

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

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**2015 Session****Geneva, 12–13 November 2015**

Item 8 of the provisional agenda

**Lethal autonomous weapons systems**

**Report of the 2015 Informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS)**

**Submitted by the Chairperson of the Informal Meeting of Experts**

1. The 2014 Meeting of the High Contracting Parties to the Convention held on 13 and 14 November 2014 in Geneva decided, as contained in paragraph 36 of its final report (CCW/MSP/2014/9), “to convene under the overall responsibility of the Chairperson an informal meeting of experts of up to five days during the week of 13 to 17 April 2015 to discuss the questions related to emerging technologies in the area of lethal autonomous weapons systems, in the context of the objectives and purposes of the Convention. The Chair of the Meeting of Experts will, under his or her own responsibility, submit a report to the 2015 Meeting of the High Contracting Parties to the Convention, objectively reflecting the discussions held.” Mr. Michael Biontino, Ambassador of Germany, served as the Chairperson of the Meeting of Experts.

2. The following High Contracting Parties to the Convention participated in the work of the meeting: Albania, Argentina, Australia, Austria, Belarus, Bolivia (Plurinational State of), Bosnia and Herzegovina, Brazil, Bulgaria, Canada, Chile, China, Colombia, Croatia, Cuba, Cyprus, Czech Republic, Ecuador, El Salvador, Estonia, Finland, France, Georgia, Germany, Greece, Guatemala, Holy See, Honduras, Hungary, India, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kuwait, Lao People’s Democratic Republic, Latvia, Lithuania, Madagascar, Mexico, Mongolia, Morocco, Netherlands, New Zealand, Norway, Pakistan, Philippines, Poland, Portugal, Qatar, Republic of Korea, Republic of Moldova, Russian Federation, Saudi Arabia, Serbia, Sierra Leone, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, State of Palestine, Sweden, Switzerland, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Venezuela (Bolivarian Republic of) and Zambia.

3. The following Signatory State to the Convention participated in the work of the meeting: Egypt.

4. The following States not parties to the Convention participated as observers: Algeria, Brunei, Darussalam, Cote d’Ivoire, Ghana, Indonesia, Lebanon, Libya, Malaysia, Mozambique, Myanmar, Singapore, Thailand and Yemen.

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5. The representatives of the United Nations Institute for Disarmament Research (UNIDIR), United Nations Interregional Crime and Justice Research Institute (UNICRI), United Nations Office of Disarmament Affairs (UNODA), European Union, International Committee of the Red Cross (ICRC) and Geneva International Centre for Humanitarian Demining (GICHD) participated in the work of the meeting.

6. The representatives of the following non-governmental organizations participated in the work of the meeting: Basel Peace Office, Campaign to Stop Killer Robots [Amnesty International, Article 36, Facing Finance, Human Rights Watch, Seguridad Humana en Latino América y el Caribe (SEHLAC), International Committee for Robot Arms Control (ICRAC), Mines Action Canada, Nobel Women's Initiative, Norwegian Peace Association, PAX, Pax Christi Ireland, Protection, Women's International League for Peace and Freedom (WILPF)], Centre for a New American Security, International Campaign to Ban Landmines–Cluster Munition Coalition (ICBL–CMC), and World Council of Churches.

7. The representatives of the following entities also participated in the work of the meeting: Brigham Young University Law School; Centre for Land Warfare Studies; Columbia Law School; European University Institute; Geneva Academy of International Humanitarian Law and Human Rights (ADH); Geneva Centre for Security Policy; Graduate Institute of International and Development Studies; Josef Korbel School of International Studies, University of Denver; National University of Ireland; Peace Research Institute Frankfurt (PRIF); Stockholm International Peace Research Institute (SIPRI); The Harvard Sussex Program (SPRU) University of Sussex; Université de Genève; University of California; University of Central Lancashire; University of Strasbourg and University of Valenciennes.

8. On Tuesday, 13 April 2015, the meeting was opened by Mr. Ravinath Aryasinha, Ambassador of Sri Lanka, as Chairperson-designate of the 2015 Meeting of the High Contracting Parties to the Convention. The meeting received a video message from the United Nations High Representative for Disarmament Affairs, Ms. Angela Kane.

9. In accordance with its programme of work, as contained in the annex, the Meeting of Experts had interactive exchanges on the following issues: technical issues; characteristics of lethal autonomous weapons systems (LAWS); international humanitarian law (IHL); overarching issues and the way forward. The Meeting of Experts commenced with a general exchange of views.

10. Serving as Friends of the Chair were Ms. Yvette Stevens, Ambassador of Sierra Leone, and Mr. Urs Schmid, Ambassador of Switzerland, on technical issues; Ms. Päivi Kairamo, Ambassador of Finland, and Mr. Youngjip Ahn, Ambassador of the Republic of Korea, on characteristics of LAWS; Ms. Zsuzsanna Horvath, Ambassador of Hungary, on possible challenges to IHL due to increasing degrees of autonomy; Ms. Marta Mauras, Ambassador of Chile, and Mr. Ravinatha Aryasinha, Ambassador of Sri Lanka, on overarching issues and Ms. Filloreta Kodra, Ambassador of Albania, on transparency. The Chairperson presided over the discussions on the way ahead.

11. Each substantive session commenced with kick-off presentations from the following experts:

(a) **Technical issues (Part I):**

- Mr. Stuart Russell, Professor – Artificial Intelligence: Implications for Autonomous Weapons;
- Mr. Andrea Omicini, Professor – The Distributed Autonomy: Software Abstractions and Technologies for Autonomous Systems; and
- Mr. Paul Scharre – State of play and expectations.

