Chair's summary of the discussion on

Agenda item 6 (a) 9 and 10 April 2018

Agenda item 6 (b) 11 April 2018 and 12 April 2018

Agenda item 6 (c) 12 April 2018

Agenda item 6 (d) 13 April 2018

Agenda item 6 (a)

On Monday, 9 April the Group of Governmental Experts on emerging technologies in the area of lethal autonomous weapons systems (LAWS) commenced the consideration of agenda item 6(a) "Characterisation 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 discussion on agenda item 6(a) was continued during Tuesday, 10 April. States outlined their views and perspectives on the importance and the various aspects pertaining to the characterisation of the systems under consideration.

Delegations exchanged views on different approaches to the characterisation of lethal weapons systems based on emerging technologies related to autonomous intelligent systems in order to promote a common understanding on concepts and characteristics relevant to the objectives and purposes of the CCW. A compilation of views expressed by delegations during the November 2017 session of the GGE and in Working Papers submitted in 2017 and 2018 was circulated as a ready reference. Further, four broad approaches to characterisation were highlighted and served as a reference point during the discussions.

Separative approach

An approach whereby characteristics and concepts not relevant to the objectives and purposes of the CCW are set aside ("via negativa"), while gathering the characteristics and concepts that are definitely relevant to the objectives and purposes of the CCW ("via positiva").

Cumulative approach

An approach whereby categories of characteristics are added to a master list and then concepts and characteristics therein are evaluated against certain technical, legal-humanitarian or political-security criteria to assess their relevance to the objectives and purposes of the CCW. Such categories could include physical performance, targeting performance and other technical characteristics. They could also include characteristics that are related to the human-machine interface, the human-machine relationship or secondary characteristics such as reliability, predictability, subordination to command and control etc.

Accountability approach

An approach, which considers a set of characteristics related to the functions and type of decisions handed over to machines, and which avoids using levels of autonomy and other technical characteristics or categories related to the loss of human control. This approach would depend rather on the context and scenario in which the systems under consideration would be used and would involve a combination of technical and human-interface evaluations centred on accountability of States and humans.

Purpose oriented and effect-based approach

This approach focuses on desirable and undesirable consequences of possible lethal weapons systems based on emerging autonomous intelligent systems and technologies.

Delegations listed comprehensive sets of characteristics that were of interest to the deliberations while reaffirming the applicability of International Humanitarian Law to the systems under consideration. Some delegations noted that the absence of an agreed definition should not prevent the Group from moving forward with the discussions. Others pointed to the lack of common understanding on various issues related to emerging technologies in the area of LAWS and encouraged more effort to be invested in education and deepening the collective understanding.

Delegations suggested that existing weapons systems were not the subject of the discussions, whereas others expressed the view that systems under consideration were already in existence. Likewise, some delegations felt that lethality was an essential characteristic spelt out in the mandate while others felt that the term "lethal" as a characteristic needed to be further examined in the light of the fundamental notion of use of force. Delegations also discussed important questions related to the ability of the machine for self-learning and self-evolution, which could potentially enable the machine to redefine targets. Delegations suggested distinguishing autonomy from semi-autonomy or automation at the outset, or using a broad spectrum of autonomy, with different levels of independence in lethality or the means to be lethal, at the outset. The possibility to interrupt or abort the operation of a system ('stop button') was also discussed as a characteristic. In discussing technical characteristics, delegations underlined the need to apply a human-centric focus in the discussions to focus on the human element in the design and (ultimate) decision-making chain when choosing targets, authorising or using (lethal) force.

It was felt that issues such as lethality, 'stop button', whether LAWS currently exist or not as well as the extent to which self-learning should be a characteristic could be left aside for a later discussion; agreement on each and every characteristic was not essential at the outset and the Group could proceed in a step-by-step manner when characterising the systems under consideration. This was also true for one approach that suggested a distinction between anti-personnel and anti-material systems.

Delegations highlighted that autonomy is a spectrum and that it would be challenging to ascertain at what exact point on the scale could autonomy become problematic. Delegations stressed that autonomy can exist throughout or during parts of the targeting cycle. Accordingly, some semi-autonomous machines can have highly autonomous critical functions while highly autonomous machines can have no autonomy in critical functions. Thus, purely technical criteria were not sufficient in framing a characterization of existing weapons or future weapons and could only serve as a reference point given the fast evolution of emerging technologies. This was also logical given the purpose and scope of the CCW.

