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Scenario Compendium for the Legal, Operational and Technical Analysis of Lethal Autonomous Weapon Systems

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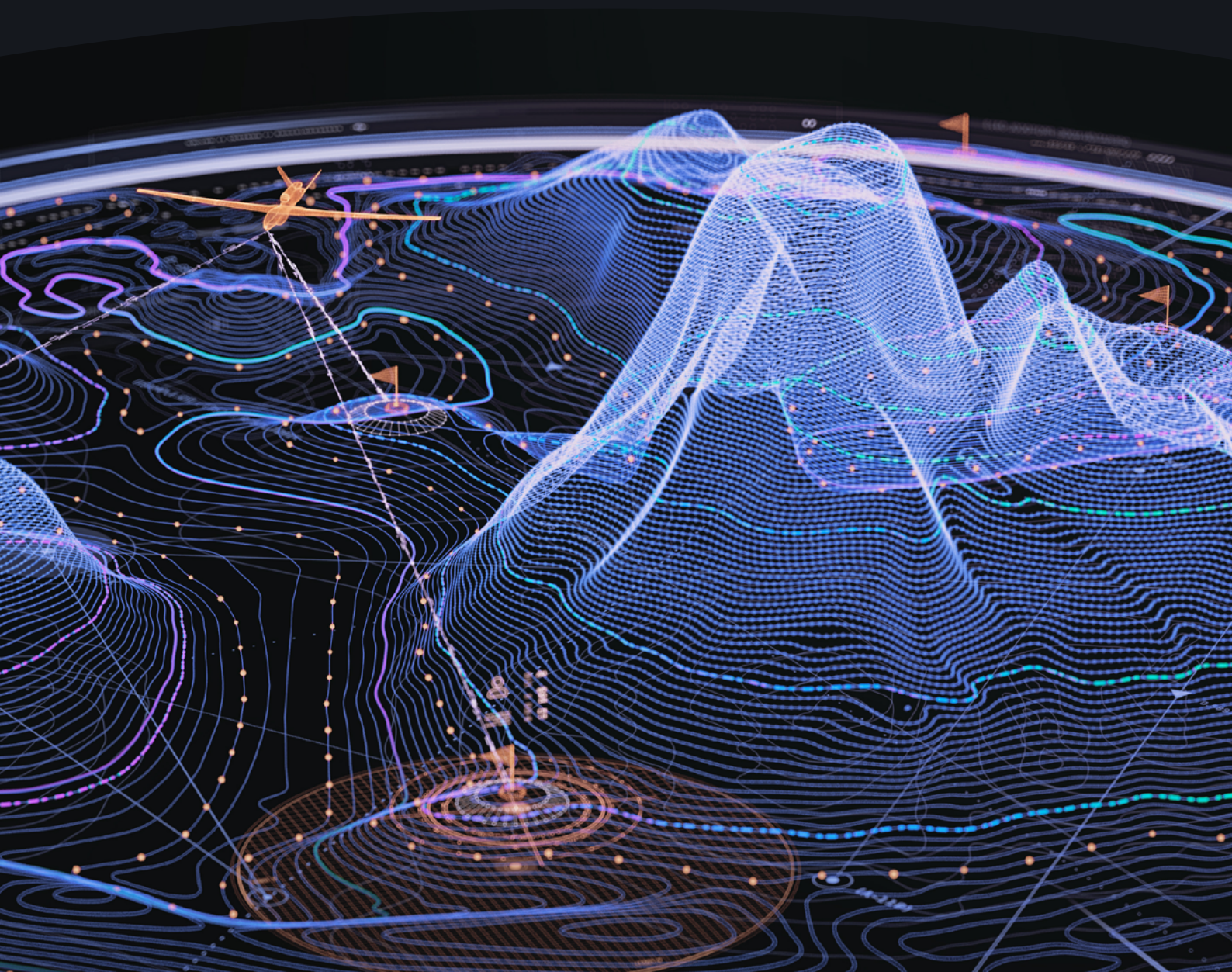

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Cover Image: Tactical drone mission interface (generated with AI). Credit: Adobe Stock / eriksvoboda.

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Preface

Advances in science and technology are reshaping the ways in which military force is developed and employed. Recent breakthroughs in areas such as artificial intelligence, sensing and data processing are enabling new forms of military capability, including systems that can perform functions with varying degrees of autonomy. Elements of these developments are already visible in contemporary conflicts, where the increasing integration of digital technologies and automation is influencing how operations are planned, conducted and assessed. These trends are driving renewed attention to the implications of autonomy in the use of force.

In this context, in his *New Agenda for Peace*, the United Nations Secretary-General called for the prohibition of lethal autonomous weapon systems (LAWS) that function without human control or oversight and cannot be used in compliance with international humanitarian law (IHL). He also called for all other types of autonomous weapon systems to be regulated. Similarly, the States Parties to the Convention on Certain Conventional Weapons, through the work of the Group of Governmental Experts (GGE) on LAWS, have emphasized the need to distinguish between systems that are inherently incompatible with IHL and must be prohibited, and those that could be used in compliance with IHL but require regulation. While this "two-tier" approach has not been institutionalized, many delegations have underscored that this distinction should form a central element of any future instrument, making continued examination of these issues essential.

Notably, both the Secretary-General and the GGE on LAWS have reaffirmed the centrality of international humanitarian law. This agreement builds on the shared understanding that IHL remains the indispensable governing framework for the conduct of hostilities and in armed conflict more widely. It provides the minimum, foundational legal threshold to mitigate the humanitarian consequences of war – including in contexts where LAWS may be deployed.

These positions further rest on two key considerations: understanding the potential use of LAWS; and clarifying what compliance with IHL means in practice when applied to such systems.

Beyond broader provisions of international law, including IHL and its principles, there is an absence of international agreement on prohibited uses of LAWS and shared measures to ensure compliance. To fill this gap, this Scenario Compendium has been developed as an analytical tool to support States and the wider international community in further exploring these complex issues. It will also help States to subsequently identify, adopt and implement specific measures to foster and enhance compliance with IHL. Amid growing calls to uphold compliance in alignment with the fundamental purpose of IHL – to limit the effects of armed conflict for humanitarian reasons – the need for concrete measures to foster and enhance compliance has become an operational necessity.

As military technologies continue to evolve, meaningful engagement with their implications requires approaches that are both grounded in operational reality and anchored in existing legal frameworks. Additionally, ensuring that legal principles, obligations and prohibitions are robustly applied across contexts in which LAWS may be deployed constitutes a critical safeguard to protect civilians in the face of both rapid technological innovations and evolving security and operational contexts. Ultimately, by providing a common reference point for analysis, this Scenario Compendium aims to support more structured and informed dialogue among States and other stakeholders. It is offered as a contribution to ongoing international efforts to better understand the implications of autonomy in the use of force and to ensure that its development and use remain consistent with international law.

VOLUME I

Introduction and user guide

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1. Background and context

For many years, the international community has engaged in discussions on lethal autonomous weapon systems (LAWS), particularly in relation to how their potential development and use could challenge compliance with international humanitarian law (IHL).

The development and use of LAWS in armed conflict is fully subject to international humanitarian law, and is thus subject to IHL's fundamental principles, underlying obligations and prohibitions.[1]

The position of the United Nations Secretary-General on the subject of LAWS is well articulated in his *New Agenda for Peace*, released in 2023. In it, he calls for a **legally binding instrument to prohibit** lethal autonomous weapon systems that function without human control or oversight and which cannot be used in compliance with international humanitarian law; and **to regulate** all other types of autonomous weapon systems.[2]

States have affirmed the applicability of IHL to LAWS on multiple occasions in United Nations forums, including in the work and reports of the Group of Governmental Experts (GGE) on LAWS under the Convention on Certain Conventional Weapons (CCW Convention) and at the General Assembly. However, while States agree on the applicability of IHL to LAWS, differences in position have surfaced over how IHL applies, where there are possible limitations in the application of IHL, and whether new instruments are required or the law as it is (*lex lata*) would be sufficient to govern the development, deployment and use of LAWS.

The arguments within the GGE on LAWS in favour of a legally binding instrument centred on the need to strengthen IHL in light of the unique challenges posed by autonomous functions in weapon systems, as the core principles of IHL were developed at a time when humans were solely responsible for making judgments of distinction, proportionality and precautions in attack. Further, a legally binding instrument adopted at the multilateral level would prevent possible fragmentation of approaches at the national level. For States that support a legally binding instrument, the continued development of the law, rather than its mere reiteration, is inherent to the framework of the CCW Convention.

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1 Member States taking part in the Group of Governmental Experts on LAWS under the Convention on Certain Conventional Weapons have, throughout the years, agreed on the importance of ensuring compliance with international law, particularly IHL, throughout the life cycle of LAWS. See, for example, the language of the Report of the 2023 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems: "weapons systems based on emerging technologies in the area of LAWS must not be used if they are incapable of being used in compliance with IHL", and "States must ensure compliance with their obligations under international law, in particular IHL, throughout the lifecycle of weapon systems based on emerging technologies in the area of LAWS." Report of the 2023 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, CCW/GGE.1/2023/2, 24 May 2023, https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2023)/CCW-GGE.1-2023-2_English.pdf.

2 United Nations Secretary-General, *A New Agenda for Peace*, Policy Brief no. 9 (New York: United Nations, July 2023), 27, https://www.un.org/sites/un2.un.org/files/our-common-agenda-policy-brief-new-agenda-for-peace-en.pdf.

The position of the International Committee of the Red Cross (ICRC), noting serious concerns regarding the reliability, accuracy and predictability of such systems,[3] has been to recommend legally binding **prohibitions** – including for those autonomous weapons designed "in such a manner that their effects cannot be sufficiently understood, predicted and explained"[4] or those that are designed or used "to attack humans directly"[5] – and clear **restrictions** on the use of the autonomous systems that do not fall under the prohibitions category. Notably, the ICRC recommends "limits on the duration, geographical scope, scale and situation" of the use of autonomous weapons, in particular restricting the use of such weapons to "only situations in which civilians and civilian objects are not present".[6]

Elements of prohibitions and regulations have also featured prominently in the discussions of the GGE on LAWS.[7] As of March 2026, the rolling text under discussion in the Group similarly stated prohibitions under IHL (e.g., prohibitions on the use of LAWS that are inherently indiscriminate if their effects in attack cannot be anticipated and limited) and requirements and measures to ensure compliance with IHL (e.g., operate LAWS under a responsible chain of command and control, limit the operation of LAWS to a defined perimeter, and restrict use to military objects).[8]

The direction recommended by the Secretary-General, and by other bodies in recent years, is clear: develop and adopt a combination of prohibitions and regulations.

This has become informally recognized as the "two-tier approach".[9]

However, the operationalization of such objectives requires closing knowledge gaps as well as broadening the pool of States contributing to such efforts. Presently, many States continue to lack a national position on LAWS or sufficient capacities to engage on this topic at the multilateral level. This has an impact on both the number and diversity of perspectives that actively contribute to this debate.

Over the course of 2024 and 2025, UNIDIR conducted a study aimed at taking stock of the perspectives of States and the expert community on the application of IHL in relation to LAWS.

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3 International Committee of the Red Cross (ICRC), "Autonomous Weapon Systems and International Humanitarian Law: Selected Issues", Position Paper, December 2025 (updated March 2026), 9, https://www.icrc.org/sites/default/files/2026-03/4896_002_Autonomous_Weapons_Systems_-_IHL-ICRC.pdf.

4 Ibid., 10.

5 Ibid., 13.

6 Ibid., 18.

7 GGE on LAWS, Report of the 2023 Session, CCW/GGE.1/2023/2, 24 May 2023, https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2023)/CCW-GGE.1-2023-2_English.pdf; GGE on LAWS, Chair's Summary of the Second 2024 Session, CCW/GGE.1/2024/WP.11, 2 October 2024, https://documents.un.org/doc/undoc/gen/g24/181/91/pdf/g2418191.pdf.

8 GGE on LAWS, "Rolling text, status date: 18 December 2025", https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2026)/CCW_GGE_LAWS_Rolling_Text_-_status_18_December_2025.pdf.

9 The two-tier approach is not part of the mandate of the GGE on LAWS, and it is not formally recognized as part of the Group's programme of work, but it has gained traction in the discussions.

The study resulted in two publications, one based on a literature review[10] and the other based on regional consultations.[11] It highlighted that:

1. Many of the differences observed in the interpretation of IHL in relation to LAWS are rooted in pre-existing and long-standing differences in legal interpretation that are further amplified when LAWS are introduced.[12]
2. While States may not (yet) be ready to converge on a single, internationally agreed, legal interpretation of how IHL would apply to LAWS, there is significant interest in developing concrete compliance measures. This view notes that differences in national interpretations should not stand in the way of reasserting IHL's centrality.[13]
3. Scenario-based exercises are an effective methodology to support future work on the interpretation and application of IHL in relation to LAWS. The conduct of such exercises provided both an important opportunity to gain insights from different perspectives (both across government and between government and experts from academia and industry) and a useful way to identify concrete measures to foster IHL implementation at different levels.[14]

It is within this context that UNIDIR developed this Scenario Compendium through a series of consultations with multidisciplinary and regionally diverse groups of military, technical, legal and academic experts. [15] The Compendium serves as a tool to further support States and the broader international community as they develop and refine positions on the application and implementation of IHL to LAWS, with a view to making concrete steps towards an international agreement on how to operationalize the two-tier approach.

2. Purpose and scope

This compendium provides a structured catalogue of scenarios for the use of LAWS in all domains (land, naval and air) in both international armed conflict (IAC) and non-international armed conflict (NIAC).

For the purposes of the Scenario Compendium, LAWS are characterized according to the GGE on LAWS rolling text (as of December 2025):

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10 Netta Goussac and Magdalena Pacholska, *The Interpretation and Application of International Humanitarian Law in Relation to Lethal Autonomous Weapon Systems* (Geneva: UNIDIR, 2025), https://unidir.org/publication/the-interpretation-and-application-of-international-humanitarian-law-in-relation-to-lethal-autonomous-weapon-systems/.

11 Yasmin Afina, *Regional Perspectives on the Application of International Humanitarian Law to Lethal Autonomous Weapons Systems* (Geneva: UNIDIR, 2025), https://unidir.org/publication/regional-perspectives-on-the-application-of-international-humanitarian-law-to-lethal-autonomous-weapon-systems/.

12 Ibid., 30.

13 Ibid., 27.

14 Ibid., 33.

15 More information on the methodology is provided in Annex B. Experts who chose to be named are listed in the acknowledgements.

a functionally integrated combination of one or more weapons and technological components, that can identify, select, and engage a target, without intervention by a human operator in the execution of these tasks.[16]

States have continued to engage on the characterization of LAWS in subsequent meetings of the GGE on LAWS, and the wording is likely to evolve. Nevertheless, the validity and usability of the scenarios would not be compromised should States agree to an alternative characterization of LAWS or, in the absence of a consensus text, if States were to apply national definitions or characterizations.

Important note

The Scenario Compendium does not endorse, recommend or advocate for the development, acquisition or use of LAWS. The inclusion of potential LAWS use cases reflects analytical necessity, not a tacit endorsement of their use.

The primary purpose of the Scenario Compendium is to support structured legal analysis centred around the potential use of LAWS in different operational and tactical contexts that will enable States to achieve one or a combination of the following outcomes:

- support the development of new – or stress-test existing – policies, doctrines, tactics, procedures and rules of engagement, including on issues related to human control and judgement;
- support discussions on operational planning;
- support the examination of technical requirements;
- support the training of legal advisers and senior decision-makers; or
- support national legal review processes.

It is important to note that the Scenario Compendium does not provide legal conclusions, nor does it seek to offer any approach to interpreting these legal principles. The responsibility for legal assessment, interpretation and application rests solely with users.

The scenarios contained in this compendium are not constructed around LAWS as the central subject matter. Rather, they are built around defined tactical and operational contexts across land, naval and air domains during international and non-international armed conflict. Each scenario describes a military situation in which force is employed to achieve one or more military objectives. The analytical starting point is therefore the tactical environment: mission type, operational constraints, target characteristics, civilian presence, intelligence conditions and domain-specific dynamics.

16 GGE on LAWS, “Rolling text, status date: 18 December 2025”, Box I.

LAWS are introduced only as a possible means by which physical force could be delivered within that tactical context. The scenarios do not presume that LAWS will be used; and they do not assume the operational necessity, technical feasibility or legal permissibility of LAWS use. Instead, they identify situations in which LAWS could be employed and specify the nature of the effects that such systems, if used, would be intended to produce (e.g., destruction, etc.).

This distinction is essential for the proper use of the Scenario Compendium. The Scenario Compendium does not consider autonomous weapons in abstract, rather only insofar as their use would intersect with:

- a defined military objective;
- a defined tactical environment; and
- a defined intended effect.

The analytical focus is therefore the tactical environment and the intended military effect – not LAWS or the technologies themselves. This approach ensures that discussion of autonomous weapons remains grounded in operational reality and in the legal framework governing the conduct of hostilities.

3. Intended use and analytical value

The Scenario Compendium is designed as a neutral technical resource to support States in analysing the legal, operational and technical implications of the potential deployment of LAWS.

As international discussions on LAWS continue to evolve, recent negotiating texts have emphasized the need for "context-appropriate human judgement and control"[17] to ensure that the use and effects of LAWS comply with international law, and in particular international humanitarian law. This includes the principles and requirements of distinction, proportionality and precautions in attack. The following iteration of the GGE on LAWS rolling text, from June 2026, referred to the "operational context" as one of the factors in determining "the appropriate level of human judgement and control" needed to uphold compliance with IHL.[18]

Such formulations underscore the central challenge of assessing autonomy in weapon systems in abstraction. "Context" and what constitutes appropriate human judgement and control can be better examined within defined operational and tactical situations and environments. The Scenario Compendium provides structured examples of what such contexts might look like and situates the possible use of autonomous weapons within realistic operational settings.

17 GGE on LAWS, "Rolling text, status date: 18 December 2025", Box III.

18 GGE on LAWS, "Rolling text, status date: 05 June 2026", https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2026)/GGE_LAWS_-_Rolling_Text_-_5_June_2026.pdf.

A note on human control and judgement

The concept of human control has been a core component of the debate on LAWS from the start. In this time, several formulations have been used to refer to the same basic principle: the importance of the human element in decisions about the use of force to ensure compliance with IHL.

While the exact terminology used to express this concept has evolved over the years, by 2019 States Parties to the CCW had already agreed by consensus to a set of guiding principles. Among these were that

> 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 factors should be considered including the operational context, and the characteristics and capabilities of the weapons system as a whole.[19]

The same consensus report also concluded that human judgement is essential in order to ensure that the potential use of LAWS is in compliance with international law, and in particular IHL.[20]

This formulation underscores two important aspects:

1. **Operational context is central** in determining quality and extent of human–machine interaction.
2. **Military decision-making in relation to the use of force is complex.** While "human control" alone is often interpreted as direct operation of the weapon system, "judgement" reflects the wider decision-making process that leads to the use of force, from system design to decisions on when, how and under what conditions force should be employed in compliance with IHL.

The scenarios presented in this compendium allow States and the broader community to further explore the impact of different contexts on both judgement and control. By providing illustrative snapshots of contexts and a selection of different employment options for LAWS, the Scenario Compendium allows users to:

- Discuss the level of control in the three critical functions (identification, selection and engagement of targets) required to ensure compliance with IHL in each scenario and for each option for use of LAWS. While no formal taxonomy of levels of control for LAWS exists, a common approach could be to use the human "on the loop", "in the loop" or "out of the loop" categorization.
- Discuss how broader parameters, from system design choices to doctrines, rules of engagement and others, could contribute to supporting or challenging compliance with IHL in each scenario and for each option for the use of LAWS.

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19 Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, CCW/GGE.1/2019/3, Annex IV – Guiding Principles, 25 September 2019, https://docs.un.org/en/CCW/GGE.1/2019/3.

20 Report of the 2019 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems, CCW/GGE.1/2019/3, Annex IV – Guiding Principles, 25 September 2019, https://docs.un.org/en/CCW/GGE.1/2019/3.

3.1. Development and refinement of legal interpretation

At the national level, the Scenario Compendium will support States in developing or refining their interpretations of how international humanitarian law applies to the possible use of LAWS. It is intended to help States to:

- consider how distinction, proportionality and precaution in attack operate under different delegation models;
- examine what forms of human judgement and control may be required in specific tactical circumstances;
- assess accountability and command arrangements; and
- identify areas requiring doctrinal clarification, procedural safeguards or policy guidance.

In this way, the Scenario Compendium operationalizes abstract concepts by embedding them in defined scenarios. It provides a structured basis for unpacking what "context-appropriate" human judgement and control may entail in practice.

3.2. Cross-institutional and national use

The Scenario Compendium is designed to facilitate both specialized deep dives and cross-cutting national dialogue.

Subject matter experts may use individual scenarios to facilitate analysis of discrete legal, technical or operational questions. At the same time, the structured format supports discussions across legal, operational, diplomatic and technology-development communities, helping to reveal assumptions and clarify institutional positions. Examples of cross-cutting questions could include the following:

- Under what circumstances would the use of LAWS provide an advantage over alternative weapon systems?
- What kinds of technical requirement (e.g., precision, sensitivity, accuracy) would be needed to ensure the legally compliant use of LAWS in a given scenario?
- What additional operational and tactical considerations would be required (e.g., type of payload, blast radius, etc.)?
- Are there any gaps in current doctrines, tactics, procedures and rules of engagement that would preclude the use of LAWS in a given scenario?

The scenarios are deliberately incomplete in order to allow users to layer their specific national systems, doctrines, rules of engagement and review processes onto a common baseline. This common baseline will facilitate grounded analysis across users without the need to embed sensitive or unsuited operational details in a shared framework.

3.3. Confidence- and capacity-building

In international settings, the Scenario Compendium may serve as both a confidence-building tool and a capacity-building tool.

By providing shared tactical reference points, it will enable States to compare how they interpret and apply international humanitarian law, how they conceptualize human judgement and control, and how they structure safeguards and oversight. Such structured comparative discussions can illuminate areas of convergence and divergence between States without requiring the disclosure of sensitive capabilities.

The Scenario Compendium provides ready-made, multi-domain heuristic frameworks that bring into focus legal and operational questions that might otherwise remain too abstract to examine meaningfully. By anchoring evolving debates in operational realities and established legal frameworks, the Scenario Compendium supports more precise, transparent and technically informed consideration of and engagement on LAWS.

4. Legal framing of the scenarios

The scenarios are situated in armed conflict settings, where international humanitarian law applies. Scenarios in Volume II are specifically situated within the framework governing international armed conflict. Status determinations, target categories and operational assumptions are grounded accordingly. Scenarios in Volume III are situated within the framework governing non-international armed conflict. Organized armed group dynamics, territorial control, intensity and other status considerations reflect this classification.

Each scenario includes structured legal questions. These questions are prompts designed to support analytical discussion of principles such as distinction, proportionality, precaution in and against the effects of attacks, as well as adjacent issues such as documentation and accountability pathways. The questions are organized thematically around the main IHL principles that emerge from each scenario.[21] As some questions may be of relevance to more than one principle, the questions are organized under the most relevant principle, notwithstanding their possible relevance to other principles.

The scope of questions laid out in the Scenario Compendium is specifically grounded in IHL – the object of the project's overarching focus. This focus should not in any way be interpreted as a negation of the importance of other branches of public international law that may be of relevance to the scenarios and, more generally, to the development, deployment and use of LAWS in both international and non-international armed conflict settings (e.g., *jus ad bellum*, international human rights law, the law of naval warfare and international criminal law).

21 For a general overview of these principles, see Annex E.

The scenarios in the naval domain engage core IHL principles governing the conduct of hostilities, particularly distinction, proportionality and precautions, as applied in this environment. These principles are further specified through the *lex specialis* of naval warfare, which includes rules relating to blockades, neutrality and capture.

In addition to scenario-specific questions on IHL, a number of cross-cutting legal questions are also provided to support a higher-level analysis. These include the following:

- What does the commander need to know for the purpose of deciding to deploy LAWS, and for their subsequent use, in each scenario? What information do they need to have access to in order to ensure compliance with IHL?
- What is the intended function and use of LAWS? What are the core characteristics, capabilities and limitations of the LAWS? On what data have they been trained? On what parameters and metrics does their performance rely?
- In all scenarios, would the use of a given LAWS be at least as reliable with respect to legal compliance as the use of a non-autonomous system for the same intended effect?

5. Structure of the Scenario Compendium

5.1. General architecture

The Scenario Compendium comprises three volumes:

- *Volume I: Introduction and User Guide.* This volume provides all the required information on how to use the Scenario Compendium to best effect.
- *Volume II: International Armed Conflict.* This volume comprises scenarios from a fictional international armed conflict between two States, named Alpha and Beta.
- *Volume III: Non-International Armed Conflict.* This volume comprises scenarios from a non-international armed conflict between the State of Alpha and a non-State armed group called the Delta Armed Group (DAG).

Volumes II and III share the same structure:

- **A geopolitical context.** This provides the strategic contours of the conflict, the geography and the actors involved.
- **An illustrative map.** This is not intended to be used for operational planning, but only to provide a visual aid in the interpretation of the scenarios.
- **The scenario catalogue.** The scenarios are grouped by domain (land, naval, air), and include:
  - **strategic anchors** that provide domain-specific operational framing, including environment characteristics, typical force-employment patterns and specific constraints;
  - **an index of the scenarios** to facilitate scenario selection; and
  - the **scenarios** themselves.

The three volumes are supported by five annexes:

- Annex A. Acronyms and abbreviations,
- Annex B. Methodology,
- Annex C. Typology of operations,
- Annex D. Scenario template,
- Annex E. Key international humanitarian law principles.

Disclaimer

The names of all States and geographical locations are represented by letters of the Greek alphabet. These names and all the events described in the scenarios are entirely fictional. The maps are for illustration purposes only. Any resemblance to real-world places, individuals or events is unintended and purely coincidental.

5.2. Scenario template

Each scenario follows a standard template to facilitate selection and use. The template includes the following elements:

- a **header**, which provides the basic information on each scenario to facilitate identification and classification;
- a **scenario narrative**, which provides a description of the events unfolding in the scenario;
- a **mission and targets section**, which clearly indicates what the mission is and what the intended target or targets for the scenario are;
- **options for LAWS employment**, broken down by mission function, likely targets and key operational risks – the options are neither ranked nor assessed in terms of legality, feasibility or preferability;
- **operational variables**, which introduce controlled uncertainty without altering core narrative facts;
  - the variables are designed to enable discussions on the use of LAWS under changing circumstances and may include such factors as intelligence reliability, civilian presence, environmental factors or communications degradation;
  - each variable is presented in three variants: favourable, adverse and uncertain;
- **a set of guiding questions for legal analysis** that guide the users to applied questions of international humanitarian law compliance for that context or operation.

In most cases, the scenario leads users to conduct the analysis from the perspective of one specific actor. However, some scenarios can be analysed from multiple perspectives. When this is the case, missions and targets, LAWS employment options, and operational variables must be adjusted accordingly.

5.3. Deliberate omissions from the scenarios

The scenarios are deliberately structured as analytical baselines, rather than as comprehensive operational descriptions. They define a tactical context and the relevant actors and potential effects to an extent sufficient to enable structured legal and operational discussion. They do not attempt to replicate the full complexity of real-world force structures, intelligence architectures, weapon systems, wider enabling capabilities or national doctrine. **The omission of these parameters is intentional.**

The Scenario Compendium is designed as a common reference framework for States and various expert communities. In order to preserve that common baseline, the scenarios do not embed specific technologies, doctrines or rules of engagement. Users are expected to complement each scenario with:

- their own systems and technical capabilities (where relevant);
- applicable command-and-control structures;
- targeting processes and doctrine;
- national rules of engagement;
- weapon-review standards and internal legal procedures; and
- any other missing factors as appropriate and required.

Such additions should be explicitly identified as user-generated inputs for the purposes of the exercise. This approach serves two purposes:

- it enables realistic national-level analysis without embedding sensitive or State-specific details in the baseline scenario; and
- it preserves comparability across analyses conducted by different States and institutions.

6. User guide and facilitator responsibilities

6.1. Exercise design principles

As mentioned above, the Scenario Compendium is designed to be adaptable. The scenarios provide a structured baseline, not a fixed script. Users are free to modify any aspect of a scenario in order to tailor it to national legal, operational or technical needs.

Modifications may include:

- adjusting force structures;
- altering operational tempo;
- modifying intelligence conditions;
- changing civilian density;
- introducing or removing communications constraints; and
- reframing mission objectives.

All modifications should be explicitly identified as such. The integrity of the exercise, and thus comparability across users, depends not on preserving the scenario in its original form, but on maintaining clarity between baseline structure and introduced modifications.

6.2. Integrating systems and capability analysis

The scenarios are system-agnostic by design. They do not embed specific platforms, architectures or capabilities. Users may employ the scenarios in two principal ways with respect to systems, as follows.

Assessing existing or in-development systems

Participants may use a scenario to evaluate how an existing or in-development system could be employed within that tactical context. In this case, the principal analytical question would be:

Given the system under consideration and its characteristics, what use could it have in the specific scenario and how could it be used in compliance with international humanitarian law?

This approach allows legal advisers, operators and engineers to consider whether a system's technical characteristics are compatible with legal and operational requirements in defined environments.

Deriving technical requirements from intended use

Alternatively, users may begin from the intended operational effect and legal compliance requirement and work backwards. In this case, the principal guiding question would be:

Given the intended use in a given scenario, what technical requirements would a system need to meet to be used in compliance with international humanitarian law?

This reverse-engineering approach allows capability planners to derive system specifications – such as sensing accuracy, explainability, human override functions, communication resilience or geofencing precision – from operational and legal constraints.

Both approaches are valid and may be combined within the same exercise.

6.3. Overlaying national doctrine and legal frameworks

As described in Section 5.3, the scenarios are deliberately incomplete. To take full advantage of the Scenario Compendium, when using the scenarios at the national level users should overlay the following, where applicable:

- national doctrine;
- targeting procedures;
- command-and-control structures;
- rules of engagement;
- weapon-review processes; and
- policy directives and operational constraints.

This overlay is essential for realism and relevance – it ensures that any discussion reflects how autonomous weapon systems would be managed within existing national frameworks, rather than in isolation.

In international settings, while excluding sensitive national information, States would be encouraged to highlight the extent to which their views reflect national positions, hypothetical analysis (i.e., abstract examination not linked to current national posture) or exploratory reasoning (i.e., preliminary reflection informed by national experience but not representing a formal commitment).

6.4. Using operational variables

Operational variables are designed to introduce structured complexity without altering scenario baselines. Facilitators or users may:

- select one or more variables;
- increase or decrease complexity;
- alternate favourable and adverse conditions; and
- combine multiple variable elements.

Facilitators or users may also introduce additional variables if desired. When adjusting variables, facilitators should ensure internal consistency.

A recommended approach is to begin with baseline conditions and introduce complexity incrementally.

6.5. Running an exercise

The Scenario Compendium supports a range of formats, from small internal consultations to multi-day expert workshops. A basic, adaptable exercise sequence is outlined in the table below.

STEP	DESCRIPTION
Step 1. Define objective(s)	Clarify the aims of the exercise: ▸ Examine legal interpretation ▸ Stress-test policy ▸ Assess a specific system ▸ Derive technical requirements ▸ Explore delegation thresholds ▸ Support multilateral exchange ▸ Confirm IAC or NIAC context ▸ Confirm domain of warfare ▸ Select scenario(s)
Step 2. Select operational context	▸ Confirm IAC or NIAC context ▸ Confirm domain of warfare ▸ Select scenario(s)
Step 3. Establish baseline conditions	▸ Review operational narrative (geopolitical context, domain-specific strategic anchoring, scenario narrative) ▸ Confirm baseline operational variables ▸ Overlay applicable national frameworks
Step 4. Select option for LAWS employment	▸ Select one option for use of LAWS ▸ Confirm intended effect ▸ Confirm targets
Step 5. Conduct structured analysis	Depending on format, participants may work in groups (legal, operational, technical, policy) or in plenary. Key analytical prompts include: ▸ How does IHL apply in this context and where are the primary compliance risks? (Use specific legal questions in each scenario) ▸ What constitutes context-appropriate human judgement and control? ▸ What operational safeguards are required? ▸ What technical capabilities are necessary to fulfil the mission in compliance with IHL?
Step 6. Introduce variable stressors	▸ Modify one or more operational variables ▸ Modify the option for use of LAWS ▸ Reassess legal and operational conclusions
Step 7. Conduct comparative discussion	Where relevant: ▸ Compare across options for use of LAWS ▸ Compare across domains ▸ Compare across different levels of complexity (based on operational variables) ▸ Compare national approaches

Step 8. Consolidate findings	Capture insights on: ▸ Legal interpretation ▸ Operational considerations ▸ Technical requirements ▸ Safeguards and oversight mechanisms ▸ Areas requiring further clarification

6.6. Facilitator responsibilities

The quality and credibility of an exercise depend significantly on the discipline with which it is conducted. The facilitator's role is procedural, rather than substantive: to maintain structure, clarity and analytical integrity without influencing conclusions. As such, facilitators should attend to the following concerns:

Maintain clarity between the baseline scenario and any introduced modifications

The facilitator must clearly distinguish between:

- elements that form part of the original scenario baseline; and
- modifications introduced by participants during the exercise.