- (b) **Technical issues (Part II):**
- Ms. Elizabeth Quintana – Operational considerations for LAWS;
  - Ms. Heather Roff, Professor – Strategic doctrine;
  - Mr. Wolfgang Richter, Colonel – Tactical considerations for the use of LAWS;
  - Mr. Darren Ansell, Doctor – Reliability and vulnerability of autonomous systems; and
  - Mr. Frédéric Vanderhaegen, Professor – The effect of dissonances on resilience of autonomous systems.
- (c) **Characteristics of LAWS (Part I):**
- Ms. Maya Brehm – Meaningful Human Control;
  - Mr. Marcel Dickow, Doctor – Multidimensional definition of robotic autonomy;
  - Mr. Neil Davison, Doctor – Critical functions; and
  - Mr. Nehal Bhuta, Professor – Policy implications: The notion of meaningful human control and standard-setting for the purposes of monitoring, evaluation and verification.
- (d) **Characteristics of LAWS (Part II):**
- Mr. Pekka Appelqvist, Professor – Systems approach to LAWS: (characteristics, considerations and implications);
  - Mr. Giovanni Sartor, Professor – Legal framework for civilian autonomous systems: Liabilities for autonomous systems in the civil domain;
  - Mr. Jason Millar – Challenges to meaningful human control;
  - Ms. Caitríona McLeish, Doctor – Experiences from the chemical and biological weapons regimes in dealing with the problem of dual use; and
  - Ms. Sybille Bauer, Doctor – Nature of dual-use export regimes.
- (e) **Possible challenges to IHL due to increasing degrees of autonomy:**
- Mr. William Boothby, Doctor – Article 36, Weapons reviews and autonomous weapons;
  - Ms. Kathleen Lawand – Is there a need for additional regulation? Legal challenges under international humanitarian law raised by autonomous weapons systems; and
  - Mr. Eric Talbot Jensen, Doctor – International humanitarian law in light of emerging technologies.
- (f) **Overarching issues (Part I):**
- Mr. Christof Heyns, Professor – Human rights and ethical issues;
  - Ms. Bonnie Docherty – Human rights implications of fully autonomous weapons;
  - Ms. Karolina Zawieska – Anthropomorphism with regards to LAWS; and
  - Mr. Patrick Lin, Professor – The right to life and the Martens Clause.

- (g) **Overarching issues (Part II):**
- Ms. Monika Chansoria, Doctor – LAWS: A Regional Security Perspective;
  - Mr. Michael Horowitz, Professor – Autonomous weapons systems: Public opinion and international security issues; and
  - Mr. Jean-Marc Rickli, Professor – Impact of LAWS on international security: strategic stability, non-State actors and future prospects.
- (h) **The way ahead:**
- Ms. Sarah Knuckey, Professor – Transparency;
  - Mr. Jeroen van den Hoven, Professor – Value sensitive design; and
  - Mr. Ian Anthony, Doctor - Transparency and information sharing measures.

## **General debate**

12. A number of delegations took the floor in the general debate, underlining their particular interest in the issue of Lethal Autonomous Weapons Systems (LAWS). Certain areas of common understanding emerged from the discussion, including a rejection of fully autonomous weapons systems deciding over the use of force against humans without any human intervention.

13. Some delegations stated that machines or systems tasked with making decisions on life and death without any human intervention, were they to be developed, would be in breach of international humanitarian law (IHL), unethical and possibly even pose a risk to humanity itself.

14. A number of delegations stressed that such systems do not currently exist and several delegations expressed that their governments had no intention of developing weapons systems of this nature.

15. Delegations expressed their appreciation for the discussions within the framework of the Convention on Certain Conventional Weapons (CCW). With a wide range of experts on military matters, international law and humanitarian issues, the CCW could guarantee a balance between humanitarian concerns and security aspects. Some delegations underlined the need for a fact-based discussion. Other delegations added that the human rights aspects of the issue should be addressed and that the CCW might not be the only appropriate framework for discussion on LAWS.

16. The imperative for unconditional respect of international law, in particular of IHL and international human rights law, was an area of universal appreciation. Irrespective of the nature of a weapon system, delegations expressed their unwillingness to compromise on the implementation of IHL. Important elements of IHL referred to include an unequivocal accountability chain in the deployment of a weapons system, the respect of the principles of distinction, proportionality and precautions in attack.

17. Some States regarded LAWS as fundamentally in conflict with the basic principles of IHL and called for an immediate, legally binding instrument providing for a ban on LAWS. Such a ban would encompass the development, acquisition, trade and deployment of LAWS.

18. Due to the complexity of the considerations involved in targeting decisions, several States raised doubts as to whether LAWS would be able to comply with the basic requirements of IHL such as the principles of proportionality or distinction.

19. The fear that LAWS could fundamentally change the nature of warfare was expressed. It was argued that LAWS would be unethical by their very nature as they lack human judgment and compassion, their existence would increase the risk of covert operations and intentional breaches of IHL, and they would exacerbate asymmetric warfare and lead to impunity due to the impossibility of attribution. The concern was raised that LAWS would generate new risks of proliferation and could lead to a new arms race. They could challenge regional balances and possibly global strategic stability as well as affect general progress on disarmament and non-proliferation. Moreover, LAWS could lower the threshold for starting or escalating military activity. Finally, LAWS could fall into the hands of non-state actors and increase the risk and potential of terrorism.

20. However, most delegations expressed the view that it was too early to draw far-reaching conclusions as the subject of the discussions needed further clarification. Some delegations saw the debate as being only at an early stage, with the need for the development of further common understanding. The term “meaningful human control” was raised frequently as a possible notion to advance the understanding of the nature of LAWS. However, some delegations saw a need for further debate on this notion, or preferred the term “autonomy”. Other delegations highlighted the concept of “critical functions” as potentially helpful in identifying defining elements of LAWS. Some delegations also made a distinction between automated and autonomous systems. It was pointed out by some delegations that existing weapons systems were not a subject of the LAWS debate.

21. Many delegations underlined the dual-use character of the technology necessary for the development of LAWS and stressed the benefits of autonomous technologies in the civilian sphere. Delegations referred to the important contributions by civil society organisations, industry, researchers and scientific organisations to understanding the technical and legal challenges posed by LAWS.

22. Enhancing transparency as a trust-building measure was mentioned by several delegations. Specifically, procedures for a legal weapons review process in accordance with Article 36 of Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977 (Additional Protocol I) was proposed as a possible area for further work.

23. The International Committee of the Red Cross (ICRC) proposed that consideration of existing weapon systems with autonomous functions may provide useful insights regarding the acceptable levels of autonomy and of human control, and under what circumstances. Representatives of civil society organisations pointed to the perceived disconnect between the declarations of many States expressing their intention to refrain from acquiring LAWS, whilst pursuing the development of further autonomous functions in weapons systems. They called for enhanced transparency and a more ambitious mandate as a next step in the debate. While some organisations called for rigorous definitions, others argued that, at this stage of the debate, an adequate framework for regulations should take priority over definitions.

### **Technical issues (Part I)**

24. The first panel on technical issues focused on developments in artificial intelligence, the notion of distributed autonomy, and expected further developments in autonomous systems.