Delegations suggested a variety of attributes and interpretations that could be used in characterizing emerging technologies in the area of LAWS. These included:

- A system operating with neither human control after activation nor subordination to the chain of command
- A system capable of understanding higher level intent and direction with the ability to take appropriate action by choosing its course of action without depending on human oversight and control
- A system that once launched or deployed assumes a complex adaptive self-learning mode
- An adaptive system capable of navigating through a complex environment by redefining scenarios and approaches
- A rules-based system able to switch to autonomous mode

Delegations also discussed if the following systems should fall under the mandate of the GGE:

- A system with manual override, self-destruct, or self-deactivate function
- Systems that are technologically advanced but have no autonomy
- Systems with some degree of autonomy like close-in weapons systems which autonomously engage incoming targets based on clearly defined parameters
- A rules-based system that is subject to a clear chain of command and control
- A learning system-that offers options

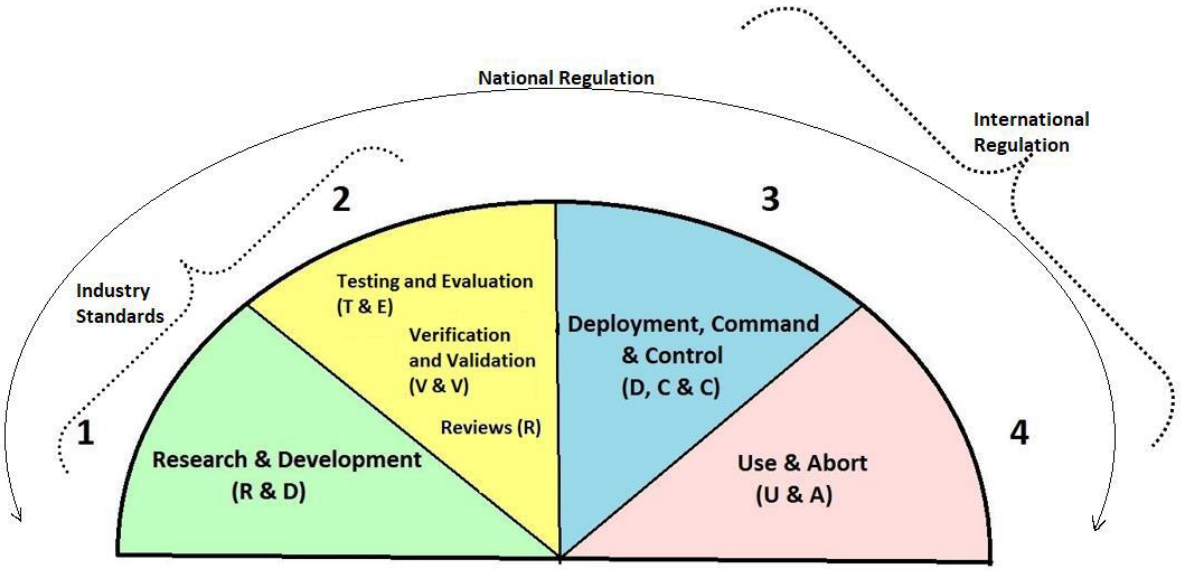
Some delegations emphasised that while selection and engagement of a target is a principal function among other critical functions, autonomy in non-critical functions can be adequately addressed within existing legal frameworks. Others considered it important to cover other current and emerging functional capabilities such as learning, adaptation and adjustment and not only critical functions when discussing the characteristics of LAWS. Delegations discussed if the method and nature of human control over critical functions were the key consideration in judging the weapons systems' compliance with IHL.

Delegations emphasised the importance of reaffirming relevant States' obligations to a legal review of current and new weapon systems. The importance of examining and sharing best practices was also underlined, which included but was not limited to sharing national policies and approaches for assessing and dealing with autonomous technologies; considerations related to the human-element in the use of force; intelligibility and explainability; and adoption of new standards, methods and protocols for testing and validation. In the context of the discussion on

a purpose-oriented approach, some delegations stated that policy should drive definitions and related characteristics, not the other way around.