Any changes to force composition, intelligence conditions, civilian presence, rules of engagement, system capabilities or delegation models should be explicitly identified and recorded. Doing so ensures transparency in reasoning and prevents conclusions drawn under modified conditions from being attributed to the baseline scenario.

Ensure balanced participation across communities

Where exercises involve multiple communities of practice – legal, operational, technical, diplomatic – the facilitator should actively encourage balanced contributions. If the purpose of the exercise is to enable stakeholder discussions, then the objective is to achieve balance across stakeholders, not dominance of one perspective over others.

Prevent drift into abstract or technological debate

The Scenario Compendium is designed to situate autonomous weapons within tactical contexts. Facilitators should therefore redirect discussion if it drifts into, for example:

- general political debate about autonomous weapons;
- abstract discussion detached from the scenario; or
- technological speculation unrelated to the defined mission or effect.

When necessary, facilitators should refocus participants by returning to the core analytical prompts, such as:

- What is the mission?
- What is the intended effect?
- What are the applicable obligations of international humanitarian law?
- What constitutes context-appropriate human judgement and control in this case?

Keep analysis anchored in the defined tactical context

All legal and operational reasoning should remain tied to the specific facts of the scenario as defined. If participants introduce additional assumptions, those assumptions should be articulated clearly and assessed for consistency with the scenario's operational logic. The facilitator should guard against unstated or implicit assumptions and internal inconsistencies across variables. Anchoring analysis in the tactical context preserves realism and comparability.

Preserve the neutrality of the exercise

The facilitator must not advocate particular interpretations, regulatory outcomes, or capability models. Given that, facilitators should:

- avoid steering participants towards specific conclusions;
- encourage articulation of reasoning; and
- ensure that various views are recorded accurately.

Neutral facilitation strengthens the credibility of the exercise, particularly in international settings.

Uphold analytical discipline

More broadly, the facilitator's responsibility is to ensure that scenario examination remains structured, rigorous and transparent. This includes:

- clarifying terminology;
- distinguishing policy statements from exploratory reasoning;
- summarizing key points of agreement and divergence; and
- documenting insights without attributing positions (unless this has been agreed).

The role of the facilitator is not to determine answers, but to ensure that the right questions are examined in a methodical manner.

VOLUME II

International Armed Conflict

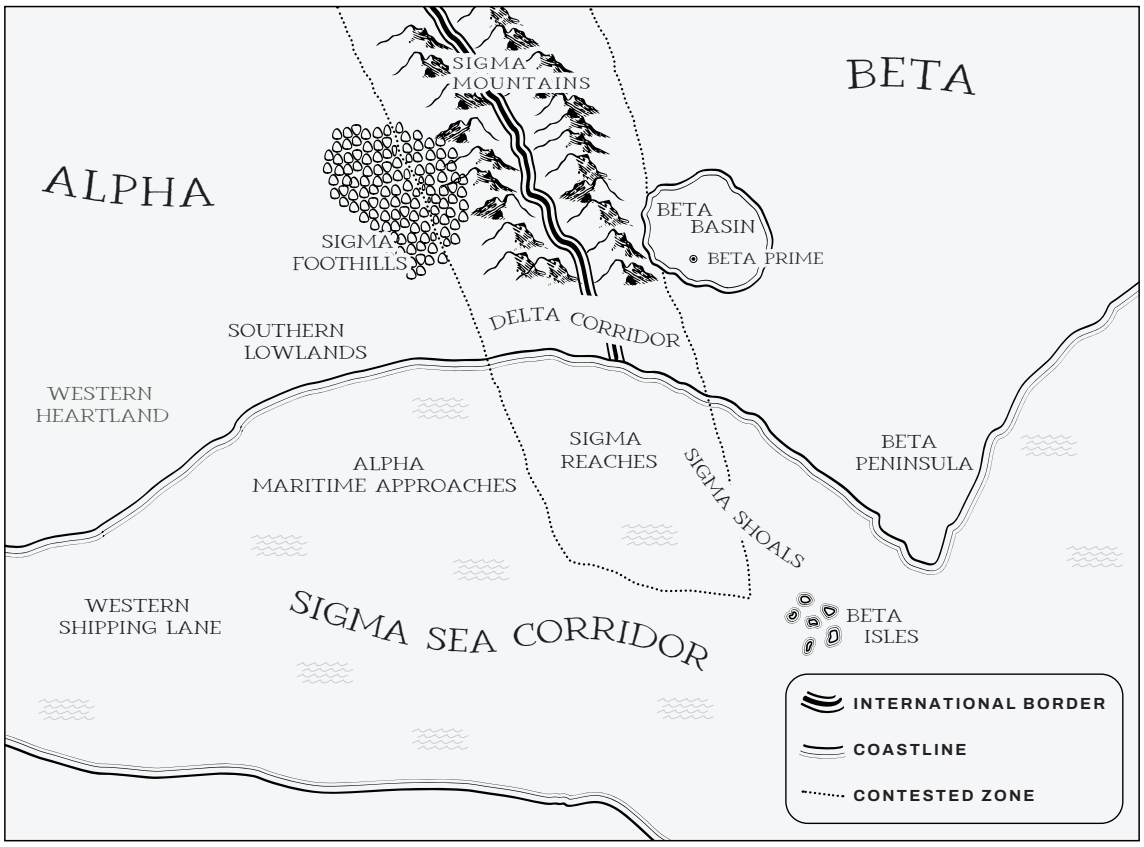
This volume is part of the Scenario Compendium on lethal autonomous weapon systems (LAWS). Background information on the publication, its scope and structure, as well as guidelines and instructions for using the scenarios, are provided in Volume I.

Disclaimer

All names of States and geographical locations are designated by letters of the Greek alphabet, and the events described in the scenarios are entirely imaginary. All maps are for illustration purposes only. Any resemblance to real-world places, individuals or events is unintended and purely coincidental.

Table of contents

Geopolitical overview of the Sigma war



1. Purpose and scope

This chapter establishes the shared geopolitical and geographic context for The Sigma war, an international armed conflict between the States of Alpha and Beta. It serves as a common reference layer for land, air, and naval scenario development and analysis.

This overview:

- provides high-level context on the principal actors and the conflict;
- defines territorial control and contested areas across domains;
- describes key geographic regions and strategic corridors;
- supports cross-domain coherence in scenario use; and
- avoids tactical, operational, or scenario-specific detail.

2. Principal actors

State of Alpha

Alpha is a **mid-sized coastal State** located in the western and southwestern portion of the Sigma region. Its economy and security posture are closely linked to maritime trade, coastal infrastructure, and inland logistics corridors connecting the coast to interior population centres.

From a defence perspective, Alpha maintains **technological superiority in conventional military platforms** compared to Beta across all domains. This advantage derives from advanced sensing, networking, and integration capabilities that enable higher levels of coordination, situational awareness, and operational reach.

Alpha has **access to autonomous weapon systems** across all domains. These systems are integrated into its broader force structure as force multipliers, complementing conventional platforms rather than substituting for them.

Strategically, Alpha prioritizes:

- protection of maritime access and coastal infrastructure;
- control of key inland transport corridors and logistics hubs; and
- preservation of freedom of action across domains through technological advantage and integration.

Alpha's geography and capability profile result in a strong emphasis on **cross-domain integration** and the protection of critical nodes rather than territorial depth.

State of Beta

Beta is a **mid-sized coastal State** situated in the eastern and northeastern portion of the Sigma region. Its administrative, industrial, and population centres are concentrated in its western provinces, while its southern and eastern territories provide access to the Sigma Sea Corridor.

Beta maintains **larger overall force numbers** compared to Alpha across all domains. Its force structure is optimized primarily for **territorial defence, area control, and sustained presence,** emphasizing resilience, redundancy, and coverage across its national territory and adjacent maritime zones.

Beta also has **access to autonomous weapon systems** across all domains. These systems are employed primarily to enhance defensive coverage, persistence, and situational awareness, particularly in contested land and maritime areas.

Strategically, Beta prioritizes:

- maintaining depth and interior lines of communication;
- defending key coastal, island, and border regions; and
- sustaining control and denial across contested zones over time.

Beta's geography and force structure support a **defence-oriented, territorially anchored posture across domains**.

3. The Sigma war – conflict context

The **Sigma war** is an **ongoing international armed conflict** between Alpha and Beta, characterized by sustained confrontation across land, air, and maritime domains.

The conflict reflects a **peer inter-State competition** in which:

- both parties possess modern, professional armed forces;
- both have access to **autonomous weapon systems** across domains; and
- neither side exercises comprehensive dominance across all geographic and operational dimensions.

Hostilities are concentrated along:

- the **northwest–southeast land border**, particularly in the Sigma Mountains and the Delta Corridor;
- the **Sigma Sea Corridor**, including island groups, chokepoints, and maritime approaches to principal ports and naval logistics hubs; and
- airspace above contested land and maritime areas.

While Alpha's technological advantages in conventional platforms enable greater integration and reach, Beta's larger force structure and territorially optimized posture allow it to sustain pressure and presence across contested zones. This asymmetry contributes to a **persistent, non-decisive conflict dynamic**, characterized by fluctuating levels of control rather than clear breakthroughs.

This overview does not consider the origins, legality, or potential resolution of the conflict. Its sole purpose is to provide a **neutral, stable geopolitical reference** to support scenario development and analytical consistency across domains.

4. Regional geography

The Sigma war theatre is structured around three defining geographic elements:

- a **northwest–southeast land border** separating Alpha (west/southwest) and Beta (east/northeast);
- a **shared maritime basin** south of the land border, known as the **Sigma Sea Corridor**; and
- contested **airspace** aligned with both the land frontier and the maritime basin.

This situation supports sustained **multi-domain operations** while maintaining a clear strategic distinction between land, maritime, and air theatres.

5. Territorial control framework

The following tables provide an overview across the three domains of the areas either controlled by one of the two States or contested. These areas will be extensively referenced in the scenarios and are described in this section for ease of reference.

5.1. Land domain – Territorial control framework

ALPHA-CONTROLLED AREAS	CONTESTED AREAS	BETA-CONTROLLED AREAS
Sigma Foothills Rolling and forested terrain west of the international land border. Forms Alpha's forward interior zone with limited road networks and mixed civilian–military traffic	**Sigma Mountains** Rugged mountain belt aligned with the international land border. Contains key passes and prepared defensive positions. Constitutes the primary land front	**Beta Provinces** Beta's western administrative and industrial core, anchored by the major urban centre Beta Prime
Southern Lowlands Coastal plain west of the Delta Corridor, including agricultural land, logistics infrastructure, and population centres. Areas closer to the contested belt experience persistent pressure and disruption	**Delta Corridor** North–south transport, logistics, and population axis crossing the border region. Includes market towns, road and rail links, irrigation infrastructure, and fluctuating civilian presence	**Beta Basin (interior)** Elevated plateau east of the border, providing Beta interior lines of communication, and strategic command of adjacent areas
Alpha Western Heartland Political and economic core of Alpha, located further west and not adjacent to the frontline	**Western Rim of the Beta Basin** Ridgelines and approaches overlooking the Sigma Mountains and Delta Corridor	–

5.2. Maritime domain – Territorial control framework

ALPHA-CONTROLLED MARITIME AREAS	CONTESTED MARITIME AREAS	BETA-CONTROLLED MARITIME AREAS
Alpha maritime approaches Deep-water maritime approaches to Alpha's principal ports and naval logistics hubs	**Sigma Reaches** Central cluster of reefs, islets, and narrow passages forming a natural maritime chokepoint. Hosts critical undersea communication cables and pipelines	**Beta Peninsula** Beta's primary coastal region hosting naval bases, coastal defence systems, and energy infrastructure
Western Shipping Lane (shared / international use) High-traffic commercial route running closer to Alpha's coast and regularly used by neutral shipping	**Western Approaches to the Beta Isles Sea** Space west of the island group where control is fluid and frequently contested	**Beta Isles** Island group in the central Sigma Sea Corridor, enabling control of access to western sea lanes

–	**Central Sigma Sea Corridor** Shared seaway characterized by persistent competition for sea control, access, and denial	**Sigma Shoals** Shallow waters near the Beta coast, well suited to small craft operations and coastal denial

5.3. Air domain – Territorial control framework

ALPHA-CONTROLLED AIRSPACE	CONTESTED AIRSPACE	BETA-CONTROLLED AIRSPACE
Western Air Defence Region Airspace over Alpha territory, including the Sigma Foothills, Southern Lowlands, and western maritime approaches	**Central Sigma Air Contest Zone** Airspace over the Sigma Mountains, Delta Corridor, and central Sigma Sea Corridor. Characterized by overlapping claims, degraded situational awareness, and frequent contestation	**Eastern Air Defence Region** Airspace over the Beta Provinces, Beta Basin, Beta Peninsula, and Beta Isles
Western Coastal Approach Airspace Airspace supporting maritime access and protection of the Alpha port complex	**Transit and Support Airspace** Airspace used for cross-domain support to land and maritime operations without stable control by either side	**Eastern Coastal and Island Airspace** Airspace supporting Beta coastal defences and island-based surveillance

6. Cross-domain coherence

Across all domains, contested areas represent **persistent zones of strategic competition** rather than temporary tactical fluctuations. Control designations reflect **enduring patterns of influence, access, and denial**.

All domains share the same **territorial logic, control notation, and geographic nomenclature**, providing a stable foundation for scenario development and analysis.

Note on autonomous weapon systems

For the purposes of this report, a **lethal autonomous weapon system** can be characterized as:

*A functionally integrated combination of one or more weapons and technological components, that can identify, select, and engage a target, without intervention by a human operator in the execution of these tasks.**

This characterization is provided solely to support analytical clarity and does not imply any assessment regarding the legality, acceptability, or use of such systems by any party.

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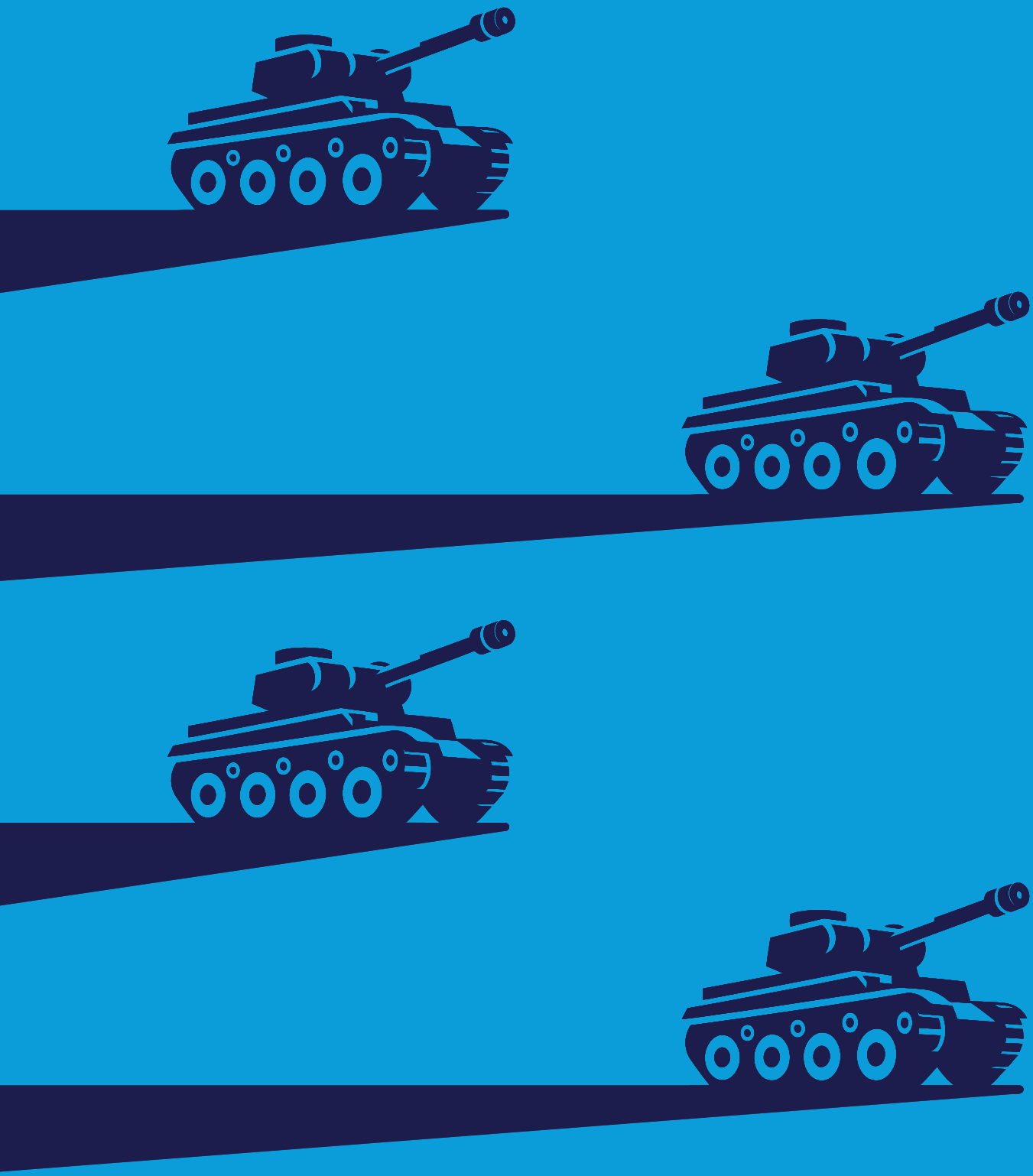
* See GGE on LAWS, Rolling Text, Box I, as of 18 December 2025, https://docs-library.unoda.org/Convention_on_Certain_Conventional_Weapons_-Group_of_Governmental_Experts_on_Lethal_Autonomous_Weapons_Systems_(2026)/CCW_GGE_LAWS_Rolling_Text_-_status_18_December_2025.pdf.



1. Land domain

1.1. Stragetic anchor

Purpose of the strategic anchor

This strategic anchor establishes the common operational, legal, and geographic reference for all land scenarios developed under the Sigma war framework. It is designed to:

- provide a stable strategic baseline against which individual Land scenarios can be assessed;
- ensure coherence between land scenarios and concurrent air and naval operations;
- support structured analysis of international humanitarian law considerations arising from land operations conducted under conditions of uncertainty, time pressure, electronic warfare, and civilian proximity; and
- frame discussions concerning the potential use of lethal autonomous weapon systems (LAWS) in the land domain, without prescribing outcomes or solutions.

Individual scenarios build on this anchor and should not restate its assumptions.

1.1.1. Strategic context

Alpha and Beta, two neighbouring mid-sized states in the Sigma region, are engaged in an international armed conflict following escalation along their shared international land border. What began as localized incidents and reciprocal allegations of cross-border incursions has expanded into sustained multi-domain hostilities encompassing land, maritime, and air operations.

Land combat is concentrated along the international land border–particularly in the **Sigma Mountains** and the **Delta Corridor** – where sustained confrontation persists without either side achieving dominance. The land campaign remains tightly interlinked with contested air operations above the same belt and maritime activity in the Sigma Sea Corridor, shaping sustainment, timing, and escalation dynamics without assuming stable control in any domain.

1.1.2. Operational land objectives

State of Alpha

Alpha holds technological advantages in conventional platforms and integration across sensors, command and control, and effects, enabling higher operational tempo and coordination under degraded conditions. Alpha has access to autonomous systems across domains, including LAWS.

Alpha's operational land objectives are to:

- shape the contested areas, particularly along the Sigma Mountains and Delta Corridor, to enable ground manoeuvre and disrupt Beta's sustained presence;
- protect and sustain land operations from its own territory, using the Sigma Foothills and Southern Lowlands as depth and support areas; and
- apply selective pressure toward Beta's interior depth, complicating reinforcement flows and defensive coherence from the Beta Basin and Beta Provinces.

State of Beta

Beta maintains larger overall force numbers across land, air, and maritime domains. Its force structure is optimized for territorial defence, area control, and sustained presence, emphasizing resilience, redundancy, and coverage across its national territory and adjacent contested zones. Beta has access to autonomous systems across domains, including LAWS.

Beta's operational land objectives are to:

- deny Alpha freedom of manoeuvre and prevent a breakthrough across the Sigma Mountains;
- sustain control and denial across the Delta Corridor despite fluctuating civilian presence and contested access;
- preserve defensive depth and interior lines of communication through the Beta Basin; and
- protect the stability and functioning of Beta Provinces, including Beta Prime, against operations that would impose strategic disruption.

1.1.3. The land battlespace

Land operations take place across the same named regions used in the air and naval strategic anchors, expressed through the territorial control framework described above. The contested areas represent the most unstable and analytically demanding environment, combining variable civilian proximity, infrastructure density, terrain-induced sensor degradation, and rapid escalation dynamics under contested information conditions.

Territories outside of the contested area provide comparatively greater control to the respective State, but remain subject to penetration, long-range effects, and cross-domain spillover.

Environmental factors – including weather, terrain, urban density, and electromagnetic congestion – frequently constrain classification confidence and decision-making timelines across land operations.

TABLE 1.

Land domain – Territorial control framework

ALPHA-CONTROLLED AREAS	CONTESTED AREAS	BETA-CONTROLLED AREAS
Sigma Foothills Rolling and forested terrain west of the international land border; Forms Alpha's forward interior zone with limited road networks and mixed civilian–military traffic	**Sigma Mountains** Rugged mountain belt aligned with the international land border; Contains key passes and prepared defensive positions; Constitutes the primary land front	**Beta Provinces** Beta's western administrative and industrial core, anchored by the major urban centre of Beta Prime
Southern Lowlands Coastal plain south of the Delta Corridor, including agricultural land, logistics infrastructure, and population centres; areas closer to the contested belt experience persistent pressure and disruption	**Delta Corridor** North–South transport, logistics, and population axis crossing the border region; Includes market towns, road and rail links, irrigation infrastructure, and fluctuating civilian presence	**Beta Basin (interior)** Elevated plateau and basin system east of the border, providing Beta with depth, interior lines of communication, and strategic oversight of adjacent areas
Alpha Western Heartland Political and economic core of Alpha, located further west and not directly adjacent to the front line	**Western Rim of the Beta Basin** Ridgelines and approaches overlooking the Sigma Mountains and Delta Corridor	–

1.1.4. Legal baseline, rules of engagement and additional guidance on the use of force

The situation constitutes an international armed conflict (IAC) between Alpha and Beta. All land operations are governed by international humanitarian law applicable to IAC. Protections apply to civilians, medical units and personnel, persons *hors de combat*, cultural property, dams and critical infrastructure.

Each State applies national rules of engagement and guidance on the use of force consistent with IHL, including requirements related to distinction, proportionality, precautions in attack, and the regulation of engagement authority near civilians and protected objects. In particular, rules and guidance are provided to:

- set positive identification (PID) standards including multi-source confirmation requirements;
- regulate use of force and engagement authority in and near populated areas, critical infrastructure, and other protected objects; and

- define conditions for employing autonomous and semi-autonomous systems, including:
  - thresholds for autonomous target engagement;
  - abort/override contingencies under EW degradation; and
  - requirements for multi-source PID in cluttered environments.

1.1.5. Integration with other domains

Land operations are conducted in parallel with ongoing air and naval operations and remain compatible with them. Cross-domain dynamics (e.g., contested airspace affecting ISR and communications, maritime pressure affecting sustainment and logistics) may be incorporated in specific Land scenarios where analytically useful.

1.2. Scenario catalogue

Land-101 – Urban complex targeting

Conflict type

IAC – Alpha vs. Beta

Operation category

Urban Offensive Operations (Urban Assault / Precision Urban Strike)

Geographic setting

Western approaches to Beta Prime, Beta

1. Scenario narrative

Alpha's advance towards the Beta Prime urban centre has slowed in a residential district within Beta Provinces, on the eastern side of the contested belt, a densely built area of mid-rise apartments, narrow streets, and partially evacuated civilian zones. Beta forces have established layered defensive positions inside several structures overlooking key approach routes.

Alpha seeks to secure this district to enable follow-on forces to isolate Beta Prime. Manoeuvre is restricted due to debris, damaged vehicles, and intermittent small arms fire from upper floors. Civilian movement continues in an irregular pattern despite earlier evacuation guidance.

Alpha's forces have identified a cluster of three adjacent apartment buildings believed to contain a Beta forward battle group command node coordinating defensive operations across the district; two reinforced infantry platoons occupying mid-level floors with prepared firing positions; and an anti-armour team using upper floors for vantage lines across the main approach route. Neutralizing the command node and degrading or destroying defensive positions within the cluster would enable Alpha's manoeuvre towards the district's central artery. Engagement is authorized once military objectives and combatants are positively identified. No clearance has been granted for area-wide strikes.

Alpha's forward forces establish covered positions in adjacent streets as intermittent small arms fire originates from elevated floors. Smoke from an earlier strike to the west drifts through the district, reducing visibility across the eastern façades and degrading sensor resolution.

Movement along approach routes is constrained by narrow streets and debris. With line of sight limited, platoon leaders prepare available fire and support options.

SIGINT indicates sustained radio traffic consistent with the Beta forward battle group command node, suggesting ongoing coordination of multiple defensive positions. Short encrypted bursts imply recent reinforcement or internal repositioning.

Weather reports anticipate declining visibility in the coming hour as shifting wind carry additional smoke across the area.

Alpha's brigade commander assesses that delay may allow Beta forces to reposition deeper into Beta Prime or reinforce adjacent sectors. Forward elements begin preparations to engage the identified military objectives and combatants within the building cluster.

2. Mission and targets

Mission

Secure the residential district on the western approaches to Beta Prime by neutralizing Beta defensive positions within the identified apartment building cluster in order to enable follow-on manoeuvre.

Targets

- Beta forward battle group command node located within the building cluster.
- Reinforced infantry platoons occupying mid-level floors with prepared firing positions.
- Anti-armour team positioned on upper floors overlooking the main approach route.

Engagement is authorized only against positively identified military objectives and combatants. No clearance has been given for area-wide strikes.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision urban strike	Neutralize confirmed command node and defensive firing positions within identified buildings	Beta command element; Fortified infantry firing points; Anti-armour team on upper floors	Misidentification of specific floor or unit; Potential civilian presence on lower floors; Structural effects within multi-story buildings
Counterfire suppression	Detect and engage hostile firing positions during active engagement	Beta personnel firing from windows, rooftops, or prepared apertures	Difficulty distinguishing combatants from civilians at range; Dynamic relocation between floors
Protective overwatch in support of ground manoeuvre	Provide persistent observation and engagement against emerging threats during ground manoeuvre	Beta forces repositioning within the cluster and engaging Alpha ground forces	Sensor degradation from smoke; Friendly fire risk during close-proximity manoeuvre

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR and SIGINT confirm command node location and distinguish defensive elements by floor and function	ISR degraded by smoke and obstructions; Inability to localize command node within specific building	Conflicting ISR assessments produce ambiguity regarding which structure houses the target node
Risk to civilians	Lower floors confirmed evacuated; Civilian movement limited and predictable	Civilians present on lower floors and near entrances during engagement	Civilian distribution within intermediate floors cannot be confirmed; Movement patterns irregular
Urban density and structural complexity	Internal layouts known; Structural resilience assessed with moderate confidence	Multi-story construction and unknown interior configuration affect munition behaviour and blast propagation	Internal structural modifications or barricades may alter expected engagement effects
Visibility and sensor performance	Clear weather and minimal smoke allow stable identification of firing positions	Smoke, debris, and weather reduce sensor fidelity	Wind shifts may either improve or further degrade visibility during engagement window
Defensive mobility of Beta forces	Static defensive positions on identified floors	Beta personnel rapidly relocate between floors and buildings during engagement	Uncertainty regarding internal movement routes linking adjacent structures
Electronic interference	Minimal Beta electronic countermeasures affecting remotely piloted or autonomous systems	Confirmed Beta EW degrades ISR feeds and targeting links	Intermittent electronic interference causes inconsistent targeting data
Proximity of protected or sensitive structures	No critical civilian infrastructure immediately adjacent to the cluster	Nearby medical clinic and market area within potential effects radius	Degree of civilian occupancy in adjacent non-military buildings unclear

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and the principles of precautions in attack and from the effects of an attack (particularly with respect to the target to be engaged as part of the mission).

Specifically, the following questions are of relevance to the application of IHL in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be combatants, groups of combatants, military equipment, the buildings or parts of them?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments of persons and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?
  - Can the LAWS detect religious personnel?
    - What parameters and data is it using to identify and classify religious personnel as such?
    - Has the LAWS been programmed to not engage persons classified as religious personnel?
- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
    - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?

        - What parameters and measures are in place to heighten their protection?

- Can the LAWS detect and assess the loss of protection for persons?
    - Can it detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
        - What parameters and data is it using to assess such loss of protection for civilians?
        - What safeguards and measures are in place to minimize risks of false positives?
    - Can the LAWS detect and assess the loss of protection for protected persons, including medical and religious personnel?
        - What parameters and data is it using to assess such loss of protection?
        - What safeguards and measures are in place to minimize the risks of false positives?
- Can the LAWS detect the loss of protection for objects?
    - Can the LAWS assess the loss of protection for civilian objects?
        - What parameters and data is it using to assess such loss of protection for civilian objects?
        - What safeguards and measures are in place to minimize risks of false positives?
    - Would such feature be in alignment with the presumption of civilian status under IHL?
    - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
        - What parameters and data is it using to assess such misuse?
        - How would the system classify a “misuse”?
        - What safeguards and measures are in place to minimize risks of false positives?
    - For medical units and transports specifically, can the LAWS identify whether these objects are being used outside their humanitarian function to commit acts harmful to the enemy?
        - What parameters and data is it using to assess such use?
- What measures are in place to ensure target verification to the extent feasible?

Precautions

- What system features or operational controls are in place to proactively avoid – and in any event minimize – risk of collateral damage?
    - Does IHL require these tasks to be undertaken by a human? On what legal basis?
    - To what extent must risk reduction be initiated and undertaken by a human operator?
- Can the LAWS detect civilians, civilian objects and civilian movement as they are encountered, ascertain their status and adapt its course of action accordingly, including through the abortion or suspension of engagement?

- What parameters and data is it using to conduct such an assessment?
- Is the assessment done on a continuous basis? What measures are in place to ensure that such continued assessment is documented?
- Would the effects of deploying and using LAWS make it necessary to give effective advance warning? Is the system equipped to deliver a warning?
- What parameters and data is it using to assess whether a warning would be appropriate and feasible?

- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?

Land-102 – Attack against high-value convoy

Conflict type

IAC – Alpha vs. Beta

Operation category

Ground manoeuvre operations (Movement to Contact / Interdiction)

Geographic setting

Delta Corridor, central Beta

1. Scenario narrative

Beta forces use sections of the Delta Corridor – a mixed agricultural and peri-urban region – as a primary resupply axis supporting their defensive network around Beta Prime. The corridor consists of narrow paved roads, irrigation canals, small villages, and dispersed civilian traffic, some of which continues despite evacuation advisories.

Alpha's operational plan requires disrupting Beta's logistics flow to prevent reinforcement and resupply of front-line positions in the Sigma Mountains and the Beta Prime Urban Cluster. Recent ISR has highlighted night-time movement patterns along a secondary logistics route within the Delta Corridor.

Alpha's 501st Armoured Battalion is positioned west of the corridor with authority to engage designated military objectives and combatants transiting the area.

Alpha has identified an upcoming Beta logistics convoy assessed to contain an undetermined number of commercial vehicles, one of which is carrying specialized munitions or air defence components; two military cargo trucks providing sustainment supplies and escort; and two armoured vehicles possibly providing close protection.

The specific vehicle carrying the high-value materiel cannot be conclusively identified. The convoy uses irregular timings merging intermittently with civilian-traffic in the corridor.

The convoy departs its Beta staging area under low-light conditions and enters a section of the Delta Corridor characterized by narrow mobility lanes. Alpha's ISR elements detect movement consistent with the convoy's profile but lose intermittent contact due to obscured terrain and civilian vehicles using the same route.