25. The experts made the following points in their presentations:
- (a) **Artificial intelligence**
    - (i) The rapid progress made in the area of artificial intelligence in recent years due to increasing data processing capacity, increased industry research and an overarching theoretical framework.
    - (ii) Today in several areas, including facial recognition, flight navigation or in tactical video-games, autonomous systems and computers already exceed human performance. The number of such areas is bound to increase rapidly. Humans may soon be largely defenceless against artificial systems. The physical limits (energy, speed, range, payload), rather than computational shortcomings, will be the inhibiting factor in the development of LAWS.
    - (iii) The challenges posed by limited information, uncertainty over the outcome of actions and open-universe uncertainty (“unknown unknowns”) limit the predictability of a system and the implications of its actions.
    - (iv) There is a need to pay attention to the potentially destabilising momentum of emerging technologies.
  - (b) **Distributed autonomy**
    - (i) Autonomous systems refer to software systems and components.
    - (ii) Complex computational systems are modelled as multi-agent systems. Agents can be human or software by nature; their defining feature is autonomy. Each autonomous agent pursues its own goal. As such, autonomy is modelled as the distributed property of socio-technical systems.
    - (iii) Autonomy is therefore distributed among agents (and agent societies). In the same way, decision making, responsibility and liability are distributed.
    - (iv) Attributable responsibility requires engineering discipline and norms.
  - (c) **State of play and expectations**
    - (i) The notion of autonomy has several dimensions:
      - Degree of human control – in the loop, on the loop, out of the loop;
      - Degree of “intelligence” – a continuous spectrum between automated and fully autonomous machines and systems;
      - Nature of the task – from a small element within an operation to an overarching goal.
    - (ii) The reasons for taking humans out of the loop may include speed requirements, risks of communications being disrupted, need for self-defence, and fear by States of being “left behind”.
    - (iii) The challenges of IHL compliance may be averted by using LAWS in a bounded environment such as underwater or outer space.
    - (iv) There are risks posed by autonomous systems interacting at speeds beyond human capacities. An example was the crash of the New York Stock Exchange on 6 May 2010, which was caused by automated trading. This event points to the need for circuit breaks, avoiding unintended and unforeseen interactions between automated systems.

26. In the discussion, there was an appeal to the experts to assist in identifying a definition of autonomy. It was explained that there is a trade-off between the intelligence of software and the possibility of controlling its behaviour. The anticipated reluctance of military commanders to open up to transparency was mentioned by some delegations as an obstacle to imposing engineering discipline and transparency. However, it was also noted that legitimate security concerns of States must be balanced against transparency needs. Doubts were expressed by some delegations as to the possibility of designing software which would be resistant to unintended consequences in fast interactions.

27. Civil society organisations articulated the concern that the design of LAWS for areas without apparent challenges to IHL (e.g. underwater, air, outer space) may pave the way for the legitimization of LAWS.

28. Experts mentioned that autonomous functions could be introduced into the cyber sphere and used in such a way as to launch attacks against States. Finally, it was argued that technical progress in autonomous systems is extremely fast and therefore, the window of opportunity for regulating these systems would close rapidly.

## **Technical Issues (Part II)**

29. The second panel on technical issues focused on understanding the military rationale behind the development of increasingly autonomous functions and technologies. Presentations were given on operational considerations for LAWS, strategic doctrine, and tactical rationale for the deployment of LAWS. Another part of the presentations and discussions was devoted to the issues of reliability, resilience and vulnerability of LAWS, touching on the manageability of complex systems.

30. The experts made the following points in their presentations:

(a) **Operational considerations for LAWS**

- (i) The security environment today is characterised by diverse threats, an increasingly globalised defence industry, dominance of the civilian sector in research and development, and increasing vulnerability to cyber-attacks.
- (ii) Increasing speed, rising costs of military personnel, the ability to intervene in areas difficult to access, and the need to stay ahead of possible adversaries in terms of technology were put forward as possible reasons for military interest in autonomous functions.
- (iii) At the same time, militaries are cautious of fully autonomous systems due to the difficulties of assessing the liability of commanders, the danger of autonomous systems falling into the hands of the adversary, the risk of an arms race and a possible lowering of the threshold for engaging in military intervention.
- (iv) Political oversight of the military always requires meaningful human control and many layers of scrutiny already exist.

(b) **Strategic doctrine**

- (i) Historically, autonomous functions were developed to compensate for numeric weakness and to enhance capabilities in air, land and sea environments. Today, priorities have shifted to the reduction of costly personnel in labour intensive or dangerous tasks.

- (ii) The rationale for enhanced autonomous functions is different with regard to aerial, naval and land systems. For example:
    - Aerial systems are being developed in view of enhanced endurance and to bundle intelligence, surveillance, reconnaissance and the capability to strike simultaneously, albeit remaining as distinct capabilities. Impediments to this approach include public distrust and intense political scrutiny; high costs of development and operation; obstacles to interoperability; and vulnerability and unpredictability.
    - In naval environments, limitations in communication and increasing areas and distances in surveillance tasks are drivers for the development of autonomous systems. Naval LAWS would pose new challenges to maritime law and encounter testing and verification problems in a complex environment.
    - Land systems are being developed to countermine actions, defensive artillery and autonomous ground systems capable of collaborating with other entities. Ground systems pose particular concerns regarding compliance with IHL, as military objectives and targets evolve dynamically.
  - (iii) In armed conflict, tactical considerations will require systems to be small, durable, distributable and stealthy.
  - (iv) These developments could lead to an increased risk of an arms race and proliferation, as smaller systems are more easily acquired by non-state actors.
  - (v) In insurgency conflicts, the increased distance between the operator and the target would present particular risks of inappropriate military action.
- (c) **Tactical considerations in the use of LAWS**
- (i) Generally speaking, autonomous weapons systems are designed to increase survivability of armed forces, and to achieve goals with higher precision, fewer forces and less risks for civilians.
  - (ii) Degrees of autonomy in weapons have been present for decades, including automatic munitions (e.g. landmines), precision-guided munitions, target identification and tracking, automated target selection and engagement against incoming missiles.
  - (iii) The use of autonomous weapons is not equal to tactical autonomy. Complex battlefield situations involve the need for coordinated and combined use of fire, movements, reconnaissance, quick and effective delivery of weapons, foreseeing redundancies, etc. LAWS would be used to carry out specific tasks, but not to replace tactical command and control functions.
  - (iv) Autonomous weapons systems are and will be under the control of commanders responsible for selecting specific targets or target categories, specifying the area and time of activity and designing the operation against the requirements of the situational context in compliance with IHL.

(d) **Reliability and vulnerability of autonomous systems**

- (i) Operating failures in LAWS could result in catastrophic consequences and therefore, they would have to be engineered to the highest level of accuracy to reduce programming errors, including false requirements, incorrect algorithms, inadequate testing or incorrect use of the software.
- (ii) In this regard, strict adherence to existing industrial standards (DO-178C)<sup>1</sup> was recommended.

