

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

25 September 2019

Original: English

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

Geneva, 25–29 March 2019 and 20–21 August 2019

Item 6 of the provisional agenda

Adoption of the report (second session)

Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems

I. Introduction

1. The 2018 Meeting of 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 Have Indiscriminate Effects (CCW), held in Geneva from 21 to 23 November 2018, decided, as contained in its final document (CCW/MSP/2018/11):

“The Group of Governmental Experts related to emerging technologies in the area of lethal autonomous weapons systems (LAWS) in the context of the objectives and purposes of the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons, established by Decision 1 of the Fifth Review Conference of the High Contracting Parties to the Convention (CCW/CONF.V/10), shall meet for a duration of seven (5+2) days in 2019 in Geneva, consistent with document CCW/CONF.V/2.

The Rules of Procedure of the Meetings of the High Contracting Parties shall apply *mutatis mutandis* to the Group. The Group shall conduct its work and adopt its report by consensus which shall be submitted to the 2019 Meeting of the High Contracting Parties to the Convention. In accordance with the goals of the CCW Sponsorship Programme, the Meeting encouraged the widest possible participation of all High Contracting Parties.

The Group will be chaired by Mr. Ljupčo Jivan Gjorgjinski, Minister Counsellor, Chargé d'affaires a.i. of the former Yugoslav Republic of Macedonia.”

2. The Group of Governmental Experts met from 25 to 29 March and from 20 to 21 August 2019. The Chair organized informal meetings on 15 May, 28 June and 19 August 2019.

II. Organization and work of the Group of Governmental Experts

3. On Monday, 25 March 2019, the session was opened by the Chairperson, Ljupčo Jivan Gjorgjinski of North Macedonia. Michael Møller, Director-General of the United Nations



Office at Geneva delivered a statement on behalf of the Secretary-General of the United Nations.

4. At the same meeting, the Group adopted its agenda¹, as orally amended, as contained in Annex I, confirmed the Rules of Procedure, as adopted by the Fifth Review Conference², and adopted its programme of work³, as orally amended, as contained in Annex II. Peter Kolarov, Political Affairs Officer, UNODA, served as the Secretary of the Group, and was assisted by Amy Dowler, Mélanie Gerber, and Heegyun Jung, Political Affairs Officers, UNODA.

5. The following High Contracting Parties to the Convention participated in the work of the Group: Algeria, Argentina, Australia, Austria, Bangladesh, Belarus, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cuba, Czech Republic, Denmark, Djibouti, Dominican Republic, Ecuador, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Holy See, Honduras, Hungary, India, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kuwait, Lao People's Democratic Republic, Latvia, Lebanon, Lithuania, Luxembourg, Mexico, Mongolia, Montenegro, Morocco, Netherlands, New Zealand, North Macedonia, Norway, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Serbia, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, State of Palestine, Sweden, Switzerland, Turkey, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela (Bolivarian Republic of).

6. The following Signatory State to the Convention participated in the work of the Group: Egypt and Sudan.

7. The following States not party to the Convention participated as observers: Haiti, Iran, Mozambique and Myanmar.

8. The representatives of the European Union, the International Committee of the Red Cross (ICRC) and the United Nations Institute for Disarmament Research (UNIDIR) participated in the work of the Group in accordance with the rules of procedure.

9. The representatives of the following non-governmental organizations participated in the work of the Group: Association of World Citizens, Campaign to Stop Killer Robots [Amnesty International, Article 36, Asociación para Políticas Públicas, Association for Aid and Relief Japan, Center for International Security and Policy, Deutsche Friedensgesellschaft (DFG-VK), Facing Finance, Human Rights Watch, International Committee for Robot Arms Control (ICRAC), Mines Action Canada, Nobel Women's Initiative, Norwegian Peace Association, PAX, Pax Christi International, Pax Christi Ireland, Pax Christi Vlaanderen, Peace Union Finland, Project Ploughshares, Protection, Pugwash Conferences on Science and World Affairs, Rete Italiana per il Disarmo, SafeGround Inc., Seguridad Humana en Latinoamérica y el Caribe (SEHLAC), Soka Gakkai International, Stockholm International Peace Research Institute (SIPRI), Sustainable Peace and Development Organisation (SPADO), Women's International League for Peace and Freedom (WILPF)], Centre for a New American Security (CNAS), ConsciousCoders, Future of Life Institute, ICT4Peace Foundation, Trusted Autonomous Systems Defence CRC and UNHR Geneva.

