unsupervisable, unpredictable or unconstrainable in time and space would be unlawful.

h. Legal review at the national level of the study, development, acquisition or adoption of a new weapons system can help ensure that all weapons, including potential emerging technologies in the area of lethal autonomous weapons systems, can be used in compliance with international law, including international humanitarian law. States are free to independently determine the mechanism to fulfil this obligation although the exchange of best practices could be beneficial.

i. The legal review of new weapons systems based on emerging technologies in the area of lethal autonomous weapons systems should consider intended or expected uses of the weapon system.

j. Weapons systems under development, or modification, which significantly alters the function of existing weapons systems, must be reviewed to ensure compliance with IHL.

k. Intended uses of weapon systems that differ significantly from the intended uses that were considered when those systems were tested, evaluated, or otherwise reviewed, should be reviewed to ensure compliance with international humanitarian law.

4. Under the same agenda item, the Group recognized the need for further work on the following aspects:

a. Ethical and moral considerations continue to guide the work of the Group, although there are different views on the application of the Martens Clause.

b. Apart from international humanitarian law, there are a range of views on the relevance of other legal regimes, notably International Human Rights Law and International Criminal Law, where applicable.

c. Delegations differed as to whether current international humanitarian law could cope with the challenges arising from LAWS or if further regulations, rules or clarifications were needed.
D. 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

5. On the agenda item “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” the Group further concluded as follows:

a. Autonomy in the detection, selection and engagement of a target, independent of a human operator or commander, is a central characteristic of weapon systems of core interest to the Group.

6. Under the same agenda item, the Group recognized the need for further work on the following aspects:

a. Further work is needed to build understanding of data bias. Algorithm-based programming relevant to emerging technologies in the area of lethal autonomous weapons systems 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.

b. Further consideration is needed on the characteristics of emerging technologies in the area of lethal autonomous weapons systems, including: self-learning and 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 that the use of force is triggered by something the system detects in the environment, other than in a strictly automatic sense, in a way that would not be necessarily foreseen by a human operator or commander.

c. A common understanding of emerging technologies in the area of lethal autonomous weapons systems would contribute to ensuring compliance with the rules of international humanitarian law.

E. 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

7. On the agenda item “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” the Group further concluded as follows:

a. Human responsibility for the use of force can be exercised in various ways including but not limited to through strategic direction in the pre-development stage and across the life-cycle of the weapon system, including: research and development; testing, evaluation, and certification; deployment, training, and command and control; use and abort functions; and post-use assessment.

b. Human involvement at the development stage is not alone sufficient to ensure compliance with international humanitarian law for attacks in armed conflict given the inherently variable and unpredictable nature of real-world operational environments.
8. Under the same agenda item, the Group recognized the need for further work on the following aspects:

a. Further work is required to reach a shared understanding on the necessity of human judgement in the use of force, in particular in the target acquisition and engagement functions, which require human operators and commanders to conduct comprehensive and informed assessments in order to ensure their use of force is consistent with applicable international law.

b. Although there is agreement on the centrality of the human element in the use of force, further work is needed on developing shared understandings of the concept of human control.

c. Further clarification is needed on the human-machine interaction required, including human control over the use of force and its relationship with human judgement, including at different stages of a weapon’s life cycle, in order to secure compliance with IHL in relation to the use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems.

d. Some delegations stressed that a human judgement needs to be reasonably temporally proximate to an attack to remain valid and expressed interest in further exploration of the concept of “reasonably temporally proximate”, which is likely to be context-dependent.

e. There were divergent views on the need for real-time supervision during the targeting and engagement cycle. Some delegations consider that the ability of a weapons system to deliver the effect intended by a human commander or operator could be supported through cumulative interventions in different stages of a weapon system’s life-cycle, which may allow for some autonomous functioning during the targeting cycle. Some delegations called for direct human control, both through design and in use.

f. There was disagreement over whether human control was contingent on an ability to intervene in the operation of a weapon, once activated or launched. Further clarity is needed on the need for intervention, and how it relates to the operational context and the legal assessment.

F. Review of potential military applications of related technologies in the context of the Group’s work

9. On the agenda item “Review of potential military applications of related technologies in the context of the Group’s work” the Group further concluded as follows:

a. The risks of civilian casualties and precautions to help minimize the risk of incidental loss of civilian life, injuries to civilians and damage to civilian objects should be considered. Other types of risks should be considered, as appropriate, including but not limited to the risk of unintended engagements, loss of control of the system to unauthorized parties, risks of proliferation, acquisition by terrorist groups, and potential effects on international peace and security.

b. Mitigation measures can include: rigorous testing of systems, readily understandable human-machine interfaces and controls, training personnel, establishing doctrine and procedures, and circumscribing weapons use through appropriate rules of engagement.

c. Research and development of autonomous technologies should not be restricted based on the sole rationale that such technologies could be used for weapons systems.
d. Given the dual use nature of the underlying technologies in the area of lethal autonomous weapons systems, it is important to promote responsible innovation.

10. Under the same agenda item, the Group recognized the need for further work on the following aspects:

a. Some delegations argued that emerging technologies in the area of lethal autonomous weapons systems could aid the human in complex combat environments, and that testing could provide the system with the predictability and certainty that would allow the human operator to comply with international humanitarian law. Other delegations expressed doubts that in complex operational environments, autonomous such systems would act as expected or be capable of complying with IHL principles, which require human discernment and context-based assessments.

b. There were divergent views on whether autonomy in critical functions challenged the maintenance and attribution of combatant and commander responsibility.

Recommendations

11. The Group recommends that High Contracting Parties, at their 2019 Meeting, formally endorse the additional guiding principles agreed by the Group in 2019, as contained in paragraph 2 above, adding to the existing ones a unified whole of Guiding Principles on Emerging Technologies in the area of Lethal Autonomous Weapons Systems. The Group further recommends that all future work on the issue of emerging technologies in the area of lethal autonomous weapons systems should build, to the extent possible, on the operationalization of these guiding principles.

12. The Group recommends that, under the overall responsibility of the President of the CCW Meeting of High Contracting Parties, States Parties further explore the role that the CCW may play in discussing and agreeing measures to enhance cooperation on the implementation of legal weapons reviews, including through sharing of best practices on reviews involving weapon systems employing emerging technologies in the area of lethal autonomous weapons systems, without prejudice to complementary efforts in other bodies.

13. The Group recommends that High Contracting Parties, at their 2019 Meeting, establish a Working Group to consider a compilation of legal norms and best practices for implementing existing applicable international law, in the context of emerging technologies in the area of lethal autonomous weapons systems and the objectives and purposes of the Convention.

14. The Group of Governmental Experts related to emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons shall meet for a duration of thirty days in 2020 and 2021 in Geneva in accordance with Decision 1 of the Fifth Review Conference of the High Contracting Parties to the Convention (CCW/CONF.V/10), to work toward developing a framework [Political Commitment / Normative Instrument] on emerging technologies in the area of lethal autonomous weapon systems, to prepare and submit for consideration and adoption to High Contracting Parties at Sixth CCW Review Conference in 2021, without prejudice to any future efforts on the topic.