31. In the discussion, some delegations raised the risks of LAWS undermining stability and arms control regimes. In particular, the concern was expressed that LAWS would prolong hostilities for longer than was necessary. However, it was pointed out that the risk of an arms race was not specific to LAWS. Possible measures to counter these dangers could include additional transparency – e.g. publishing implementing procedures for legal weapons reviews, an agreement on a code of conduct, or new arms control agreements taking into account emerging technologies. Moreover, the possible usefulness of sharing standards for testing and deploying new weapons systems was mentioned. It was also reiterated by some delegations that autonomous systems could not replace humans at the tactical level, but would rather supplement certain functions in technical levels of operations. Some delegations referred to the general trend towards increasingly autonomous weapons and assuming that they were capable of discriminating between civilian and military targets would in fact help to protect civilian populations.

32. Some delegations expressed concern regarding the risks emanating from reduced human interaction and communication between adversaries in case of the deployment of LAWS.

33. Several delegations pointed to lethality as the crucial characteristic which implies the necessity for regulations and raises the core ethical concern regarding the transfer of life-and-death decisions to machines.

34. Some delegations expressed concern regarding the unpredictability of machine behaviour with self-learning capabilities, in particular when deployed in an unknown or complex environment. The point was made that the lack of determinism and the complexity of the systems would make comprehensive testing difficult, if not impossible. In this context, the importance of limiting the operation of LAWS in time and space was mentioned as a possible solution. It was also proposed that LAWS should be equipped with self-destruction mechanisms, which would respond when a system was either hijacked or malfunctioned.

35. Other delegations underlined the usefulness of autonomy for the implementation of important military functions such as mine clearance, rescue operations and the protection of civilians. LAWS could enhance the precision of strikes and thus reduce collateral damage. However, a rigorous evaluation was to be carried out, not only at the moment of acquisition, but over the entire life cycle, including thorough testing, effective adaptation to changing circumstances and full and effective respect of IHL at all times.

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<sup>1</sup> Software Considerations in Airborne Systems and Equipment Certification. Primary document by which the certification authorities such as the Federal Aviation Administration (FAA) and Transport Canada, European Aviation Safety Agency (EASA) approve all commercial software-based aerospace systems.

## Characteristics of LAWS (Part I)

36. In the absence of an agreed definition, achieving more clarity on the basic features that distinguish LAWS from other weapons systems was seen as a way to better understand these systems and determine whether they would raise possible challenges to IHL. The discussion focused on the notions of “autonomy” and “meaningful human control” as possible benchmarks for furthering the understanding of LAWS, placing limits on their use and ensuring their compliance with international law.

37. The experts made the following points in their presentations:

(a) **Meaningful human control**

- (i) Meaningful human control describes the interaction between a human being and weapon technologies that have the capacity to function independently. The aim is to identify the best ways to regulate the evolution of these technologies and, if necessary, place constraints on their use.
- (ii) There seems to be a widespread understanding that both the legal and ethical acceptability of a weapon system would require some form of human control. However, the exact nature of this control is still unclear.
- (iii) Control can be exercised in multiple ways, e.g. through the management of resources. Control does not have to be absolute. Human control over weapons systems is generally exercised in determining when, where, and how force is applied.
- (iv) As a first step, one may focus on what type of control is not considered meaningful. This might include systems operating over extended periods of time with no possibility of human intervention or supervision.
- (v) The notion of ‘meaningful human control’ is a way to structure the debate, rather than as a means of defining autonomy. It should serve as a way to identify parameters for LAWS that would make them legal and acceptable.

(b) **Multidimensional definition of robotic autonomy**

- (i) In contrast to political approaches to autonomy, a techno-centric approach was proposed with the aim of defining a level of autonomy as well as calculating and benchmarking the various dimensions of a robotic system that play a role regarding its autonomous functioning. Possible advantages of such an approach include calculability, reproducibility, verifiability, transparency and negotiability.
- (ii) A definition of autonomy of LAWS should take into account all factors that contribute to it, leading to a multidimensional definition. In this regard, the different factors that should be examined are physical (time, space, energy), sensors (quality, quantity, impact), weapons (quality, quantity, capabilities), human control (steering, veto) and machine (errors, fault, tolerance, self-preservation).

(c) **Critical functions**

- (i) In the search for defining elements of LAWS, it may be useful to focus on the “critical functions” of selecting and attacking targets.

This focus on autonomous use of force would be more useful than an analysis of the technical sophistication of the weapon. Moreover, unlike the critical functions, the technical sophistication is not relevant to the ethical and legal considerations concerning an autonomous weapons system.

- (ii) Further factors to be considered are the level of human supervision, nature of the target (object, human), complexity of the environment, and predictability and reliability of the weapon system.
  - (iii) Consequently, further reflection is needed on how the context can affect human supervision with regard to the critical functions.
- (d) **Policy implications**
- (i) Existing international law, including IHL, provides the appropriate normative framework for evaluating the legality of LAWS.
  - (ii) In the LAWS debate, meaningful human control was proposed as including both technical and normative standards. Meaningful human control could be made an explicit requirement of IHL, leaving its determination open to further elaboration and standard setting.
  - (iii) Standards are an important tool to specify the requirements of norms. For example, while Article 36, Additional Protocol I, constitutes an important norm, its effectiveness can only be ensured if further specifying standards in relation to LAWS are defined.
  - (iv) Standards could also constitute an important tool for transparency.

38. The following discussion focused primarily on the notion of “meaningful human control” and how this emerging concept could be useful to effectively address the potential risks associated with LAWS. Different views were expressed regarding the usefulness and advantages of the notion of meaningful human control when addressing LAWS.

39. Several delegations expressed scepticism over the utility of “meaningful human control”, assessing it as being too vague, subjective and unclear. Some delegations held that when characterising LAWS, “autonomy” would be a more precise and appropriate technical term. Other delegations considered meaningful human control as a notion that could be useful in identifying a clear goal. In particular, with respect to IHL, the notion requires States to take all of the necessary technical and policy measures to ensure full compliance.

40. Several delegations stressed that the legal and ethical debates that arise from meaningful human control are two separate issues and should not be confused.

41. Some delegations stressed that autonomous functions were evolving step-by-step and total and full autonomy as such could be considered a fundamentally theoretical notion. Some States doubted the military utility of fully autonomous weapons systems and underlined that such systems may never exist.

