Commentary by Canada on the operationalization of the Guiding Principles affirmed by the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems

Introduction

The Group of Governmental Experts on "Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (LAWS)" mandated by the Convention on Certain Conventional Weapons (CCW) endorsed eleven Guiding Principles by consensus in 2019. The following is a commentary by Canada on the operationalization of these guiding principles.

This commentary reflects current thinking and understanding of the underlying technology, and is offered without prejudice to Canada's position on future discussions.

1. **Distinction between "Lethal Autonomous Weapons Systems" and "Fully Autonomous Weapons Systems":**

While several definitions of "lethal autonomous weapons systems" have been proposed, there is currently no internationally agreed-upon definition of either "lethal autonomous weapons systems" or "fully autonomous weapons systems". From Canada's perspective, these two concepts are related, but distinct. Fully autonomous weapons systems could have two variants – lethal and non-lethal – while lethal autonomous weapons systems would be less than *fully* autonomous.

Canada is committed to maintaining appropriate human involvement in the use of military capability which can exert force. Systems that are fully autonomous would leave no room for appropriate human involvement, and would be unacceptable on that basis. War must remain, at its root, a human enterprise.

2. **Operationalization of the Guiding Principles for Canada:**

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

Under international humanitarian law (IHL), at least two distinct aspects need to be analyzed: whether the weapon itself is lawful and whether the use of the weapons system during hostilities might be prohibited. IHL applies to any weapons system regardless of complexity.

This guiding principle is operationalized for Canada through our national legal review of all weapons systems including those with autonomous functions, as well as our strict adherence to IHL throughout the lifecycle of a weapon including development, training, and use. Canada believes fully autonomous weapons systems could not be used in a manner compliant with IHL. Therefore, Canada is committed to advancing international efforts to ban their development and use.

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

Canada sees this principle as operationalized through compliance with IHL, which calls for State and individual responsibility for decision. Humans, not machines, are responsible for the use of force.

By removing human involvement from part of their life cycle, fully autonomous weapons systems would render responsibility for decision-making difficult to trace, which is one reason why Canada is opposed to such systems.

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

Appropriate human involvement must be maintained in the use of force. Canada ensures appropriate human involvement first through its national legal reviews of all weapons systems, which ensure that weapons systems meet Canada's international legal obligations, as well as through strict adherence to IHL throughout the lifecycle of the weapon.

We sees the term "involvment" as encompassing both human judgment and human control; it is our view that armed conflict should remain fundamentally a human enterprise.

It is important to examine the relationship between humans and machines to ensure that advanced technology preserves adequate space for human risk assessment and decision-making. For example, appropriate human involvement would include the exercise of human judgment in processes such as research and development, procurement, testing, verification, validation and accreditation, weapons reviews, training, operational deployment, target selection, weapons release, and after-action reviews. Relatedly, in deploying weapons systems, humans should assess a range of factors such as the operational environment, the geopolitical context, the nature of the mission, the weapon type, use and target, the training of human operators, the predicted performance, and the availability, integrity and security of data.

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

Human beings are accountable for their actions in software design, weapon design, procurement, deployment, testing, mission planning, mission command, operational control, data loading, mission authorization, and national legal review of weapons. Accountability can be achieved through a responsible chain of human command and control involving commanders and the operators who use autonomous weapons systems.

Ultimately, states remain responsible for the actions of their military forces.

Accordingly, Canada has committed to ensuring appropriate human involvement in the use of autonomous weapons systems. Taken together with obligations under international law, this human command and control ensures that important factors such as the geopolitical context and the type of weapons system are taken into account.

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

Canada implements a permanent national legal review of all of its weapons systems.

Canada fully complies with Article 36 of Additional Protocol I to the Geneva Conventions, which requires states to determine whether new weapons, means or methods of warfare may be employed lawfully under international law. In other words, in the study, development, acquisition or adoption of a new weapon, means or method of warfare, Canada determines whether its employment would, in some or all circumstances, be prohibited by IHL.

Canada sees merit in exploring information sharing options to improve the CCW High Contracting Parties' collective understanding of legal weapons reviews, in order to ensure that all weapons systems used comply with IHL. We believe this can contribute to the effective implementation of Guiding Principle E and to addressing the potential humanitarian and international security challenges posed by emerging technologies in the area of autonomous weapons systems.

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

See reference to Canada's national legal review.

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

The technical elements of the review necessarily include the system's design intent, development process, and testing campaign. Similarly, technical and legal reviews capture deployment risks that might have operational and/or legal consequences. Mitigation measures may include technical changes to the system and/or the adoption of specific tools, techniques, and procedures to ensure both operational safety and IHL compliance when using the system.

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

It is conceivable that advances in autonomy could facilitate the implementation of the fundamental principles of IHL (distinction, proportionality, military necessity, and humanity). In some cases, high levels of autonomy might even allow for greater precision in the use of force and improved accuracy and support to human commanders, upholding compliance with IHL. In any case, retaining a determinant role for humans (that means appropriate human involvement) in the use of force is essential.

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

Regardless of the sophistication of autonomous weapons systems, Canada will not bestow legal or moral personality onto these systems. Canada views appropriate human involvement in the use of military capability as the cornerstone of the use of weapons with some degree of autonomy.

As previously indicated, Canada sees the term "appropriate human involvement" as encompassing both human judgment and human control; it is our view that armed conflict should remain fundamentally a human enterprise.

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

CCW discussions should not hamper research in autonomous systems in general, as there are benefits to the use of intelligent autonomous technologies for civilian as well as military purposes. States should be able to conduct research in the area of autonomy and what autonomous systems can be appropriately tasked to do.

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

Given the mixture of States party to the CCW and the fact that it includes major military powers, Canada views the CCW as the appropriate forum for international discussions on such weapons. We believe that further discussion within the CCW is required before calling for a particular outcome. Progress on our collective understanding (Guiding Principle K) is paramount in order to achieve agreement on a normative and operational framework for autonomous weapons systems.