10. The representatives of the following entities also participated in the work of the Group: Birmingham City University, Cambridge University, Charles University, CNA Center for Autonomy and Artificial Intelligence, Geneva Centre for Security Policy (GCSP), Graduate Institute Geneva, Harvard Law School, Hiroshima Peace Institute, Institute for Peace Research and Security Policy at the University of Hamburg, International Panel on the Regulation of Autonomous Weapons (iPRAW), Meiji University Research Institute for the History of Global Arms Transfer, National University of Ireland (Galway), Royal Danish Defence College, St. Mary's University College Belfast, Takaoka University of Law, Tampere University, Trier University, United States Naval War College, Université Lumière

¹ CCW/GGE.1/2019/1.

² CCW/CONF.V/4.

³ CCW/GGE.1/2019/2.

Lyon 2, University Institute General Gutierrez Mellado, University of New South Wales Canberra at the Australian Defence Force Academy, University of Oxford, University of Portsmouth, University of Queensland, University of St. Gallen, University of the Armed Forces of Germany (UniBW), University Pablo de Olavide (Seville) and Vienna School of International Studies.

11. In accordance with its Programme of work, the Group considered the following agenda items:

- 5 (a) An exploration of the potential challenges posed by emerging technologies in the area of Lethal Autonomous Weapons Systems to International Humanitarian Law;
- 5 (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;
- 5 (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;
- 5 (d) Review of potential military applications of related technologies in the context of the Group's work;
- 5 (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.

12. Without setting a precedent for future meetings and without prejudice to future work of the Group, with the intention to structure the discussion, the Chairperson submitted possible questions, as contained in Annex III. The Chairperson was assisted in his work by Friends of the Chair from Argentina, Australia, Canada, Costa Rica, Estonia, Iraq, Mexico, Pakistan, South Africa, and Sweden.

13. The substantive discussion on agenda items 5 (a) to 5 (e) took place at its plenary meetings on 25 to 29 March. On 20 and 21 August the Group considered its draft final report.

14. The Group considered the documents listed in Annex V. The Group noted with appreciation the contributions of those High Contracting Parties submitting Working Papers, presenting their national policies and positions, and the input of civil society, academia and industry.

15. A summary of the discussions held during the March and August meetings of the Group, prepared under the Chairperson's responsibility and in consultation with High Contracting Parties, is attached as Addendum to this report. The Group noted that this paper had not been agreed and had no status.

III. Conclusions

16. The Group took into consideration the guiding principles affirmed by the Group in 2018, as contained in paragraph 21 of CCW/GGE.1/2018/3, and used the principles as a basis for their work in 2019. In order to further elaborate the guiding principles, the Group considered various potential additional guiding principles, based on its five agenda items, as follows.

Based on discussions on the five agenda items, an additional guiding principle was identified:

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

International Humanitarian Law (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.

17. On the agenda item 5 (a) “An exploration of the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to International Humanitarian Law” the Group concluded as follows:

(a) The potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems must be conducted in accordance with applicable international law, in particular IHL and its requirements and principles, including inter alia distinction, proportionality and precautions in attack;

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

(c) States, parties to armed conflict and individuals remain at all times responsible for adhering to their obligations under applicable international law, including IHL. States must also 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 lethal autonomous weapons systems in accordance with their obligations under IHL;

(d) The IHL requirements and principles including inter alia distinction, proportionality and precautions in attack must be applied through a chain of responsible command and control by the human operators and commanders who use weapons systems based on emerging technologies in the area of lethal autonomous weapons systems;

(e) Human judgement is essential in order to ensure that the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems is in compliance with international law, and in particular IHL;

(f) Compliance with the IHL requirements and principles, including inter alia distinction, proportionality and precautions in attack, in the potential use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems requires inter alia that human beings make certain judgements in good faith based on their assessment of the information available to them at the time;

(g) In cases involving weapons systems based on emerging technologies in the area of lethal autonomous weapons systems 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 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;

(h) A weapons system based on emerging technologies in the area of lethal autonomous weapons systems, must not be used if it 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;

(i) 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 lethal autonomous weapons systems would be prohibited by any rule of international law applicable to that State in all or some circumstances. States are free to independently determine the means to conduct legal reviews although the voluntary exchange of best practices could be beneficial, bearing in mind national security considerations or commercial restrictions on proprietary information.