42. The concept of predictability was considered useful for addressing the development of weapon systems, especially those with self-learning capacities.

43. Other issues raised included the need to address the accountability gap LAWS would seem to create; the developments in automation and the consequent evolving intelligent partnership between operators and technical systems.

44. It was underlined that ultimately, States were the responsible actors in the development, acquisition and deployment of any weapon system, including LAWS and

needed to comply with Article 36, Additional Protocol I. There were proposals to establish an informal mechanism to exchange best practices on national legal weapons reviews and an independent body to supervise how such standards would be applied.

## **Characteristics of LAWS (Part II)**

45. The second panel on the “Characteristics of LAWS” addressed the dual-use characteristics of autonomous technologies. The term “dual-use” refers to the fact that the underlying technology can be used for both civilian and military purposes. Experts explained the concept of a systems-approach to LAWS, as applied to other civilian systems operating in networks, legal provisions regulating autonomous functions in the civilian sphere, and how other disarmament treaties and export control regimes have dealt with dual-use products.

46. The experts made the following points in their presentations:

(a) **Systems approach to LAWS**

- (i) LAWS should be considered as complex network systems, rather than independent platforms. This is necessary for understanding stochastic behaviour, non-linear dynamics or unpredictable behaviour associated with LAWS. Cognitive features, including memory association, and learning and problem-solving are essential for a system to be considered autonomous.
- (ii) In a complex battlefield, networks of LAWS can provide advantages if they integrate surrounding infrastructure in a Command, Control, Communication, Computer, Intelligence, Surveillance and Reconnaissance (C4ISR-) System.
- (iii) The distribution of functions in such a network of systems renders the boundaries of LAWS ambiguous and impedes the ability to localise the decision making process.
- (iv) Due to rapidly evolving technology and increasing reliance on autonomous functions in the civilian sector, possible regulations will have to focus on generic principles in the development, deployment and operation of LAWS.

(b) **Legal framework for civilian autonomous systems**

- (i) Autonomous systems are already widely used in the civilian domain, for example, for transportation, in medical applications, or to support rescue operations. These systems are subject to national legal provisions including both criminal and civil law provisions.
- (ii) Criminal offences are either caused intentionally or by negligence. When an autonomous system is intentionally misused or harm is caused through negligence, the human operator is criminally liable. When the *mens rea* (lack of intent, knowledge, recklessness or unjustified lack of awareness of the harm) of the user cannot be established there will be a responsibility gap. This responsibility gap may not be a problem in the civilian domain if the social benefits of autonomous technologies (e.g. overall reduced accidents with autonomous cars), outweigh the social costs. However, this balance cannot be factored into the military domain and the assessment of the deployment of LAWS.

- (iii) In cases of civil liability, when harm is caused without fault of the possible actor, the gaps can be bridged by legal instruments such as strict liability (e.g. for agents or animals), compulsory insurance, or producer compensation (e.g. by car manufacturers). However, these liability concepts cannot be easily transferred into the military domain.
  - (iv) As the above lessons learnt from the civilian domain are not easily transferred to the military domain, it could be useful to consider deployment liability for autonomous system which is similar to the command liability with regard to humans. Clearly, more reflection is needed on ways to determine responsibility for harm which is caused by LAWS.
- (c) **Challenges to meaningful human control**
- (i) “Meaningful human control” conveys the distinct human element in the decision-making processes and is used with reference to ethical and moral values.
  - (ii) Human decision-making itself cannot provide a consistent reference for ethical values. Even simple and seemingly unrelated alterations of circumstances (e.g. surrounding noise) can substantially change most people’s behavioural patterns.
  - (iii) The apparent paradox that human control is vulnerable and prone to bias or faulty decision making should not lead to the conclusion that this process should be delegated to machines. It rather suggests that special care has to be taken when designing human-machine interfaces in order to avoid distorting the human intention. This is particularly pertinent because bias in decision-making could be amplified in a chain of subsequent instructions to multiple elements of a system.
- (d) **Nature of dual-use export control regimes**
- (i) Examples for export control regimes for dual-use goods are provided by the Chemical Weapons Convention (CWC) and the Biological and Toxin Weapons Convention (BWC). United Nations Security Council Resolution (UNSCR) 1540 (2004) aims to deny non-state actors and terrorists access to weapons of mass destruction.
  - (ii) The crucial question faced by these regimes is how to suppress illicit weapons development without hindering trade and technological development for peaceful purposes.
  - (iii) The CWC and BWC focus on purposes of use, not on specific substances or technologies (“general purpose criteria”). Controls are directed at the end user or the end use.
  - (iv) Rapid evolution of technologies would not necessitate constant adaptation of a possible treaty when regulation focuses on the purpose of use. Moreover, it allows for peaceful activities to develop unhindered.
  - (v) Industrial cooperation proved to be indispensable for the creation of an effective verification regime that included declarations and on-site inspections.

47. An important part of the discussion continued to focus on the notion of meaningful human control. Some delegations reiterated their doubt regarding the adequacy of this

notion. The focus on a narrow definition of meaningful human control would not safeguard against unintended consequences. Instead, the adequacy of the relationship between humans and machines was identified as the core question. The term “human judgment” was proposed as an alternative. Further discussions were seen as necessary. It was noted that human control would be particularly vulnerable to external influence, in particular under duress (e.g. in the battlefield).

48. Regarding dual-use items, the question was raised as to whether a discussion on export control regimes for LAWS was premature. There was still no definition of LAWS, let alone a common understanding about whether these weapons systems should be subjected to additional regulation and control regimes may pose an obstacle to the legitimate transfer of technology. Moreover, given the absence of a definition, it was as yet unclear whether the characterisation of LAWS as “conventional” weapons was appropriate.

49. In response, it was stressed that the mechanisms of the CWC and BWC regimes and the principle of “General Purpose Criteria” could serve as examples of how control regimes could be implemented without harming industrial and peaceful development. Experts also pointed to a shift in acceptability of technology denial for terrorist organisations, which had been strengthened by United Nations Security Council Resolution 1540 (2004).

### **Possible challenges to international humanitarian law due to increasing degrees of autonomy**

50. Building on the 2014 Meeting of Experts, this year’s session on IHL provided a more in-depth examination of the challenges posed by LAWS in terms of compliance with IHL, targeting rules with regard to LAWS, and the guarantee of accountability and legal responsibility in relation to LAWS.