The convoy approaches a chokepoint near a canal bridge pre-identified by Alpha as the optimal location to execute the interdiction. However, environmental conditions and the presence of civilian vehicles complicate visual identification.

As the convoy nears the canal bridge – a natural decision point for manoeuvre – Alpha's forces prepare to attack before the convoy disperses into a more populated section of the corridor. Weather forecasts indicate further cloud cover will degrade sensor performance in the next hour.

2. Mission and targets

Mission

Destroy the identified Beta logistics convoy before it reaches its distribution point west of the Delta settlement in order to disrupt resupply and reinforcement of defensive positions around Beta Prime.

Targets

- Armoured escort vehicles assessed to be providing protection to the convoy
- Military-type cargo trucks providing sustainment supplies
- Vehicle assessed to be carrying specialized munitions or air defence components (specific vehicle not conclusively identified)

Engagement authority is limited to positively identified military objectives within the convoy.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision convoy attack	Neutralize armoured escort vehicles and confirmed military cargo trucks at the chokepoint	Armoured vehicles; Identified military-type trucks	Misidentification of commercial vehicles interspersed within convoy; Blast effects near civilian traffic
High-value vehicle targeting	Detect and engage vehicle assessed to be carrying specialized materiel	High-value commercial vehicle	Inability to conclusively identify correct vehicle; Duplication of signatures
Escort suppression	Engage protective armoured elements to prevent defensive response during attack if conducted by ground troops	Armed escort vehicles	Escalation of engagement in confined terrain; Collateral damage near canal infrastructure
Chokepoint overwatch	Provide persistent observation and engagement capability prior to and during attack	Vehicles manoeuvring to bypass canal bridge	Civilian vehicles entering engagement area; Degraded identification under cloud cover

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR tracks convoy departure, composition, and vehicle types with high confidence; High-value materiel truck positively identified	ISR intermittent due to cloud cover and rural clutter; Convoy size and composition unconfirmed; High-value materiel truck not positively identified	Conflicting ISR and HUMINT on number of vehicles and presence of high-value materiel
Risk to civilians	Civilian traffic density low along projected route during interdiction window	Civilian vehicles interspersed within convoy and transiting near canal bridge	Civilian traffic patterns fluctuate unpredictably along corridor
Vehicle discrimination	Clear differentiation between armoured escort and civilian vehicles	Military cargo trucks resemble commercial freight vehicles	Emissions or signatures suggestive but not conclusive of military payload
Terrain and chokepoint geometry	Canal bridge isolates convoy and limits manoeuvre options	Irrigation canals and vegetation restrict ground observation and manoeuvre	Convoy may divert along secondary roads prior to chokepoint
Sensor performance	Stable weather allows persistent tracking and identification	Cloud cover and low light degrade tracking and targeting accuracy	Rapid weather deterioration reduces sensor fidelity mid-engagement
Electronic interference	No significant EW interference affecting ISR feeds	EW interference produces duplicate or inconsistent tracking points	Source and consistency of electronic interference unclear
Engagement window	Convoy isolated before entering populated area	Delay risks convoy dispersing into more densely populated corridor sections	Exact timing of convoy arrival at chokepoint uncertain

5. International humanitarian law guiding questions

> **Key issue**
>
> This scenario primarily concerns distinction (with particular attention to the accuracy of the LAWS and how it relates to the scenario and the obligation to do everything feasible to verify that targets are military objectives), the choice of means and methods of warfare, as well as precautions in attack (specifically with respect to the ability to exercise constant care and target prioritization) and proportionality (in the light of evolving variables and their subsequent impact on expected incidental harm).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the convoy or its elements, the military equipment, the armoured vehicles, or the road?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?
  - Can the LAWS detect religious personnel?
    - What parameters and data is it using to identify and classify religious personnel as such?
    - Has the LAWS been programmed to not engage persons classified as religious personnel?
- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object? What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?

- What parameters and measures are in place to heighten their protection?

- Can the LAWS assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
  - Can the LAWS detect and assess the loss of protection for protected persons, including medical and religious personnel?
    - What parameters and data is it using to assess such loss of protection?
    - What safeguards and measures are in place to minimize the risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a “misuse”?
    - What safeguards and measures are in place to minimize risks of false positives?
  - For medical units and transports specifically, can the LAWS identify whether these objects are being used outside their humanitarian function to commit acts harmful to the enemy?
    - What parameters and data is it using to assess such use?
- What measures are in place to ensure target verification to the extent feasible, particularly when ISR coverage is intermittent or limited?

Precautions

- In the light of the heightened risks to civilians due to civilian activity in the Delta Corridor, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
- What measures and technical features are in place to ensure that target prioritization for the LAWS (e.g., targeting armoured vehicles) would limit the risk of misidentification of targets

or collateral damage?

  - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the obligation of the deploying State to conduct effective investigations in cases of alleged violations of IHL?

- What is the military advantage of neutralizing the convoy versus denying the infrastructure (roads)? Are there any specific measures in place to ensure that the system's course of action is consistently aligned with this assessment?
- Has the LAWS been programmed to continuously detect civilian movement and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?

Proportionality

- Can the LAWS verify that the proportionality assessment remains valid immediately prior to the strike in order to mitigate risk of collateral damage, particularly as assessments on the expected incidental harm on civilian infrastructure at various points (notably the canal bridge) might evolve due to changing variables?

Choice of means and methods of warfare

- How would the commander decide that the use of the LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- To what extent has the LAWS been designed, trained and tested for compliance with IHL for each of its functions?

Land-103 – Assault on a fortified defensive line

Conflict type

IAC – Alpha vs. Beta

Operation category

Breaching operations (Obstacle breach / fortification reduction)

Geographic setting

Sigma Mountains, Northern Beta

1. Scenario narrative

Alpha's advance along the Sigma Mountains has reached a prepared Beta defensive position consisting of trench networks, bunkers, anti-vehicle obstacles, and fire positions overlooking the surrounding ridgelines. The ground is uneven, with narrow approach routes shaped by rock formations and previous artillery impacts. There is no civilian presence in the area, with the nearest settlement hours away.

Visibility fluctuates due to intermittent fog common to the Sigma Mountains. Beta forces are believed to have limited mobility and to be operating from hardened positions.

Alpha's Armoured Brigade is tasked with penetrating this defensive belt to create a lane for follow-on forces towards the Beta Basin.

Alpha must conduct a deliberate breach against a section of the Beta defensive line where a reinforced battalion occupies connected trench systems and fortified bunkers. Anti-armour teams are placed along approach routes, and a local Beta tactical command post operates from a hardened shelter near the second trench line.

The designated breach lane covers a frontage of approximately 500 metres. Alpha must neutralize defensive positions that prevent the assault force from reaching the obstacle belt. No clearance is granted for area-wide or deep fires beyond the designated sector.

Alpha's assault forces take position behind a series of covered staging areas concealed by terrain. Engineering units prepare to move forward once suppressive fires degrade the first line of Beta defences. Fog drifts across the heights, limiting visibility to several hundred metres and reducing sensor fidelity.

As the window of relative concealment begins to close with improving daylight, Alpha's brigade commander assesses that delaying the breach will give Beta forces time to strengthen the defensive belt or reposition reserves. Forward assault elements initiate preparations to neutralize defensive positions on the designated frontage.

2. Mission and targets

Mission

Conduct a deliberate breach of the designated 500-metre frontage of the Beta defensive belt in order to enable follow-on manoeuvre towards the Beta Basin.

Targets

- Reinforced battalion occupying trench systems and fortified bunkers
- Anti-armour teams positioned along approach routes
- Beta tactical command post located near the second trench line

Engagement authority is limited to defensive positions within the designated breach sector. No area-wide or deep fires beyond the sector are authorized.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Trench-line suppression	Neutralize defensive positions along first trench line prior to breach	Occupied trench segments and active bunkers	Misidentification of occupied vs. decoy bunkers; Fog degrading target confirmation
Command node destruction	Engage tactical command post near second trench line	Hardened command shelter	Hardened structure resilience
Anti-armour team interdiction	Detect and engage anti-armour elements covering approach routes	Anti-armour teams positioned along ridgelines	Limited observation due to terrain; Rapid repositioning
Breach-lane overwatch	Provide suppression and observation during engineer movement	Defensive elements targeting breach lane	Friendly fire risk during close operation with manoeuvre units

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR confirms bunker occupancy, trench activity, and command node location	ISR limited by fog and terrain; occupancy and command location unclear	Conflicting indications regarding bunker abandonment or relocation of command post
Risk to civilians	No civilian presence within operational sector	Unanticipated protected personnel present within defensive belt	Possible presence of a small military medical facility with personnel *hors de combat* mixed with troops
Visibility and environmental conditions	Stable weather allows sustained observation of defensive positions	Fog and wind distort thermal and acoustic returns	Weather conditions fluctuate during engagement window
Defensive density	Defensive positions fixed and mapped with moderate confidence	Limited information available on the type and location of defensive positions	Defensive positions only partially mapped
Terrain effects	Terrain allows concealed approach and controlled breach lane	Uneven ground and narrow approaches constrain manoeuvre	Rock formations and artillery impacts alter expected lines of advance
Electronic interference	No confirmed EW affecting ISR	Strong electronic countermeasures affect accuracy and reliability of communications and ISR	Intermittent electronic interference randomly affecting sensor feeds
Timing pressure	Early action prevents reinforcement or repositioning	Delay enables Beta to strengthen defensive belt	Window of concealment under fog uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (including with respect to specially protected persons and objects and the obligation to do everything feasible to verify that targets are military objectives), precautions and proportionality, in addition to reflections on the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be combatants, the trench systems, military equipment or the bunkers?
  - What parameters and data is it using to identify and classify the targets?
- How would the fog have an impact on the ability of the LAWS to identify targets? Conversely, how would it have an impact on the ability to identify personnel *hors de combat* and specially protected objects? To what extent could it affect the assessments necessary for compliance with the rule of distinction?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?
  - Can the LAWS detect religious personnel?
    - What parameters and data is it using to identify and classify religious personnel as such?
    - Has the LAWS been programmed to not engage persons classified as religious personnel?
- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?

- Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten their protection?

- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
  - Can the LAWS detect and assess the loss of protection for protected persons, including medical and religious personnel?
    - What parameters and data is it using to assess such loss of protection?
    - What safeguards and measures are in place to minimize the risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a “misuse”?
    - What safeguards and measures are in place to minimize risks of false positives?
  - For medical units and transports specifically, can the LAWS identify whether these objects are being used outside their humanitarian function to commit acts harmful to the enemy?
    - What parameters and data is it using to assess such use?
- What measures are in place to ensure target verification to the extent feasible, particularly when ISR coverage is intermittent or limited?

Precautions

- In the light of the heightened risks to protected persons and objects due to limited visibility, what measures are in place to ensure that constant care to protect civilians is taken in the deployment and use of LAWS, particularly in the event that ISR capabilities are limited?

- What precautionary measures can be taken, or are in place, to identify and classify military objectives in the light of limited visibility?

- Has the LAWS been programmed to continuously detect protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?

Proportionality

- Can the LAWS verify that the proportionality assessment remains valid immediately prior to the strike in order to mitigate risk of collateral damage, particularly as assessments on the expected incidental harm might evolve due to changing variables, notably with respect to the need to account for persons classified as *hors de combat*?

Denial of quarter

- The trenches indicate the presence of combatants. Given limited visibility, what measures are in place to ensure that the LAWS is deployed in compliance with the prohibition of denial of quarter?

Land-104 – Engagement near a protected hydroelectric facility

Conflict type

IAC – Alpha vs. Beta

Operation category

Fire support operations (precision fires / interdiction)

Geographic setting

Kappa Dam, western Beta

1. Scenario narrative

The Kappa Hydroelectric Facility supplies power regionally and regulates water levels across several provinces, including in Alpha-controlled territory. The structure includes spillway gates, a turbine hall built into the rock face, and an administrative complex situated on the downriver side. Civilian presence in the immediate vicinity has decreased but is not fully absent, as the operating and maintenance crew have to ensure constant service continuity of the facility.

Beta forces have established a command post within the facility from which they exercise command and control of operations defending the western approaches to Beta Prime. Beta ground forces are positioned around the dam's upper access road and adjacent maintenance structures to ensure the protection of the command post. Alpha's operational advance in the area requires degrading this command and control capability.

Because damage to the dam could produce significant downstream effects, prior authorization is required for any strike within the restricted zone surrounding the facility.

Alpha surveillance assets have identified activity consistent with Beta forces using portions of the dam complex for a company-sized defensive element positioned around the upper maintenance buildings; a command and control post within the dam itself; and communication equipment and a mobile SAM system on top of the dam.

Alpha's mission is to prepare fires to neutralize these defensive positions to allow for subsequent deployment of special operations forces to engage the command post inside the dam. Only discrete military objectives and combatants may be engaged; actions must avoid unacceptable risk to dam integrity.

Alpha's forces deploy into covered firing positions east of the facility. Weather is stable, though forecast winds may affect sensor clarity later in the day. ISR teams track activity around the maintenance structures but cannot maintain consistent visual confirmation of personnel due to the dam's complex geometry.

Ground manoeuvre units approaching from the ridgeline encounter sporadic fire from elevated positions near the service road. Observation is constrained by the curvature of the hillside and restricted access angles around the dam complex.

Short bursts of encrypted radio traffic indicate that Beta forces may be repositioning or reinforcing defensive points near the upper buildings. A small vehicle is briefly observed entering one of the maintenance structures before disappearing from view.

As Alpha's manoeuvre units close on positions overlooking the dam approach, the brigade commander assesses that delaying action may allow Beta forces to consolidate defensive positions, closing the window of opportunity to enable the subsequent special operation.

2. Mission and targets

Mission

Execute precision fires against Beta defensive positions at the Kappa Hydroelectric Facility in order to degrade command and control and enable a subsequent special operations assault.

Targets

- Company-sized Beta defensive element positioned around upper maintenance buildings
- Communication equipment and mobile SAM system positioned on top of the dam

Engagement authority is limited to discrete military objectives and combatants within the restricted zone. Actions must avoid unacceptable risk to dam integrity.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Engagement of defensive elements	Neutralize defensive elements in upper maintenance buildings	Company-sized defensive positions	Structural damage affecting dam systems; Civilian maintenance crew presence
C2 equipment engagement	Disable C2 capabilities	Communication equipment on dam crest	Structural damage affecting dam systems; Civilian maintenance crew presence
Air defence systems engagement	Destroy or disable mobile SAM system	Mobile SAM platform and associated personnel on dam crest	Structural damage affecting dam systems; Civilian maintenance crew presence
Protective overwatch	Provide persistent observation and engagement during manoeuvre and SOF mission execution	Beta forces repositioning near service roads	Sensor distortion from concrete and rock surfaces; Friendly fire risk

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR and HUMINT confirm location of C2 post and defensive distribution	ISR limited by thermal reflections; Internal structure mapping incomplete	Conflicting ISR and HUMINT regarding C2 location inside dam vs. adjacent building
Risk to civilians	Civilian worker locations known and predictable; Downstream presence limited	Civilian workers present in administrative and maintenance areas during engagement	Civilian worker location and movement are inconsistent and unpredictable
Infrastructure sensitivity	Defensive elements located away from critical structural components	Engagement risks damage to spillway gates or turbine hall systems	Unknown proximity of military equipment to critical infrastructure nodes
Sensor performance	Stable weather supports consistent ISR tracking	Dam geometry and surface reflections distort thermal and optical feeds	Forecast wind shifts may degrade sensor clarity during engagement
Defensive repositioning	Beta positions remain static around upper buildings	Short encrypted bursts indicate repositioning and reinforcement	Internal movement within restricted zones cannot be confirmed
Terrain masking	Clear observation from eastern firing positions	Curvature of hillside restricts line of sight to service roads	Variable angles of approach affect identification and targeting precision

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the dam's status as a military objective by function and the application of specific protections due to its nature as an object containing dangerous forces), alongside precautions, proportionality, and questions around the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be combatants, the hydroelectric facility or its parts (e.g., the command post), or military equipment?
  - What parameters and data is it using to identify and classify the targets?

- What would amount to "discrete" military objectives? What parameters does the LAWS use to identify military objectives as "discrete"? To what extent would these parameters be in alignment with IHL requirements?

- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS distinguish between military personnel and civilian workers?
  - What parameters and data is it using to differentiate military personnel from civilian workers? Would these features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and, if the status of its targets changes mid-operation (e.g., repositioning of enemy forces outside of the dam, or if combatants become *hors de combat* mid-operation), adapt its course of action accordingly, including through the abortion or suspension of engagement?

- What measures are in place to ensure that the LAWS is operating in continuous compliance with the additional protections provided for objects containing dangerous forces (i.e., the dam)?

- What measures are in place to ensure target verification to the extent feasible, particularly when ISR coverage is intermittent or limited and sensors may be disrupted?

Precautions

- Which precautionary measures should be taken in the use of LAWS to minimize risks of harm to civilians and civilian objects, particularly with respect to disruptions to power and water supply to civilians?

- Can the LAWS identify components that, when targeted and engaged, might cause the release of dangerous forces (i.e., flooding)?

- Can the LAWS adapt its course of action, including target selection and force application, to avoid – and in any event minimize – risk of damage to civilian objects and incidental loss of civilian life and injury to civilians?

- Given the requirement for prior authorization for any strike within the restricted zone surrounding the facility, what measures are in place should communications with the system be interrupted or sensors be distorted?
  - To what extent could such disruption affect with the State's ability to comply with IHL obligations?

- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?

- To what extent could such degradation affect the assessments necessary for compliance?

Proportionality

- What are the foreseeable direct and indirect effects from destroying the command post within the hydroelectric facility?
  - To what extent would it affect civilian life, particularly with respect to energy and water supply?
  - To what extent could that be excessive when weighed against the concrete and direct military advantage anticipated from the operation?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context, particularly in the light of the sensitivities around the operation being conducted against targets within a hydroelectric facility?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- To what extent has the LAWS been designed, trained and tested for compliance with IHL for each of its functions?

Land-105 – Roadway security under civilian ambiguity

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Area security / route control

Geographic setting

Secondary road network within the Delta Corridor

1. Scenario narrative

The Delta Corridor remains a contested transport and population axis linking the Sigma Mountains with interior areas on both sides of the border. Despite repeated advisories and intermittent restrictions, civilian movement along secondary roads continues, driven by agricultural activity, access to markets, and local displacement patterns.

In recent weeks, Alpha ground movements through the corridor have been repeatedly disrupted by short-duration engagements along a secondary east–west road connecting forward positions near the Sigma Mountains to staging areas further west. These engagements have occurred in proximity to civilian traffic and have not resulted in sustained engagement or territorial control by either side.

Alpha forces are tasked with securing the designated roadway to ensure freedom of movement for military traffic and prevent hostile interference with resupply and troop movements. Engagement authority is limited to positively identified Beta forces that pose an immediate threat to route.

Alpha patrols establish observation positions overlooking key segments of the roadway while civilian vehicles continue to transit in both directions. Traffic slows intermittently at natural choke points created by terrain and roadside infrastructure. Visibility is further reduced by dust and roadside vegetation.

As a Alpha military resupply convoy approaches the sector, reports emerge of Beta infantry units gathering near a bend in the road where previous incidents have occurred. Several civilian vehicles are present in the immediate vicinity, and movement patterns become irregular. Communications from forward observation elements indicate increasing difficulty in maintaining situational awareness as vehicles converge on the area.

Alpha forces begin preparations to secure the roadway and respond to a potential attack under conditions of continued civilian movement and limited visibility.

2. Mission and targets

Mission

Secure the designated secondary roadway to ensure freedom of movement for military traffic and prevent hostile interference with resupply and troop movements.

Targets

- Beta infantry unit posing an immediate threat to route security

No authorization exists for area-wide fires or engagement beyond identified enemy troops.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Continuous armed patrol of entire route	Identify and engage Beta units posing immediate threat to route security	Beta ground forces before the attack to transiting convoy begins	Misidentification amid civilian traffic; Short engagement distances
Convoy protective escort	Provide real-time surveillance and defensive fires during convoy transit	Beta ground forces while the attack to convoy is underway	Friendly fire risk during close manoeuvre; Civilian vehicle proximity
Containment	Prevent enemy forces to disperse after engagement	Beta ground forces after the attack to convoy is completed	Loss of positive identification; Civilians moving along same routes

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	ISR confirms presence of Beta infantry units prior to engagement	No consistent identification beyond initial contact; Fragmented reporting	Conflicting assessments of whether incidents are coordinated military action or opportunistic activity
Risk to civilians	Civilian traffic temporarily reduced or diverted during engagement	Continuous civilian traffic	Civilian movement patterns fluctuate unpredictably at choke points
Visibility and terrain	Clear sight-lines along roadway segments	Dust, vegetation, and terrain-masking degrade observation	Visibility shifts rapidly with traffic and environmental conditions
Engagement distance	Sufficient standoff distance from civilian vehicles	Short engagement distances increase risk of incidental harm	Distance to potential threat varies unpredictably

Adversary identification	Armed personnel clearly distinguishable from civilians	Armed personnel not distinguishable from civilians	Status and affiliation of individuals uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions (including considerations of the obligation to take constant care), along with questions related to proportionality, distinction and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Precautions

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?
  - Can the parameters be adapted (autonomously or manually) should the circumstances of the scenario change, particularly in the light of heightened risk due to civilian presence?
- Can the system's selected course of action be adapted should circumstances on the ground change, particularly in the light of heightened risks due to civilian traffic in the Delta Corridor?
- What specific, precautionary measures should be taken before and in the use of LAWS in this scenario to minimize risks of incidental loss of civilian life and damage to civilian objects, particularly in the light of the driving factors behind continued civilian movement along secondary roads?
- What would be the function of the LAWS?
  - Would it be to either identify or engage the target? Or both identify and engage the target?
  - To what extent has the LAWS been designed, trained and tested for compliance with IHL for each of these functions, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?

- To what extent could such degradation affect the assessments necessary for compliance?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly as assessments on the expected incidental civilian harm might evolve due to changing variables, notably in the light of fluctuating civilian traffic?

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be combatants, military vehicles or military equipment?
  - What parameters and data is it using to identify and classify the targets?
- What types of target (objects versus individuals) has the LAWS been trained to identify or to engage?
  - Has the system been trained on data that accounts for local realities and cultural context?
- Can the LAWS detect persons *hors de combat*?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
  - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
- If the mission is to "Identify and engage Beta units posing immediate threat to route security", how is "immediate threat" to route security defined in the context of this scenario?
  - Will the LAWS be tasked with undertaking such an assessment?
    - If so, what parameters does the LAWS use to quantify and measure the imminence of threat?
  - To what extent are these metrics factored into assessments of the targetability of an individual or object, particularly with respect to military objectives by use?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context, particularly in the light of the known heightened risks to civilians in the Delta Corridor?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- To what extent has each of the functions of the LAWS been designed, trained and tested for compliance with IHL?

Land-106 – Forest / complex terrain interdiction

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Complex terrain operations / interdiction

Geographic setting

Forested areas of the Sigma Foothills

1. Scenario narrative

The Sigma Foothills form Alpha's forward interior terrain adjacent to the contested belt. Dense forest cover, limited road access, and uneven ground restrict movement and degrade sensor performance. The area has seen an increase in small-scale cross-border activity, including reconnaissance, harassment, and the movement of personnel and equipment towards the Delta Corridor.

Civilian presence in the area is limited but persistent, consisting primarily of residents of isolated settlements. Civilian movement patterns are irregular and vary with weather and daylight.

Alpha forces are tasked with interdicting Beta elements operating within the forested area to prevent infiltration towards the contested belt and disruption of rear-area activities. Targets are expected to be small, mobile groups rather than fixed positions.

Alpha deploys infantry units supported by remote sensors to monitor likely infiltration routes through the forest. Thick vegetation and uneven terrain limit visibility to short distances, and communications with higher headquarters are intermittent.

As weather conditions deteriorate and daylight fades, sensor performance degrades further. A group of individuals is detected moving along a narrow trail towards the contested belt, carrying elongated objects that cannot be clearly identified at range. Attempts to reposition patrols to improve observation are slowed by terrain and vegetation.

With night approaching and the detected movement nearing the forest edge, Alpha forces begin preparations to engage a potentially hostile element under conditions of limited visibility and uncertain classification.

2. Mission and targets

Mission

Engage Beta elements operating within the Sigma Foothills to prevent infiltration towards the contested belt.

Targets

- Positively identified Beta personnel operating within forested terrain

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Trail patrol and engagement	Detect and engage infiltrating Beta personnel along forest trails	Platoon-sized Beta units moving towards contested belt	Misclassification of civilians; Limited identification at range; Severe sensor degradation under canopy
Protection of ground troops	Provide overwatch to Alpha's ground troops and engage Beta forces posing a threat to ground forces	Platoon-sized Beta units posing immediate threat to Alpha's forces	Misclassification of civilians; Limited identification at range; Severe sensor degradation under canopy
Escape-route containment	Prevent withdrawal towards forest interior	Beta forces dispersing after detection	Loss of line of sight; Terrain masking

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-day ISR confirms repeated hostile movement patterns	Thermal and acoustic detections intermittent and ambiguous	Conflicting assessments of hostile vs. civilian activity
Risk to civilians	Civilian presence minimal and separated from infiltration routes	Civilian activity detected in adjacent areas	Civilian movement patterns irregular and weather-dependent
Canopy and terrain	Partial canopy openings allow identification	Dense canopy severely degrades sensor performance	Canopy density varies along trail network
Communications	Stable communication with higher headquarters	Intermittent communications due to terrain	Communication reliability fluctuates during operation
Timing	Interdiction occurs prior to forest-edge crossing	Delay allows infiltration towards contested belt	Exact timing of group movement uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction in the context of terrain interdiction, precautions, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be an area of land or small, mobile groups?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?
- Can the LAWS assist in appropriately identifying and subsequently targeting military objectives in the context of this scenario?
  - What parameters and data is it using to classify military objectives as such?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- In the light of the known, irregular civilian movement patterns, what measures should be undertaken for the deployment of LAWS for the purpose of terrain interdiction to avoid – and in any event minimize – risk of damage to civilian objects and incidental loss of civilian life, injury to civilians and damage to civilian objects?
- Can the LAWS be used to assist in the identification and engagement of enemy forces?
  - Can the LAWS autonomously adapt its course of action (e.g., suspend or abort) to minimize risk of damage to civilian objects and incidental loss of civilian life and injury to civilians, particularly when communications with higher headquarters is intermittent?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?

Choice of means and methods of warfare

- Can the LAWS be used in a terrain interdiction role (similar to a properly demarcated minefield)?
  - How would the commander decide that the use of the LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

Land-107 – Ground combat search and rescue (CSAR) under fire

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Personnel recovery / ground CSAR

Geographic setting

Forward slopes of the Sigma Mountains

1. Scenario narrative

Fighting along the Sigma Mountains remains fluid, with localized advances and withdrawals occurring along ridgelines and valleys that provide limited cover and restrict mobility. Weather conditions change rapidly, affecting visibility and communications. Civilian presence in the immediate area is assessed as low, though small settlements exist in adjacent valleys.

During a recent engagement, a Alpha reconnaissance element operating forward of main positions became isolated following indirect fire and communications disruption. Contact with the element has been intermittent, and its exact location remains uncertain.

Alpha forces are tasked with recovering isolated personnel believed to be located within the contested area of Sigma Mountains. The mission is limited to personnel recovery and force protection. No offensive targeting objectives have been assigned. Engagement authority is limited to military objectives and combatants posing an immediate threat to recovery forces or the isolated personnel.

Alpha recovery forces move towards the reported area using covered routes along the slopes. Visibility is limited by terrain and low cloud cover, and communications remain intermittent.

As recovery elements approach the last known position, heavy direct and indirect fire is reported from an unknown direction. Movement in the area increases, but identification of individuals remains uncertain due to terrain masking and intermittent sensor coverage. Weather conditions are expected to deteriorate further, reducing the window for recovery.

Alpha forces begin preparations to secure the area and recover the isolated personnel under conditions of ongoing contact and limited situational awareness.

2. Mission and targets

Mission

Recover isolated Alpha personnel within the contested area of the Sigma Mountains while protecting recovery forces.

Targets

Beta platoon using small arms and light weapons fire, including mortar positions.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Covering / suppressive fire	Allow Alpha's recovery elements to manoeuvre by saturating enemy positions with fire	Beta personnel firing on recovery forces (area fire)	Misidentification of friendly and hostile movement
Direct engagement	Locate and engage Beta forces attacking recovery element	Beta personnel firing on recovery forces	Friendly fire risk; Uncertain hostile positions
Overwatch / force protection	Prevent hostile encirclement during recovery	Beta elements manoeuvring along slopes	Terrain masking; Degraded coordination

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	ISR confirms location of isolated personnel and hostile positions	Fragmentary transmissions and uncertain location data	Conflicting reports on mobility and status of isolated personnel
Risk to civilians	No civilians in immediate recovery zone	Unexpected civilian presence in adjacent valleys	Civilian movement patterns unclear due to terrain masking
Friendly–hostile discrimination	Clear separation between friendly and hostile movement	Overlapping movement and positions complicate identification	Terrain masking produces ambiguous detections
Communications	Stable coordination between recovery and command	Communications are fully denied	Intermittent communications and interference
Weather	Stable weather allows extended recovery window	Deteriorating weather reduces visibility and recovery window	Rapid weather shifts alter conditions mid-operation
Time pressure	Personnel stable and sheltered	Worsening exposure and hostile fire create urgency	Exact duration of viable recovery window uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and proportionality (particularly with respect to the mission's aim of personnel recovery and force protection and the system's ability to assess collateral damage), along with precautions.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - Considering the defined targets are specifically "Beta platoon using small arms and light weapons fire", would it be all combatants? Only those using small arms and light weapons fire or other military equipment? Or both of these?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS reliably and accurately determine the source of the heavy direct and indirect fire?
  - What measures are in place for the LAWS to detect a degradation in its performance due to the limited visibility, intermittent communications and deteriorating weather conditions? What has the LAWS been programmed to do in such situations?
- As engagement authority is limited to military objectives and combatants posing an "immediate threat" to recovery forces or the isolated personnel, how is "immediate threat" to recovery forces defined in the context of this scenario?
  - Will the LAWS be tasked with assessing imminence of a threat?
    - If so, what parameters does the LAWS use to quantify and measure, on the one hand, imminence of a threat and, on the other, the threat itself?
  - To what extent is this metric factored into assessments of the targetability of an individual or object?
- What measures are in place to reduce the risk of the LAWS confusing friendly with hostile movement, particularly given limited visibility, intermittent communications and deteriorating weather conditions?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Precautions

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the source of heavy fire?
  - What measures are in place to ensure that the LAWS does not engage the source of heavy fire if the expected incidental harm would be excessive?

Proportionality

- How is "military advantage" measured in this context in the light of the mission's aim to recover isolated Alpha personnel within the contested area while protecting recovery forces? How does this affect proportionality assessments?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly as assessments on the expected incidental civilian harm might evolve due to changing variables?

Land-108 – Industrial / energy facility raid

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Special operations / infrastructure interdiction

Geographic setting

Peripheral industrial zone at the western edge of the Beta Basin

1. Scenario narrative

As fighting continues along the contested belt, Beta has increased reliance on industrial facilities located near the western edge of the Beta Basin to support military operations as forward logistics hubs. These sites lie outside the immediate area of active combat but remain within reach of land-based operations conducted from the Sigma Mountains.

The facility under observation is a large industrial energy complex consisting of storage tanks, processing units, and internal access roads. The presence of highly toxic chemicals has been reported on site. Civilian personnel continue to work at the site under modified operating schedules, and commercial activity has not ceased entirely.

Alpha forces are tasked with interdicting Beta military use of the industrial facility to disrupt support to ongoing defensive operations. Targets are limited to discrete military objectives and combatants located within or adjacent to the facility. No authorization has been granted for actions that would cause widespread or uncontrolled damage to the industrial complex.

Alpha elements position near the outskirts of the industrial zone, maintaining standoff observation. Access routes are limited, and the internal layout restricts visibility into several key structures.

As night approaches, vehicle movement within the facility increases, and several individuals are observed entering a secured structure previously identified as a Beta command and control node. Civilian personnel remain present in other parts of the complex, and lighting conditions create overlapping signatures complicating classification.

2. Mission and targets

Mission

Destroy command and control node within an industrial facility.