18. Under the same agenda item, the Group considered a range of aspects, described in detail in the Chair’s summary, including the following aspects that may benefit from additional clarification or review:

(a) International law, in particular the United Nations Charter and IHL, as well as relevant ethical perspectives applicable to the use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, continue to guide the work of the Group;

(b) Further work is needed to build shared understanding on the role of operational constraints regarding tasks, target profiles, time-frame of operation, and scope of movement over an area and operating environment. There was not shared understanding on how constraints and capabilities could reduce the likelihood of causing civilian casualties or damage to civilian objects and thereby assist with implementation of IHL by parties to an armed conflict;

(c) Possible good practices in the conduct of legal reviews, at the national level, of a potential weapons system based on emerging technologies in the area of lethal autonomous weapons systems to determine if its employment, in light of its intended or expected use, would be prohibited by the requirements and principles of IHL in all or some circumstances.

19. On the agenda item 5 (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” the Group concluded as follows:

(a) The role and impacts of autonomous functions in the identification, selection or engagement of a target are among the essential characteristics of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, which is of core interest to the Group;

(b) Identifying and reaching a common understanding among High Contracting Parties on the concepts and characteristics of lethal autonomous weapons systems could aid further consideration of the aspects related to emerging technologies in the area of LAWS.

20. Under the same agenda item, the Group considered a range of aspects, described in detail in the Chair’s summary, including the following aspects that may benefit from additional clarification or review:

(a) Possible bias in the data sets used in algorithm-based programming relevant to emerging technologies in the area of lethal autonomous weapons systems;

(b) Different potential characteristics of emerging technologies in the area of lethal autonomous weapons systems, including: 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.

21. On the agenda item 5 (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” the Group concluded as follows:

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.

22. Under the same agenda item, the Group considered a range of aspects, described in detail in the Chair’s summary, including the following aspects that may benefit from additional clarification or review:

(a) Although there is agreement on the importance of the human element in the use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, further work would be needed to develop shared understandings of this concept and its application.

(b) Further clarification is needed on the type and degree of human-machine interaction required, including elements of control and judgement, in different stages of a weapon’s life cycle, in order to ensure compliance with IHL in relation to the use of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems.

(c) Human involvement at the development stage of a weapon system based on emerging technologies in the area of lethal autonomous weapons systems may not be sufficient to ensure compliance with IHL for attacks in armed conflict given the variable and unpredictable nature of real-world operational environments. Emerging technologies in the area of lethal autonomous weapons systems may be useful for enhancing the implementation of IHL applicable to attacks in armed conflict by a party to conflict given the potential for emerging technologies to reduce human error and to increase precision in attacks.

23. On the agenda item 5 (d) “Review of potential military applications of related technologies in the context of the Group’s work” the Group concluded as follows:

(a) During the design, development, testing and deployment of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems, 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 of 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;

(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. 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.

24. Under the same agenda item, the Group considered a range of aspects, described in detail in the Chair’s summary, including the following aspects that may benefit from additional clarification or review:

(a) Some delegations argued that emerging technologies in the area of lethal autonomous weapons systems could aid the human operator and human commander in complex combat environments, and that a range of precautionary measures, including testing and evaluation of the system, training and established procedures, could allow the use of the system in accordance with IHL. Other delegations argued that in complex operational environments, weapons systems based on emerging technologies in the area of LAWS would not perform tasks as expected or be capable of being used in accordance with IHL principles and requirements, and that human judgement and context-based assessments are required;

(b) Consideration should be given by the Group on Governmental Experts on emerging technologies in the area of lethal autonomous weapons systems to the possible effects of weapons systems based on emerging technologies in the area of lethal autonomous weapons systems on regional and global security and stability, including thresholds for armed conflict, and compliance with IHL.

25. On the agenda item 5 (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” the Group concluded as follows:

(a) In the context of the CCW, delegations raised a diversity of views on potential risks and challenges posed by emerging technologies in the area of lethal autonomous weapons systems including in relation to harm to civilians and combatants in armed conflict in contravention of IHL obligations, exacerbation of regional and international security dilemmas through arms races and the lowering of the threshold for the use of force. Proliferation, acquisition and use by terrorists, vulnerability of such systems to hacking and interference, and the possible undermining of confidence in the civilian uses of related technologies were also raised.

