LAWS Group of Governmental Experts of the High Contracting Parties to the
Convention on Certain Conventional Weapons

Considerations on the appropriate level of human involvement in LAWS

Food-for-thought paper by Finland
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Introduction

At the request of the GGE LAWS Chair, H. E. Ambassador Janis Karklins, Finland is pleased to contribute to the discussion on the operationalisation of the 11 guiding principles at national level.

In this paper, an attempt is made to present a basic framework for defining the required level of human involvement in different phases of operational use of LAWS. Of the guiding principles, focus is particularly on elements of human-machine interaction (c), accountability (d), and risk assessment and mitigation measures (g).

Rationale

Discussions on LAWS often come back to the question of what autonomous features and functions should be restricted or banned in the case of LAWS. It is also often argued that computative control of LAWS cannot ever achieve the qualitative capabilities needed to comply with IHL requirements, even with human-defined tasking within strict operational restrictions and boundaries.

In this paper, the issue is approached from an alternate angle: What would constitute an ethically sustainable and IHL compliant way to overcome the justified concerns regarding LAWS, supposing that the required level of technological sophistication is reached one day?

Why is this approach relevant? Increasing capabilities of machine autonomy are already visible in civilian applications and will continue to be developed in the coming years regardless of military use. A quantum leap in computing could be just around the corner. In weapons systems, higher precision and distinction is pursued for military purposes, but can also support humanitarian objectives. However, the easier an advanced technology is to apply, the easier it will be to use it for harmful purposes. In the near future, we might well see armed autonomous civilian capabilities used for military purposes.

The most efficient way to ensure that future LAWS comply with IHL is to define a framework for their legitimate use. At the same time, putting in place measures that enable the responsible use of new technology will have obvious benefits also for the implementation of IHL.

Framework for human involvement

As concluded in the GGE, the core question is how to guarantee an appropriate level of human involvement both during the entire life-cycle of LAWS, and in an operative use-cycle. In the following, a simplified five-phase framework for the appropriate level of human involvement required to ensure compliance with IHL in operational use is presented. The process is cumulative; each phase needs to be completed before proceeding to the next.

Phase 1. Weapons review
A rigorous weapons review, in line with Article 36 of the first Additional Protocol to the Geneva Conventions, is essential for determining the legality of any new means or method of warfare. In the area of emerging technologies, such as artificial intelligence and machine autonomy, the review needs to be critical, wide in scope, multidisciplinary, and detailed with regard to the intended use-cases. The level of admissible autonomy depends on the context and its constraints, i.e., on the complexity of the operative use-case and the sophistication of the cognitive skills of the weapons system. Integration of the weapons review process in the entire lifecycle of LAWS, from early concept design to later phases, is essential, as software is updated and evolves in design.

Phase 2. Doctrine, organisation and training
All personnel involved in the operative planning and use of LAWS need to receive the necessary training and education to enable them to fully understand the dimensions and complexity of the particular LAWS in question. The easier the systems are to use for multiple purposes, the more comprehensive training and education is needed for users to understand the limitations of the system and the responsibilities of humans as its users. Military doctrines and their operational and tactical implementation need to comply with IHL in their entirety, including the use of LAWS. Responsibility and accountability of the chain of command must be ensured throughout the organisation in all situations.

Phase 3. Mission planning and defining the box-of-operation
The mission planning and tasking phase includes the task(s) given to LAWS by a human, e.g., a military planner, or the commander of a mission. Detailed instructions to describe the mission, specific tasks with attached priorities, criteria for accomplishment, and mission-specific constraints to abort the tasks are described for the LAWS in this phase. In operative use, the functioning of LAWS can be unexpected for the adversary, and still remain legal. At the same time, friendly forces and non-combatants need to be able to trust that the system works in a predictable and safe manner, if encountered.