Targets

- Command and control node

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Targeted infrastructure strike	Destroy the command and control node within facility	Identified building	Civilian co-presence; Industrial secondary effects, including chemicals
Overwatch during ground action	Support precision engagement during limited entry	Armed Beta personnel inside compound	Restricted visibility; Friendly fire risk

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-source ISR reporting confirms military use of a specific building	ISR is conflicting with no certainty on which building is used as C2 node	ISR limited; Unclear whether site is currently used as C2 node or only for short-term storage
Risk to civilians	Civilian personnel absent from target structures during engagement window	Ongoing civilian activity within facility	Civilian workforce presence varies unpredictably
Industrial risk	Risks of secondary industrial effects are limited and predictable	The risk of significant secondary effects, including on highly hazardous materials, is high	Full risk mapping and assessment of secondary effects is not available
Environmental conditions	Conditions allow controlled observation of military-use areas	Adverse conditions significantly degrade ISR and communications systems	Variable conditions impact reliability of ISR and communications systems

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, precautions (particularly with respect to minimizing risk of collateral damage, including through secondary effects), proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Is it access pathways to the facility? Is it the actual facility or its parts (e.g., the command-and-control node only)? What would be the targets of the LAWS?
- What parameters and data does the system use to determine whether a vehicle movement consists of military objectives (i.e., military vehicles) or civilian objects (i.e., civilian vehicles)?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Precautions

- Do the technical functions of the LAWS enable the identification and engagement of individual military objectives without causing damage to the facility, particularly considering the risks of secondary effects arising from the presence of highly toxic chemicals on site?
  - To what extent is the LAWS proactively able to minimize risk of collateral damage? Conversely, to what extent must risk reduction be initiated and undertaken by a human operator?
- What measures are in place to ensure that the deployment and use of the LAWS would minimize risks to civilian personnel present on the ground? More broadly, what measures are in place to minimize risks of reverberating effects for civilians if the dangerous forces are released and to reduce risks of damage to civilian objects (i.e., parts of the industrial facility not used for military purposes)?
- In the light of the heightened risks to civilians due to the presence of civilian personnel, the continued commercial activity and the potential secondary effects from damage to the industrial energy complex, what measures are in place to ensure that constant care is taken in the deployment and use of the LAWS, particularly in the event that visibility is limited?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- Can the LAWS assess or support assessments of the risk of secondary effects (e.g., fire and chemical spill)?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly as assessments on the expected incidental harm might evolve due to changing variables?

Choice of means and methods of warfare

- How would the commander decide that the use of the LAWS is appropriate in this operational context, particularly given that the operation is being conducted in an industrial zone with high risks of secondary effects (e.g., fire and chemical spill)?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- Would it be appropriate for the LAWS to identify and engage specific targets, as opposed to identifying and engaging non-specific targets?
  - Is it accurate and reliable enough?
  - How would this decision to delegate target identification and engagement to the LAWS compare to a scenario where such systems would not be deployed?

Land-109 – Mountain / extreme terrain interdiction

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Extreme terrain operations / interdiction

Geographic setting

High-altitude passes within the Sigma Mountains, approaching the Beta Basin

1. Scenario narrative

Sigma Mountains include a series of high-altitude passes that connect the contested belt with Beta's interior. These routes are narrow, exposed to extreme weather, and difficult to access, but they offer opportunities for movement that bypass more heavily monitored corridors. Snow, high winds, and rapid temperature changes are common, frequently degrading mobility and sensor performance.

Civilian presence observed during the last week in the immediate area is minimal, limited to seasonal herders and maintenance crews operating intermittently during periods of improved weather.

Alpha forces are tasked with interdicting hostile movement through selected mountain passes to prevent the transfer of personnel and materiel between the contested belt and Beta's interior. Targets are expected to be small, mobile groups transiting the passes. Engagement authority is limited to positively identified military objectives and combatants under current environmental conditions.

Alpha elements deploy to positions overlooking the selected pass. Movement is slow, and extreme weather conditions limit the duration of human observation.

As a weather front moves through the area, visibility deteriorates rapidly. A group of individuals carrying what appear to be weapons is detected ascending towards the crest of the pass. Options for repositioning are limited by terrain and exposure risk.

With conditions worsening and the detected movement nearing the pass, Alpha forces begin preparations to interdict under severe environmental constraints.

2. Mission and targets

Mission

Interdict hostile movement through designated high-altitude passes to prevent transfer of personnel and materiel.

Targets

- Positively identified Beta personnel transiting the mountain pass

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Pass interdiction	Engage personnel transiting high-altitude routes	Small mobile groups carrying military equipment / weapons	Misclassification of limited civilian activity
Overwatch and protection of ground forces	Provide protection to ground forces as they engage Beta forces	Beta forces engaging Alpha ground forces	Restricted visibility; blue-on-blue risk
Escape-route denial	Interdict withdrawal towards interior	Dispersing Beta forces along alternate passes	Loss of line-of-sight; terrain complexity

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-day ISR confirms deliberate hostile movement pattern	Intermittent ISR detections under cloud and snowfall	Conflicting assessments of hostile vs. seasonal civilian transit
Risk to civilians	Civilian presence minimal and geographically separated	Seasonal herders or maintenance crews near engagement area	Civilian transit varies with weather
Weather conditions	Stable weather allows identification and engagement	Snow, wind, and cloud severely degrade mobility and sensors	Rapid weather changes mid-operation
Terrain masking	Clear line of sight from overwatch positions	Narrow, exposed passes limit repositioning	Alternate routes not fully mapped
Communications	Reliable communications despite conditions	Environmental conditions degrade communications	Signal reliability fluctuates

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and precautions.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be individual combatants or groups of combatants?

- What parameters and data is it using to identify and classify the targets?

- Would it be legally sufficient for the LAWS to identify targets based on group size and movement patterns? What would be the legally acceptable target profile in this scenario?
- Considering the reported seasonal civilian transit, based on what parameters would the LAWS identify a target?
  - What measures are in place to ensure that the system continuously operates on a positive identification basis with respect to lawful targets in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What safeguards and measures are in place to minimize risks of false positives?

Precautions

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- Has the LAWS been programmed to continuously detect civilian movement as it is encountered (e.g., seasonal herders) and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place for the LAWS to detect a degradation in its performance due to the known extreme weather conditions and the subsequent effects on mobility, sensors and communications? What has the LAWS been programmed to do if its performance is found to have degraded?
  - To what extent could such degradation affect the assessments necessary for compliance?

Land-110 – Close air support (CAS)

Conflict type

International armed conflict (IAC) – Alpha vs. Beta

Operation category

Joint fires / close air support

Geographic setting

Forward engagement area within the Sigma Mountains

1. Scenario narrative

Ground fighting along Sigma Mountains has intensified, with repeated localized engagements occurring along ridgelines and valleys that provide limited cover and restrict manoeuvre space. The area remains under persistent surveillance and intermittent fire from both sides. Airspace above the contested belt is heavily contested, with neither party exercising sustained control.

Weather conditions are variable, and electronic interference has periodically degraded communications between ground units and supporting air assets. Civilian presence in the immediate area is assessed as minimal, though small settlements remain in adjacent valleys.

A Alpha unit is tasked with holding a defensive position along a ridgeline overlooking a key approach route. During an engagement, hostile fires originating from concealed positions threatens to disrupt control of the area.

The mission is to suppress and neutralize hostile firing positions to enable the Alpha unit to retain its position and prevent further advance.

The unit comes under increasing fire as Beta forces exploit terrain features to limit exposure. Attempts to manoeuvre away are constrained by steep slopes and limited covered routes. The unit's organic fires provide only partial suppression.

The commander requests CAS to suppress hostile firing points and stabilize the situation. Airspace remains contested, with the presence of air defence systems, and access by crewed aircraft is not assured.

As Beta fire continues, the unit reports increasing difficulty maintaining its position. Intermittent communications allow partial exchange of targeting information, but confirmation of hostile positions is lacking. Weather conditions are expected to deteriorate further.

2. Mission and targets

Mission

Provide close air support to suppress and neutralize Beta firing positions targeting Alpha's ground unit.

Targets

- Positively identified Beta firing positions.
- Mobile air defence systems.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision close air support	Locate and engage hostile firing points along opposing ridgeline	Concealed hostile firing teams	Incomplete target coordinates; Friendly proximity
Targeting of air defence systems	Achieve control of tactical airspace to enable crewed systems operations	Mobile SAM units	Incomplete target coordinates; Friendly proximity

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Combined ISR and ground observation confirm hostile firing points	Exact positions cannot be consistently fixed	Conflicting reports on size and mobility of hostile elements
Risk to civilians	Civilian presence minimal in engagement zone	Small settlements in adjacent valleys potentially exposed to Alpha CAS fires	Civilian proximity to ridgeline engagement area uncertain
Airspace control	Temporary window of air access available	Contested airspace limits crewed aircraft access	Mobile SAM presence probable but unconfirmed
Communications	Stable data link between ground and air assets	Denied communications and electronic interference	Intermittent connectivity affects targeting updates
Terrain masking	Clear identification of firing points	Terrain features obscure hostile positions	Hostile repositioning between covered points

Time pressure	The situation is stable under partial enemy suppression fires and the ground unit is able of maintaining defensive position	Sustained hostile fire threatens overrun	Duration of viable defensive position uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, precautions and proportionality (particularly with respect to collateral damage assessments).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS reliably determine the source of fire? Would the "Beta firing positions" correspond to combatants, military equipment or both? What would constitute a military objective in this scenario? What would be the targets of the LAWS?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Precautions

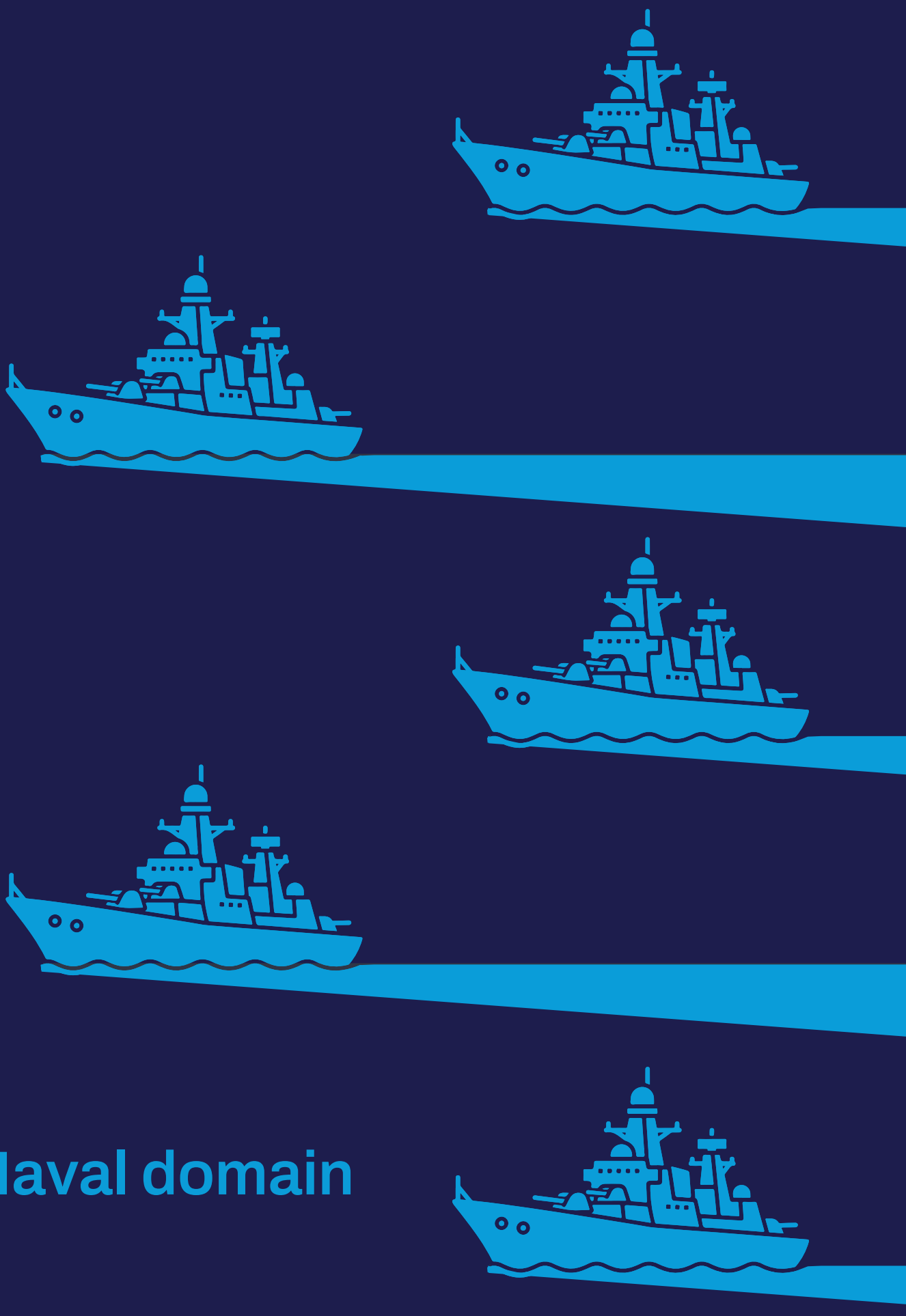
- Would the effects of deploying and using LAWS make it necessary to give effective advance warning to civilian settlements remaining in adjacent valleys?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be necessary?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the source of fire?
  - What measures are in place to ensure that the LAWS does not engage the source of fire if the expected incidental harm would be excessive?

- To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

- What measures are in place for the LAWS to detect a degradation in its performance due to the variable weather conditions and periodically degraded communications between ground units and supporting air assets?
  - What has the LAWS been programmed to do if its performance is found to have degraded?
  - To what extent could such degradation affect the assessments necessary for compliance?

Proportionality

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the source of fire?
  - What parameters does the LAWS use for such an assessment, particularly given the limitations in visual confirmation and the weather conditions?
  - What measures are in place to ensure that the LAWS does not engage the source of fire if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?



2. Naval domain

2.1. Strategic anchor

Purpose of the Strategic Anchor

This strategic anchor establishes the common operational, legal, and geographic reference for all naval scenarios developed under the Sigma war framework. It is designed to:

- provide a stable strategic baseline against which individual Naval scenarios can be assessed;
- ensure coherence between naval scenarios and concurrent air and land operations;
- support structured analysis of international humanitarian law considerations arising from land operations conducted under conditions of uncertainty, time pressure, electronic warfare, and civilian proximity; and
- frame discussions concerning the potential use of lethal autonomous weapon systems (LAWS) in naval operations, without prescribing outcomes or solutions.

Individual scenarios in the following chapter build on this anchor and need not restate its assumptions.

2.1.1. Strategic context

Alpha and Beta are engaged in an international armed conflict following escalation along their shared land border. Naval operations form an integral part of the conflict, supporting land and air campaigns and shaping access, denial, and control across the maritime domain.

The **Sigma Sea Corridor**, a shared maritime basin south of the international land border, constitutes the primary naval theatre. The corridor connects national ports, island territories, and international sea lanes, making it strategically vital for both belligerents and for neutral actors.

2.1.2. Operational Naval Objectives

State of Alpha

Alpha's maritime posture is oriented towards:

- securing access to and from the **Alpha maritime approaches.**
- protecting sea lines of communication through the Sigma Sea Corridor.
- enabling joint operations in support of land and air campaigns.
- preserving freedom of navigation for commercial shipping vital to its economy.

State of Beta

Beta's maritime posture focuses on:

- denying Alpha uncontested use of the Sigma Sea Corridor;
- leveraging control of the **Beta Peninsula, Sigma Shoals, and Beta Isles** to impose operational constraints;
- contesting access through the **Sigma Reaches**; and
- protecting coastal and island-based military infrastructure.

2.1.3. The Maritime battlespace

The maritime battlespace is closely linked to adjacent **coastal terrain, island territories, and overlying airspace,** creating continuous interaction between naval, land, and air operations. Naval operations take place across the same named regions used in the air and land strategic anchors, expressed through the territorial control framework described below. Contested maritime areas, represents the most unstable and analytically demanding environment, combining variable civilian proximity, infrastructure density, terrain-induced sensor degradation, and rapid escalation dynamics under contested information conditions.

TABLE 1.

Maritime domain – Territorial control framework

ALPHA-CONTROLLED MARITIME AREAS	CONTESTED MARITIME AREAS	BETA-CONTROLLED MARITIME AREAS
Alpha maritime approaches Deep water approaches to Alpha's principal ports and naval logistics hubs	**Sigma Reaches** Central cluster of reefs, islets, and narrow passages forming a natural maritime chokepoint; Hosts critical undersea communication cables and pipelines	**Beta Peninsula** Littoral Beta's primary coastal bulge hosting naval bases, coastal defence systems, and energy infrastructure
Western Shipping Lane (shared / international use) High-traffic commercial route running closer to Alpha's coast and regularly used by neutral shipping	**Western Approaches to the Beta Isles Sea** Space west of the island group where control is fluid and frequently contested	**Beta Isles** Island group projecting Beta control into the central Sigma Sea Corridor and influencing access to western sea lanes
–	**Central Sigma Sea Corridor** Shared basin characterized by persistent competition for sea control, access, and denial	**Sigma Shoals** Shallow littoral waters near the Beta coast, well suited to small craft operations and coastal denial

2.1.4. Legal baseline, rules of engagement and additional guidance on the use of force

The situation constitutes an International armed conflict between Alpha and Beta. All naval operations described in the scenarios are governed by international humanitarian law applicable to IAC, law of naval warfare, treaty law, customary law, the law of neutrality and State practice. Protections apply to medical units and hospital ships, shipwrecked and wounded personnel, neutral shipping, civilian objects, and dual-use infrastructure (unless and until this becomes a military objective).

Each State applies national rules of engagement and guidance on the use of force consistent with IHL, including requirements related to distinction, proportionality, precautions in attack, and the regulation of engagement authority near civilians and protected objects. In particular, rules and guidance are provided to:

- set positive identification (PID) standards including multi-source confirmation requirements;
- regulate use of force and engagement authority near civilian traffic, critical infrastructure, and other protected objects; and
- define conditions for employing autonomous systems, including:
  - thresholds for autonomous target engagement;
  - abort/override contingencies under EW degradation; and
  - requirements for multi-source PID in cluttered environments.

2.1.5. Integration with Other Domains

Naval operations are conducted in parallel with ongoing air and land operations and remain compatible with them. Cross-domain dynamics (e.g., contested air space affecting ISR and communications, land pressure on coastal installation) may be incorporated in specific naval scenarios where analytically useful.

2.2. Scenario catalogue

The scenarios in the naval domain engage core IHL principles governing the conduct of hostilities, particularly distinction, proportionality, and precautions, as applied in this environment. These principles are further specified through the *lex specialis* of naval warfare including, but not limited to, rules relating to blockade, neutrality, and capture.

NAVAL-201 – Convoy interception

Conflict type

IAC – The Sigma war (Alpha vs. Beta)

Operation category

Surface warfare – fleet engagement / convoy attack

Geographic setting

Central Sigma Sea Corridor

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

Alpha dispatches a mixed convoy consisting of two auxiliary replenishment ships, three merchant vessels under Alpha's flag, and a small escort group of one frigate and two patrol vessels. The convoy must pass near the Sigma Shoals, where Beta maintains a strong coastal presence. Beta has repeatedly stated that Alpha's convoys are supporting its land campaign and are therefore considered legitimate targets. Alpha insists on the right to move its commercial shipping through the Sigma Sea corridor. Both sides are already engaged in a broader naval campaign, with intermittent clashes reported throughout the region.

As the Alpha convoy nears the Sigma Shoals, Beta coastal command issues an order to engage the escort group. A formation of Beta missile boats and fast attack craft approaches the convoy in open sea. Alpha escort commanders receive instructions to defend the convoy and engage Beta units once they close within weapons range.

2. Mission and targets

Alpha mission (convoy protection)

Ensure that the convoy transits safely to the Alpha maritime approaches and repel Beta interception attempts.

Target

- Beta fast attack craft and missile boats approaching the convoy from the Sigma Shoals

Beta mission (convoy interception)

Prevent Alpha from resupplying its forward land forces and engage Alpha's escorts to force abandonment or diversion of the convoy.

Target

- Alpha escort and auxiliary ships

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Convoy protection (Alpha)	Engage Beta missile boats and fast attack craft approaching within weapons range	Beta missile boats and fast attack craft	Misclassification of fast-moving contacts amid civilian traffic; Rapid manoeuvring in congested waters
Convoy interception – limited to escort ships (Beta)	Disable or sink Alpha escorts	Alpha frigate and patrol vessels	Presence of merchant vessels and auxiliary shipping in close formation; Rapid manoeuvring in congested waters
Convoy interception – escort and auxiliary ships (Beta)	Disable or sink Alpha escort and auxiliary ships	Alpha frigate and patrol vessels; Alpha auxiliary ships	Presence of merchant vessels in close formation and risk of misclassification; Rapid manoeuvring in congested waters

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Stable and reliable ISR allows for positive identification and tracking of all potential targets	Multiple radar contacts emerging from Sigma Shoals; Uncertain whether missile boats or fishing vessels	Electronic interference suggests spoofing; Visual feeds contradict radar classification
Civilian maritime density	Civilian traffic limited and clearly separated from convoy axis and area of engagement	Heavy civilian traffic complicates identification	Merchant and neutral vessels intermixed with military formations
Sensor fidelity	Stable sensor picture allowing contact discrimination	Environmental interference degrading sensor fidelity	Intermittent sensor degradation creates uncertainty about classification of fast-moving contacts
Neutral involvement	No neutral-flag vessels in immediate proximity	One or more merchant ships flying a neutral flag are transiting in the area escorted by a neutral-flag warship	One or more merchant ships flying a neutral flag are transiting in the area; uncertainty over the presence of a neutral escort ship
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status
Environmental and operating conditions	Stable weather and environmental conditions support sustained observation, manoeuvre, and weapons employment	Adverse weather, sea state, or terrain-driven effects degrade manoeuvre, detection, or weapons performance	Variable or deteriorating conditions alter visibility, manoeuvre space, or engagement parameters during the operational window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to determining the status of vessels in a convoy, and their subsequent targetability), as well as the regime of protection of persons *hors de combat* (with a specific focus on the shipwrecked), proportionality, precautions and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- For Alpha, what has the LAWS been configured to identify and classify as a target?
  - How would the LAWS identify and select targets (i.e., the fast attack craft and missile-armed patrols approaching the convoy)?
    - Is it conduct-based, computer vision-based or a combination of the two?
    - Would it be based on any other technical features and parameters?
    - What parameters and data is it using to identify and classify the targets?
  - Would the technical features of the LAWS enable reliable and accurate interpretation of the vessels' behaviour?
    - On what data and parameters has the LAWS been trained to interpret the vessels' behaviour?
    - On what data and parameters has the system been trained to identify, select and engage a target?
    - On what parameters would the LAWS rely to verify and validate the nature of the targets?
- For Beta, what has the LAWS been configured to identify and classify as a target?
  - Would it be the escort group as a whole, or just parts of it? Would it be individual vessels belonging to the opposing party?
  - What parameters and data is it using to identify and classify the targets?
- What technical features would enable the LAWS to determine, verify and validate the composition of the convoy and the status of the individual vessels in the convoy?
- What lawful basis, if any, would Alpha have for permitting LAWS to target a merchant vessel?
  - To what extent would Alpha consider delegating the determination of convoy composition to a LAWS to be consistent with its obligations under IHL, including the protection of civilians and other specially protected persons and objects?
  - To what extent would Alpha consider delegating the determination of each vessel's status (i.e., targetable versus non-targetable) to a LAWS to be consistent with its obligations under IHL?

- What does positive identification require in the context of this scenario: Is it a positive identification of targets only? Or would it also entail a positive identification of non-targetable objects and individuals (e.g., civilian vessels or the shipwrecked)?
  - Has the LAWS been designed, trained and tested appropriately and sufficiently to establish positive identification in a reliable and accurate manner?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status in cases of uncertainty under IHL?
- Has the LAWS been programmed to continuously distinguish between enemy patrol boats, fishing vessels and other types of vessel?
  - Can the LAWS detect the presence of civilian ships and accordingly adapt its course of action, including by directing or re-directing force or by aborting or suspending engagement?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status in cases of uncertainty under IHL?
- Is the State comfortable with permitting the LAWS to determine the military objective status of targets on the basis of the nature of the small attack vessels (as a military objective by nature) and distance from the convoy (i.e., "approaching the convoy")?
  - Does this assessment align with the legal standard of reasonable certainty? In other words, can they be reasonably certain that the State is able to comply with its IHL obligations by relying on the LAWS to determine the targets' status as military objectives?
  - To what extent would other behaviours be factored into such an assessment?
  - Would it be more comfortable with basing this decision on a combination of range and behaviour?

Protection of persons *hors de combat*

- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?
- What has the system been designed and trained to do if shipwrecked or wounded persons are detected?
  - Has the LAWS been programmed to not engage persons classified as shipwrecked or wounded?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become shipwrecked or wounded mid-operation)?
  - To what extent would any response involve human operators? What courses of action has it been programmed to adopt if overall communications are disrupted?

Proportionality

- Can the LAWS verify that the proportionality assessment remains valid immediately prior to each strike in order to mitigate risk of collateral damage and harm to shipwrecked and wounded persons?

Precautions

- What measures are in place for the LAWS to detect a degradation in its performance due to degraded sensors?
  - What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?

Denial of quarter

- What measures are in place to ensure that the LAWS is deployed in compliance with the prohibition of denial of quarter with respect to combatants on targeted vessels?
  - Has the system been trained to continuously identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

NAVAL-202 – Contested-zone passage

Conflict type

IAC – The Sigma war (Alpha vs. Beta)

Naval operation category

Surface warfare – sea control / denial

Geographic setting

Eastern Sigma Sea Corridor, near Sigma Reaches

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

Alpha directs a single high-value logistics vessel, escorted by one frigate, to transit a corridor that Beta has declared a restricted military zone. Beta asserts that control of this zone is essential to protect its naval operations and coastal batteries. Alpha rejects the declaration as unlawful and continues its passage. A Beta surface action group is positioned to enforce its declared zone by force. Clashes elsewhere in the Sigma war indicate that neither State is avoiding high-intensity engagements.

As the Alpha transit group enters the declared restricted area, Beta naval command issues orders to engage the Alpha frigate to compel withdrawal.

Simultaneously, Alpha command confirms authorization to continue passage and return fire if Beta initiates attack. Beta warships advance to a firing posture; the Alpha frigate prepares countermeasures and defensive systems. With both sides having orders to engage under specific conditions, use of force seems unavoidable.

2. Mission and targets

Alpha's mission (transit enforcement and protection of logistics vessel)

Maintain navigation through the Sigma Sea corridor and engage Beta units if they attempt to forcibly deny passage.

Target / threat

- Beta warships deployed to forcibly deny passage

Beta's mission (denial and engagement)

Enforce the restricted zone by diverting or sinking Alpha naval units.

Target

- Alpha frigate (primary); logistics ship (secondary, depending on classification)

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
High-value vessel protection (Alpha)	Engage Beta warships attempting to deny passage	Beta combat warships	Manoeuvre limited by risk of entering coastal weapons envelopes; Engagement occurring adjacent to commercial shipping routes
Enforcement of restricted zone – targeting limited to escort ship (Beta)	Engage Alpha frigate upon entry into restricted zone	Alpha frigate	Boundary determination error leading to premature engagement; Close formation with logistics vessel and proximity to commercial shipping routes complicating fire-control geometry
Enforcement of restricted zone – targeting of escort ship and logistics ship (Beta)	Engage all Alpha vessels upon entry into restricted zone	Alpha frigate and logistics vessel	Boundary determination error leading to premature engagement; Risk of misclassification of logistics vessel; Engagement in contested maritime space adjacent to commercial routes

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Stable and reliable ISR allows for positive identification and tracking of all potential targets	ISR does not provide a stable and reliable surface picture	ISR provides contradictory reports that seem inconsistent with expected vessel classes
Maritime traffic proximity	Engagement occurs away from high-traffic shipping routes	Commercial traffic operating close to declared restricted zone	Civilian routing patterns shift as tension escalates
Electronic interference	Minimal EW impact on tracking and targeting	EW masking reduces classification accuracy	Inconsistent radar signatures complicate vessel identification
Engagement geometry	Clear standoff distance between opposing naval formations	Close manoeuvre in confined sea space increases miscalculation risk	Distance between formations fluctuates during approach

Risk of entering coastal defence weapons range	Surface engagement remains outside effective coastal battery range	Transit group enters overlapping coastal and surface weapons envelopes	Uncertainty regarding coastal battery activation or readiness
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed personnel in water within the engagement zone	Reports of personnel in water but unclear affiliation or status
Environmental and operating conditions	Stable weather and environmental conditions support sustained observation, manoeuvre, and weapons employment	Adverse weather, sea state, or terrain-driven effects degrade manoeuvre, detection, or weapons performance	Variable or deteriorating conditions alter visibility, manoeuvre space, or engagement parameters during the operational window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, precautions, proportionality (particularly as they relate to the enforcement of restricted maritime zones), and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- For Alpha, what has the LAWS been configured to identify and classify as a target?
  - By what means does the LAWS determine the flag status of the vessels?
    - Has the LAWS been programmed, trained and tested to reliably and accurately identify merchant vessels?
  - How would the LAWS identify and select targets (e.g., the Beta warships deployed to forcibly deny passage)?
  - On what basis would the system characterize a vessel as a target? Would it be based on computer vision or image reconnaissance, on conduct, on a combination of these, or on any other technical methods?
  - What parameters and data is the LAWS using to identify and classify the targets as military objectives?
- Would the technical features of the LAWS enable reliable and accurate interpretation of the vessels' behaviour?
  - On what data and parameters has the system been trained to identify, select and engage a target?

- What, if anything, has the LAWS been programmed to do for specific behaviours or acts (e.g., if a neutral merchant vessel attempts to breach a lawful blockage after an unheeded warning)?

- For Beta, what parameters does the LAWS use to identify and classify targetable logistics ships?
  - On what parameters and data would the LAWS rely to verify and validate the nature and classification of the target?
- Can the LAWS reliably and accurately detect vessels entering the restricted zone?
  - Can the system subsequently ascertain their status?
  - Can the system ascertain their status as a military objective (i.e., as targetable)?
- Can the LAWS identify the loss of protection for objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection?
  - What safeguards and measures are in place to minimize the risks of false positives?
  - Has the LAWS been programmed, trained and tested to comply with the applicable IHL tests? For example, can it establish an "act harmful to the enemy" that would lead to the loss of protection for hospital ships?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - How would the system classify a "misuse"?
- To what extent has the LAWS been designed, trained and configured to ensure that the principle of distinction is respected?
  - What information would the commander need to know or have access to with respect to the system's parameters to comply with the law?

Precautions

- What measures are in place for the LAWS to detect a degradation in its performance and communications due to environmental factors and electronic interference?
  - What has the LAWS been programmed to do in such situations?
  - How would operators mitigate such risks of degradation, particularly with respect to the performance of sensors in relation to environmental factors?
  - To what extent could such degradation affect the assessments necessary for compliance?
- What (minimum) level of assurance is required to deploy LAWS against an enemy warship?
  - Does this minimum level of assurance rest on the IHL requirement of reasonable certainty?
- To what extent has the LAWS been designed, trained and configured to ensure that the required precautions are taken?

- What information would the commander need to know or have access to with respect to the system's parameters to comply with IHL?

Proportionality

- Is the LAWS capable of anticipating and assessing collateral damage, for example with respect to personnel *hors de combat*, impact on nearby commercial traffic or effects on medical personnel?
- Can the LAWS verify that the proportionality assessment remains valid immediately prior to each strike in order to mitigate risk of collateral damage, particularly if the environment is dynamic, circumstances are evolving and orders change?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What benefits, if any, are there in the use of LAWS in this scenario?
  - Do the benefits outweigh the legal risks?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

NAVAL-203 – Anti-surface ambush in the Sigma Reaches

Conflict type

IAC – The Sigma war (Alpha vs. Beta)

Naval operation category

Surface warfare – anti-surface engagement / ambush

Geographic setting

Western Sigma Reaches, Sigma Sea Corridor

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

The Sigma Reaches consist of narrow, reef-lined channels within the contested maritime space frequently used by Alpha to reposition surface forces supporting its main maritime campaign. Beta has recently increased missile boat activity in the area. Alpha deploys a surface action group (SAG) consisting of one frigate and two corvettes to transit the Reaches and stage further east. Beta believes this group is preparing for offensive operations and has tasked its own forces to intercept and engage.