51. The experts made the following points in their presentations:

(a) **Legal weapons reviews**

- (i) States Parties to Additional Protocol I are subject to the regulations of Article 36 which provides for a legal weapons review in the case of the study, development, acquisition or adoption of a new weapon, means or method of warfare, ensuring compliance with applicable international law. States not party to Additional Protocol I are subject to the obligation of a review of new weapons under international customary law.
- (ii) A concern when reviewing LAWS is how such systems could apply targeting rules at least as accurately as a human. Questions included whether the system could assess anticipated military advantage, expected collateral damage, or whether collateral damage may be deemed excessive. When engaging human targets, the system must be able to distinguish combatants from civilians, and able-bodied combatants from those ‘hors de combat’.
- (iii) Systems deployed in an offensive manner choosing their own targets would most probably fail a legal weapon review under current technologies. However, technology may evolve and meet the requirements in the future.
- (iv) Meaningful human control may be useful as a policy approach to address shortcomings in current technology. However, it should not be applied as a legal criterion as this could undermine existing targeting

law by introducing ambiguity. Instead, a rigorous application of the legal weapons review duties in good faith by States, in particular with regard to the targeting rules, would be the best guarantee for adequate protection of civilians and civilian objects.

(b) **Is there a need for additional regulation?**

- (i) Autonomy should be seen as a characteristic of technology attached to a weapon system, not the weapon itself. LAWS is therefore an “umbrella term” covering a wide range of weapons systems.
- (ii) Conformity of autonomous weapons with IHL will depend on the specific type of a weapon system and other factors including the type of task; its use for offensive versus defensive purposes; the context in which it is used (air; ground; sea; simple versus crowded environment); the type of target (material; personnel); type of force (kinetic versus non kinetic); freedom of the weapon to move in space (fixed or mobile system; narrow or wide geographical area of operation); the timeframe of the action of the weapon (does it attack only at a specific point in time or over a longer period of time).
- (iii) Increasing autonomy and complexity of weapons systems mean their outcomes may be less predictable. However, predictability is crucial in order to assess conformity with IHL. Deploying a weapon system with unpredictable effects creates a significant risk of a breach of IHL.
- (iv) At the operational stage, a commander would have to fully understand the capabilities of the autonomous system as this would require a judgment on the acceptable risk in deployment.
- (v) A rigorous legal weapons review is therefore needed. A significant challenge is how to test LAWS as part of such a process and in particular, how to test predictability. The ICRC encourages States to establish a mechanism for a review process and stands ready to advise States on these matters.

(c) **IHL in light of emerging technologies**

- (i) New weapons technologies always give rise to discussion on the ability of the law to properly regulate the technology in question. With regard to earlier emerging technologies, such as balloons, submarines and early aircraft, different attempts were made to prohibit or impose a temporary ban on these weapons systems. However, these attempts did not withstand the onslaught of war.
- (ii) It may be deemed more prudent to allow the development of technologies, whilst ensuring that they are developed in compliance with existing law.
- (iii) Autonomous technologies could lead to more discriminating weapons systems. It may therefore be premature to prohibit LAWS on the basis of the current shortcomings in autonomous technologies.

52. In the following discussion, several delegations reiterated their unwillingness to delegate decisions concerning life and death to an autonomous system. For some delegations the targeting rules are best assessed and applied by humans. Further, several delegations cautioned against taking for granted that existing IHL applies to LAWS and that by doing so, these weapons could be prematurely legitimized.

53. There was wide support for encouraging the implementation of legal weapons reviews and the need for all States to ensure that new weapons systems would be used in compliance with IHL.

54. Experts underlined that the review process would have to be implemented in good faith, including the consideration of the intended use. Several delegations subsequently explained elements of their national review processes. It was proposed that States could share their legal weapons review procedures with other CCW States Parties as a confidence-building measure. A number of delegations saw value in sharing best practices and lessons learnt from legal weapons reviews within the CCW. Some States expressed their view that the legal weapons review process was sufficient to deal with concerns arising from LAWS.

55. However, a number of concerns and questions were raised in this respect. Legal weapons reviews would have to assess the lawfulness of a LAWS and its capability to implement the targeting rules. Doubts were expressed as to whether all States had the necessary technical and scientific capacities to effectively implement a review process. Additionally, several delegations expressed scepticism regarding the willingness of all States to thoroughly test LAWS. Some delegations raised doubts as to whether legal weapons reviews, which are essentially national processes, could build trust and confidence. There were questions about how these review processes were implemented in practice and whether weapons systems had been rejected. Further concerns were raised regarding the fact that different States inevitably apply different standards within these processes.

56. There were differing views on whether it would be possible to hold a human accountable for the actions of a LAWS. It was argued that current military chains of command could ensure accountability. Training, proper instructions, and rules of engagement would also assist in avoiding the misuse of autonomous systems. There were calls for the development of further safeguards in order to ensure the effectiveness of the accountability chain.

57. There were calls for the development of standards specific to LAWS and a new normative framework. Demands for the prohibition of LAWS referred to the example of Protocol IV of the CCW regarding the prohibition of blinding laser weapons. Whereas, other delegations argued that the prohibition of LAWS without a clear understanding of potential opportunities and risks of the technology was premature. Finally, the point was made that whether or not to prohibit LAWS was not a legal issue, but rather an ethical one.

## **Overarching issues (Part I)**

### **Human rights and ethical issues**

58. The first part of the session on overarching issues was dedicated to ethical and human rights questions. The panel included experts on international human rights law as well as on ethics, philosophy and computer science.

59. The experts made the following points in their presentations:

(a) **Human Rights**

- (i) Human rights and ethics have been prominent in the debate on LAWS which gained momentum with the report of the Human Rights Council's Special Rapporteur on extrajudicial, summary or arbitrary executions in May 2013. Although the CCW mandate is dedicated to IHL, there are reasons why discussions on LAWS should not be limited to IHL but should also include international human rights law.