To enable planning and governance of the autonomous functioning of LAWS, clear pre-defined boundaries need to be set. These include geographical coordinates, the allowed time window, and environmental conditions for authorised operation, but also system specific limitations, preconditions, rules of engagement, etc. Consequently, some of the limitations are permanent by nature, while others are system/platform specific, or derive from the requirements and context of the particular mission and its subtasks.

Combined, these limitations form a multidimensional matrix of parameters, a kind of virtual box-of-operation for the LAWS in question. A self-assessment system is needed to continuously monitor that the requisite conditions are met and the mission remains within the set limits. Self-diagnostic features are vital in order for the system to maintain the integrity of the planned operation.

If the box-of-operation is "broken" in any dimension, it will affect the choice of functions available for the operation. As a result, the level of autonomy may need to be altered, which would affect the execution of the task and could lead to the abortion of the mission and returning to base; or continuing to perform non-lethal tasks only; or the weapons system would need to request new plans. Depending on circumstances, changes in the allowed functions can be dynamic: if original parameters set for the mission are resumed, the full range of functions may again become available.

Phase 4. Launch and the point-of-no-return
Justified use of military force always requires contextual assessment, assessing a wide variety of risks and other aspects, including the fundamental rationale for the military necessity of the operation. If deemed legitimate and justified, the deliberative human decision will follow to launch the system on its mission, with the specified degree of freedom and limitations.

After launching the weapon, i.e., activating or sending the system to execute the given task, there may still be a possibility for cancelling or re-parametrizing the action. But as in any weapons system, at a certain moment a point-of-no-return will be reached, after which adjustment or cancellation of the action are no longer possible for the operator – like in long-range artillery fire, where it may take tens of seconds before the projectiles hit

their target. However, integrated contextual intelligence could enable the LAWS to rectify human errors by analysing information during the execution of the task, checking it against the box-of-operation, and if needed, adapting its conduct accordingly.

Phase 5. Monitoring the mission and ending it
A communication link between the command centre (the officer in charge) and LAWS should always be maintained if the intended use enables communication. However, if the lack of communication in an off-the-loop use-case has been taken into account in all the previous phases, pre-planned or unexpected loss of communication will not cause harm. Communication channels may be deliberately cancelled due to operative reasons (to maintain radio silence), or they may be lost as a result of jamming, interference, or physical battle damage. By definition, autonomy is about self-sustainability and the ability to cope with the specified mission without external assistance. If on-the-loop communication is required for using a weapons system, then the system is not autonomous in its critical targeting and attack functions, i.e., it does not qualify as LAWS.

The mission ends once the task has been executed or the mission is aborted either by the system itself or ultimately by the user in charge. Sensitive on board self-diagnostics and careful specification of the box-of-operation are indispensable parts of human-machine interaction. These should enable the LAWS to self-abort when needed. However, regardless of precautions, an unexpected situation could still require to abort an off-the-loop mission. For such emergencies, both the technical systems design and the operative planning have to include several alternative and independent methods to halt the operation of LAWS.

Conclusion

International law continues to apply in full regardless of technological developments. Any weapons system, whether with or without autonomous features, must be used in accordance with international humanitarian law. At the same time, military practice has to adapt to reflect the reality of increasing cognitive capabilities of machine autonomy. In any situation, humans remain fully responsible for the use of military force and its consequences.

A careful, comprehensive and contextual weapons review process can form the basis for the legal use of a hypothetical LAWS, assuming that the cognitive capabilities of the system match the intended use-case. Profound understanding of the issues at hand is required of anyone entrusted with the use of LAWS, so that they are able to plan the mission and define the restrictions attached to it. For machines, recognising contextual changes is very challenging. Even a slight change in circumstances may alter the context significantly, turning a legitimate military task into a war crime. Detailed definition of the intended use-cases, combined with careful tuning of the box-of-operation, is of vital importance.

In the final decision to launch an operation, military necessity, risks, and potential benefits have to be carefully judged. This requires full understanding of the complexity of the task and high human ethical standards.