Agenda item 6 (b)

Under this agenda item, delegations "further considered the human element in the use of lethal force and aspects of human-machine interaction in the development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems". A compilation of views expressed by delegations in the November 2017 session of the GGE and in Working Papers submitted in 2017 and 2018 was circulated as an aide-memoire prior to the discussion. Delegations also had for reference a set of three slides prepared by the Chair: first, on four broad areas of touch points in the human-machine interface (the 'sunrise' slide); second, a list of terms used by different delegations, and third, some qualitative, purpose and practice related considerations with regard to the human-machine interface. The solid line indicates that while national frameworks could cover all areas of the human-machine interface, the extent of international or industry level regulation could be limited.



Graph 1: Human-machine touchpoints in the context of emerging technologies in the area of lethal autonomous weapons systems.

Different terminologies and conceptualisations were brought forward by delegations with regard to human control. One was the importance of maintaining human control over critical functions of lethal autonomous weapons systems. Another was the human element in the different phases of the lifecycle of a weapon system and the level and quality of human control that can be applied at each stage.

Regardless of the approach, delegations reaffirmed the essential importance of human control, supervision, oversight or judgement in the use of lethal force. It was pointed out that while terms such as human control did not create an obligation under IHL, their use could be derived from the requirement for compliance with IHL in the application of lethal force.

Using the 'sunrise' slide of the various touch points in the human-machine interface, delegations stated that human control, supervision, oversight or judgement could be exerted in varied forms and at different times in the following phases: first, in the research and development phase; second, at the stage of testing and evaluation, verification and validation, and reviews; third, the deployment, command and control stage; and fourth, the use and abort stage. Some delegations mentioned additional stages, such as a stage preceding the first one, consisting of national policies and regulations with regard to weapons development or the actual decision to procure weapons, or a stage after the fourth related to evaluation and assessment of use. While there was some merit in looking at these touch-points separately, it was pointed out that the different stages could be threaded through with the notion of accountability. Delegations also called for elaboration of the human-machine interface in order to balance the weaknesses of one with the relative strengths of the other as well as to maintain the human as the essential element in the man-machine team, with overall responsibility for coordination and decision-making.

Delegations noted that human control is already exerted in the research and development phase, which could possibly include weapons reviews. In the research and development phase, teams of software developers will jointly create algorithms, technical experts will "train" the software and engineers will be responsible for the hardware and the integration of the software. Hardware and software design must allow an operator to actually exercise control during the operation of the system, through specific instruments in the human-machine interface and relevant procedures programmed into the system's processes to enable human input and intervention.

Delegations highlighted the necessity to demonstrate that weapons systems have the capacity to be used in accordance with IHL. Weapons system must possess the capability of distinction and proportionality. Training of armed forces to ensure the ability to use a given system in compliance with international law, specifically international humanitarian law, was also important. The importance of legal weapons reviews under Article 36 of Protocol I to the Geneva Conventions was reiterated by delegations.

In the context of deployment and command and control, delegations underlined the need for a system to maintain the double principle of command and subordination. Subordination means that the framing, re-definition and adjustment of a weapons system's mission needs to be done by humans. Concrete decisions related to the 'when and where' of the use of lethal force need to be taken by humans. It was added that, communication links, even if intermittent, must be maintained – through a variety of means - between the chain of command and the weapons system, in order to maintain sufficient control and allow humans to take ultimate decisions regarding the use of lethal force.

In context of the deployment and use of a weapons system in an armed conflict, delegations noted that military personnel activate the weapons systems and potentially monitor their functioning. This would require that the operator know the characteristics of the weapons system, is assured that they are appropriate to the environment in which it would be deployed and has sufficient and reliable information on them in order to make conscious decisions and ensure legal compliance. It was also noted that control over use encompasses the procedural requirements to maintain control over the systems during planning, tasking and operation in a two-step approach: the ability to understand the situation and its context, for e.g. when battle space situations change or during malfunctions, and the option to appropriately intervene if necessary by overriding the system or manipulating the machine either at all steps of the targeting cycle, or at least during the target selection and engagement. It was also expressed that machines cannot simply be programmed to comply with IHL, therefore positive measures are necessary to prevent indiscriminate action and maiming by LAWS caused by breakaway of human control. To develop such measures, the concepts of meaningful human control and human judgment need to be further elaborated and clarified.