- (ii) The underlying issue in the debate about LAWS is the increased reliance on processing power of computers when making a decision on whether to use force against humans. A holistic approach is needed to include situations of armed conflict and law enforcement, lethal and non-lethal use of force.
  - (iii) The use of LAWS potentially affects the right to life, the right to bodily integrity, the right to human dignity, the right to humane treatment and the right to remedy. As the principle underlying all other rights, the right to dignity is fundamental.
  - (iv) Even if a machine was able to comply with the requirements of IHL, doubts remain as to whether lethal decisions made by a machine would be ethical. Decisions taken by machines over life and death would affect the dignity of the person targeted. They would also affect the dignity of the principal on whose behalf the killing takes place – States, governments and societies. Even if LAWS were sufficiently accurate to spare lives in comparison to the actions of human soldiers, the dignity of those targeted would still be affected.
  - (v) In law enforcement, the use of force is allowed only when it is necessary, proportional, and as a last resort. LAWS would not be able to fulfil these requirements.
  - (vi) A condition for the remedy of violations in the use of force is individual accountability. Therefore, the accountability gap inherent to LAWS leads to violations of international human rights law. Following these considerations, LAWS should be banned.
- (b) **Right to life and Martens Clause**
- (i) The right to life and human dignity are intimately linked. In fact, the right to life can be reframed as the right to dignity. From this perspective, legislation values dignity over and above security considerations in some countries. While the concept of dignity remains somewhat vague and a lack of human dignity is not equal to illegality, the Martens Clause can expand our understanding of human dignity.
  - (ii) With regard to LAWS, challenges concerning accountability, remedy and, most importantly, the lack of possible human reflection on life-and-death decisions, may affect dignity.
  - (iii) However, most of the time soldiers are not required to reflect on the gravity of their actions. In contrast to this, moral reflection can be exercised in the design and programming of LAWS.
  - (iv) To refer to the Martens Clause, a weapon would have to be deemed *mala in se* which, in the case of LAWS, requires further consideration. In this respect, anthropomorphism, that is attributing human characteristics to a weapon, should be avoided.
  - (v) The notions of “right to life”, “right to dignity” and the Martens Clause have to be sharpened in order to provide practical guidance.
- (c) **Anthropomorphism with regards to LAWS**
- (i) There is a tendency to anthropomorphise non-human objects in all cultures and societies. Robots are often designed to have human

characteristics, even though they are fundamentally different from humans.

- (ii) The projection of human characteristics leads to confusion and misguided expectations. This is reinforced by misleading terminology, including terms such as “autonomy”, “intelligence”, “decision making”, “morality”, and “self-awareness”.
- (iii) Anthropomorphism of LAWS leads to a misleading framework of interpretation and the projection of a human onto a machine. It also presents the risk of dehumanising human beings by equating them with objects and reducing them to single characteristics.
- (iv) It would be possible to describe the state of robotics more accurately by using more appropriate terminology stressing the difference between humans, and artefacts resembling humans (“artificial autonomy”, “robotic autonomy”, “artificial agents” etc.).
- (v) This would return to a human-centred approach and accentuate that the only subjects using weapons are human beings.

60. In the subsequent discussion two divergent points of view emerged regarding the ethical and legal framework. The first one applied universal ethical values for anticipated capacities of LAWS and fundamentally doubted the morality of delegating the decision to kill a human to a machine. Proponents suggested that legal and ethical questions do not only arise in armed conflict, but also in law enforcement situations. Therefore, it was further proposed that, besides IHL, international human rights law had to be considered. However, pure legal considerations might not be sufficient; hence the call for a pre-emptive ban on the basis of ethical considerations was a logical consequence.

61. A different view cautioned against drawing premature conclusions while the nature of LAWS was still unclear and neither possible risks, nor possible benefits could be assessed on a solid basis. In this situation, a focus on the legal requirements seemed prudent. While there were no legal limitations due to autonomy *per se*, an appropriate course of action would be to focus on compliance with IHL and, in the case of the use of LAWS for law enforcement purposes, on compliance with international human rights law.

62. In order to ensure respect for applicable law, a national legal weapons review pursuant to Article 36, Additional Protocol I, was recommended. It was also emphasized that the legally prohibited should not be confused with the morally undesirable as this would entail ambiguity and undermine IHL. However, it was also noted that further work on national legal weapons review processes could pave the way for considering methods to make the application of these processes more uniform in all States, while respecting national law and customs.

63. The discussion also brought to light differing views on the inherent nature of LAWS. Some delegations deemed it possible that autonomous technologies could become independent intelligent agents that could possibly escape the control of their human creator. Others insisted that machines would always be mere tools – although sophisticated ones – in the hands of humans. Concepts such as self-awareness could not be reproduced in machines as they were far from being understood even in humans. In this context, meaningful human control would need further reflection. The assumption that machines would make life-and-death decisions is erroneous as commanders, operators, programmers and engineers are responsible for the decision to use force. Based on the assumption that advances in technology would occur incrementally over time, attention was also drawn to the possible evolution of the relationship between humans and machines today. The next

generation might have a different attitude to technology, possibly including the acceptance of LAWS.

64. There was divergence on the interpretation of the Martens Clause and its application to LAWS. The concept of “the principles of humanity and the dictates of the public conscience” were considered by some delegations as only applicable in the event that no other norm to regulate a given situation could be found. Some delegations argued that given the legal vacuum concerning LAWS, the Martens Clause led to the need for a legally binding instrument, such as a ban. For others, no legal vacuum exists as IHL does not prohibit autonomy as such, but would provide a means of regulating its possible use.

65. Concerns were expressed by several delegations regarding the further shift of power in favor of developed countries and the increased vulnerability of developing countries due to the development of LAWS. Moreover, a possible arms race would divert important resources which could otherwise be used for the benefit of development and urgent social and economic policies.

66. Finally, in view of the close links between human rights law and IHL, closer cooperation between the Human Rights Council and the CCW on specific questions arising from LAWS was recommended by some delegations. Other recommendations included the encouragement of further public debate and involvement of civil society, academia and other competent bodies.

## **Overarching issues (Part II)**

### **General security**

67. The second part of the session on overarching issues was dedicated to general security matters, including strategic implications for regional and global stability, new forms of arms races, new asymmetries and lowering of the threshold for applying force.

68. The experts made the following points in their presentations:

#### **(a) General security perspective**

- (i) Technology plays a critical role as an enabler and enhancer of force and may be useful for a variety of security roles.
- (ii) New weapons technologies, including unmanned aerial vehicles, can be used for surveillance and assist in situations such as natural disasters. When used in combat, the ability of such technologies to comply with the principle of distinction is paramount. Lethal functions should be considered with care and proper regulation.

#### **(b) Autonomous Weapon Systems: Public opinion and security issues**

- (i) Referring to the Martens Clause, a number of actors claim that LAWS violate the “dictates of public conscience”. As “public conscience” is a broad notion, the benchmark for clear evidence would have to be supported by forceful, unambiguous and widespread public understanding.
- (ii) While public opinion cannot be equated to public conscience, it might be perceived as a relevant indicator. Some have supported their claims with research indicating public discomfort with such technologies.
- (iii) There is evidence that the results of surveys strongly depend on the applied methodology. A complex and widely unfamiliar subject such as LAWS would require questions to be embedded in a relevant

context. One survey suggests that public opinion in the United States of America is inconclusive on LAWS when the use of LAWS is weighed against exposing their own military to danger. A low level of opposition to the idea of developing LAWS for defensive purposes was demonstrated. However, more research would be necessary to substantiate the results.