(b) Delegations presented different options to address these potential risks and challenges in the context of the objectives and purposes of the CCW. Their pros and cons were discussed under four categories, including a legally-binding instrument, a political declaration, and clarity on the implementation of existing obligations under international law, in particular IHL.

IV. Recommendations

26. The Group recommends that:

(a) High Contracting Parties, at their 2019 Meeting, endorse the guiding principles affirmed by the Group as contained in Annex IV of this report.

(b) 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 total of [thirty/twenty-five/twenty] days over 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), consistent with CCW/CONF.V/2 and subject to the financial situation of the Convention.

(c) The rules of procedure of the Review Conference shall apply *mutatis mutandis* to the Group. The Group shall 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. The widest possible participation of all High Contracting Parties is to be promoted in accordance with the goals of the CCW Sponsorship Programme.

(d) In this period, the group 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. In its discussions 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. Delegations are encouraged to include legal, technological and military experts.

(e) The Group 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. The Group's recommendations will be reported, as appropriate, for consideration at the 2020 Meeting of High Contracting Parties and 2021 Sixth Review Conference.

V. Adoption of the report

27. On 22 August 2019, the Group considered and adopted its final report, as contained in CCW/GGE.1/2019/CRP.1, as orally amended.

Annex I

Agenda

As adopted by the Group of Governmental Experts on 25 March 2019

1. Opening of the meeting.
2. Adoption of the agenda (first session only).
3. Confirmation of the rules of procedure (first session only).
4. Organization of the work of the Group of Governmental Experts.
5. Focus of work of the Group of Governmental Experts in 2019:
 - (a) An exploration of the potential challenges posed by emerging technologies in the area of Lethal Autonomous Weapons Systems to International Humanitarian Law;
 - (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;
 - (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;
 - (d) Review of potential military applications of related technologies in the context of the Group's work;
 - (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.
6. Adoption of the report (second session).

Annex II

Programme of Work⁴

As adopted by the Group of Governmental Experts on 25 March 2019

Monday, 25 March 2019

10:00 – 13:00

1. Opening of the meeting
2. Adoption of the agenda
3. Confirmation of the rules of procedure
4. Organization of the work of the Group of Governmental Experts
- 5 (d) Review of the potential military applications of related technologies in the context of the Group's work (presentations on experiences from High Contracting Parties invited)

15:00 – 18:00

- 5 (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

Tuesday, 26 March 2019

10:00 – 13:00

- 5 (a) An exploration of the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to international humanitarian law

15:00 – 18:00

- 5 (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

Wednesday, 27 March 2019

10:00 – 13:00

- 5 (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 prejudicing policy outcomes and taking into account past, present and future proposals

15:00 – 18:00

Continuation of any list of speakers that have not been exhausted

Thursday, 28 March 2019

10:00 – 13:00

Continuation of any list of speakers that have not been exhausted

⁴ As reflected in paragraph 13 of the report, the plenary meetings on 20 and 21 August were dedicated to the consideration and adoption of the final report in accordance with agenda item 6.

15:00 – 18:00

Multi-stakeholder facilitated discussion

Friday, 29 March 2019

10:00 – 13:00

A consideration of any emerging elements and commonalities

15:00 – 18:00

Discussion on the way ahead

Annex III

Possible questions for the GGE to explore in 2019

Submitted by the Chairperson

1. On agenda item 5 (a) “An exploration of the potential challenges posed by emerging technologies in the area of lethal autonomous weapons systems to international humanitarian law”
 - Does autonomy in the critical functions of weapons systems challenge the ability of States or parties to a conflict, commanders, and individual combatants to apply IHL principles on the conduct of hostilities (distinction, proportionality, precautions) in carrying out attacks in armed conflict?
 - Does autonomy in the critical functions of weapons systems challenge the maintenance of combatant and commander responsibility for decisions to use force?
 - What is the responsibility of States or parties to a conflict, commanders, and individual combatants in decisions to use force involving autonomous weapons systems, in light of the principles of international law derived from established custom, from the principles of humanity and the dictates of public conscience (Martens Clause)?
 - How can legal reviews of weapons with autonomous functions contribute to compliance with IHL? What are past or potential challenges in conducting weapons reviews of weapons with autonomy in their critical functions, and how can these challenges be addressed?
2. On agenda item 5 (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”
 - Which characteristics of autonomous weapons systems would be important from the point of view of International humanitarian law (IHL) and 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) specifically?
 - Is autonomy an attribute of a weapon system as a whole or should it be attached to different tasks of weapons systems?
 - Is the environment of deployment, specific constraints on time of operation, or scope of movement over an area, important from an IHL/CCW perspective?
 - Is a differentiation between anti-personnel and anti-materiel weapons meaningful from an IHL/CCW perspective?
3. On agenda item 5 (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”
 - Specifically, what type and degree of human involvement (in the form of control, oversight and/or judgement) is required or appropriate when using weapons with autonomy in their critical functions to ensure compliance with IHL?

