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Switzerland's commentary on operationalizing the guiding principles at a national level, as requested by the Chair of the 2020 Group of Governmental Experts (GGE) on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems (LAWS) within the Convention on Certain Conventional Weapons (CCW)

Switzerland sees the eleven guiding principles as an important consolidation of basic understandings on emerging technologies in the area of LAWS among the High Contracting Parties (HCP). The principles can guide current and future work in the multilateral context, notably the consideration and development of the normative and operational framework in the GGE. In addition, HCP may consider their operationalization at the national level, notably in the context of complying with international humanitarian law (IHL) rules and satisfying ethical concerns in the context of these emerging technologies.

Switzerland holds the view that human control is necessary to ensure IHL-conformity. Such human control can be applied at various stages of the life cycle of an autonomous weapon system (AWS), including the design phase. Switzerland is also of the opinion that the actual decision to deploy an AWS and the assessments and decisions regarding its use in a specific attack remain eminently critical touch points in the human-machine interaction and must be retained within a responsible (military) chain of human command and control with structures and processes that ensure IHL-conform decisions in the use of force, including AWS.

Switzerland holds that an AWS would run contrary to guiding principle A and would be unlawful: if 1) the outcomes cannot be reasonably predicted, or; 2) the effects cannot be limited in accordance with IHL or 3) the system otherwise cannot be used in accordance with IHL. In addition, Switzerland is of the view that it is persons, not machines, who must comply with IHL. While certain tasks relevant for IHL-conformity could be facilitated by increasing autonomy, that same technology might increase the demands on a human operator at the moment of the use of the weapon, notably by taking feasible precautions as required by IHL.

Notably, it is Switzerland's view that an AWS which would be able to define or modify its mission and its rules of engagement without human validation would run contrary to several guiding principles, including principles A, B and C. Such a system should be neither developed nor engaged.

As outlined below with regard to guiding principle C, and in order to ensure and facilitate compliance with IHL, Switzerland is convinced of the need for humans to retain control at

various stages of the lifecycle of a weapon system, including in the use of force. We consider these to be key considerations to advance the debate and make recommendations in relation to the clarification, consideration and development of aspects of the normative and operational framework.

A number of technical and operational measures, including operational constraints regarding tasks, target profiles, time-frame of operation, and scope of movement over an area and operating environment, can be applied before the AWS's use. However, to ensure IHL-compliance and to satisfy ethical concerns, Switzerland stresses the relevance for human control and supports efforts to gain further clarity on the extent to which the characteristics of human control may evolve as technology develops, and what would be the appropriate degree of human involvement, whatever the level of technological maturity.

Switzerland's commentary on guiding principle A

As with any other means and method of warfare, the rules on the conduct of hostilities must be respected in all circumstances, whether force is used against persons or objects, whether in offense or in defense. Moreover, the requirement for the full compliance with IHL is not limited to the rules governing the conduct of hostilities. If AWS were to be used in relation to other activities governed by IHL, for instance guarding persons deprived of their liberty, additional specific rules need to be respected. The rules and principles of IHL apply independently of the military technology used; in that sense, IHL has a technologically-neutral approach.

While noting potential benefits of autonomy to reduce risks for both civilians and military forces, emerging technologies in the area of lethal autonomous weapons systems also pose various challenges with regard to ensuring compliance with IHL. The predictability of AWS, contextual awareness, qualitative judgements or potential self-learning capabilities are cases in point. Against this background, Switzerland holds that AWS whose outcomes cannot be reasonably predicted or whose effects cannot be limited as required by IHL or that otherwise cannot be used in accordance with IHL would run contrary to guiding principle A and would therefore be unlawful. These elements imply a significant level of human control.

Generally, Switzerland is of the view that it is persons, not machines, who must comply with IHL. While certain tasks relevant for IHL-conformity could be facilitated by increasing autonomy, that same technology might increase the demands on a human operator at the moment of the use of the weapon, notably by taking feasible precautions as required by IHL.

Switzerland would see value in the CCW exploring the potential role of constraints in the design and functioning of AWS as well as operational constraints, for instance regarding tasks, target profiles, time-frame of operation, or scope of movement over an area and operating environment as mentioned in its commentary to guiding principle C in contributing to ensure and facilitate compliance with IHL. In addition, ensuring respect for IHL in the context of AWS may require additional or complementary legal or practical measures such as: training of the personnel developing and using AWS, giving and supervising orders and instructions, for instance with regard to operational constraints. The role of legal advisors could become even more relevant as autonomy increases.