As Alpha's SAG enters the outer channel, Beta coastal command orders missile boats to initiate an ambush once Alpha crosses a designated waypoint. Alpha commanders observe multiple fast-moving contacts emerging from island cover. Beta units activate fire-control radars. Alpha SAG's commander receives orders to engage Beta vessels if they close to weapons range. The geography limits manoeuvre options.

2. Mission and targets

Alpha's mission

Detect and neutralize Beta fast attack craft operating near the Sigma Reaches.

Target

- Beta fast attack craft using island cover to mount an ambush

Beta's mission (ambush and disruption)

Execute an attack once Alpha forces enter the narrow channels.

Target

- Alpha frigate and corvettes

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Ambush strike (Beta)	Engage Alpha surface warships upon crossing designated waypoint	Alpha frigate and corvettes	Limited manoeuvre space within reef-lined channels
Counter-ambush engagement (Alpha)	Neutralize Beta fast attack craft emerging from island cover	Beta missile boats and fast attack craft	Rapid emergence from concealment; Degraded visibility and sea clutter

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Stable and reliable ISR allows for positive identification and tracking of all potential targets	ISR does not provide a stable and reliable surface picture	Different ISR feeds provide contradictory reports and seem inconsistent with known vessel classes
Risk to civilians	No fishing or other type of civilian vessels present in the area	Several fishing boats are persistently present in the area of possible engagement	Several fishing boats are occasionally present in the area of possible engagement
Limited manoeuvre in reef-lined channels	Controlled transit through mapped channels with predictable contact geometry	Narrow, reef-lined channels severely restrict manoeuvre options	Incomplete mapping of the reefs in the area creates unpredictable contact geometry and limits manoeuvrability
Sensor fidelity and sea clutter	Stable radar and visual tracking despite sea state	Degraded radar performance due to sea clutter and islet masking	Ambiguous vessel signatures using islet cover complicate classification
Risk of entering overlapping fire envelopes (Alpha)	Engagement confined to open approaches beyond coastal influence	Engagement occurs within narrow channels near coastal monitoring positions	Uncertainty regarding integration of shore-based sensors with missile-boat operations
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Conflicting Reports of personnel in water at the time of engagement
Environmental and operating conditions	Stable weather and environmental conditions support sustained observation, manoeuvre, and weapons employment	Adverse weather, sea state, or terrain-driven effects degrade manoeuvre, detection, or weapons performance	Variable or deteriorating conditions alter visibility, manoeuvre space, or engagement parameters during the operational window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, along with issues surrounding precautions and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- For Alpha, what has the LAWS been configured to identify and classify as a target?
  - How would the LAWS identify and select targets (e.g., the Beta fast attack craft using island cover to mount an ambush)?
  - On what basis would the system characterize a vessel as a target? Would it be based on computer vision or image reconnaissance, on conduct, on a combination of these or on any other technical methods?
  - What parameters and data is it using to identify and classify the targets?
- Would the technical features of the LAWS enable the reliable and accurate interpretation of the vessels' behaviour?
  - What data and parameters has the system been programmed, trained and tested on to identify, select and engage a target?
  - Can the LAWS conduct such assessments of the vessels' behaviour in a manner that upholds the presumption of civilian status in cases of uncertainty (e.g., when an adversary's intentions are unclear)?
  - How would a LAWS be designed to identify behaviour as uncertain? How much uncertainty would be deemed acceptable?
  - What safeguards and measures are in place to minimize risks of false positives?
- For Beta, what parameters does the LAWS use to select and engage its targets (i.e., the Alpha frigates and corvettes)? Are these exclusively based on location (i.e., entering the narrow channels)?
  - On what basis would the system characterize a target? Would it be based on computer vision or image reconnaissance, on conduct, on a combination of these or on any other technical methods?
  - To what extent would these parameters be in alignment with IHL obligations and protections?
- What specific measures are in place to ensure that the systems' classification is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL??

Precautions

- What measures are in place for the LAWS to detect a degradation in its performance due to environmental factors, particularly sea clutter?
  - What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance?
- Has the system been trained and tested for deployment in cluttered, reef-lined channels similar to the environment in which this scenario unfolds?
  - To what extent would this knowledge affect the commander's decision to deploy, or not deploy, the LAWS in this scenario?

Denial of quarter

- What measures are in place to ensure that LAWS is deployed in compliance with the prohibition of denial of quarter with respect to the combatants on the targeted vessels?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

NAVAL-204 – Amphibious advance near the Beta Isles

Conflict type

IAC – The Sigma war (Alpha vs. Beta)

Naval operation category

Amphibious warfare – interception

Geographic setting

Western Beta Isles, Sigma Sea Corridor

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

Alpha initiates an amphibious operation in the western Beta Isles as part of its strategy to pressure Beta's coastal defences and secure additional staging points. An Alpha amphibious group (one amphibious ship, two escorts, and several landing craft) advances towards the Isles under radio silence to maintain surprise.

Beta monitors increased Alpha naval movements and assesses that an imminent landing is likely. Beta naval command tasks its forces to Engage the amphibious group before it reaches landing range.

As the Alpha amphibious group approaches the western Beta Isles, Alpha escorts detect high-speed contacts approaching consistent with an interception attempt. The amphibious group receives orders to continue the landing operation and engage Beta units if they attempt to stop the formation.

2. Mission and targets

Alpha mission

Ensure the delivery of landing forces to predesignated beaches on Beta Isles' western shore by engaging with Beta units threatening the landing force.

Target

Beta surface interceptors and patrol boats, coastal anti-ship missiles.

Beta mission

Engage the amphibious group before it reaches landing range.

Target

- Alpha amphibious ship and escorting surface vessels

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Amphibious group protection (Alpha)	Engage Beta fast attack craft and patrol boats approaching landing formation	Beta surface interceptors	Restricted waters limiting manoeuvre; Proximity to landing craft and friendly fire; Potential presence of civilian vessels
Targeting of coastal anti-ship missile systems (Alpha)	Neutralize coastal anti-ship missile positions threatening amphibious group	Coastal missile batteries	Engagement near shoreline; Sensor disruption affecting targeting accuracy; Potential presence of civilian objects in the proximity
Strike against landing force (Beta)	Engage amphibious ship and escorts	Alpha amphibious ship and surface escorts	Close formation of landing craft; Potential proximity of civilian and neutral vessels in inter-island routes

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Stable and reliable ISR allows for positive identification and tracking of all potential targets	ISR does not provide a stable and reliable surface picture	ISR provides contradictory reports that seem inconsistent with expected vessel classes
Risk to civilians	No civilian or neutral vessels in inter-island routes during engagement window	Civilian and neutral vessels present along inter-island routes; Civilian infrastructure of unknown use in proximity of coastal missile batteries	Civilian routing is unpredictable; Coastal missile batteries located near a major road with a varying level of civilian traffic
Risk of entering coastal defence weapons range	Amphibious group remains outside effective coastal missile envelope	Transit brings formation within effective range of coastal anti-ship missiles	Uncertainty regarding readiness of coastal missile batteries
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status

Environmental and operating conditions	Stable weather and environmental conditions support sustained observation, manoeuvre, and weapons employment	Adverse weather, sea state, or terrain-driven effects degrade manoeuvre, detection, or weapons performance	Variable or deteriorating conditions alter visibility, manoeuvre space, or engagement parameters during the operational window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, along with precautions, proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- For Beta, what has the LAWS been configured to identify and classify as a target?
  - How would the LAWS identify and select targets?
  - On what basis would the system characterize its targets (i.e., the Alpha amphibious ship and escorting surface vessels) as military objectives? Would it be based on computer vision or image reconnaissance, on conduct, on a combination of these or on any other technical methods?
  - What parameters and data is it using to identify and classify the targets?
- For Alpha, would the technical features of the LAWS enable the reliable and accurate interpretation of the targeted units' behaviour?
  - To what extent would the use of LAWS to predict behaviour be in alignment with IHL obligations and protections?
  - How does the system quantify and measure the threat level of Beta's units in relation to its landing force? At what point would such a threat trigger engagement?
  - On what data and parameters has the system been trained to identify, select and engage a target?
  - Can the LAWS adapt its course of action in cases of uncertainty with respect to the target's status, including through the abortion or suspension of engagement in the light of the presumption of civilian status in cases of uncertainty under IHL?
  - What safeguards and measures are in place to minimize risks of false positives?
- Is the system capable of identifying the presence of neutral, merchant and other protected vessels (e.g., hospital ships) in inter-island routes? Would it be capable of adapting its course of action and the application of force accordingly?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- What measures are in place for the LAWS to detect limitations to or a degradation in its performance due to environmental factors and intermittent sensor disruption?
  - What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

Proportionality

- What are the foreseeable direct and indirect effects on civilians of a successful amphibious landing, particularly with respect to the expected incidental harm?
  - How does this harm relate to the military advantage anticipated from the mission?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, circumstances are evolving and orders change?

Choice of means and methods of warfare

- How would the commander decide whether the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

NAVAL-205 – Merchant vessel interception

> **Conflict type**
>
> IAC – The Sigma war (Alpha vs. Beta)

> **Naval operation category**
>
> Surface warfare – engagement of merchant vessels

> **Geographic setting**
>
> Western Sigma Sea Corridor, near the Beta Peninsula

1. Scenario narrative

A large merchant vessel transits the Western Sigma Sea corridor towards the Alpha maritime approaches. Beta claims the ship is transporting materiel to support Alpha's land offensive. Alpha denies this and asserts the vessel is carrying mixed civilian cargo. Beta deploys a maritime interception patrol from the Beta Peninsula consisting of two missile boats to stop and inspect the vessel. The area includes sporadic civilian traffic, mostly fishing boats and small traders, but traffic density is lower than in other parts of the corridor.

The merchant vessel refuses repeated Beta orders to stop for boarding, increases speed, and alters course away from the Beta patrol line. Alpha broadcasts that the vessel is a civilian ship exercising freedom of navigation.

Beta maritime command issues a final instruction to the merchant vessel to stop for inspection. The merchant vessel continues at speed and ignores radio challenges. The Beta missile boats close distance to enforce compliance. Beta command then issues a direct order to disable the vessel's propulsion to compel it to stop.

2. Mission and targets

> **Beta mission (interception and compliance enforcement)**
>
> Halt and inspect the merchant vessel as ordered by coastal command, including by forcibly disabling propulsion if the ship refuses to comply.

> **Target**
>
> - The merchant vessel transiting the Western Sigma Sea

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Propulsion disablement strike	Disable vessel propulsion or direction control	Propulsion and steering systems	Civilian crew presence; Structural damage affecting vessel seaworthiness; Risk of misidentification given presence of other civilian vessels in proximity

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR confirms that vessel is carrying exclusively military equipment	ISR confirms that vessel is carrying a mixed cargo of civilian goods, including humanitarian aid, and military materiel	Cargo composition remains uncertain
Risk to civilians	Civilian traffic minimal in immediate vicinity	Civilian traffic (fishing vessels and merchant ships) present in adjacent waters	Civilian traffic (fishing vessels and merchant ships) is unpredictable
Vessel's flag	Merchant vessel flies Alpha's flag	Merchant vessel flies the flag of a neutral State with no ties to Alpha	Merchant vessel flies the flag of a State that has publicly expressed support for Alpha's military action
Proximity to neutral or protected vessels	No neutral-flag or protected vessels in formation	RSV Antares sails in proximity of a Alpha hospital ship	Unconfirmed reports of a neutral-flag merchant ship escorted by a neutral-flag warship sailing in the area
Environmental and operating conditions	Stable weather and environmental conditions support sustained observation, manoeuvre, and weapons employment	Adverse weather, sea state, or terrain-driven effects degrade manoeuvre, detection, or weapons performance	Variable or deteriorating conditions alter visibility, manoeuvre space, or engagement parameters during the operational window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction issues (particularly with respect to the identification of targets and the provision of special protections), along with questions around precautions, proportionality, and the choice of means and methods of warfare (particularly in the context of the exercise of the right of visit and search).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - Would it be the merchant vessel, specific parts of it (e.g., the propulsion), or the suspected cargo containers – considering the contemplated attack is the use of force to disable the propulsion?
  - What parameters and data is it using to identify and classify the targets?
- What parameters for the identification of the target would be acceptable, with respect to compliance with IHL obligations and protections, for the system to base its assessment on?
  - Can the LAWS be used reliably and accurately for conduct-based targeting? To what extent would the use of LAWS to predict behaviour comply with IHL? Can the LAWS assess whether a ship is intentionally and clearly refusing to stop? On what basis?
- Can the LAWS detect protected objects (e.g., hospital ships, considering the presence of an Alpha hospital ship nearby)?
  - What parameters and data is it using to detect and classify objects as protected? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten their protection?
  - Has the LAWS been programmed to not engage protected objects?
    - If protected objects are detected, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Can the LAWS assess the character of the cargo on board the vessel to feed into target assessments?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?
- Can the LAWS assess the loss of protection for objects?
  - What parameters and data is it using to assess such loss of protection for objects?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- What measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly with respect to possible civilian movement as it is encountered (e.g., civilian crew on board or non-involved vessels nearby)?
  - Has the LAWS been programmed to continuously detect civilian movement or protected person and objects as they are encountered, and to ascertain their status?
    - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place for the LAWS to detect limitations to or a degradation in its performance due to environmental factors and intermittent sensor disruption? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

Proportionality

- Is the LAWS capable of anticipating and assessing collateral damage (e.g., to civilian cargo on board the merchant vessel, civilian crew and nearby non-involved vessels)?
- As the profile of the mission and military advantage evolve, can the LAWS adapt its course of action, including through the abortion or suspension of engagement?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, circumstances are evolving and orders change?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- Can the LAWS be relied on to conduct disabling fire only (i.e., only the force necessary to disable the propulsion system)?
- How could the LAWS assist in the exercise of the right of visit and search?
  - What would make it an appropriate choice in this context?

NAVAL-206 – Submarine contact near the Sigma Undersea Cable

Conflict type

IAC – The Sigma war (Alpha vs. Beta)

Naval operation category

Anti-submarine warfare (ASW)

Geographic setting

Northern Sigma Reaches, Sigma Sea Corridor

1. Scenario narrative

Alpha maintains a dispersed ASW patrol across the Northern Sigma Reaches, an area where the seabed hosts a critical undersea fibre-optic cable serving Alpha, Beta, and several neutral States. Beta has recently increased submarine deployments to contest Alpha's sea control efforts. Alpha ISR confirms that Beta has deployed an attack submarine in the area.

As Alpha's ASW group approaches the area designated for cable protection, the frigate's towed array acquires a submerged contact at medium range consistent with a Beta attack submarine. Beta's submarine adjusts depth and speed, attempting to slip beneath a thermal layer and evade.

Alpha command issues instructions to localize and engage the contact.

2. Mission and targets

Alpha's Mission (ASW)

Locate, track, and destroy Beta submarine activity near the cable corridor.

Target

- Beta submarine(s)

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Submarine engagement	Seek and destroy Beta submarine	Beta submarine	Misclassification of maintenance submersible or towed equipment; Complex acoustic environment; Engagement in proximity to critical undersea infrastructure

ASW force protection	Protect naval formation from enemy torpedoes	Beta torpedoes or other positively identified underwater asset	Misclassification of maintenance submersible or towed equipment; complex acoustic environment; Engagement in proximity to critical undersea infrastructure
Cable protection	Engage underwater threats to cable infrastructure	Beta submarine, torpedoes or other underwater assets threatening the underwater cable	Misclassification of maintenance submersible or towed equipment; Complex acoustic environment; Engagement in proximity to critical undersea infrastructure

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Distinct propulsion signature consistent with Beta's diesel electric attack submarines	Low-confidence acoustic contact detected intermittently due to seabed reflections	Second contact near cable route may be maintenance submersible
Risk to civilian traffic	Engagement confined away from civilian traffic	Heavy civilian traffic transiting in ASW patrol area	Civilian traffic in the ASW patrol area follows irregular patterns
Proximity to critical undersea infrastructure	Engagement occurs at safe distance from cable route	Engagement conducted directly along cable corridor	Submarine manoeuvring intermittently along cable path
Risk of spillover effects	No disruption to communications infrastructure	Cable damage would disrupt military and civilian communications across multiple States	Extent of communications dependency across the region and downstream effects remain unclear
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status
Environmental and operating conditions	Stable acoustic conditions enable contact classification	Dense seabed infrastructure creates false contacts and reverberation	Thermal layers and reflections hinder contact confidence

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and, in particular, proportionality, along with questions around precautions and the choice of means and methods of warfare (particularly in terms of preventing damage to a critical undersea fibre-optic cable).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Is the LAWS capable of interpreting the submarine's behaviour (including likely intent to target the cable) and classify it as a military objective?
  - On what data and parameters has the system been trained to identify the submarine and classify it as a military objective?
  - What, if anything, has the LAWS been programmed to do for specific behaviour or acts (e.g., if the submarine adopts a certain trajectory towards or around the cable)?
- Has the LAWS been configured to act on its own following such determination, or will human decision-making and intervention be strictly required?
  - Will the system engage the submarine on the basis of its status as a military objective by nature and positive identification? Or will it need to meet certain other criteria or exhibit certain behaviour?
    - In the latter case, what behaviour?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- Can the LAWS anticipate and assess any collateral damage, including to the cable or on land? Is this assessment conducted only before the LAWS launches an attack, or is it contingent and continuous (e.g., on detection of possible civilian movement, given the likelihood of commercial traffic in the area)?
- In the light of the heightened risks to civilians (particularly with respect to the cable), the severe risks of general disruption to both civilian and military communications, and the secondary effects from possible damage to the undersea fibre-optic cable, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?
  - Is the LAWS capable of adapting its course of action, including through the abortion or suspension of engagement, based on the anticipated collateral damage?
- Has the LAWS been trained and tested for deployment amid dense seabed infrastructure and complex acoustic conditions similar to the environment in which this scenario unfolds?
  - To what extent would this knowledge affect the commander's decision to deploy the LAWS in this scenario?

Proportionality

- In the light of Alpha's initial mission to locate, track and destroy the Beta submarine that is active near the cable corridor, what level of risk of collateral damage would be acceptable if the LAWS were to be deployed?
  - Would the level of acceptable risk change in conjunction with the instructions issued by Alpha command to localize and engage the contact?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, circumstances are evolving and orders change?
  - As the profile of the mission and military advantage evolve, can the LAWS adapt its course of action, including through the abortion or suspension of engagement?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- Can the LAWS assist in providing cable security?
  - What measures must be implemented to ensure that deployment of the LAWS is appropriate with respect to IHL obligations and protections?

NAVAL-207 – Offensive mine warfare in the Sigma Reaches

Conflict type

International armed conflict (IAC) – Sigma war (Alpha vs. Beta)

Naval operation category

Mine warfare – offensive sea denial

Geographic setting

Sigma Reaches, Sigma Sea Corridor

1. Scenario narrative

Beta determines that imposing sustained area denial in the Sigma Reaches will disrupt adversary naval movement and reshape operational tempo across the Sigma Sea corridor. The Reaches are a strategic chokepoint through which naval formations and commercial shipping routinely transit.

Beta naval command authorizes the establishment of an offensive sea-denial zone in selected portions of the Reaches. The objective is the creation of a persistent barrier that compels rerouting, delay, or operational degradation of opposing maritime forces.

To achieve this, Beta considers two operational approaches:

1. autonomous mine-laying operations to deploy naval mines along designated transit lanes within the chokepoint; or
2. deployment of lethal autonomous weapon systems positioned to engage vessels entering a defined denial zone and thereby produce a comparable area-denial effect.

Beta planners assess that such measures will impose uncertainty and risk on adversary transits while reducing the need for continuous surface patrol.

Commercial shipping continues to operate in portions of the Reaches, although density varies across transit lanes. The seabed hosts dense undersea infrastructure, and acoustic conditions are complex.

2. Mission and targets

Beta mission (offensive sea denial)

Establish a persistent denial zone in the Sigma Reaches to disrupt and degrade adversary naval freedom of manoeuvre and impose operational delay, uncertainty, and cost on transiting naval formations.

Target

- Alpha naval assets entering or transiting designated denial lanes within the Sigma Reaches

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Autonomous mine-laying	Deploy naval mines along designated transit lanes to establish denial belt	Alpha vessels transiting chokepoint	Unintended risks to neutral shipping; Ambiguity regarding precise field boundaries; Risk of mine positioning beyond intended deployment zone due to system malfunction
Autonomous area denial	Deploy autonomous systems configured to engage vessels entering defined denial zone	Naval vessels crossing activation threshold within designated area	Activation based on geospatial or sensor-defined criteria; Misclassification of neutral vessels

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Verified acoustic, magnetic, and hull-signature libraries available for all anticipated adversary vessel classes transiting the chokepoint	Signature libraries incomplete, outdated, or degraded; High similarity between naval and commercial vessel signatures	Reliable signatures available for some adversary vessel classes but not all; Partial classification confidence across transit lanes
Risk to civilians	Commercial shipping diverted from designated denial lanes prior to activation	Neutral vessels continue operating within or near denial zone	Civilian routing is unpredictable across the chokepoint
Denial-zone boundary definition	Geographic coordinates clearly defined and validated prior to activation	Ambiguous or poorly delineated denial boundaries increase risk of unintended engagement	Sensor-defined or dynamically adjusted boundaries create uncertainty in the classification of transiting vessels
Environmental and operating conditions	Stable sea state and acoustic conditions enable optimal sensor and system performance	Adverse sea state or complex acoustic conditions degrade system performance	Variable environmental conditions alter detection reliability and engagement geometry
Proximity to critical undersea infrastructure	Denial systems positioned away from major cable routes	Systems deployed directly along dense undersea infrastructure corridors	Uncertainty regarding exact alignment between denial zone and infrastructure corridors

Critical communications spillover risk	Denial operations do not disrupt communications infrastructure	Mine detonation or engagement causes disruption to military and civilian communications	Extent of downstream operational impact unclear if infrastructure integrity is compromised

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions (particularly with respect to managing the risk of collateral damage, and how this obligation applies in the context of the use of naval mines), along with considerations of the protection of persons *hors de combat*, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Precautions

- Should the LAWS that is deployed by Beta to lay mines be expected to have the ability to assess possible collateral damage to merchant vessels resulting from mines? In other words, can the LAWS decide on the mines' positioning?
- What obligations arise for Beta to give warning?
  - How could a notification contribute to minimizing risk of incidental harm while mitigating foreseeable long-term civilian risk?
- Can mine clearance and deactivation, which extend beyond an immediate attack, constitute precautionary obligations for Beta?
  - Do the deactivation rules of the Hague Convention (VIII) on Submarine Mines apply to States deploying and using LAWS? If they do, has the LAWS been trained and configured for compliance with these rules?
- With respect to the LAWS that is deployed for area denial, what parameters does the LAWS use to select and engage its targets (i.e., Alpha naval assets entering the defined denial zone)?
  - Are they based on location (i.e., entering the denial zone), on computer vision or image reconnaissance, on conduct, or on a combination of these? What measures are in place to verify that possible target vessels entering the defined denial zone are military objectives?
  - Would a vessel's location within the denial zone be sufficient to justify its status as a military objective, particularly for vessels that do not constitute military objectives by nature?
- What measures are in place to ensure that risks to neutral shipping are minimized?
  - What parameters for that purpose are set in the LAWS used?
  - What level of risk is deemed acceptable?

- If that level of risk were to be exceeded, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement? Would the effects of deploying and using the LAWS make it necessary to give effective advance warning to civilian vessels, including to those that enter the denial zone?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?

Protection of persons *hors de combat*

- Would the LAWS detect and assist the shipwrecked? How would it do so in an area where naval mines have been deployed?
- Would the detonation of a mine trigger the obligation under Article 18 of the Geneva Convention (II) on the Wounded, Sick and Shipwrecked at Sea to search for, detect, collect and assist casualties (i.e., shipwrecked and wounded persons) after an engagement?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- What types of autonomous system could be used in the detection, destruction and clearance of naval mines?
  - Could LAWS be used for such purposes in this operational context?
  - Could they detect, destroy or clear mines?

NAVAL-208 – Counter-denial and mine countermeasures under active surface threat

Conflict type

International armed conflict (IAC) – Sigma war (Alpha vs. Beta)

Naval operation category

Mine countermeasures (MCM) and force protection

Geographic setting

Sigma Reaches, Sigma Sea Corridor

1. Scenario narrative

Following the establishment of an offensive sea-denial zone in portions of the Sigma Reaches, naval transit through the chokepoint has become operationally uncertain. Reports of detonations, anomalous sonar returns, and unexplained course deviations have led Alpha to conclude that mines or mine-like autonomous denial systems have been emplaced along critical transit lanes.

Alpha deploys a mine countermeasures (MCM) group to restore controlled access through the affected sector of the Reaches. The MCM force consists of dedicated clearance vessels operating at reduced speed and limited manoeuvrability, supported at distance by combat warships tasked with force protection.

Beta maintains surface units within operational reach of the denial zone. While Beta does not directly interfere with the clearance effort at the outset, its naval presence signals intent to preserve the denial effect and monitor attempts to degrade it.

As Alpha MCM vessels begin systematic detection and classification of underwater contacts, they encounter a mixed operating picture: conventional mine-like signatures, possible autonomous weapon systems, decoys, and dense seabed infrastructure. Some systems appear stationary; others display intermittent acoustic behavior consistent with adaptive activation thresholds. Clearance operations require close approach to suspected devices. Each neutralization attempt reduces manoeuvre options and temporarily exposes the MCM vessels.

Simultaneously, Beta combat warships close to weapons range. The situation evolves into a dual-pressure environment in which Alpha must both continue subsurface clearance and prepare to protect the MCM force against surface engagement.

2. Mission and targets

Alpha mission (counter-denial and force protection)

Detect, classify, and neutralize mines or mine-like denial systems within designated transit lanes. Protect MCM vessels from interference or interception by Beta combat warships.

Targets

- Naval mines or underwater autonomous weapon systems
- Beta combat warships operating within engagement range

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Denial system neutralization	Engage and destroy confirmed mines or autonomous systems within designated clearance lanes	Naval mines; Mine-like autonomous denial systems	Misclassification of decoys or seabed infrastructure; Triggering adjacent systems during neutralization; Limited manoeuvrability during close approach
Clearance-perimeter protection	Engage Beta surface vessels that enter a defined protective perimeter around MCM vessels	Beta combat warships breaching the MCM perimeter	Engagement while MCM vessels operate at reduced speed; Constrained manoeuvre space in chokepoint; Interference with ongoing subsurface neutralization operations
Counter-interception strike	Engage Beta combat warships at range to degrade their ability to threaten the clearance operation	Beta surface vessels operating beyond the immediate escort perimeter but within operational reach	Expansion of engagement footprint beyond the clearance zone; Diversion of escort assets from direct MCM protection; Escalation from localized protection to broader surface engagement

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Comprehensive acoustic and magnetic signature libraries allow reliable discrimination between conventional mines, autonomous denial systems, and seabed infrastructure	Signature overlap between denial systems and commercial or environmental noise; Incomplete or degraded classification data	Reliable signatures available for some system types but not others; Mixed classification confidence across clearance lanes
Risk to civilians	Commercial shipping diverted away from active clearance area	Neutral vessels operating near or within clearance perimeter	Civilian routing shifts unpredictably during operations
Denial system activation parameters	Activation thresholds and trigger logic partially understood prior to neutralization	Unknown or adaptive activation criteria increase risk during inspection and neutralization	Incomplete identification of which systems are sensor-triggered vs. proximity-triggered
MCM manoeuvre constraints	Clearance conducted with stable escort perimeter and controlled approach lanes	Reduced speed and manoeuvrability expose MCM vessels to surface or subsurface threats	Variable separation between MCM units and escorts affects protection geometry
Proximity of Beta combat warships	Beta naval units remain outside effective engagement envelope	Beta surface vessels manoeuvre within weapons range of clearance group	Intent of Beta naval movement unclear (monitoring vs. preparation for engagement)
Environmental and operating conditions	Stable sea state and acoustic conditions support controlled detection and engagement	Adverse sea state or acoustic distortion degrade detection and neutralization accuracy	Variable environmental conditions alter sensor performance and engagement geometry
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status
Proximity to critical undersea infrastructure	Clearance lanes selected away from major cable alignments and other undersea infrastruture	Neutralization operations conducted near dense infrastructure corridors	Alignment between denial systems and infrastructure routes uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions, along with considerations around distinction and the protection of persons *hors de combat* (notably the shipwrecked).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- With respect to the LAWS that is deployed for clearance, perimeter protection or counter-interception strike, what parameters and data would it use to select and engage targets (i.e., Beta surface vessels or combatants)?
  - Would they be based on location (i.e., within the defined protective perimeter around MCM vessels), on computer vision or image reconnaissance, on conduct, on a combination of these or on any other technical methods?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?
- What measures and technical features are in place to ensure that target classification for the LAWS serves to limit the risk of misidentification of targets or collateral damage?
  - What specific measures are in place to ensure that the system's classification of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

Precautions

- What measures are in place to ensure that the risk of damage or harm to civilians is avoided or minimized, particularly noting that merchant and neutral vessels may be operating near the contested environment or within the clearance perimeter?
  - What parameters are set for this purpose in the LAWS used?
  - What level of risk is deemed acceptable?
  - If that level of risk were to be exceeded, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Could the LAWS that is deployed for the detection, destruction or clearance of mines anticipate and assess possible collateral damage to merchant and neutral vessels resulting from these activities?
- When a LAWS is used to detect and clear mines, what obligations to give warning arise?
  - How could notification contribute to minimizing risk of incidental harm while mitigating foreseeable long-term civilian risk?

- Can mine clearance and deactivation constitute precautionary obligations extended beyond an immediate attack? Do the deactivation rules of the Hague Convention (VIII) on Submarine Mines apply to States deploying and using LAWS? If so, has the LAWS been trained and configured for compliance with these rules?

Protection of persons *hors de combat*

- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - How would it do so in an area where naval mines have been deployed?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?
- Would the LAWS involved in minelaying operations also have the ability to monitor whether the shipwrecked require rescue?
- Would the detonation of a mine trigger the obligation under Article 18 of the Geneva Convention (II) on the Wounded, Sick and Shipwrecked at Sea to search for casualties after an engagement?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- What types of autonomous system could be used in the detection, destruction and clearance of naval mines?
  - Could a LAWS be used for such purposes in this operational context? Could it detect, destroy or clear mines?

NAVAL-209 – Amphibious assault and beachhead establishment on the Beta Isles

Conflict type

International armed conflict (IAC) – Sigma war (Alpha vs. Beta)

Naval operation category

Amphibious warfare – assault landing

Geographic setting

Beta Isles, Sigma Sea Corridor

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

Alpha initiates an amphibious assault to seize control of the Beta Isles. The Isles provide Beta with surveillance coverage and advantageous positions on critical sea lanes. Alpha assesses that control of this terrain is necessary to control the Sigma Sea Corridor.

Following preparatory naval positioning, Alpha amphibious vessels reach designated launch points offshore. Landing craft detach from the amphibious ships and begin transit towards pre-identified beach sectors. The operation has crossed the commitment threshold: once the first wave is launched, withdrawal becomes operationally complex and politically consequential.

Beta coastal defence units are equipped primarily with short-range anti-ship and artillery systems covering the immediate shoreline approaches. Fixed defensive positions, surveillance sites, and anti-ship systems cover the landing approaches. Beta naval units manoeuvre offshore to contest the assault and disrupt beachhead establishment.

As landing craft advance towards shore, they enter a vulnerability window during which manoeuvre options are limited and exposure to coastal fire increases. Alpha escorts reposition to shield the amphibious vessels and suppress identified coastal firing positions.

Beta commanders assess that preventing the establishment of a foothold is critical. Coastal batteries prepare to engage landing craft and amphibious ships within range, while combat warships move to apply pressure on Alpha escorts.

The operational threshold is reached as:

- landing craft enter effective coastal engagement range; and
- Beta naval and coastal units are authorized to employ force to prevent beachhead establishment.

The situation escalates into direct engagement tied to shoreline control and the immediate protection or disruption of the landing force.

2. Mission and targets

Alpha mission (Amphibious assault and beachhead establishment)

Land assault forces on designated beach sectors of the Beta Isles. Protect landing craft during shore transit and initial beachhead establishment. Suppress coastal defence assets and surveillance positions directly threatening the landing zone.

Target

- Beta coastal defence systems, shoreline surveillance sites, and naval units contesting the assault

Beta mission (amphibious defence)

Prevent or disrupt Alpha's landing before a beachhead is secured. Engage landing craft and amphibious vessels within effective coastal engagement range. Preserve control of key shoreline terrain and defensive infrastructure.