Delegations mentioned that an autonomous system must not acquire the capacity to repurpose itself automatically and repeatedly, and the human operator must maintain the capacity to intervene as is the case in current civilian applications. Further, human control over a machine must be adapted to the specific sets of tasks and the environment in which a system is operating and must allow the human to make meaningful decisions that comply with IHL and other requirements or to disengage the system if required. Several clarifications on how to describe the extent of human interaction with LAWS were suggested, such as substantive, meaningful, appropriate or sufficient human control. Delegations also suggested a minimum level of or minimum indispensable extent of human control.

Delegations stated that post- use, it is necessary to have the possibility to establish accountability. The accountability should be the same as for any other weapons and include aspects of record-ability, audit-ability or explainability. Reliability, predictability and trust were mentioned as other qualitative aspects of control.

The discussions benefited from presentations by delegations of real-world examples. Delegations discussed an existing defensive weapon system with the capability of countering rocket, artillery and mortar threats. The case study served as an example of a weapon system whose operations involve a mix of human decision-making and automation. High levels of automation and some autonomous functions allow the system to operate at the necessary speed, while human operator oversight and inputs assures the safety of the operation and allows for intervention if necessary. The presentation provided information on why and how the weapon system was developed, how it functioned, and whether it has worked as intended. The presentation was made with the intention to increase the understanding in the GGE of how autonomy in various functions can enhance the ability of weapons to serve their purposes while also respecting international humanitarian law.

Delegations also discussed an example of a weapon systems under development whose operations would lead to greater compliance with IHL. This system, an underwater autonomous vessel equipped with a sonar, ship registry data, and torpedoes would be able to recognise and

differentiate between civilian and military vessels based on the input from the sonar system and comparison of the input with the onboard ship registry. In case a civilian vessel is detected, the torpedos would not be launched or would be diverted.

During discussions on agenda time 6 (b) the following terms were listed non-exhaustively by the Chair for further discussion.

(Maintaining) (Ensuring) (Exerting) (Preserving)	(Substantive) (Meaningful) (Appropriate) (Sufficient) (Minimum level of) (Minimum indispensable extent of)	Human	(Participation) (Involvement) (Responsibility) (Supervision) (Validation) (Control) (Judgment) (Decision)

It was also stated that the GGE could usefully focus at its future meetings on practice related considerations, including the feasibility of some measures of human control, supervision or judgment, keeping in mind qualitative requirements such as reliability, predictability and explainability or auditability.

Agenda Item 6 (c)

The Expert Panel Discussion under agenda item 6 (c) on "Review of Potential military applications of related technologies in the context of Group's work" held on April 12, 2018 brought together five independent experts giving due consideration to equitable geographical representation and gender balance.

- Professor Mary Cummings, one of US Navy's first female fighter pilots and currently professor in Duke University, Fellow of AIAA and Co-Chair of WEF's Council on Artificial Intelligence and Robotics;
- Professor Dominique Lambert, University of Namur in Belgium, member of Royal Belgian Academy and International Academy for Philosophy of Science;
- Professor Viacheslev Pshikhopov, Director of R&D Institute of Robotics and Control Systems of Southern Federal University and Head of Robotics and Intelligent Systems Laboratory of Russia;
- Professor Pascale Fung, Director of the Centre for AI Research, Hong Kong University of Science and Technology, IEEE fellow, ISCA fellow and expert of the WEF Global Future Council on AI and Robotics; and
- Professor Anthony Gillespie, Visiting Professor at University College London, Fellow of the Royal Academy of Engineering and former official at DSTL, the scientific arm of the UK MoD.