Switzerland's commentary on guiding principle B

Given that AWS possess no agency or legal personality of their own, individual criminal responsibility focuses on the responsibility of humans that are involved as operators, commanding officers, programmers, engineers, technicians or in other relevant functions. In cases where the deployment of an AWS allegedly results in a serious violation of IHL, States must investigate and, if appropriate, prosecute the suspects.

In order to ensure human responsibility for decisions on the use of weapon systems a certain degree of human control must be exerted or embedded at the appropriate stages of the life cycle of the weapon. Human control can be exercised in various ways throughout different phases of the life cycle of a weapon system, and notably in the targeting-cycle. Those who design and procure a system must ensure that the system can be used in accordance with IHL, while those who deploy and employ an AWS must ensure an IHL-compliant use. Those actors must evaluate with particular scrutiny, under what circumstances, and with which parameters and safeguards, a system can be employed in compliance with IHL.As a general assumption, the more significant human involvement in a specific use of an AWS is, the easier it is to assign individual responsibility.

Switzerland's commentary on guiding principle C

While different terms have been used to characterize the human-machine interaction, it is largely uncontested that a certain type or level of control is indispensable whenever AWS are to be employed. The key question, when operationalizing principle C, is where and how limits for autonomy must be set, and, given the rapid technological developments, with which control options such limits can be drawn, notably to ensure that IHL is respected in all circumstances, including in unexpected situations.

Applying the requirements of lawful use to AWS is complex as many pivotal rules of IHL presume the application of evaluative decisions and value judgements. A key area for further work is to gain clarity on the extent to which the need for human control may evolve as technology develops, and what would be the appropriate degree of human involvement, whatever the level of technological maturity. Likewise, it is important to better understand to what extent the role of the human changes as a new quality of human-machine interaction is developed. In this context, and in accordance with principle K, the CCW is well placed to deepen the understanding of the potential necessary limits of autonomy in weapons systems, taking into account inter alia 1) the type of tasks to be carried out; 2) the complexity of the environment; 3) the complexity of the systems; and, 4) the cognitive abilities and workload of the human supervisor. The appropriate parameters for the human-machine interaction are very likely to be context-dependent, system-specific and not generically definable.

Switzerland sees a number of possible **factors that could be considered when assessing the necessary level of control.** These include inter alia:

i) Constraining the targets and tasks of the AWS, for instance by setting a narrow target profile, taking into account the operational environment;

ii) Imposing temporal and spatial limits on the operation of the AWS, or let human control these parameters, notably in areas where civilians are present.

iii) Maintaining the ability of human supervision, by using technology (for instance appropriate human-machine interfaces) to support the human cognitive involvement.

iv) Maintaining the ability to intervene in any AWS operation during the course of an attack, preserving the possibility to deactivate an AWS, or to override the application of force, if necessary.

v) Integrating fail-safe mechanisms which are triggered when the system operates outside defined mission parameters, or when it malfunctions.

vi) Integrating 'black box' systems able to record information collected by the AWS and allowing for the tracking of the systems actions and decisions.

vii) Ensuring that self-learning algorithms do not evolve beyond established parameters.

viii) Ensuring that AWS are fully integrated in military command and control structure.

This list of factors (i-viii) is not exhaustive. In accordance with principle K, Switzerland supports further work in the context of the CCW to determine, in more detail, the quality and extent of human control and the possible respective operational constraints.

Switzerland's commentary on guiding principle D

Accountability for developing, deploying and using any emerging weapons system can be ensured in various ways. Without prejudice to other forms of liability (e.g. under tort law) the responsibility of states for internationally wrongful acts and criminal responsibility of individuals are of particular importance.

States and humans must not escape international responsibility by a process of "delegating" certain tasks to AWS. States must remain legally responsible for violations of IHL as well as all acts committed by persons forming part of its armed forces. As mentioned with regard to guiding principle B individuals must remain responsible under international law for war crimes or other international crimes such as genocide or crimes against humanity when employing AWS. Rules governing omissions as well as the responsibility of the military commanders with respect to their subordinates and other persons under their control may also play an important role when using AWS.