Target

- Alpha landing craft, amphibious vessels, and escorting combat warships

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Shore-based defence suppression (Alpha)	Engage fixed coastal defence systems directly covering designated landing sectors	Beta short-range anti-ship missile batteries, shore artillery, and fixed surveillance sites	Misidentification of inactive or decoy positions; Engagement near civilian shoreline structures; Compressed timelines once landing craft are exposed
Mobile threat suppression during landing (Alpha)	Engage mobile naval or coastal units manoeuvring to target landing craft	Beta combat warships; mobile coastal missile units repositioning along shoreline	Rapidly changing target geometry; Risk of engagement while landing craft are exposed and manoeuvre-limited; Overlap between surface and shore-based fire zones
Strike against Amphibious Forces (Beta)	Engage landing craft and amphibious vessels to prevent establishment of a beachhead	Alpha landing craft and amphibious ships	Engagement during high-density manoeuvre near shoreline; Risk of striking vessels already committed to landing; Interaction between surface and coastal fire zones

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Accurate identification of active coastal firing positions and defensive systems	Incomplete mapping of shoreline defences; Decoys or concealed systems present	Conflicting ISR regarding readiness and distribution of coastal assets
Risk to civilians	Civilian presence cleared from designated landing sectors	Civilian maritime or shoreline presence near engagement zone	Uncertainty regarding civilian movement in adjacent coastal areas
Landing-phase vulnerability window	Landing craft reach shore under limited exposure and rapid suppression of coastal fire	Sustained exposure of landing craft to direct coastal engagement before beachhead secured	Uncertainty regarding duration of exposure during shore transit
Littoral manoeuvre constraints	Clear beach approaches with manageable surf and obstacle conditions	Narrow beach sectors, obstacles, or terrain restricting landing craft movement	The number, type and locations of obstacles are not fully known
Coastal defence sustainability	Redundant firing positions and sufficient munitions to sustain engagement throughout landing phase	Limited ammunition stocks or exposed firing positions vulnerable to rapid suppression	Uncertainty regarding ability to sustain coordinated coastal fires beyond initial engagement window
Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status
Environmental and operating conditions	Stable sea state and visibility support coordinated landing and suppression	Adverse sea state or reduced visibility complicate landing craft control and targeting	Variable weather and sea conditions alter engagement geometry

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions (particularly with respect to risks to civilian maritime traffic), along with proportionality, distinction and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Has the LAWS deployed by either party been configured to identify and classify targets as military objectives?
  - Has the LAWS been programmed, trained and tested to reliably and accurately differentiate between, on the one hand, civilian, neutral and other protected vessels and, on the other, military vessels?
    - What has the LAWS been configured to identify and classify as a target and, subsequently, as military objectives?
    - What parameters and data is it using to identify and classify the targets as military objectives?
  - What safeguards and measures are in place to minimize risks of false positives with respect to targets?
  - Would such features be in alignment with the presumption of civilian status under IHL in cases of uncertainty?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
  - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?

Precautions

- In the light of the heightened risks to civilians due to possible civilian maritime and shoreline presence near the engagement zone, what measures are in place to ensure constant care to spare civilians is taken in the deployment and use of the LAWS?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

- Would the effects of deploying and using LAWS make it necessary to give effective and advance warning of incoming attacks to civilian vessels nearby?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?

Denial of quarter

- What measures are in place to ensure that LAWS is deployed in compliance with the prohibition of denial of quarter with respect to combatants on targeted vessels?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

NAVAL-210 – Subsurface sea-control engagement in the Sigma Reaches

> **Conflict type**
>
> International armed conflict (IAC) – Sigma war (Alpha vs. Beta)

> **Naval operation category**
>
> Anti-submarine warfare – submarine vs. submarine engagement

> **Geographic setting**
>
> Sigma Reaches, Sigma Sea Corridor

Facilitation note

Scenario users may conduct analysis from either Alpha or Beta perspective, applying the mission, targets, intelligence, and constraints as presented.

1. Scenario narrative

Both Alpha and Beta seek to assert subsurface control over the central Sigma Reaches. The area offers manoeuvre space suitable for covert operations and favourable acoustic conditions for submarine deployment.

Alpha deploys an attack submarine to patrol the central Reaches and interdict Beta submarine activity. Beta simultaneously deploys an attack submarine to contest control of the same sector and to threaten adversary naval movements in adjacent waters.

Both submarines operate under standing orders authorizing engagement if an adversary submarine is positively identified within defined patrol sectors. Neither side has surface units in immediate proximity. The engagement environment is exclusively subsurface.

As both submarines manoeuvre for tactical advantage, depth changes and course adjustments alter acoustic geometry and detection probability. Each seeks to obtain firing-quality targeting confidence while minimizing the risk of counter-detection.

2. Mission and targets

> **Alpha mission**
>
> Seek and destroy the Beta submarine operating in the Reaches.

> **Target**
>
> - Beta submarine assessed to be operating within the Sigma Reaches

> **Beta mission**
>
> Seek and destroy the Alpha submarine operating in the Reaches.

Target

- Alpha submarine assessed to be operating within the Sigma Reaches

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Attack against submarine (engagement only)	Engage confirmed adversary submarine	Opposing submarine	Misclassification of acoustic contact; Weapons release based on incomplete solution; Revealing own position through engagement; Friendly fire risk (own-ship acquisition / lock-on)
Attack against submarine (full targeting cycle)	Locate and engage adversary submarine	Opposing submarine	Misclassification of acoustic contact; Weapons release based on incomplete solution; Revealing own position through engagement; Friendly fire risk (own-ship acquisition / lock-on)
Torpedo countermeasure	Engage torpedoes launched by opposing submarine	Enemy torpedoes	Misclassification of acoustic contact; Weapons release based on incomplete solution; Friendly fire risk (own-ship acquisition / lock-on)

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Verified acoustic signature libraries available for all anticipated adversary submarine classes	Overlapping acoustic signatures or environmental noise degrade classification confidence	Reliable signatures available for some submarine classes but not all
Risk to civilians	Engagement confined to deep-water patrol sector away from civilian maritime traffic	Engagement occurs beneath heavy commercial shipping lanes	Civilian maritime routing shifts through patrol sector during engagement window

Presence of shipwrecked personnel	No personnel in water during engagement	Confirmed shipwrecked personnel in engagement zone	Reports of personnel in water but unclear affiliation or status
Acoustic and thermal layer conditions	Stable thermal layering enables reliable passive tracking and solution refinement	Complex acoustic environment distorts bearing and range estimation	Variable thermal layering alters detection advantage during engagement
Firing solution confidence	High-confidence targeting solution established before weapons release	Incomplete range or bearing data at moment of launch	Partial solution quality; Uncertainty regarding depth and movement of adversary
Counter-detection exposure	Submarine maintains acoustic discretion during tracking phase	Active sonar use or weapons launch increases adversary detection probability	Uncertainty regarding whether adversary has detected own vessel prior to launch

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns the protection of persons *hors de combat*, precautions, proportionality and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Protection of persons *hors de combat*

- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS search for, detect, collect and assist the shipwrecked and wounded?
  - What parameters and data is it using to identify and classify persons as shipwrecked and wounded?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become shipwrecked or wounded mid-operation)?

Precautions

- In the light of the heightened risks to civilians due to civilian maritime traffic on the surface, what measures are in place to ensure constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What are the risks of submarine engagement underneath civilian traffic (e.g., debris, failed intercept, secondary effects)?

- Can the LAWS adapt its course of action accordingly and as necessary, including through the abortion or suspension of engagement?

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

Proportionality

- What are the foreseeable direct and indirect effects of engaging the submarines?
  - In the light of proportionality assessments, how and where should the submarines be engaged?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly as the environment is dynamic, circumstances are evolving and orders change?

Denial of quarter

- What measures are in place to ensure that the LAWS is deployed in compliance with the prohibition of denial of quarter, particularly if adversary submarines might be crewed?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

NAVAL-211 – Sea-launched deep strike against military industrial complex

Conflict type

International armed conflict (IAC) – Sigma war (Alpha vs. Beta)

Naval operation category

Maritime power projection – strategic deep strike

Geographic setting

Offshore launch platforms in Sigma Sea Corridor; inland military–industrial complex within Beta territory

1. Scenario narrative

As the Sigma war intensifies, Alpha assesses that Beta's continued military production capacity is sustaining its operational tempo across multiple domains. Intelligence identifies a military–industrial production complex located inland within Beta territory responsible for the manufacture of armoured vehicle components and missile subsystems.

Alpha determines that degrading this production capability could generate cumulative operational effects without committing ground forces. Naval command authorizes a sea-launched deep strike using long-range precision systems deployed from offshore platforms in the Sigma Sea corridor.

Beta maintains layered air defence coverage protecting critical infrastructure across its territory.

2. Mission and targets

Alpha mission

Conduct a sea-launched precision strike to degrade Beta military production capability and / or disable air defence systems protecting the targeted industrial zone.

Targets

- Military production buildings, assembly halls, and storage infrastructure within the industrial complex
- Air defence radar sites, interceptor launch nodes, or command elements protecting the complex and surrounding airspace

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Direct industrial complex strike	Launch long-range precision strike against identified military production structures	Production buildings, storage facilities	Misidentification within mixed-use industrial zone; Unintended damage to co-located civilian facilities; Uncertainty regarding current operational status of targeted buildings
Air defence suppression strike	Engage radar nodes and air defence systems protecting the complex to enable follow-on air access	Air defence radar sites, interceptor nodes, and command elements	Incomplete mapping of integrated air defence network; Residual defensive coverage despite initial suppression; Strike sequencing challenges
Sequential strike	Conduct coordinated strike package targeting both air defence systems and production facilities	Air defence nodes and selected production buildings	Compressed timing between strikes; Shifting defensive posture during engagement; Expanded strike footprint increasing collateral exposure

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	High-confidence structural mapping and confirmation of military production functions within targeted buildings; Known location, number and type of air defence assets	Conflicting ISR regarding building function and operational use; Unknown location, number and type of air defence assets	Reliable identification of some facilities but uncertainty regarding others within the complex; Uncertain location, number and type of air defence assets
Risk to civilians	No civilian workers on site	Only civilian workers present on site	Mix of civilian workers and military personnel on site
Structural configuration of industrial complex	Stand-alone military production complex with discrete infrastructure	Military production embedded within broader civilian industrial zone with shared utilities and transport links	Mixed-use zone with identifiable but adjacent military-designated buildings
Air defence coverage density	Limited or partially degraded air defence coverage over target area	Dense, layered air defence systems protecting the complex	Partial gaps in coverage with uncertain readiness levels

Target activity status at time of strike	Military production actively underway within confirmed facilities	Uncertainty regarding whether targeted facilities are currently producing military materiel	Fluctuating production cycles; Partial shutdowns or dual-use production lines
Environmental and operating conditions	Stable atmospheric conditions support precision strike accuracy	Adverse weather or atmospheric distortion degrade targeting precision	Variable atmospheric conditions alter strike accuracy and predictability

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, precautions, proportionality and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS that has been deployed to target the industrial complex been configured to identify and classify as a target? Would it be the military production facility as a whole or parts of it?
  - What parameters and data is it using to identify and classify the targets?
- How would the targetability of the industrial facility or parts of it be assessed?
  - What parameters and data is it using to identify and classify targets as military objectives?
  - Would the LAWS or human operators determine whether the industrial facility has mixed civilian components, particularly if there is a mix of civilian workers and military personnel on site?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL in cases of uncertainty?
- What specific measures are in place to ensure that the system's identification and classification of targets is documented to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL, particularly if there is uncertainty regarding the current operational status of targeted buildings?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?

- Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data?
  - What parameters and measures are in place to heighten their protection?
  - Has the LAWS been programmed to not engage protected objects?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- What measures are in place to ensure constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
  - Can the LAWS adapt its course of action, including target selection and force application, to avoid – and in any event minimize – risk of damage to civilian objects and incidental loss of civilian life and injury to civilians?
- What measures are in place to ensure that the trajectory of long-range precision strikes does not affect civilian objects (e.g., civilian aircraft)?
  - To what extent would there need to be specific measures for the use of LAWS in the launch of long-range precision strikes?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving (e.g., on detection of civilian presence, particularly given the possible mixed-use nature of the industrial zone)?

Denial of quarter

- What measures are in place to ensure that the LAWS – and any subsequent long-range strike – is deployed in compliance with the prohibition of denial of quarter if targeting the military production facility?
    - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

3. Air domain

3.1 Strategic anchor

Purpose of the Strategic Anchor

This strategic anchor establishes the common operational, legal, and geographic reference for all air scenarios developed under the Sigma war framework.

It is designed to:

- provide a stable strategic baseline against which individual air scenarios can be assessed;
- ensure coherence between air scenarios and concurrent land and naval operations;
- support structured analysis of international humanitarian law considerations arising from air operations conducted under conditions of uncertainty, time pressure, electronic warfare, and civilian proximity; and
- frame discussions concerning the potential use of lethal autonomous weapon systems (LAWS) in the air domain, without prescribing outcomes or solutions.

Individual scenarios build on this anchor and should not restate its assumptions.

3.1.1. Strategic context

Alpha and Beta, two neighbouring mid-sized States in the Sigma region, are engaged in an international armed conflict following escalation along their shared international land border. What began as localized incidents and reciprocal allegations of airspace violations has expanded into sustained multi-domain hostilities encompassing land, maritime, and air operations.

Air operations play a central role in shaping the pace, reach, and escalation dynamics of the conflict. They are tightly interlinked with ongoing ground combat in the Sigma Mountains and Delta Corridor, as well as maritime activity in the Sigma Sea Corridor and adjacent approaches. Control of the air domain is neither uniform nor static, but characterized by persistent contestation, degraded situational awareness, and frequent interaction with civilian airspace and infrastructure.

3.1.2. Operational air objectives

State of Alpha

Alpha fields a more technologically advanced air posture, emphasizing integration across sensors, command and control, and effects. Its air operations are oriented towards flexibility, reach, and cross-domain support, enabling both defensive missions and selective power projection beyond its immediate territory. Alpha has access to LAWS.

Alpha's operational air objectives are to:

- secure and exploit Alpha-controlled airspace to protect national assets and sustain operational tempo;
- contest and shape the Central Air Contested Zone in support of ground manoeuvre along the Sigma Mountains and the Delta Corridor;
- project air effects selectively beyond the contested zone to disrupt Beta activities that directly affect land and maritime operations; and
- maintain decision advantage through ISR, battle management, and system integration under conditions of electronic warfare and degraded situational awareness.

State of Beta

Beta maintains an air posture designed primarily for territorial defence and denial, emphasizing mass, redundancy, and resilience rather than sustained power projection. Its approach prioritizes the protection of national airspace, the attrition of adversary advantages, and the imposition of operational friction through dispersion, mobility, and deception. Beta has access to LAWS.

Beta's operational air objectives are to:

- defend Beta-controlled airspace through layered air defence, mobility, and denial strategies;
- prevent Alpha from achieving uncontested access or decision dominance in the contested zone by imposing persistent risk, uncertainty, and cost;
- preserve air and air-defence assets for prolonged operations, accepting localized losses in exchange for strategic endurance; and
- shape escalation dynamics by selectively contesting Alpha air operations while avoiding dependence on sustained power projection beyond national defence priorities.

3.1.3. The air battlespace

Air operations take place across the same named regions used in the land and naval strategic anchors, expressed through the airspace context described above.

The contested zone represents the most unstable and analytically demanding environment, combining dense civilian activity, electronic interference, terrain-induced sensor degradation, and rapid escalation dynamics.

National airspace see comparatively greater control by the respective State, but remain subject to penetration, long-range effects, and cross-domain spillover.

Environmental factors including weather, terrain, urban density, and electromagnetic congestion frequently constrain classification confidence and decision-making timelines across all air operations.

TABLE 1.

Air domain – Territorial control framework

ALPHA-CONTROLLED AIRSPACE	CONTESTED AIRSPACE	BETA-CONTROLLED AIRSPACE
Western Air Defence Region Airspace over Alpha territory, including the Sigma Foothills, Southern Lowlands, and western maritime approaches	**Central Sigma Air Contest Zone** Airspace overlapping the Sigma Mountains, Delta Corridor, and central Sigma Sea Corridor; Characterized by overlapping claims, degraded situational awareness, and frequent contestation	**Eastern Air Defence Region** Airspace over Beta Provinces, Beta Basin, Beta Peninsula, and Beta Isles
Western Coastal Approach Airspace Airspace supporting maritime access and protection of the Alpha port complex	**Transit and Support Airspace** Airspace used for cross-domain support to land and maritime operations without stable control by either side	**Eastern Coastal and Island Airspace** Airspace supporting Beta coastal defences and island-based surveillance

3.1.4. Legal baseline, rules of engagement and additional guidance on the use of force

The situation constitutes an international armed conflict between Alpha and Beta. All air operations are governed by international humanitarian law applicable to IAC. Protections apply to medical aircraft, and civilian aircraft in established corridors.

Each State applies national rules of engagement and guidance on the use of force consistent with IHL, including requirements related to distinction, proportionality, precautions in attack, and the use of force in self-defence. In particular, rules and guidance are provided to:

- set positive identification (PID) standards including multi-sensor confirmation requirements;
- regulate use of force and engagement authority near civilians and protected objects; and
- define conditions for employing autonomous and semi-autonomous systems, including:
  - thresholds for autonomous target engagement;
  - abort/override contingencies under EW degradation; and
  - requirements for multi-source PID in cluttered environments.

3.1.5. Integration with other domains

Air operations are conducted in parallel with ongoing land and naval operations and remain compatible with them. Cross-domain dynamics (e.g., land-based radars influencing air operations, naval air defences affecting air corridors) may be incorporated in specific air scenarios where analytically useful.

3.2. Scenario catalogue

AIR-301 – Suppression / destruction of enemy air defence (SEAD/DEAD) strike in the Beta Prime urban cluster

Conflict type

IAC (Alpha vs. Beta)

Operation category

Offensive counter-air (OCA) – SEAD/DEAD (urban)

Geographic setting

Beta Prime urban cluster, Sigma war theatre

1. Scenario narrative

Beta Prime is one of Beta's most densely populated metropolitan areas and hosts several industrial zones, residential districts, and dual-use communications infrastructure. During the past week, Alpha's air operations within Beta-controlled airspace in the Eastern Air Defence Region have seen increased losses and degraded freedom of manoeuvre due to a small mobile surface-to-air missile (SAM) system operating intermittently from within residential and mixed-use blocks.

The SAM unit employs frequent relocations between narrow streets, electronic deception techniques that mimic civilian communication signatures, and clutter-based masking using urban structures. This system has successfully disrupted Alpha's air operations across the Beta Prime region by threatening ISR platforms, deterring close air support, and complicating reconnaissance of ground operations in adjacent districts.

Urban density, civilian presence, and electromagnetic clutter significantly affect target identification. Civilian movement remains high–workers, commercial vehicles, and local transit continue despite intermittent fighting in outer districts.

Alpha is planning an operation to neutralize the SAM system responsible for the repeated disruption of air operations over the Beta Prime region. The means of attack have not been determined. Commanders are evaluating several options under conditions of constrained flight corridors, intermittent sensor denial, uncertain collateral effects in dense terrain, and rapidly shifting emitter signatures.

Throughout the afternoon, Alpha receives multiple brief but confirmed emissions from the central Beta Prime district consistent with a SAM system.

Alpha assesses that if the SAM systems is not neutralized, it will continue to degrade air operations supporting ground forces near the Sigma Mountains and Delta Corridor. Waiting for clearer identification may allow the system to reposition into deeper, harder-to-target areas of the city.

2. Mission and targets

Mission

Destroy the mobile SAM system disrupting Alpha air operations over the Beta Prime region in order to restore freedom of manoeuvre for ISR, close air support, and reconnaissance activities.

Target

- SAM launcher and associated radar

Engagement authority is limited to positively identified mobile SAM system. No authorization exists for area-wide strikes beyond identified military objectives.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision SEAD strike	Detect, classify, and engage the mobile SAM system during confirmed emission windows	SAM system (static, emitting)	Misidentification amid urban clutter; civilian proximity; short-duration emissions limiting confirmation
Relocation interdiction	Engage SAM system during displacement between firing positions	SAM system transiting narrow urban streets	Civilian traffic intermingling; rapid loss of track; line-of-sight constraints

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR (thermal, radar, SIGINT) correlates high confidence location within defined 1-block radius; emission patterns stable enough for targeting	ISR degraded by high-rise structures, smoke, and signal overlap; sporadic emissions complicate correlation; PID confidence limited	Conflicting ISR reporting due to decoy emitters; divergent sensor classification of vehicles
Risk to civilians	Civilian movement reduced near emitter location; target isolated from dense pedestrian clusters	High civilian density, residential co-location, and commercial traffic in immediate proximity	Civilian presence fluctuates unpredictably; rooftop and street-level activity irregular

Urban electromagnetic clutter	Emissions distinguishable from civilian signals; limited EW interference	Rooftop antennas and civilian broadcast equipment generate overlapping frequencies	Extent of spoofing and signal masking unclear; brief emission windows reduce certainty
SAM mobility	Relocation occurs within limited perimeter allowing track continuity	Rapid displacement deeper into urban grid reduces engagement window	Direction and timing of next relocation unpredictable
Sensor performance	Thermal imagery clearly identifies launcher and radar heat signatures	Industrial haze, reflections, and street canyons degrade EO/IR classification	Environmental conditions shift during operation, altering sensor fidelity
Time pressure	System remains within defined engagement radius long enough for deliberate targeting	Further delay allows repositioning into harder-to-target interior zones	Duration of current exposure window uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions (both with respect to precautions in attack and effects of an attack), as well as distinction, proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What targets has the LAWS been configured to identify and classify as military objectives?
  - What type or types of target has the LAWS been designed, trained and configured to identify, select, verify and engage?
  - What parameters and data is it using to identify and classify the targets as military objectives?
  - Is it possible to choose targets among several military objectives that would achieve a similar military advantage?
- What specific measures are in place to ensure that the system's identification and classification of targets is documented?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?

- Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

- Can the LAWS detect medical personnel?
  - What parameters and data is it using to identify and classify medical personnel as such?
  - Has the LAWS been programmed to not engage persons classified as medical personnel?
- Can the LAWS detect religious personnel?
  - What parameters and data is it using to identify and classify religious personnel as such?
  - Has the LAWS been programmed to not engage persons classified as religious personnel?

- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
  - Can the LAWS detect and assess the loss of protection for protected persons, including medical and religious personnel?
    - What parameters and data is it using to assess such loss of protection?
    - What safeguards and measures are in place to minimize the risks of false positives?
- What type of target would a LAWS that is tasked with suppressing or destroying a SAM system need to engage for that deployment and use to be lawful?
- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data?
  - What parameters and measures are in place to heighten their protection?
  - Has the LAWS been programmed to not engage protected objects?
    - If protected objects are detected, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place to ensure that the LAWS can reliably distinguish between a SAM system and civilian communications infrastructure?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?

Precautions

- To what extent is the availability, overall quantity, quality and reliability of available intelligence relevant in the context of deploying a given LAWS in this scenario?
  - For example, to what extent is the context in the target area visible to the LAWS? To what extent would this affect compliance with the rule of precautions and other applicable IHL obligations and protections?
- What measures are in place to ensure the consistent veracity of intelligence?
- Is the LAWS capable of detecting variability in intelligence, including changing weather conditions or changing analytics?
  - To what extent would the system rely on human input to factor in such variability after it has been deployed?
  - Can the system subsequently adapt its course of action, including through the abortion or suspension of engagement?
    - What parameters would be used to determine the course of action required?
- In the light of the heightened risks to civilians, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What precautionary measures can be taken, or are in place, to identify and classify military objectives in order to minimize risks of incidental harm?
  - What has the LAWS been programmed to do if it is unable to detect the target?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures and technical features are in place to ensure that target prioritization for the LAWS serves to limit the risk of misidentification of targets or collateral damage?
  - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from the effects of an attack?
  - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?

Proportionality

- How will the commander's obligation to assess the proportionality of any attack be satisfied?
  - Has the system been designed, trained and tested in alignment with such an obligation?
  - When can and should it be applied?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, there are high risks to civilians given urban density and circumstances are evolving?

Choice of means and methods of warfare

- Has the LAWS been trained and tested for deployment in cluttered, dense urban settings?
  - To what extent would this knowledge affect the commander's decision to deploy LAWS in this scenario?
- What other means and methods of warfare could be deployed in this context to achieve the intended mission (e.g., cyberoperations to neutralize the SAM system)?
  - How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

AIR-302 – High-speed UAS threat to Alpha forward airbase

Conflict type

IAC (Alpha vs. Beta)

Operation category

Defensive counter-air (DCA) – air-to-air intercept

Geographic setting

Delta Corridor, Approaches to Alpha Forward Airbase

1. Scenario narrative

Alpha Forward Airbase is one of Alpha's most critical installations supporting ongoing operations in the Sigma Mountains and Delta Corridor. The base hosts multi-role aircraft, ISR platforms, and logistics facilities essential for maintaining tempo along multiple fronts.

In recent days, Beta has intensified efforts to counter Alpha's air operations. Beta leadership now appears prepared to project air capabilities deeper into Alpha-controlled airspace. Early this morning, Alpha's air defence network detected a coordinated formation of high-speed uncrewed aerial systems (UAS) approaching the Delta Corridor. The incoming UAS transit through the Central Sigma Air Contested Zone along the Delta Corridor before approaching Alpha-controlled airspace associated with the Alpha maritime approaches.

The UAS fly in a shifting formation and demonstrate manoeuvre behaviour suggestive of autonomous navigation, though the level of autonomy cannot be verified. They maintain low-altitude, high-speed profiles and have ambiguous or minimal radar signatures. The flight vector leads directly towards Alpha Forward Airbase.

As the formation advances deeper into the Delta Corridor, Alpha's air defence command orders to engage the formation.

2. Mission and targets

Mission

Protect airspace and prevent an attack on the airbase by intercepting and destroying enemy air assets approaching the Alpha maritime approaches.

Target

- Incoming UAS formation threatening Alpha Forward Airbase

Engagement authority is limited to positively identified military objectives consistent with the ongoing international armed conflict.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Autonomous air intercept (Alpha)	Detect and engage incoming high-speed UAS prior to airbase approach	UAS formation	Misclassification of payload; engagement of reconnaissance vs. strike systems; compressed decision timelines

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR confirms multiple armed UAS flying in coordinated patterns; trajectory aligns with known OCA tactics	Radar tracking intermittent due to terrain masking and low-altitude profiles; no confirmation of payload or autonomy level	Sensors disagree on classification (reconnaissance vs. munition-carrying); conflicting coalition feeds; possible ghost tracks
Risk to civilians	Engagement occurs over sparsely populated corridor airspace with limited ground exposure	Engagement occurs over densely populated areas	Engagement occurs over dual-use transportation axis of roads and rails with civilian traffic intermittent
Payload identification	Clear indication of strike-capable airframes	No reliable confirmation of payload; signatures ambiguous	Mixed formation possibly including decoys, ISR, or strike platforms
Autonomy level	SIGINT confirms command uplinks consistent with pre-planned autonomous flight routes	No clear emissions confirming autonomy or remote control	Disagreement whether systems are remotely piloted, semi-autonomous, or fully autonomous
Sensor performance	Stable radar and EO/IR tracking across approach vector	Low-altitude, high-speed profiles degrade radar and thermal classification	Atmospheric conditions fluctuate, affecting track stability
Electronic interference	Minimal EW activity affecting defensive systems	EW spoofing creates false or duplicate tracks	Sensors provide divergent assessments of contact number and classification
Time pressure	Early detection allows layered interception prior to terminal phase	Detection occurs late in approach, compressing decision window	Exact timing of formation arrival uncertain; manoeuvre behavior dynamic
Airspace control	Temporary defensive advantage over Alpha maritime approaches	Contested airspace limits manoeuvre and response options	Control fluctuates as both sides adjust posture

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns proportionality, along with some questions in relation to distinction, precautions, the choice of means and methods of warfare, and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - Would the entire formation constitute a single military objective? Or only elements of it?
  - What parameters and data is it using to identify and classify the targets?
  - Would that determination be made by the LAWS or a human operator?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Precautions

- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - What measures are in place to monitor for civilian presence around the airbase?
- What measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?
  - Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from target engagement around the airbase?
    - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what basis?
- What are the risks of engaging a UAS over populated areas (e.g., debris, failed intercept, secondary effects)?
  - What firing parameters would be suited to the circumstances of the scenario?
    - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and

in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects, particularly in relation to risks of debris and secondary effects?

Proportionality

- Given the principle of proportionality, where and how should the formation be engaged by the LAWS?
  - What would be the military advantage in attacking the entire formation or elements of it?
  - What would be the corresponding risks of collateral damage?
- What has the formation been programmed to do in the event of engagement by the LAWS, and vice versa? To what extent could it affect proportionality assessments?

Choice of means and methods of warfare

- What other means and methods of warfare could be deployed in this context to achieve the intended mission?
  - Is there a choice of weapon or method of attack?
- How would the commander decide that the use of LAWS is appropriate in this operational context?
- To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Denial of quarter

- For strikes against the Alpha Forward Airbase, what measures are in place to ensure that the LAWS (i.e., the UAS) is deployed in compliance with the prohibition of denial of quarter?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

AIR-303 – Pre-emptive strike on border-massing forces

Conflict type

IAC (Alpha vs. Beta)

Operation category

Interdiction operations – operational interdiction (pre-emptive strike)

Geographic setting

Sigma Mountains, Sigma war theatre

1. Scenario narrative

Tensions along the Alpha–Beta border have escalated sharply within the Sigma Mountains sector. During the past 48 hours, Alpha ISR assets have detected substantial Beta military activity across a 30–40 km segment of the border zone. Imagery shows armoured vehicles dispersed along treelines and agricultural fields; mobile artillery positioned near elevated ground; temporary command posts co-located with civilian structures; and increased logistics flows through several villages and rural road networks.

The activity takes place within the Central Sigma Air Contested Zone, overlaying the Sigma Mountains and the Delta Corridor, where overlapping airspace claims, degraded situational awareness, and persistent electronic interference constrain air operations for both parties.

Alpha's leadership assesses that Beta may be preparing coordinated offensive action. Sigma Mountains–marked by rugged ridgelines, fragmented forests, and scattered farming communities–offers limited early-warning time once ground operations begin. Civilian presence remains significant across hamlets located close to military activity.

Alpha is preparing to engage Beta forward-deployed forces to delay or prevent a cross-border offensive, reducing the risk of a breakthrough into Alpha border districts, and degrading command and control structures near the front line. Commanders are evaluating multiple options for achieving the mission objectives under the current environmental, operational, and legal constraints.

Throughout the morning, Alpha receives indications that Beta units are settling into offensive positions. Alpha's air planners assess that Beta may initiate coordinated fire missions with little additional warning; delaying action could forfeit the narrow window in which dispersed forces remain exposed; and the opportunity for a strike may close if Beta units disperse further or move into more protected positions.

2. Mission and targets

Mission

Strike Beta forward-deployed forces in the Sigma Mountains in order to disrupt, delay, or prevent a potential cross-border offensive and degrade front-line command and control structures.

Targets

- Concentrations of Beta troops
- Armoured vehicles and mobile artillery units
- Mobile surface-to-air missile systems
- Field command posts co-located near frontline areas

Engagement authority is limited to positively identified military objectives and combatants associated with forward-deployed Beta forces within the defined operational sector.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Strike on Beta forces	Neutralize forward-deployed forces prior to offensive initiation	Armoured units, artillery, troop concentrations	Misidentification of civilian vehicles intermixed in agricultural areas; degraded PID under fog and smoke
Command node engagement	Disrupt frontline command and control structures	Field command posts co-located near civilian structures	Uncertainty regarding exact C2 node location
Air-defence suppression	Disable mobile SAM systems threatening strike execution	Mobile SAM missile systems	Incomplete identification of active vs. decoy systems; EW interference
Persistent overwatch and adaptive targeting	Track dispersing units and transition to engagement when exposure window permits	Moving armoured convoys and artillery repositioning	Loss of track due to terrain masking; classification delays under EW disruption

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR confirms coordinated troop movements and explicit SIGINT orders preparing for offensive action	ISR degraded by fog, smoke, and terrain masking and is deemed not reliable during the possible engagement window	ISR is inconsistent due to variable conditions
Risk to civilians	Civilian vehicles and populations spatially separated from primary military concentrations	Civilian and military vehicles intermixed near village and agricultural roads	Civilian presence fluctuates; degree of intermingling varies by location and time

Weather and environmental conditions	Clear windows permit reliable thermal and radar identification	Fog, smoke, and wind degrade EO/IR classification and thermal returns	Weather conditions shift during engagement window
Electronic interference	EW presence limited and manageable	Active EW disrupts datalinks and creates intermittent classification delays	Suspected spoofing produces ambiguous radar returns
Target mobility	Dispersed forces remain exposed within defined sector	Units rapidly reposition into protected terrain or civilian structures	Extent and timing of further dispersal uncertain
Air-defence threat	Mobile SAM positions identified and monitored	Active air defences constrain approach and limit supervision	Number and disposition of SAM systems unclear
Time pressure	Narrow but sufficient window to strike prior to offensive launch	Delay risks breakthrough into Alpha districts	Exact timing of Beta offensive remains uncertain
Terrain masking	Elevated ISR platforms maintain visibility across sector	Ridgelines and fragmented forests restrict line-of-sight	Partial terrain exposure produces intermittent tracking gaps

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions, along with some questions in relation to distinction, proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Is the LAWS capable of identifying and classifying as military objectives all types of target that could be engaged (i.e., concentrations of troops, armoured vehicles, mobile artillery, mobile SAM systems and field command posts)?
  - By what technical means, data and parameters would targets be identified?
  - How is each individual target defined and characterized?
    - For instance, for concentrations of troops, would identification be based solely on group size or on a combination of datapoints?
    - To what extent would such assessments be in line with the rules and principles of IHL?
- What measures are in place to ensure consistent compliance with the rule of distinction?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?