The Chair facilitated the discussions by posing specific questions, as follows:

- What are the emerging technologies in the area of intelligent autonomous systems most likely to be applied in the military domain? Out of these, which are likely to be deployed early on the battlefield? Are there some specific domains (maritime, for example) where this is more likely?
- What could be the pros and cons of different approaches to characterizing emerging technologies in the area of lethal autonomous weapons systems? Note: Tech or capability centric approaches, human control and/or supervision centric approaches, or other.
- What is the best way to characterize these technologies in your view? What concepts and characteristics should be captured in order to promote common understandings on what they are? What are the touchpoints in the human-machine interface that should be of interest to the Group in studying emerging technologies in the area of lethal autonomous weapons systems? Of these, which is/are the most critical?
- Are there situations in which complete loss of human control/supervision/judgment is acceptable/desirable? If yes/no, why?
- Does the technology itself place certain limits on human control/supervision/judgment? Do collaborative systems (Human-Machine Teaming) bring something different to the table in terms of exercising human control/supervision/judgment?

During the interactive dialogue, delegations posed a further number of questions and comments as given below:

- In view of the difficulty of certifying autonomous systems (*as mentioned by Prof. Cummins*), would it be still possible to conduct legal reviews in accordance with the Article 36?
- Is it the testing or lack of standards that is of concern when it comes to inability to certify LAWS?
- Can existing technologies distinguish between combatants and civilians? How are these technologies going to affect civilian populations and their human rights? Whether such systems could start a new arms race?
- What is the difference between accountability and responsibility and which is more important in our discussion? What would be the fundamental limitations in human involvement in operative situations for the decision to use firepower? Is it ultimately a technical question? (*in the context of Prof. Lambert's point about the centrality of the human element*)?
- Are we right to talk about machine decision-making or are they responding algorithmically to set inputs and have no agency of their own? Does complexity of the process make any difference and why?
- How do we see ethics in the context of programming or systems design? Would it be ethically sound to pre-program the system in the assembly line?
- How can we ensure meaningful human control over swarm tactics (*in light of Prof. Pshikhopov's point about the logic of handing over motion control to machines*)?

- Military is adapting civilian technology. There needs to be accountability of those in the military that adapt civilian technology to military applications to avoid problems stemming from system malfunction. What are the error rates currently encountered?
- What is the difference between automation and autonomy and whether a highly automated system such as a cruise missile could be considered as an autonomous weapon in the future?
- What are the best measures of universal application to keep technologies from being misused for malicious purposes (*in the context of Prof. Fung's point about AI education*)?
- The black box nature of current AI algorithms is concerning. Would it change our view if those algorithms/AI were able to explain themselves?
- Whether incorporating 'success criteria' (*as mentioned by Prof. Gillespie*) into the early development process of the system would be a way to ensure that LAWS can be deployed in accordance with Article 36?
- Whether a self-programming/learning LAWS needs to go through a review each time it is used?
- Which are the other sectors which lead in terms of good examples to better optimise human-machine collaboration in decision making?

In her remarks, Prof. Cummings spoke of the three core functions in weapons release in the military – the decider, the executor and the validator. In the case of drones, there was a human decider, a robotic executor and a human validator. In the case of LAWS, the validator would be a computer. In the next 5-15 years, technology in the battlefield would move to co-operative control with multiple vehicles coordinating together, sharing information and using computer vision for target identification and validation. She expressed concern about the lack of knowledge among engineers on the subject as well as the challenges concerning certification of LAWS for both civilian and military uses. It is the civilian world that currently has dominance over AI, which is the reason why the military establishments are seeking help from multinational companies to develop algorithms. She mentioned driverless cars as the most lethal robot at present. She highlighted the importance of drone warfare, which takes the human out of the stressful environment who can then take better decisions. Due to the innate neuro-muscular lag of humans to perceive and act upon a situation, she said that LAWS would be far more discriminatory provided existing computer perception issues were sorted out. On human-machine teaming, she said that the ideal system in the battlefield would be the one that could strongly leverage the human-machine team. The Chair noted that Prof Cummings remarks had reminded us why testing and validation was a separate touchpoint, as it poses different types of problems.