**(c) Impact of LAWS on international security: strategic stability, non-state actors and future prospects**

- (i) Strategic stability refers to the condition that exists when potential adversaries recognise that neither of them would gain an advantage if one were to begin a conflict with the other. Advantages over one's adversaries in defensive action increase stability, whereas advantages in offensive action reduce it.
- (ii) By dint of their assumed capabilities, LAWS would enhance dominance in offensive potential. This has a range of consequences: the strategic advantage in the ability to strike first would imply that the best defensive strategy would be a pre-emptive offensive strike. This would lower the threshold for the use of force and increase the probability of an arms race.
- (iii) Moreover, LAWS would be attractive to non-state actors, enabling them to create shock and awe, to use them as a force multiplier, and to spare their own fighters.
- (iv) Current off-the-shelf technology could already serve as a basis for the development of drones carrying explosives. The international community should be careful when considering the development of LAWS which could exacerbate the terrorist threat.

69. In the subsequent discussion, the utility of considering experience from unmanned aerial vehicles in the context of LAWS was questioned. On the other hand, the assertion was made that the consequences of LAWS deployments could presumably be similar for affected populations to those caused by remotely controlled or semi-autonomous weapons systems. Therefore, their perspective should be studied.

70. Some delegations questioned the relevance of the presented surveys. It was pointed out that the absence of an agreed definition curtailed the value of this research. There was agreement that more research was necessary to gather clearer evidence to inform the LAWS debate and offer support to future strategies.

71. Several interventions supported claims that LAWS may lower the threshold for the use of force and that there is a risk of abuse by non-state actors. Even a defensive design of a LAWS could be reprogrammed to serve offensive purposes. Moreover, the development of LAWS could accentuate asymmetric warfare, characterised by increased insurgency and reprisal, including the risk of escalation of conflict. While some delegations questioned non-state actors' capacities to develop and use sophisticated systems such as LAWS, others made the point that LAWS could still increase the risk of proliferation.

72. The use of LAWS could present an obstacle to attribute the use of force to a particular actor.

## Transparency

73. The session was dedicated to the importance of transparency measures applicable to LAWS and how these might be established

74. The experts made the following points in their presentations:

(a) **Transparency**

- (i) The objectives of transparency include deterring violations of regulations, exposing abuse, setting a positive precedent, fostering democratic legitimacy and promoting an informed public debate.
- (ii) Even though transparency is not an overall solution, it can be an important step and a precondition for further regulations. Discussions should include the scope, limits and means of transparency.
- (iii) A distinction between different types of transparency is important in order to understand the balance between the legitimacy and purpose of transparency and the need for state-secrecy.
- (iv) Transparency in information could include:
  - Legal and policy information;
  - Conduct information about the actual use of autonomous systems;
  - Process and accountability information; and
  - Technical information.
- (v) The transparency process should also define the addressee of the information (domestic or international, public or state organisations, victim organisations etc.).
- (vi) The structure and level of transparency should also be defined. Possible options include ad-hoc information, regular reports, the establishment of an internal oversight body or a fully developed inspection regime. Moreover, the role of civil society should be considered in the transparency process.
- (vii) In the case of LAWS, an appropriate method could include the assessment of current national and international arrangements, development of models for transparency and accountability and development of baseline information expected to be included.
- (viii) A first transparency action plan could include:
  - Creation of a focal point at a national level in order to overcome the fragmentation of information at different national levels;
  - Establishment of a point of contact for the international exchange of information;
  - Increasing the frequency of interaction; and
  - Sharing information on a voluntary basis and making it widely available.
- (ix) The substance of the information shared could include ways and procedures to implement the obligations under Article 36, Additional Protocol I, on the development and acquisition of autonomous weapons or on the use of these weapons. To implement such an

exchange, a voluntary but regular information-sharing mechanism could be established within the CCW.

(b) **Value sensitive design**

- (i) In considering and developing technology, ethical requirements and moral considerations have to be integrated and accounted for at an early stage in order to avoid a disconnect between values and the real world of engineering.
- (ii) As users of complex systems, such as surgeons, pilots, managers and soldiers, have to rely on the procedures defined by technology, their behaviour is shaped by them. Therefore, the relevant systems have to be designed in a way to allow their users to make responsible decisions. Put differently, technology has to be designed as a reliable agent of responsible human principals.
- (iii) From this perspective, meaningful human control requires a mechanism through which decisions are implemented in line with moral and practical imperatives.
- (iv) To ensure compliance with IHL and international human rights law, systems have to be designed in advance allowing for control by including transparency and verifiability at different relevant system levels.

75. In the discussion, several delegations found that it may be premature to discuss transparency measures at such an early stage. They underlined that the debate still showed substantially diverging views. Moreover, there was not yet a clear understanding of LAWS, and no legally binding instrument regulating LAWS, hence the lack of a basis for transparency measures. Scepticism was also expressed regarding the willingness of States to share information that would possibly touch on commercially sensitive data.

76. Other delegations supported the idea of transparency in the field of autonomous systems. Some made concrete proposals such as the publishing of national procedures on legal weapons review process according to Article 36, Additional Protocol I, exchanging information on these procedures, introducing controls on the international transfer of autonomous technology in order to prevent proliferation and misuse by non-state actors, developing a set of best practices or a political declaration as an interim measure, establishing national points of contact, and sharing additional information.

## **The way ahead**

77. Regarding the possible way forward, there was a general understanding that the debate needs to be further deepened. Delegations supported the CCW as the right forum in which to continue the discussions. Some delegations indicated that other *fora* could complement the CCW debate.

78. Regarding the next steps implementing such a continued discussion, some delegations saw the need for a continued informal discussion, before a more formalised approach might be envisaged. These delegations favoured a renewal of the current mandate, but nevertheless indicated flexibility.

79. Other delegations expressed their willingness to take the process a step further and signalled support for a more focused mandate, specifying the issues to be considered in detail. Delegations made different proposals as to the appropriate formal framework for a

more focused mandate. Several delegations proposed the establishment of a Group of Governmental Experts

80. Issues that were mentioned for further consideration included an in-depth examination of legal weapons reviews (Article 36, Additional Protocol I), a discussion on the general acceptability of LAWS in reference to the Martens Clause, ethical issues and the notions of meaningful human control, autonomy in the critical functions, autonomy, command and control, and system-human interaction.

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