- Can the LAWS detect persons *hors de combat*?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
  - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten their protection?
  - Has the LAWS been programmed to not engage protected objects?
    - Has the LAWS been programmed to adapt its course of action accordingly if protected objects are detected, including through the abortion or suspension of engagement?

Precautions

- Is there any intelligence on the nature of the civilian structures co-located with the temporary command posts?
- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- What measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, including with respect to the possible secondary effects of attacks on the treelines, agricultural fields and rural roads in the area?
- Has the LAWS been trained and tested for deployment in weather conditions similar to those in this scenario?
  - To what extent were the conditions of fog and smoke to be expected in the area? How would this knowledge affect expectations for precautionary measures?
- Given that there are civilian hamlets in proximity to military activity, what measures are in place to issue effective advance warning of attacks, unless circumstances do not permit?

Would the effects of deploying and using LAWS make it necessary to give effective advance warning?

- Is the system equipped to deliver a warning?
- What parameters and data is it using to assess whether a warning would be appropriate and feasible?

Proportionality

- Is the proportionality assessment undertaken by a human operator, the LAWS or a combination of both?
  - By what means is the proportionality assessment made?
  - To what extent would IHL require that such an assessment to be made by a human operator, if at all?
- What would be the potential secondary effects from damage to those structures? Have available assessments been uploaded to the given LAWS prior to deployment? Is it capable of analysing and integrating these patterns into its outputs?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

AIR-304 – Ambush on mountainous supply route

Conflict type

IAC (Alpha vs. Beta)

Operation category

Interdiction operations – operational interdiction (mountainous)

Geographic setting

Northern Slopes of the Beta Basin, Sigma war theatre

1. Scenario narrative

The northern slopes of the Beta Basin constitute one of the most strategically important supply corridors for Beta forces operating in the Sigma Mountains and Beta Prime regions. The area is characterized by narrow mountain roads, steep switchbacks, dense forest cover, and scattered small settlements. Weather conditions frequently include fog, low cloud ceilings, and strong winds that complicate air operations.

Alpha has observed that Beta is using a concealed route running through the Lambda Pass, a tight valley connecting rear logistical hubs to forward staging areas. The Lambda Pass is located on the western rim of the Beta Basin, within Beta-controlled airspace. As the route approaches the Sigma Mountains, air operations increasingly occur near the interface with the Central Sigma Air Contested Zone, where overlapping sensor coverage, terrain masking, and electronic interference degrade classification and reduce freedom of action for both parties. Movement typically occurs at night or during early morning hours when visibility is lowest.

During pre-dawn hours, Alpha ISR detected a Beta logistical convoy–carrying munitions and heavy equipment–approaching the Lambda Pass region. Initial signatures suggest a small group of vehicles traveling in a dispersed formation along the mountain road.

The area contains scattered civilian dwellings, periodic foot traffic, and light commercial vehicles transporting goods between isolated communities.

Alpha is planning a strike against the convoy in order to degrade Beta's ability to reinforce frontline positions in the Sigma Mountains, prevent the movement of ammunition and equipment to the Beta Prime Urban Cluster, and disrupt tactical operations dependent on the Lambda Pass corridor.

The convoy's direction suggests it may soon reach an area where overhead observation becomes severely limited due to steep terrain. If it enters this zone, a strike may be impossible without substantial risk or delay.

2. Mission and targets

Mission

Conduct a strike against a Beta logistical convoy transiting the Lambda Pass in order to degrade reinforcement of front-line positions and disrupt tactical sustainment operations.

Target

- Military trucks transporting munitions and equipment

Escort units

Engagement authority is limited to positively identified military objectives associated with the convoy within the defined operational corridor.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Strike against Convoy	Engage vehicles transporting weapons or ammunition	Cargo trucks within convoy	Misclassification of civilian trade vehicles; limited PID under fog and tree cover
Escort suppression	Engage protective or overwatch elements enabling convoy movement	Escort vehicles on road or elevated positions	Misidentification of escort vs. civilian movement; terrain masking

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR correlates convoy size, vehicle types, and encrypted communications typical of military convoys	ISR is unreliable and prevents sustained monitoring and tracking of the convoy	ISR is conflicting and increasing ambiguity over the classification of the vehicles in transit
Risk to civilians	Civilian presence minimal along engagement segment; dwellings distant from target vehicles	Civilian dwellings and periodic foot traffic near convoy route	Civilian activity fluctuates unpredictably across time and location
Weather and visibility	Clear pre-dawn window allows stable tracking	Fog thickens; strong winds degrade thermal clarity; radar obstructed by ridgelines	Rapidly changing conditions alter classification confidence mid-operation

Terrain masking	Elevated ISR maintains visibility over lower pass	Steep terrain and tree cover obscure vehicles; observation severely limited in upper pass	Extent of observation-denied zone uncertain
Electronic interference	Limited EW interference affecting classification	EW interference denies the use of data and communication link	Sensors provide divergent assessments of contact number and classification
Time pressure	Engagement window available before convoy reaches observation-denied area	Delay results in convoy entering zone where interdiction becomes infeasible unless conducted with autonomous systems	Exact timing of arrival at terrain chokepoint uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and the choice of means and methods of warfare, along with some questions in relation to precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be combatants, the road, the convoy or elements of it (i.e., specific vehicles)?
  - What parameters and data is it using to identify and classify the targets?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

Precautions

- Applying Article 57(3) of Protocol I to the Geneva Conventions, is there a possible choice of targets between several military objectives that would achieve a similar military advantage (e.g., with respect to the choice of attacking the road versus road users)?

- What measures are in place to avoid – and in any event minimize – the risk of damage to civilian objects and incidental injury or loss of civilian life (e.g., by limiting the number of strikes on a given target)?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Has the LAWS been designed, tested and configured for weather conditions similar to those in the scenario (i.e., fog, low cloud ceilings and strong winds that could complicate operations)?

Proportionality

- To what extent would the LAWS support human operators in conducting proportionality assessments on the target and the method of the attack, particularly with respect to expected incidental civilian harm and the anticipated concrete and direct military advantage?
  - To what extent is this task being delegated to the LAWS?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving (e.g., with possible civilian presence and movement)?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS that is deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- What knowledge does the decision maker need regarding system capabilities to support the decision to deploy the LAWS? To what extent would such deployment be appropriate in this scenario?
- Given the known weather conditions and subsequent complications for air operations, would the deployment of the air-based LAWS be the most appropriate choice to support operations?

AIR-305 – Time-sensitive strike on senior Beta land forces deputy commander

Conflict type

IAC (Alpha vs. Beta)

Operation category

Air interdiction operations – time-sensitive targeting (human HVT)

Geographic setting

Western Approaches to the Beta Basin, Sigma war theatre (Beta-controlled airspace, near the Contested Zone)

1. Scenario narrative

The western approaches to the Beta Basin form a critical operational depth area for Beta land forces engaged in sustained combat in the Sigma Mountains and Delta Corridor. While the basin interior remains firmly under Beta control, the region lies close to the interface with the Central Sigma Air Contested Zone, where airspace access, sensor coverage, and freedom of action are increasingly contested.

Beta's Land Forces Deputy Commander is assessed to be exercising forward operational control from temporary locations within this area in order to oversee ongoing ground operations. The commander's movements are deliberately irregular, relying on short-duration stops, frequent relocation, and the use of mixed civilian–military transport routes to reduce predictability and exposure.

The terrain consists of rolling highlands and sparsely populated valleys, intersected by secondary roads linking military staging areas with small towns and agricultural settlements. Civilian vehicle traffic is present but reduced due to ongoing hostilities. Weather conditions are variable, with intermittent low cloud, wind shear, and localized precipitation affecting sensor performance.

Alpha is considering a time-sensitive air strike against the Beta Land Forces Deputy Commander in order to disrupt Beta's operational command and control of ground forces engaged in the Sigma Mountains, degrade Beta's ability to coordinate reinforcements and defensive manoeuvres, and generate operational-level effects without conducting a broader deep-strike campaign.

The intended target is the individual commander, assessed as a lawful target by nature given his status as a combatant. The individual is believed to be travelling between temporary command locations using ground transport rather than operating from a fixed military installation.

During early morning hours, Alpha ISR assets detect a convoy departing a temporary location and moving westward along a secondary road network toward the Beta Basin interior. Sensor coverage fluctuates as the convoy passes through low terrain and intermittent cloud cover.

Communications intercepts indicate increased command activity coinciding with the movement.

As the convoy approaches a junction where multiple routes diverge, ISR analysts assess that the opportunity for engagement is rapidly closing. If the convoy disperses or enters denser terrain, further tracking and identification may not be possible without significant delay.

Alpha planners assess that if the commander is present, a successful strike could disrupt Beta ground operations during a critical phase of fighting; delaying action risks loss of the target and continuation of coordinated Beta manoeuvres in the Sigma Mountains; and current environmental and electromagnetic conditions limit the likelihood of obtaining additional confirmation before the engagement window closes.

2. Mission and targets

Mission

Conduct a time-sensitive air strike against the Beta Land Forces Deputy Commander in order to disrupt operational command and control and generate operational-level effects in the Sigma Mountains sector.

Targets

- Beta Land Forces Deputy Commander (lawful target given the commander's status as a combatant)
- Vehicle transporting the commander within the assessed convoy

Engagement authority is limited to positively identified combatants and military objectives associated with the commander and immediate protective elements directly linked to the convoy.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Time-sensitive HVT strike	Engage convoy vehicle assessed to be carrying the Deputy Commander within pre-determined engagement window	Identified vehicle within mixed convoy	Misidentification of occupant; civilian–military vehicle similarity; incomplete PID
Convoy tracking and adaptive engagement	Maintain persistent track and transition to strike when predetermined engagement parameters and thresholds are met	Identified vehicle within mixed convoy	Loss of track due to terrain masking; Misidentification of occupant; civilian–military vehicle similarity; incomplete PID
Escort suppression in support of ground operation	Neutralize protective elements accompanying HVT to enable ground operations	Armed escort vehicles within convoy	Civilian vehicle proximity

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-source ISR correlates convoy movement with known travel patterns of HVT; SIGINT identifies encrypted command-level communications;	ISR detects convoy but cannot visually confirm occupants; communications activity not attributable to specific individual	ISR platforms disagree on vehicle number/ type; reporting suggests possible route change; civilian traffic complicates attribution
Risk to civilians	Civilian traffic limited along selected engagement segment	Mixed civilian–military convoy; civilian vehicles merge and separate along shared road segments	Civilian movement patterns fluctuate and cannot be consistently predicted
Sensor performance	Stable sensor coverage along open terrain segments	Low cloud, wind shear, and precipitation degrade tracking	Terrain and weather intermittently disrupt tracking windows
Target mobility	Convoy route predictable with limited divergence points	Multiple junctions allow rapid dispersal and loss of identification	Exact vehicle carrying commander uncertain
Time pressure	Engagement window available prior to route divergence	Delay results in loss of target into denser terrain	Duration of tracking window uncertain
Airspace contestation	Limited interference near engagement area	Contested airspace restricts manoeuvre (e.g., presence of vehicle-mounted anti-air artillery and MANPADS)	Uncertainty over Beta counter-air capabilities as part of the convoy

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to characterizing and identifying military objectives and the ability to identify persons *hors de combat*), along with some questions in relation to precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the Beta Land Forces Deputy Commander, combatants or objects (e.g., convoys, parts of the convoys or individual vehicles)?

- What parameters and data are being used to characterize, identify and assess the targetability of persons and objects?
- Would the LAWS consider civilian vehicles that are part of the civilian–military convoy as military objectives?

- If the Deputy Commander is to be the target, by what means will they be identified?
  - What data and other parameters would the LAWS use to identify them as a target?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?

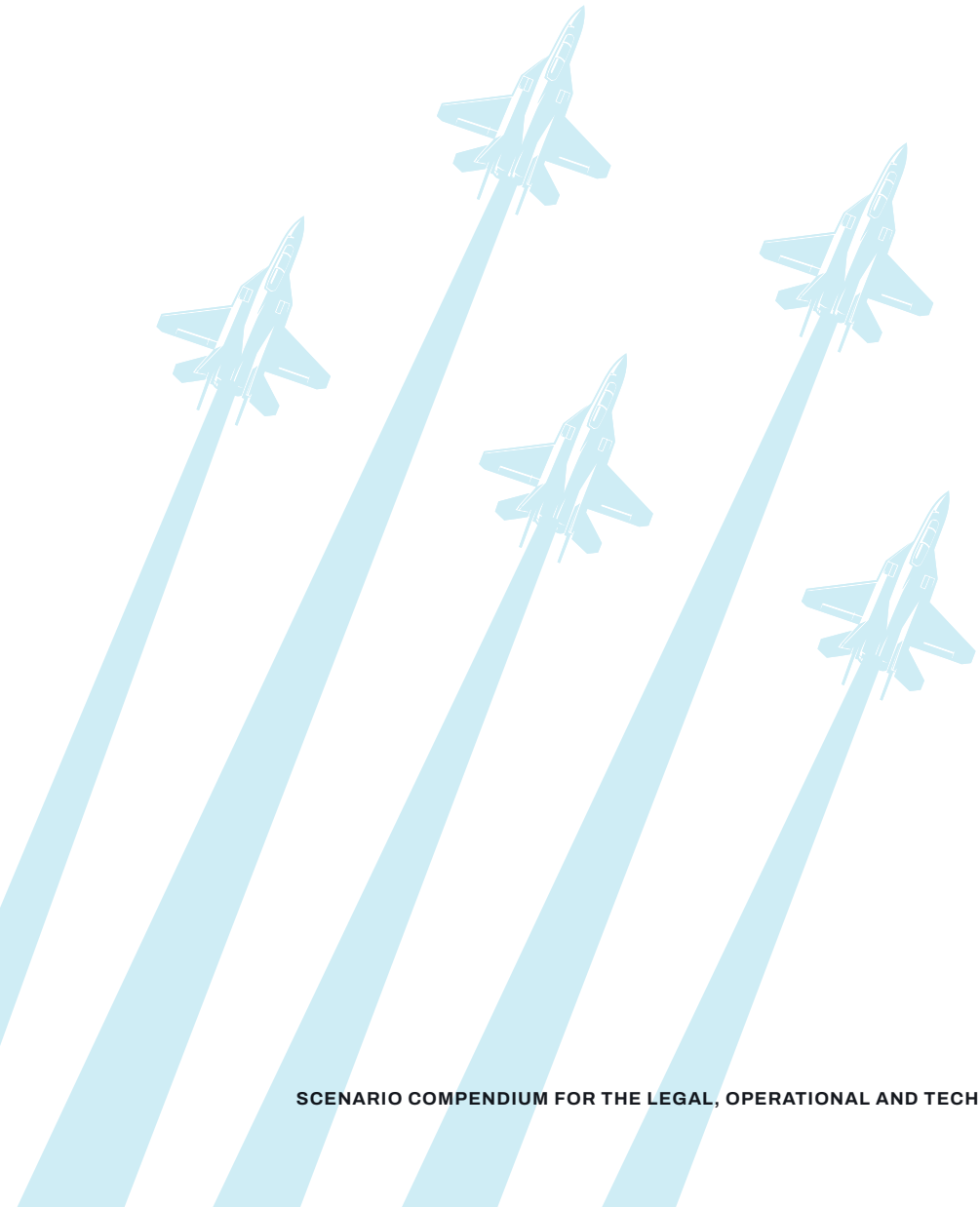
Precautions

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage?
  - What measures are in place to ensure that the LAWS does not engage the target if the expected incidental harm would be excessive?
- In the light of the heightened risks to civilians due to the mixed civilian–military use of the transport routes in question and the mixed civilian–military composition of the convoy, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?

- What firing parameters would be suited to the circumstances of the scenario?
    - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- How is the concrete and direct military advantage of neutralizing the Deputy Commander assessed? How does such advantage weigh against potential incidental harm to civilians in the convoy and surrounding area?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?



AIR-306 – Air-to-air engagement in contested airspace over the Delta Corridor

Conflict type

IAC – Alpha vs. Beta

Operation category

Offensive counter-air / air superiority engagement

Geographic setting

Central Sigma Air Contested Zone above the Delta Corridor

1. Scenario narrative

Airspace over the Delta Corridor remains heavily contested as both Alpha and Beta seek to establish local air superiority in support of ongoing ground operations in the Sigma Mountains and Beta Prime regions. The Central Sigma Air Contested Zone is characterized by overlapping air-defence coverage, intermittent electronic interference, and frequent proximity of opposing air patrols.

Alpha has established a combat air patrol (CAP) operating along the western edge of the Delta Corridor to protect ISR assets and deter Beta strike packages from approaching Alpha-controlled airspace. Beta, seeking to degrade Alpha's air dominance and protect its own manoeuvre forces, has launched a formation of crewed fighter aircraft accompanied by high-performance uncrewed combat aerial systems (UCAS).

Early warning systems detect multiple high-speed contacts approaching the CAP sector from Beta-controlled airspace. The formation exhibits coordinated manoeuvre patterns consistent with offensive counter-air operations. Some tracks display flight profiles consistent with crewed fighters; others manoeuvre with acceleration envelopes suggestive of autonomous or semi-autonomous UCAS.

Alpha's air command authorizes the CAP to intercept.

2. Mission and targets

Mission

Intercept and engage Beta military aircraft operating within the Central Sigma Air Contest Zone.

Targets

- Beta crewed fighter aircraft operating in coordinated formation
- Beta UCAS accompanying the formation

Engagement authority is limited to positively identified Beta military aircraft operating within the contested airspace.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Autonomous air-to-air engagement	Detect, classify, and engage hostile aircraft within weapons envelope	Beta crewed fighters and UCAS	Misclassification under electronic interference; compressed decision cycles; Fratricide risk in high-velocity manoeuvre environment
UCAS suppression strike	Prioritize engagement of high-performance UCAS to reduce manoeuvre asymmetry	Beta UCAS operating alongside crewed aircraft	Difficulty distinguishing UCAS from decoy systems; Fratricide risk in high-velocity manoeuvre environment

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-sensor ISR confirms hostile aircraft type, number, and vector with high confidence	Radar degradation and datalink interruptions reduce classification certainty	Divergent sensor tracks create ambiguity regarding aircraft type and composition
Risk to civilians	Engagement occurs at altitude over sparsely populated corridor	Engagement drifts toward lower altitude over civilian infrastructure	Civil aviation presence in adjacent airspace uncertain
Electronic interference	Limited electronic countermeasures affecting track stability	Active EW degrades radar fidelity and track correlation	Source and intensity of interference fluctuate during engagement
Friendly–hostile discrimination	Clear separation between Alpha CAP aircraft and Beta formation	Close-proximity manoeuvre increases track overlap	Rapid manoeuvre produces intermittent track fusion and ambiguity
Civilian air traffic presence	No civilian flights operating within engagement sector; NOTAMs and airspace closures effective	Civilian commercial or cargo aircraft operating within broader air corridor near engagement envelope	Civil aviation transponder signals intermittent; possible deviation from filed flight paths due to weather or rerouting
Manoeuvre velocity and closure rate	Stable intercept geometry allows deliberate engagement sequencing	High closure rate compresses engagement timeline	Opposing formation alters speed and vector unpredictably
Air-defence environment	No immediate surface-based air-defence threats in engagement sector	Mobile SAM systems active within engagement envelope	Disposition and readiness of air-defence systems uncertain

Time pressure	Sufficient time to confirm classification before weapons release	Immediate engagement required to prevent airspace penetration	Duration of viable engagement window uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns proportionality and precautions, along with questions of distinction.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Can the LAWS reliably and accurately distinguish between, on the one hand, crewed fighter aircraft and UCAS and, on the other, civilian aircraft?
- Should the LAWS be programmed to consider the crewed fighter aircraft and UCAS as a single military objective, or separate military objectives?
  - What parameters and data is it using to identify and classify the targets?
- What measures are in place to do everything feasible to verify targets?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*, particularly in the light of the crewed nature of the fighter aircraft?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?

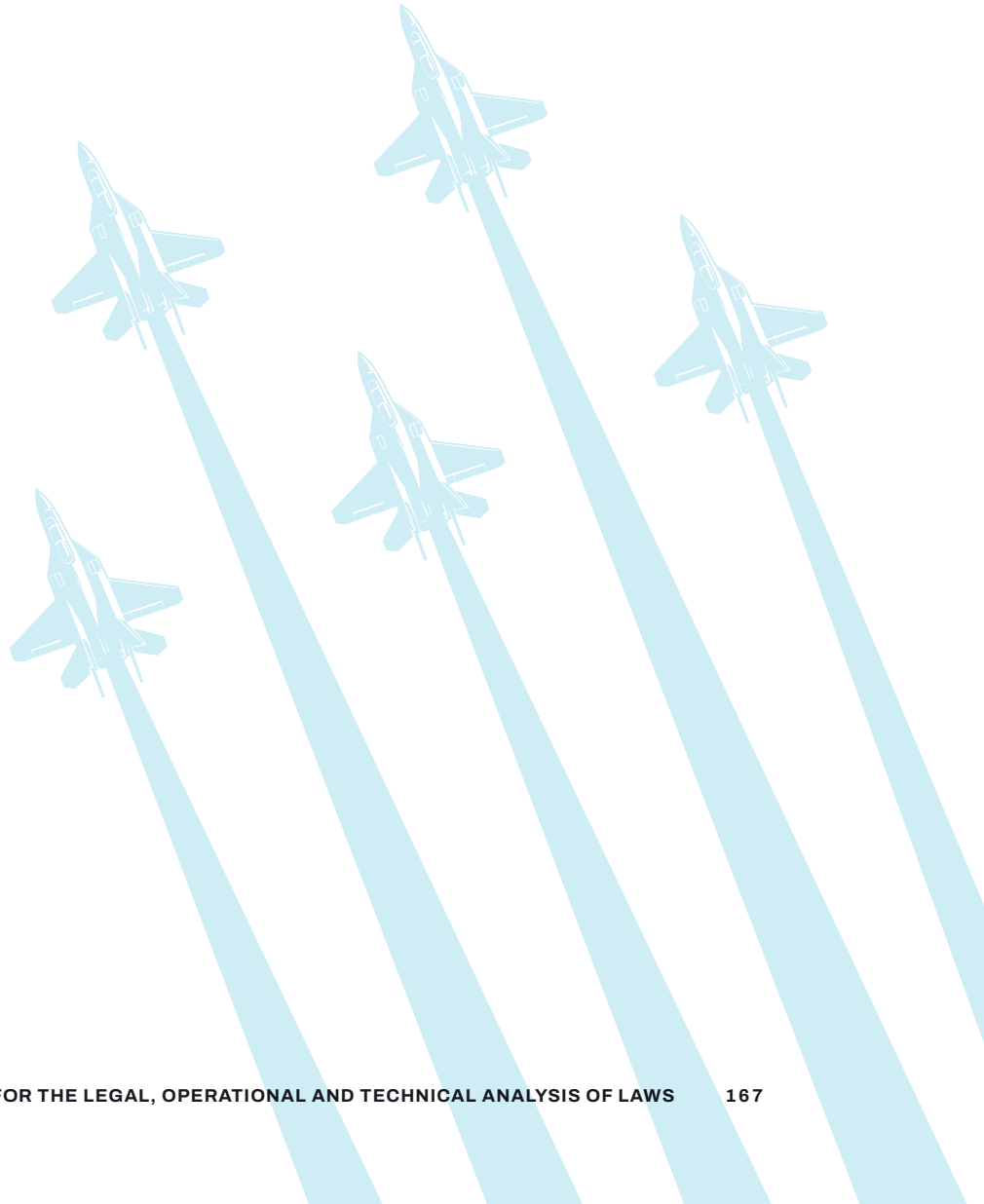
Precautions

- What measures are in place to monitor for any possible civilian presence in the airspace (i.e., civilian aviation) and underneath the airspace?
- What measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?
  - What are the risks on the ground of engaging crewed fighter aircraft and UCAS (e.g., debris falling on populated areas, failed intercept, secondary effects)?
    - What firing parameters would be suited to the circumstances of the scenario?

- To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects, particularly in relation to risks of debris and secondary effects?

Proportionality

- Given the principle of proportionality, where and how should the targets be engaged?
- What would be the military advantage in attacking the entire formation and the UCAS, or just parts of the formation?
  - What could be the consequent collateral damage, including through secondary effects (e.g., debris)?
- What has the formation been programmed to do in the event of engagement by the LAWS, and vice versa? To what extent could it affect proportionality assessments?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?



AIR-307 – Deep strike against strategic enablers in Beta Depth

Conflict type

IAC (Alpha vs. Beta)

Operation category

Strategic interdiction / strategic attack

Geographic setting

Beta interior, Sigma war theatre (Beta-controlled airspace)

1. Scenario narrative

As the Sigma war continues, Beta sustains its military operations through dispersed logistics, industrial conversion, and domestic production located deep within its national territory. These activities support Beta's ability to generate mass, replace losses, and sustain operations across the Sigma Mountains and Delta Corridor.

Alpha assesses that Beta's operational resilience depends on a limited number of strategic industrial facilities whose output directly supports ongoing military activity. These facilities are geographically removed from active fighting but remain critical enablers of Beta's campaign.

The area is firmly under Beta control and protected by layered air-defence systems. Civilian industrial and commercial activity continues in the surrounding region, albeit under wartime conditions.

Alpha is considering a deep strike against a strategic industrial facility assessed to be supporting Beta military production and sustainment. The intended effect is to degrade Beta's capacity to replenish and deploy uncrewed systems used in ongoing operations, thereby generating campaign-level effects rather than immediate tactical advantage. The facility is assessed as a military objective by use.

Strike planning identifies the facility as a HVT the neutralization of which could reduce Beta's ability to sustain operations over time. Timing considerations are influenced by air-defence posture, production cycles, and environmental factors.

Delaying action may allow Beta to continue or relocate production, reducing the effectiveness of future strikes. Final authorization must be resolved under conditions of uncertainty as strike assets approach the point beyond which diversion or abort options narrow.

2. Mission and targets

Mission

Conduct a strategic deep strike against a Beta industrial facility assessed to be producing military drones, in order to degrade Beta's capacity to replenish and deploy uncrewed systems.

Target

- Strategic industrial facility assessed as a military objective by use

Engagement authority is limited to discrete military objectives within the identified facility. No authorization exists for area-wide destruction beyond assessed military-use components.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision infrastructure strike	Neutralize drone production infrastructure	Production lines and facilities assessed as military-use	Civilian industrial co-use; structural blast propagation; incomplete facility mapping
Air-defence suppression strike	Destroy layered air-defence systems protecting facility	SAM systems and associated radar	Incomplete identification of active vs. decoy systems; contested airspace
Strike against selected production nodes	Target specific production segments to degrade output without full facility destruction	Identified buildings or sections linked to military production	Uncertain proportion of civilian vs. military output; secondary effects

4. Operational variables to consider

VARIABLE	OPTION 1 FAVOURABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-source ISR confirms sustained military production and direct linkage to operational deployment cycles	Information comes from HUMINT and cannot be verified via sensors due to environmental conditions	Conflicting reporting on proportion of military vs. civilian production; timelines for conversion unclear
Risk to civilians	Civilian presence absent from military-use sections during engagement window	Civilian industrial personnel present on or near facility	Degree of civilian co-location and workforce presence fluctuates
Infrastructure sensitivity	Military production infrastructure spatially separated from civilian components	Military and civilian production intermingled within same structures	Full mapping of internal facility configuration incomplete
Air-defence environment	Air-defence systems expected to be offline during strike window	Layered air-defence systems actively protecting facility	Air-defence posture may shift during strike window

Sensor and targeting performance	Stable environmental conditions allow precise discrimination	Urban–industrial reflections and emissions degrade targeting feeds	Weather or environmental factors shift during engagement
Strategic impact assessment	Degradation of facility expected to reduce Beta campaign sustainment	Operational redundancy within Beta industrial network	Degree of campaign-level effect uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly in relation to the definition of military objectives), along with questions on precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the strategic industrial facility as a whole, parts of it, combatants or civilians directly participating in hostilities?
  - What parameters are used to characterize, identify and assess the targetability of persons and objects, particularly with respect to the facility workers and their status?
    - How would the targetability of the industrial facility, or parts of it, be assessed? Would the LAWS or human operators determine whether the industrial facility, as a dual-use object, is protected or qualifies as a military objective by use through time?
    - Would the LAWS be programmed to consider the facility workers as directly participating in hostilities?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become *hors de combat* mid-operation)?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?

- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a "misuse"?
    - What safeguards and measures are in place to minimize risks of false positives?
- Does the LAWS have the ability to distinguish between civilian and military production?
  - Is there sufficient confidence in the ability of the LAWS to identify and classify the facility or, where appropriate, parts of it as a military objective, particularly if it is found to be dual-use?
  - What specific measures are in place to ensure that the system's identification and classification of targets are documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

Precautions

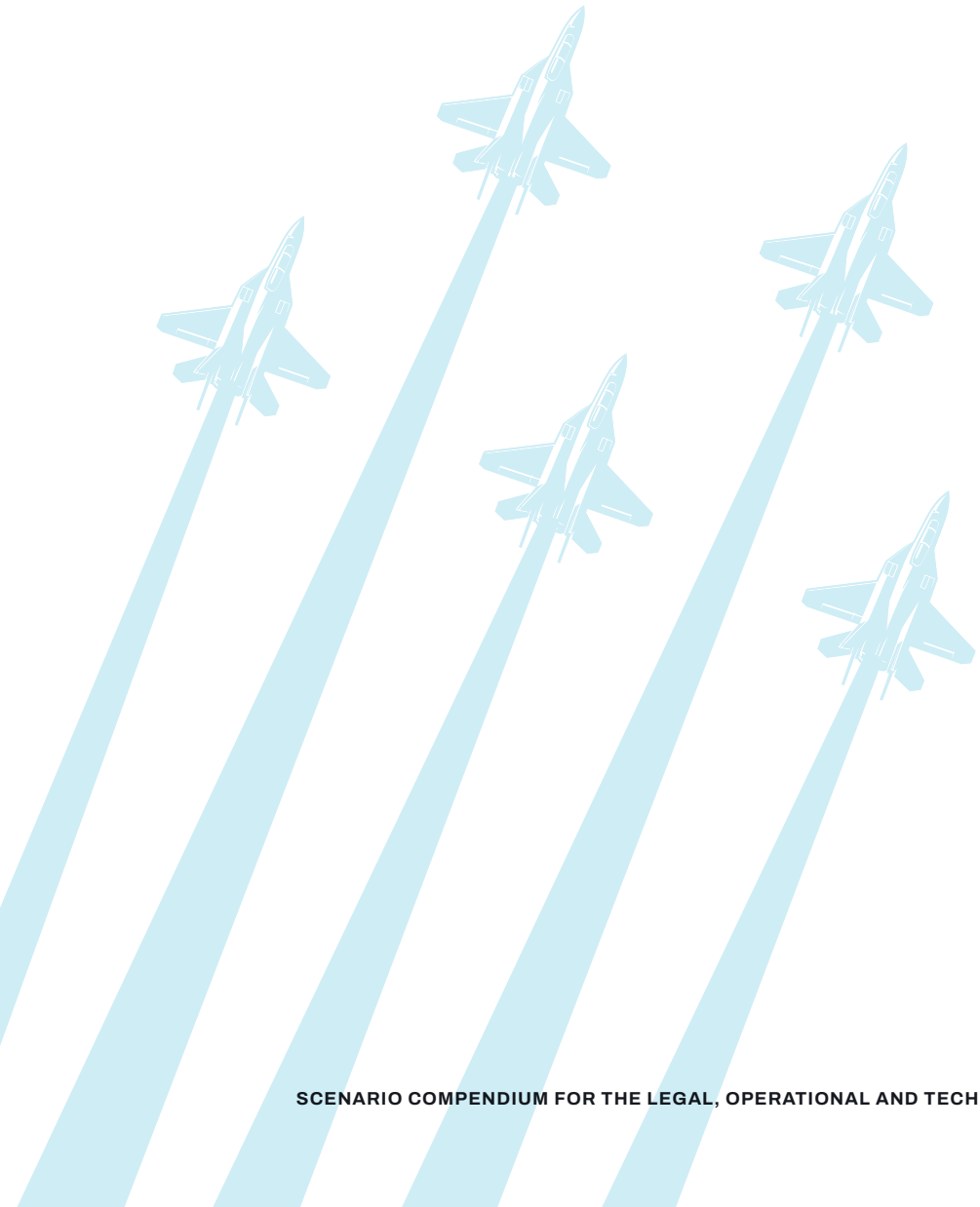
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the facility?
  - What measures are in place to ensure that the LAWS does not engage the target if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator?
- Has the LAWS been programmed to continuously detect civilian movement or protected persons and objects as they are encountered, and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?