Prof. Lambert noted that from the viewpoint of ethics, the question of responsibility is crucial. Ultimately, it is the human being who would have to take responsibility for his or her actions. A machine or artificial system cannot be held accountable or penalized for its actions. He also spoke about the limits to the algorithmic approach in problem solving. He said that even if we were able to introduce an ethical component into algorithms, it may be able to generate legal databases and provide information that could assist in legal and ethical decisions but it would not be able to replace the role of say a judge who actually makes a ruling. There is a need to

draw a distinction between assistance in decision making and taking a decision itself. One cannot ignore the interpretation aspect which comes into play in different scenarios. Ethical decisions cannot be replaced by formal processes. The Chair noted that the tendency of humans to give more responsibility to machines in collaborative systems could be an important point to include in future discussions.

Prof. Pshikhopov showed some slides, including one taking the example of the anti-ship P-700 Granit from the 1980's to underline that decision making through intelligent technology where you have group control is an effective approach. At the same time, he acknowledged the difficulty in having an equivalent number of operators when given a group of weapons systems. He pointed out that in terms of motion control, there are limits for human intervention. He also spoke of the disadvantages of the existing control methods with a human operator, pointing out that human error causes 10 per cent of total losses in unmanned systems. He highlighted the benefits of using LAWS by introducing an example from the US showing that intelligence technology allows identification of mobile objects with lower error level than when humans carry out the same task. He posed a question - what would be a better choice from the point of IHL – to let the human operator take the wrong decision and let people die or to use smart LAWS with much less casualties? In response to a question about apportioning blame, he said that war was always inhumane and if it were to happen then diplomats should also take the blame, and not just engineers, researchers or the military service.

Prof. Fung said that existing and emerging AI-based technologies continue to be funded by militaries for several operations and some have been adapted to civilian uses including for speech recognition, autonomous flight, facial and object recognition. She pointed out that rules-based systems are more susceptible to hacking and that machine learning allows the systems to become fully autonomous by optimizing functions such as minimal harm and risk. She highlighted the current trend away from the rules-based systems to machine learning based systems in the civilian sector. For the military, a hybrid approach could be a valid option. She expressed concern over the black box nature of such decision-making algorithms as well as their scalability. Machine learning could be used to reinforce proportionality, necessity and discrimination. She pointed to the need of cross-cutting education and STEM training for ethicists, doctors, lawyers, philosophers and humanists, as well as experience sharing across different cultures.

Prof. Gillespie's remarks referred to technologies, capabilities, competence and authority. He spoke of targeting functions taking the example of Observe, Orient, Decide and Act (OODA) as a sequence of multiple post-task decisions. He pointed out that there must be success-based criteria for each task, probably based on Rules of Engagement (RoE) to ensure operation within bounds set by humans. In his view, it should be possible to define the technical competence or authority level for machine decisions. He spoke about the qualitative aspects of the human machine interface, trust issues between man and machine, separation of decision making and reliability. He pointed to the importance of training of operators so that they are aware of the limits of behaviour of the automated decision-making system which is under their command. It is imperative for the human to trust the operative capability and reliability of the machine. He added that IHL sets a much higher threshold than IHRL and other commercial

considerations. The difference between military and civilian systems is that the former will always be a part of a command and control chain.

Agenda item 6 (d)

On Friday, 13 April the Group of Governmental Experts commenced the consideration of agenda item 6(d) on "*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"*.

The Chair's introductory remarks on 6 (d) underscored the political importance of the agenda item, recalled previous discussions particularly on the international security and humanitarian concerns raised by emerging technologies in the area of lethal autonomous weapons systems and raised the following questions with regard to options for addressing these concerns:

- Are existing international laws flexible enough and comprehensive enough to capture the concerns with regard to emerging technologies in the area of lethal autonomous weapons systems and the policy responses thereto? If so, how do we update the common understandings on their implementation given the unique challenges posed by lethal weapon systems with autonomous functional capabilities?
- Or, is new law needed?
- Or, should we seek to define codes of conduct and CBMs/exchange of best practices that are politically binding?
- Then again, is it possible that the issue needs to be matured further and common understandings expanded before considering a specific policy response?
- Is there some option in between or around?
- How can we learn from other governance responses, say at the national level or by industry?