Switzerland's commentary on guiding principle E

Switzerland would like to recall the obligation of all States to "respect and ensure respect" for IHL (see common Article 1 to the Geneva Conventions) and the prohibition to use means and methods of warfare in contradiction to IHL. Therefore, an implementation of IHL in good faith requires an assessment whether means and methods of warfare can be used in conformity with IHL prior to their employment in international as well as non-international armed conflicts.

As a State party to Additional Protocol I to the Geneva Convention (AP I) Switzerland's is directly bound by article 36 AP I to conduct legal reviews of new weapons. Switzerland's obligation under Art. 36 AP I has been integrated into national legislation. The relevant ordinance and directives provide for legal review in three stages, requiring a positive declaration of conformity with international law during the initialization, before procurement and before the introduction of a new weapon system into the Armed Forces. This guarantees that no weapon system can be procured without legal clearance. In order to ensure that the competent authority is able to conduct an independent legal review, in Switzerland access is granted to all relevant information, in particular with regard to the military requirements and technical characteristics of the weapon system concerned. It may furthermore require extensive testing of a new weapon system and the involvement of experts to assess potential negative consequences on health or the environment.

The predictability of an AWS in different operational environments, its accuracy and potential self-learning capabilities pose particular challenges for the legal review of such weapons. HCPs should discuss how these challenges could be addressed.

Switzerland's commentary on guiding principle F

Irrespective of the level of autonomy involved, the development and/or acquisition of any weapons system by the Swiss Armed Forces goes through a dedicated and standardized process. At each step of this process, the entire life cycle management of the system is considered, including an assessment of the level of physical and non-physical security measures that have to be applied. The key criteria to determine the required physical and cybernetic security levels are the attractiveness of a system for unauthorized actors and the potential consequences of the systems misuse. The degree of autonomy of a system, in this regard, is one among several characteristics of a weapon system relevant when assessing the level of security required.

In addition to the security measures, Switzerland supports dialogue on AWS-relevant technology in appropriate export control bodies in order to prevent the illicit proliferation of relevant technologies.

Switzerland's commentary on guiding principle G

In the development, testing and deployment of any new weapon system on behalf or by the Swiss Armed Forces, risk assessment is an integral part of the dedicated and standardized life cycle management process. The risk assessment process factors in both the risks associated with the use of a weapon and the system's intrinsic risks, such as the predictability of a system. It takes inter alia into account 1) the applicable legal norms 2) the type of tasks to be carried out; 3) the complexity of the environment; and 4) the complexity of the systems; and, 4) the cognitive abilities and workload of the human supervisor. Accordingly, the risk assessment shapes not only such elements as the deployment doctrine and training but also the testing regime to ensure required levels of predictability, cybersecurity etc. In this regard, the autonomous functions of a system are thoroughly taken into account in the risk assessment and factored in, when developing appropriate mitigation measures.

Switzerland's commentary on guiding principle H

While emerging technologies in the field of autonomy have the potential to help individuals and states to facilitate compliance with IHL by incorporating international law standards in the design of weapon systems, nothing should be interpreted in a way to relativize guiding principles A, B or C.

Switzerland's commentary on guiding principle I

AWS possess no agency or legal personality of their own; they remain a "tool".

Switzerland's commentary on guiding principle J

Emerging technologies in the field of autonomy are dual-use technologies which have significant potential to advance humanity in various sectors. CCW HCP should make sure that any potential measure it adopts does not hamper peaceful uses of these technologies. In this regard, the inclusion of the private sector, alongside with the academic community, in the CCW discussions is of relevance.

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Switzerland's commentary on guiding principle K

Against the backdrop of the centrality of principle A, and in the context of the IHL compliance approach which Switzerland has long advocated, the CCW is an appropriate framework to deal with emerging technologies in the area of LAWS. This is particularly the case given the fact that the CCW work aims to strengthen IHL, striking a balance between humanitarian concerns and military necessities. Switzerland also notes that the GGE's broad mandate allows for a comprehensive discussion including ethical and military aspects.

Notwithstanding the centrality of the CCW, there are other aspects related to new technologies such as artificial intelligence and robotics which are of relevance for international as well as human security dimensions and which deserve to be addressed in appropriate fora.

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