Including:

 - What is the form and degree, if any, of human supervision – such as the ability to intervene and abort – which, during the operation of a weapon that can autonomously select and attack targets, may be deemed sufficient for compliance with IHL?
 - Is there a level of predictability and reliability that would be required or appropriate in the autonomous functions of such a weapons system, considering the weapon’s foreseeable tasks and operational environment, for

its use to be consistent with IHL? How has the level of predictability and reliability been assessed in practice?

- How do factors such as a weapon's foreseeable tasks, its intended targets (e.g. materiel or personnel), scope of movement and its operational environments (e.g. populated or unpopulated area), affect the type and degree of human involvement required in order to ensure compliance with IHL?
 - Can IHL-compliant human-machine interaction be ensured in a weapons system with autonomy in its critical functions?
4. On agenda item 5 (d) “Review of the potential military applications of related technologies in the context of the Group’s work” (presentations on experiences from High Contracting Parties invited)
- How and to what extent is human involvement in the use of force currently exercised with existing weapons that employ or can employ autonomy in their critical functions, over different stages of their life cycle?
 - How is responsibility ensured for the use of force with existing weapons that employ or can be employed with autonomy in their critical functions? Relevant existing weapons could include types of:
 - Air defence weapon systems with autonomous modes or functions;
 - Missiles with autonomous modes or functions;
 - Active protection weapon systems with autonomous modes or functions;
 - Loitering weapons with autonomous modes or functions;
 - Naval or land mines with autonomous modes or functions;
 - “Sentry” weapons with autonomous modes or functions.
5. On agenda item 5 (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 prejudicing policy outcomes and taking into account past, present and future proposals”
- What are the advantages and disadvantages of the proposed approaches to ensuring compliance with IHL and responsibility for decisions on the use of weapons systems and the use of force?
 - legally binding instrument;
 - political declaration;
 - guidelines, principles or codes of conduct;
 - improving implementation of existing legal requirements, including legal reviews of weapons.
 - Given that these options are not necessarily mutually exclusive, and the common goal of ensuring compliance with IHL and maintaining human responsibility for the use of force, what are possible next steps to be taken by the GGE?
 - How can the GGE build upon the areas of convergence captured in the ‘Possible Guiding Principles’ agreed in 2018? How can those principles be operationalized?

Annex IV

Guiding Principles

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,¹ 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 V

List of documents

CCW/GGE.1/2019/1	Provisional agenda. Submitted by the Chairperson
CCW/GGE.1/2019/2	Provisional Programme of Work. Submitted by the Chairperson
CCW/GGE.1/2019/3	Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems
CCW/GGE.1/2019/3/Add.1	Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems. Addendum
CCW/GGE.1/2019/WP.1	Potential opportunities and limitations of military uses of lethal autonomous weapons systems. Submitted by the Russian federation.
CCW/GGE.1/2019/WP.2/Rev.1	Australia's system of control and applications for autonomous weapon systems. Submitted by Australia
CCW/GGE.1/2019/WP.3	Possible outcome of 2019 Group of Governmental Experts and future actions of international community on Lethal Autonomous Weapons Systems. Submitted by Japan
CCW/GGE.1/2019/WP.4	Food-for-Thought Paper. Submitted by Belgium, Ireland and Luxembourg
CCW/GGE.1/2019/WP.5	Implementing International Humanitarian Law in the Use of Autonomy in Weapon Systems. Submitted by the United States of America
CCW/GGE.1/2019/WP.6	Questionnaire on the Legal Review Mechanisms of New Weapons, Means and Methods of Warfare. Submitted by Argentina
CCW/GGE.1/2019/WP.7	Autonomy, artificial intelligence and robotics: Technical aspects of human control. Submitted by the International Committee of the Red Cross (ICRC).
CCW/GGE.1/2019/INF.1/Rev.1	Revised list of participants