Delegations reiterated the need to address various international security-related and humanitarian challenges arising from emerging technologies in the area of LAWS in the context of the objectives and purposes of the CCW. Among the security related challenges, the possibility of a new arms race, the danger of proliferation to non-state actors, lowering of the threshold for the use of force, cyber-attacks and hacking and spoofing of network-centric weapon systems were mentioned. In addition, the potential detrimental effects on global and regional security and stability where highlighted.

With regard to humanitarian challenges the following issues were raised: compliance with international humanitarian law, possible gaps in legal and political responsibility and accountability and ethical and moral questions raised by increased machine autonomy in the use of lethal force. Delegations also stressed the need to further assess possible humanitarian and military values or benefits of LAWS as opposed to risks. It was also stressed that any

possible regulation should refrain from restricting the application of new technologies in the civilian sector.

Some delegations advocated the establishment of transparency and confidence building measures (CBM) through clearly outlined and harmonized legal review weapons processes as a means to prevent the acceleration of a new arms race and proliferation to non-state actors and terrorist groups. It was further suggested that relevant science and commerce communities should be included in any transparency and CBM efforts to prevent the potential leak of newly developed technologies from the civilian sector to illegitimate actors. Support was expressed for the harmonization of legal weapons review processes and the elaboration of internationally agreed norms and standards. It was suggested that a technical comparative analysis of comprehensive weapons review mechanisms on development and procurement of new weapons could be undertaken, which would help to identify shortcomings and potential solutions. This could also result in a compendium of good national practice on weapons review and review of new methods of warfare and contribute towards establishing transparency and information exchange measures and cooperative technical analysis arrangements among States. The idea raised under agenda item 6 (c) that success and failure criteria could be programmed into autonomous weapons systems, and that these should be rigorously tested in the testing phase, was mentioned in this regard. The human control element was suggested as a necessary design requirement for all upcoming and future weapons developments. The discussion also touched on the feasibility of Article 36 reviews being applied in every stage of the life cycle of a weapon. There was a call for greater technical expertise, such as establishing technical bodies or expert groups, to follow the development of emerging technologies, serve as early warning mechanisms.

In the above context, some delegations mentioned that existing international law, in particular international humanitarian law, is sufficient. Delegations also reaffirmed that the regime of international responsibility and accountability for the use of lethal force in armed conflict fully applies to LAWS and that individuals could be held accountable under applicable provisions at all stages of weapons development and deployment.

Other delegations mentioned that new legally-binding provisions were necessary for addressing the humanitarian and international security challenges posed by emerging technologies in the area of LAWS. Such provisions could encompass measures mentioned above and possible additional measures including prohibitions and restrictions of the type already seen in the context of the objectives and purposes of the CCW.

Some delegations supported the 2017 proposal to establish a political declaration, which would affirm *inter alia* that humans should be responsible for a) making final decisions with regard to lethal force and b) maintaining control over autonomous weapons systems, without prejudice to policy outcomes. This could be followed by the development of codes of conduct and further confidence building measures. A technology review functionality was proposed as part of such an approach. This could serve a lighthouse function on relevant developments in emerging technologies in the area of LAWS. Some delegations, citing the possible inadequacy of non-binding approaches in the context of LAWS, viewed a political declaration as an interim step

prior to the conclusion of a legally binding instrument, say in the form of a new protocol to the CCW. A moratorium on the development of LAWS was also suggested.

Some delegations underlined the need to further develop understanding of the subject within the context of the GGE's mandate before considering a particular option.

Delegations commended the discussions which had taken place during the week and the progress made in terms of reaching a greater understanding of the subject matter in general and the notions of the human element and of accountability in the use of force in particular. The interactive discussion on characterization, human-machine interface and military applications of relevant technologies had also helped underscore areas of convergence, such as the applicability of IHL, while clarifying areas that required further work. Delegations welcomed the contributions and involvement of the civil society in the process and expressed appreciation for the contribution to the discussion made by the ICRC.

The Chair summed up the discussion and underlined the need for further deepening the engagement in August. Informal consultations in the inter-sessional period would be useful as would be possible track 2 or track 1.5 side-events on specific subjects or options. Regardless of the option eventually chosen, there were some common building blocks, as identified, say, in three of the agenda points for the GGE, and the human element in the use of force regardless of how it is worded has emerged as a central consideration.

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