Denial of quarter

- What measures are in place to ensure that the LAWS is deployed in compliance with the prohibition of denial of quarter?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?



AIR-308 – Air strike against pre-positioning Beta combat warships

Conflict type

IAC (Alpha vs. Beta)

Operation category

Air interdiction operations – air strike against maritime forces

Geographic setting

Sigma Sea Corridor, Sigma war theatre (contested maritime and air space)

1. Scenario narrative

The Sigma war is ongoing. Naval operations constitute a central component of efforts to control key sea lines of communication and support joint operations across the theatre. The Sigma Sea Corridor, extending toward the Alpha maritime approaches, is a critical maritime transit and manoeuvre space linking Beta naval forces to areas of active and anticipated operations.

Alpha intelligence has detected a group of Beta combat warships maneuvering and pre-positioning within the Sigma Sea Corridor. At the time of detection, Alpha naval forces are present in theatre but are unable to engage the Beta formation directly due to distance, positioning, competing tasking, or the need to avoid exposing surface units to disproportionate operational risk. As a result, Alpha decides to employ air-delivered strike capabilities as the primary means of engaging the Beta combat warships.

The maritime and air environment is contested. Sensor coverage varies across the corridor, and electronic activity intermittently degrades tracking quality. The Beta formation continues to maneuver, periodically altering course and spacing. As the Beta formation approaches a point where its maneuver limits future engagement options, the window for action narrows.

2. Mission and targets

Mission

Conduct an air-delivered strike against Beta combat warships maneuvering within the Sigma Sea Corridor in order to degrade maritime combat power, disrupt anticipated naval operations, and shape the maritime battlespace.

Target

- Beta combat warships

All identified Beta naval combat warships constitute lawful targets given their status as combatants within the context of the ongoing international armed conflict.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision anti-ship strike	Engage designated combat warships within formation	Identified Beta combat warships	Misidentification amid fluctuating contact tracks; maneuver during terminal phase
Sequential vessel engagement	Strike prioritized vessels to degrade combat capability of formation	Selected combat warships based on role or disposition	Target reprioritization under dynamic maneuver; saturation of defensive systems
Air-defence suppression strike	Neutralize shipborne air-defence systems enabling subsequent strike	Combat warships' integrated air-defence platforms	Incomplete mapping of defensive systems; coordinated countermeasures

4. Operational variables to consider

VARIABLE	OPTION 1: FAVORABLE	OPTION 2 ADVERSE	OPTION 3 UNCERTAIN
Intelligence reliability	Multi-source ISR confirms number, type, and disposition of combat warships with persistent tracking	Information on number, type, and disposition of combat warships is not available	Uncertainty on vessel count; possible non-military vessels in proximity
Risk to civilians	Engagement area isolated from commercial maritime traffic	Commercial vessels operating near formation	Classification of some contacts ambiguous due to fluctuating tracks
Maritime tracking continuity	Persistent tracking of individual vessels maintained	Vessels intermittently enter and exit sensor coverage	Tracking quality degrades as formation maneuvers
Electronic interference	Limited electronic degradation of tracking feeds	Electronic activity intermittently degrades contact quality	Source and persistence of anomalies unclear
Formation maneuver	Formation maintains predictable spacing and course	Frequent alteration of course and spacing complicates targeting	Future manoeuvre pattern uncertain
Defensive posture	Shipborne defensive systems identified and mapped	Layered defensive systems actively maneuvering and adjusting posture	Extent of integrated air-defence coordination uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, along with questions on the protection of persons *hors de combat*, precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the combat warships or their personnel?
  - What parameters and data are used to characterize, identify and assess the targetability of vessels or their personnel?
  - If the LAWS is capable of identifying the vessels as its targets and subsequently instructed to do so, considering the uncertainty in vessel count, what data and parameters will the LAWS use to assess and classify a vessel's status as a military objective?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL in cases of uncertainty?
- What measures and technical features are in place to ensure that target prioritization for the LAWS serves to limit the risk of misidentification of targets or collateral damage?
  - How?
  - What specific measures are in place to ensure that the system's identification and prioritization of targets are documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- How are targets determined – by the LAWS, by human operators or by a combination of both?
  - To what extent would the deploying State consider that IHL would require targets to be determined by one or the other? On what basis?
  - Would the law require the pre-programming of specific targets? If so, on what basis?

Protection of persons *hors de combat*

- Following engagement, what obligations would arise to assist any shipwrecked and wounded? How best could any such obligations be met in the context of LAWS use?
- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?
- What has the system been designed and trained to do if shipwrecked persons are detected?
  - Has the LAWS been programmed to not engage persons classified as shipwrecked or wounded?

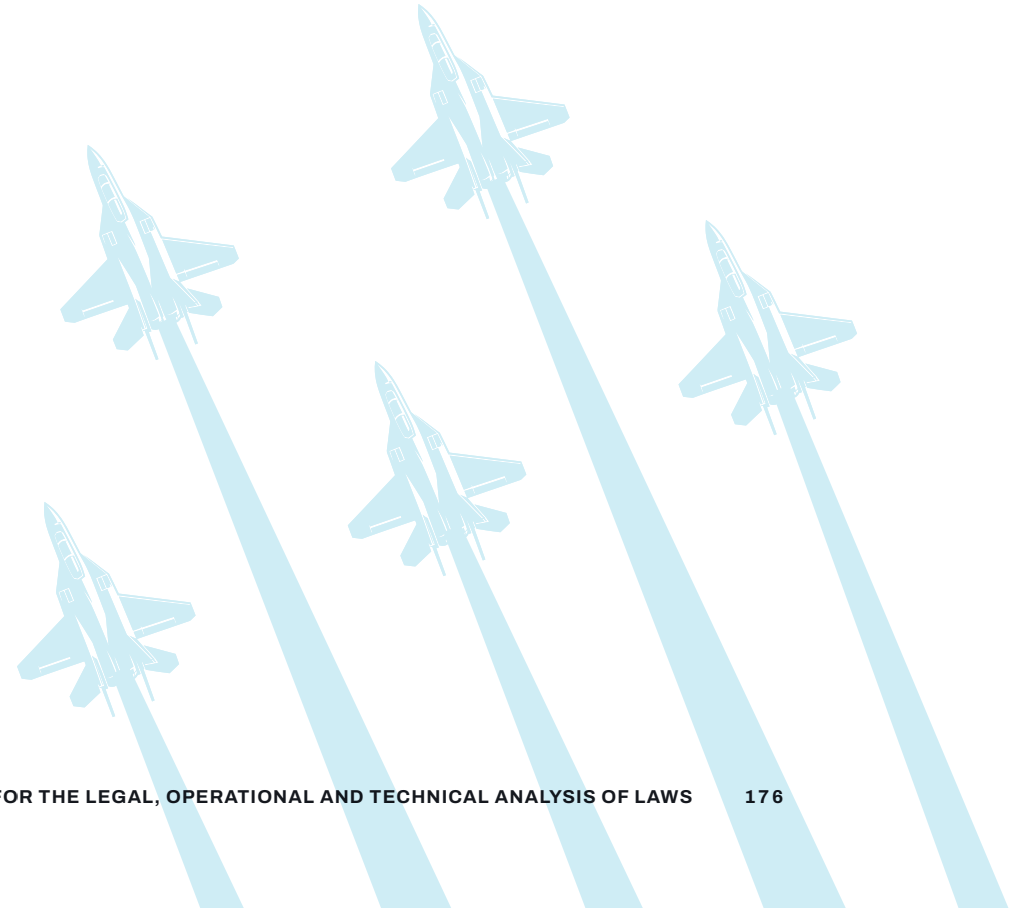
- Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if combatants become shipwrecked or wounded mid-operation)?

Precautions

- In the light of the heightened risks to civilians due to the presence of civilian vessels, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What measures are in place in the use of the LAWS to avoid – and in any event minimize – risk of damage to civilian objects and incidental loss of civilian life and injury to civilians?
- What measures are in place for the LAWS to detect sensor degradation?
  - What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

Proportionality

- Do the technical functions of the LAWS enable it to anticipate and assess collateral damage and possible effects on civilian maritime traffic?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive?



VOLUME III

Non-International Armed Conflict

This volume is part of the Scenario Compendium on lethal autonomous weapon systems (LAWS). Background information on the publication, its scope and structure, as well as guidelines and instructions for using the scenarios, are provided in Volume I.

Disclaimer

All names of States and geographical locations are designated by letters of the Greek alphabet, and the events described in the scenarios are entirely imaginary. All maps are for illustration purposes only. Any resemblance to real-world places, individuals or events is unintended and purely coincidental.

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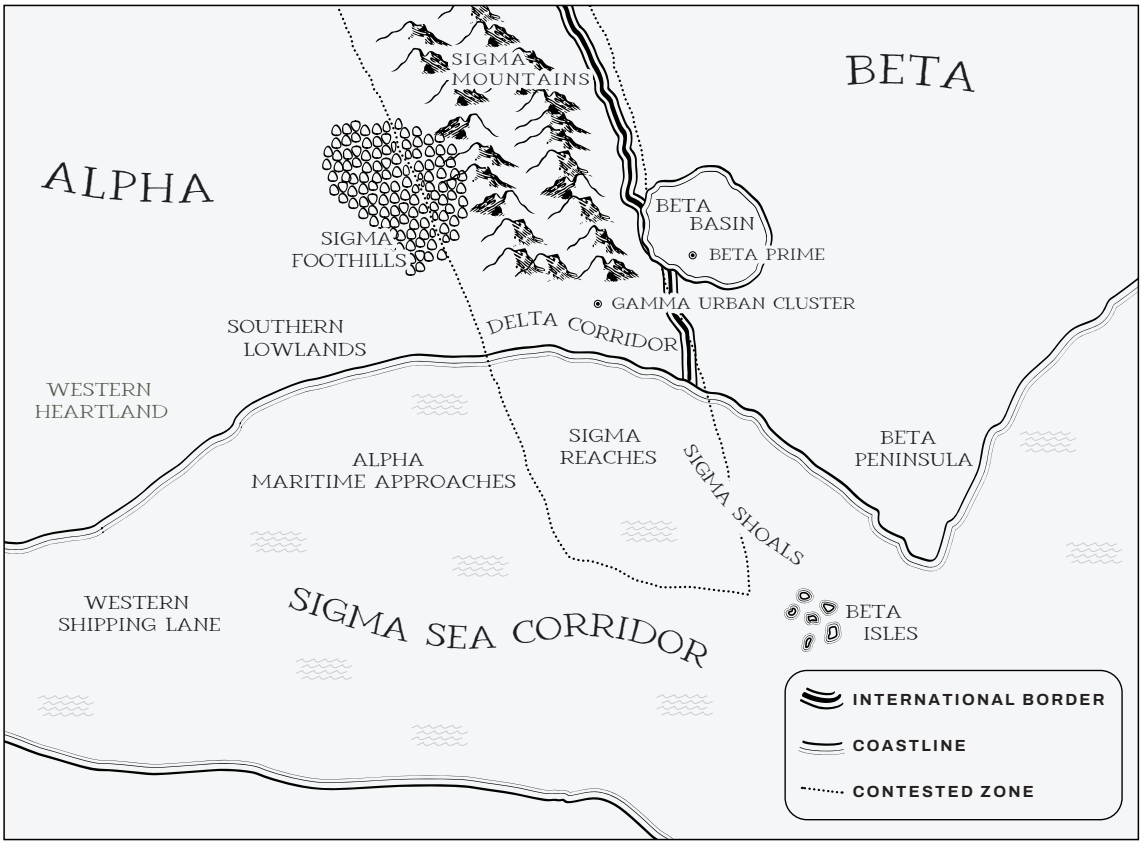
Geopolitical overview of the Sigma non-international armed conflict



1. Purpose and scope

This chapter establishes the **shared geopolitical and geographic context** for **non-international armed conflict (NIAC) scenarios** set in the Sigma region, five years after the conclusion of the Sigma war between Alpha and Beta.

It serves as a **common reference layer** for land, naval and air NIAC scenario development and analysis.

This NIAC framework:

- inherits **geography, nomenclature, and regional structure** from Volume II;
- builds directly on the **IAC geopolitical baseline** established in Volume II;
- describes the **post-war territorial settlement and security environment**;
- introduces the **armed non-State actor** active within Alpha's territory;
- identifies areas of **instability**, **insurgent influence**, and **asymmetric threat**; and
- avoids tactical, operational, or scenario-specific detail.

2. Temporal transition from IAC to NIAC

Five years after the end of the Sigma war:

- **Alpha has consolidated control** over the majority of areas that were previously contested during the international armed conflict;
- **Beta has lost effective territorial control** over areas that were previously contested east of the former international land border; and
- hostilities between Alpha and Beta have formally concluded, although political relations remain strained and unresolved.

Despite these developments, **security conditions remain fragile**, particularly in regions that experienced prolonged fighting, population displacement, and infrastructure degradation during the war.

The post-conflict environment has transitioned into a **non-international armed conflict**, centred on organized armed opposition operating within Alpha's territory.

BOX 1.

Applicability of international human rights law in non-international armed conflict

Although the legal questions in this Scenario Compendium focus exclusively on international humanitarian law (IHL), international human rights law (IHRL) also remains applicable in all situations. Both IHL and IHRL apply in complementarity within the remit of IHL, which constitutes the *lex specialis* in armed conflict. While this interplay between IHL and IHRL in armed conflict remains subject to much debate and divergences, the application of IHRL in both international armed conflict and non-international armed conflict may result in particular legal challenges for LAWS. Among others, these include: the impact on the right to privacy in contexts of occupation or mixed stabilization operations; the interplay between law enforcement and armed conflict approaches to the right to life in a non-international armed conflict; as well as the impact of LAWS use on the rights of vulnerable populations through psychological impacts.

While international human rights law is beyond the scope of this Scenario Compendium, users are encouraged to consider and apply, as part of their evaluation, an IHRL frame to further reinforce their analysis.

3. Principal actors

Alpha (state actor)

In the NIAC context, Alpha remains the internationally recognized sovereign authority across the Sigma region, including territories that were previously contested during the war. In particular:

- Alpha maintains formal control over national borders, airspace, and maritime zones;
- continues to field technologically advanced conventional forces; and
- retains access to **autonomous systems** across domains, inherited from and further developed after the war.

However, Alpha's internal security posture is shaped by:

- overstretched stabilization and internal security forces;
- degraded infrastructure in former conflict zones; and
- uneven governance and limited State presence in remote or heavily affected areas.

Alpha's strategic priorities are **restoring and maintaining internal security**, re-establishing effective administration, and countering internal armed opposition while avoiding actions that could reignite inter-State conflict.

Delta Armed Group (non-state armed group)

The **Delta Armed Group (DAG)** is an organized non-State armed group operating primarily within the **Delta Corridor**, the **Sigma Mountains**, and adjacent regions that were heavily affected during the Sigma war.

The DAG:

- presents itself as a liberation movement rooted in local grievances linked to wartime destruction, displacement, and perceived marginalization;
- operates through decentralized cells supported by regional coordination structures; and
- demonstrates a high degree of tactical adaptation and operational learning.

The DAG is assessed to have obtained **military-grade equipment**, possibly acquired through:

- capture of matériel from Alpha forces during post-war stabilization operations;
- illicit regional arms networks; and
- alleged external support linked to elements associated with Beta, which remains politically sensitive and formally denied.

Although the DAG does not exercise formal territorial control, it maintains **persistent influence and freedom of movement** in specific areas. While the DAG does not control coastline, ports, or offshore infrastructure, it seeks to impose **disproportionate economic and political costs** on Alpha by targeting maritime activity in the Sigma Sea Corridor. Its objectives include disrupting commercial shipping and undermining investor and public confidence through **asymmetric**

maritime attacks against vessels or port-adjacent infrastructure, including through missile strikes, uncrewed aerial systems (UAS) and uncrewed maritime systems (UMS). These activities exploit the strategic importance of maritime trade to Alpha's post-war recovery.

Beta (external state actor)

Beta is **not a party to the non-international armed conflict** and does not exercise territorial control within Alpha's borders. However, it remains a **salient external factor** shaping Alpha's strategic calculations. Following the end of the Sigma war, Beta has formally declared that it **will not tolerate military operations conducted by Alpha on Beta territory**, including cross-border strikes or incursions justified on counter-insurgency grounds. This position is framed by Beta as necessary to preserve the post-war settlement and regional stability. While allegations of indirect support to armed groups continue to circulate, Beta's role in the NIAC context is characterized primarily by:

- political signalling and deterrence vis-à-vis Alpha;
- sensitivity to perceived violations of sovereignty; and
- the potential to re-internationalize the conflict if defined red lines are crossed.

Beta therefore functions as a **strategic constraint** on Alpha's counter-insurgency options rather than as an active belligerent.

4. Geographic areas of instability

Formerly contested regions–including the **Delta Corridor**, **Sigma Mountains**, and **Western Rim of the Beta Basin** – remain structurally vulnerable due to:

- unexploded ordnance;
- damaged transport and energy infrastructure;
- displaced or returnee populations; and
- limited and uneven State presence.

While the **Alpha Southern Lowlands** and coastal regions are largely under State control, they remain vulnerable to sabotage and disruption due to their economic and symbolic importance.

5. Post-conflict territorial control and influence

In the NIAC context, territorial dynamics are described using the following categories:

- **State Control** – areas under effective Alpha authority;
- **Contested / Unstable** – areas where control is fragmented, degraded, or fluctuating;
- **Insurgent Influence** – areas where the DAG maintains persistent presence or freedom of movement; and

These categories reflect **degrees of control and influence**, not fixed front lines.

5.1. Land domain – Control and influence framework (NIAC)

STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
Alpha Western Heartland Political and administrative core of Alpha; Stable governance, functioning institutions, and limited insurgent presence	**Sigma Mountains** Mountainous borderland with limited State reach, degraded infrastructure, and intermittent DAG activity; Control fluctuates spatially and temporally	**Delta Corridor (core areas)** Primary area of DAG influence; Insurgent networks, logistical support, and freedom of movement, particularly in rural and peri-urban zones
Alpha Southern Lowlands (urban centres) Major population centres and economic hubs, supported by security forces and administrative presence	**Alpha Southern Lowlands (rural fringes)** Agricultural and transport-adjacent areas subject to intimidation, sabotage, and intermittent insurgent activity	**Sigma Mountains (certain valleys and passes)** Remote terrain used by the DAG for movement, concealment, and cross-regional coordination
Sigma Foothills Predominantly under State control, though terrain limits persistent presence in remote areas	**Western Rim of the Beta Basin** Former front-line zone with lingering security gaps and residual weapons contamination	**Delta Corridor (transport nodes)** Key road and rail nodes periodically contested through attacks, checkpoints, and coercion

5.2. Maritime domain – Control and influence framework (NIAC)

Note: *In the NIAC context,* ***insurgent influence at sea is non-territorial*** *and manifests through disruption, coercion, and risk generation rather than sustained presence.*

STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
Alpha maritime approaches Ports, harbours, and coastal waters, protected by naval and coast guard forces	**Central Sigma Sea Corridor** High-volume commercial shipping lane vulnerable to asymmetric disruption, despite State presence	**Commercial Shipping Routes (targeted)** DAG influence expressed through threats, attacks, and intimidation rather than actual control and sustained presence
Alpha Coastal Infrastructure Energy terminals, port-adjacent facilities, and logistics hubs secured but exposed to sabotage risks	**Western Approaches to the Beta Isles** Maritime space characterized by uncertainty and difficulty in attribution of hostile acts	**Port-Adjacent Waters** Areas used to stage maritime attacks using missiles, UMS, or suicide tactics
Territorial Waters Under State control	**Offshore Energy and Cable Zones** Infrastructure-rich areas vulnerable to covert or deniable attacks	–

5.3. Air domain – Control and influence framework (NIAC)

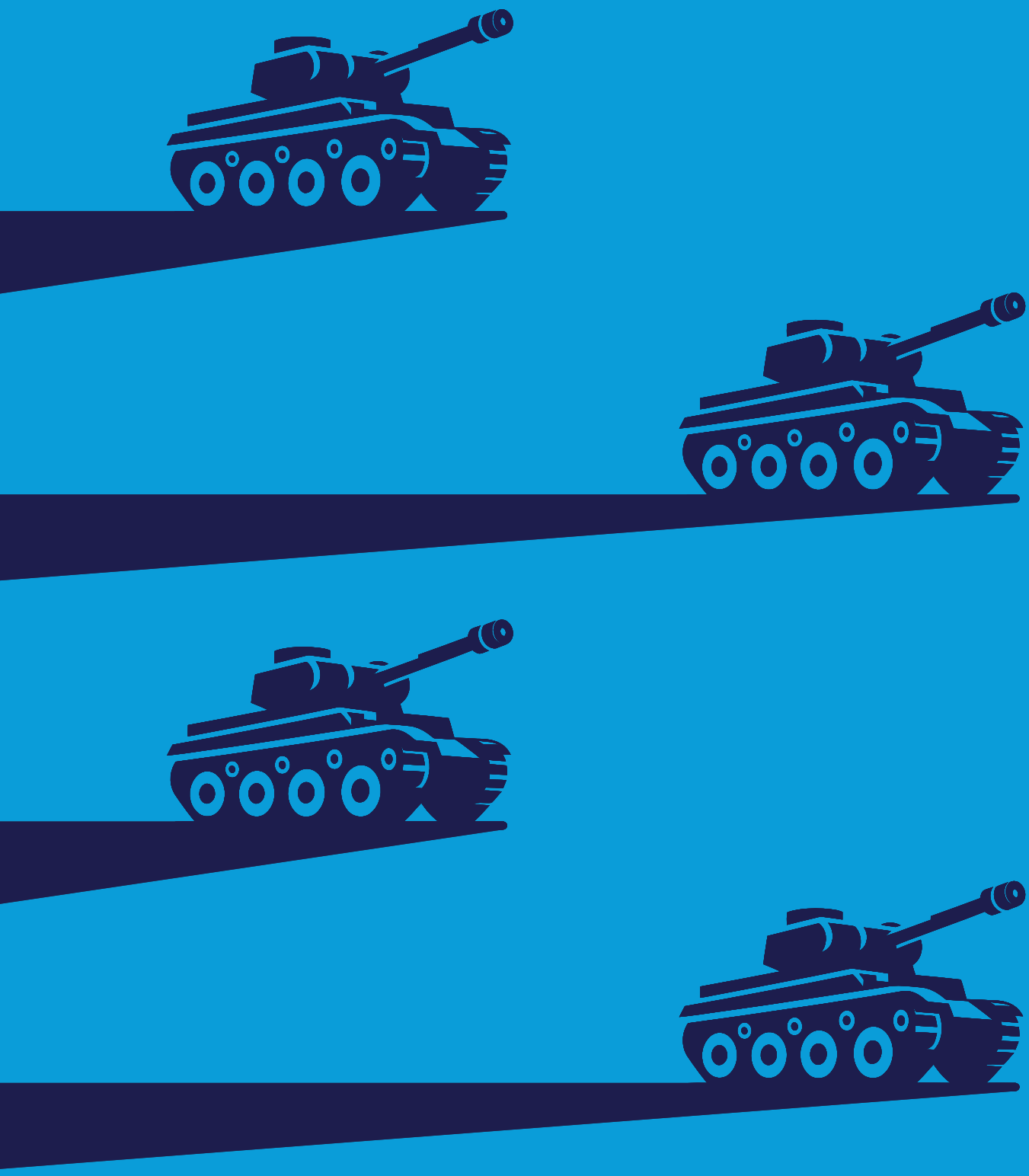
STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
National Airspace (general) Alpha retains operational control of airspace across the Sigma region	**Airspace above Sigma Mountains and Delta Corridor** Airspace characterized by degraded situational awareness and increased risk to low-altitude operations	**Low-Altitude Airspace (localized)** DAG influence through use of UAS for surveillance, targeting, and attack
Airspace above Alpha Southern Lowlands (urban) Controlled environment supporting civil aviation and security operations	**Airspace above Maritime Infrastructure** Increased vulnerability due to asymmetric threats against ports, vessels, and offshore assets	**Approach and Departure Zones (select)** Areas near key infrastructure where UAS activity poses persistent risk
Strategic Air Assets and Bases Protected and under effective state control	**Transit Airspace for Internal Security Operations** Operationally active but exposed to asymmetric interference	–

5.4. Cross-domain observations (NIAC)

Across all domains:

- control is **graduated and non-linear**, not defined by fixed front lines;
- insurgent influence is **episodic**, **adaptive**, and **asymmetric**;
- economic, political, and symbolic targets are prioritized over territorial gain; and
- actions are calibrated to remain below thresholds likely to trigger inter-State escalation.

The tables above provide the **structural baseline** for NIAC strategic anchors and scenarios across land, air and naval domains, ensuring continuity with the IAC framework while reflecting the distinct dynamics of non-international armed conflict.



1. Land domain

1.1. Strategic anchor

Purpose of the Strategic Anchor

This strategic anchor establishes the **authoritative baseline for land-domain analysis** in the Sigma post-conflict environment characterized as a **non-international armed conflict (NIAC)**.

It provides a shared analytical reference for policy, legal, and military–strategic assessment, ensuring consistency with the NIAC geopolitical framework set out in at the beginning of the Volume and coherence with concurrent **air** and **naval** strategic anchoring.

The anchor does not describe scenarios, operations, or force employment. It reinterprets the inherited Sigma war land battlespace through a NIAC lens, focusing on **the violent contest between State consolidation and organized armed opposition**, and supporting analysis of the use of force – including the potential use of LAWS – under international humanitarian law applicable to NIAC.

1.1.1. Strategic context

Following the end of inter-State hostilities, land domain instability in the Sigma theatre is concentrated in areas previously contested during the Sigma war and now formally under Alpha's sovereignty.

In these areas, post-conflict consolidation has been uneven. Damage to infrastructure, displacement, and weakened local governance interact with enduring wartime grievances and perceptions of occupation, creating an enabling environment for organized armed violence. Incomplete consolidation of State authority amplifies hostile local sentiment. The Delta Armed Group (DAG) actively exploits this environment, pursuing a campaign of violence aimed at preventing the normalization of governance and rule of law by Alpha and sustaining instability.

The DAG is embedded within the civilian population. In some areas, this reflects active support for the group's cause; in others, it results from intimidation, coercion, or the absence of effective State protection. While the group does not maintain formal training camps or territorial safe havens in Beta, its senior leadership is assessed to spend significant time there, benefiting from political, geographic, and attributional insulation. This dynamic shapes both insurgent resilience and Alpha's escalation calculus. Land domain activity is further shaped by escalation sensitivity vis-à-vis Beta. Although Beta is not a party to the NIAC, its proximity, declared red lines, and residual political influence impose constraints on Alpha's land-based use of force, reinforcing the need for calibrated and legally grounded action.

1.1.2. Operational objectives in the land domain (NIAC)

Operational objectives in the land domain are asymmetric, population-centric, and pursued through violent means.

State of Alpha

Alpha's land domain objectives focus on consolidation rather than expansion. They include:

- re-establishing effective and continuous State authority in formerly contested areas;
- protecting population centres, infrastructure, and local governance actors;
- restoring freedom of movement and administrative access; and
- degrading the operational capacity of organized armed groups while preserving political legitimacy.

These objectives are pursued under constraints imposed by population density, legal obligations under NIAC, and the strategic requirement to avoid actions that could reignite inter-State escalation.

Delta Armed Group (DAG)

The DAG pursues a deliberately violent strategy in the land domain. Its objectives include:

- **actively targeting Alpha security forces** through ambushes, attacks, and harassment;
- **systematically undermining efforts by Alpha to consolidate authority**, including attacks on governance infrastructure and stabilization activities;
- **intimidating**, **coercing**, or **violently targeting perceived Alpha sympathizers**, including local officials and community figures;
- **promoting radicalization and resistance narratives** to sustain recruitment, support, and legitimacy; and
- sustaining a climate of insecurity that prevents political normalization.

For the DAG, violence is not incidental. It is a primary instrument of influence, aimed at denying Alpha effective control and demonstrating the costs of consolidation.

1.1.3. Land battlespace characteristics

The NIAC land battlespace is geographically inherited from the Sigma war but functionally transformed.

It is characterized by:

- **persistent medium-intensity violence**, rather than episodic unrest;
- **deliberate intermingling of armed group activity with civilian presence**;
- **targeted violence against state actors and perceived collaborators**; and
- **terrain and infrastructure constraints** that limit continuous state presence.

Patterns of governance effectiveness, population security, and freedom of movement vary significantly and are actively shaped by DAG violence, rather than passively degraded by post-conflict fragility. The land domain is therefore a space of coercion and intimidation, not simply contested administration.

1.1.4. Land control and influence framework

Land-domain dynamics are described using the NIAC control categories established in the geopolitical context at the beginning of this volume.

- **State Control:** Areas where Alpha maintains effective authority, persistent security presence, and functional governance. DAG activity is present but constrained and generally covert.
- **Contested / Unstable:** Areas where DAG violence is frequent enough to disrupt governance, limit mobility, and undermine population confidence. Control fluctuates, and authority is continuously challenged through targeted attacks and intimidation.
- **Insurgent Influence:** Areas where the DAG sustains **systematic violent influence**, enabling freedom of movement, coercion of civilians, and regular attacks on Alpha forces and institutions. Formal State authority exists but is ineffective or symbolic.

These categories reflect **degrees of violent contestation**, not territorial ownership or front lines.

Land domain – Control and influence framework (NIAC)

STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
Alpha Western Heartland Political and administrative core of Alpha; Stable governance, functioning institutions, and limited insurgent presence	**Sigma Mountains** Mountainous borderland with limited State reach, degraded infrastructure, and intermittent DAG activity; Control fluctuates spatially and temporally	**Delta Corridor (core areas)** Primary area of DAG influence; Insurgent networks, logistical support, and freedom of movement, particularly in rural and peri-urban zones
Alpha Southern Lowlands (urban centres) Major population centres and economic hubs, supported by security forces and administrative presence	**Alpha Southern Lowlands (rural fringes)** Agricultural and transport-adjacent areas subject to intimidation, sabotage, and intermittent insurgent activity	**Sigma Mountains (certain valleys and passes)** Remote terrain used by the DAG for movement, concealment, and cross-regional coordination
Sigma Foothills Predominantly under State control, though terrain limits persistent presence in remote areas	**Western Rim of the Beta Basin** Former front-line zone with lingering security gaps and residual weapons contamination	**Delta Corridor (transport nodes)** Key road and rail nodes periodically contested through attacks, checkpoints, and coercion

1.1.5. Legal baseline, rules of engagement and further guidance on the use of force

The situation constitutes a NIAC between Alpha and the DAG. All land operations are governed by international humanitarian law applicable to NIAC. Alpha applies national rules of engagement and guidance on the use of force consistent with IHL, including requirements related to distinction, proportionality, precautions in attack, and the use of force in self-defence. In particular, rules and guidance are provided to:

- set positive identification (PID) standards including multi-sensor confirmation requirements;
- regulate use of force and engagement authority near civilians and protected objects; and
- define conditions for employing LAWS including:
- thresholds for autonomous target engagement;
- abort/override contingencies under EW degradation; and
- requirements for multi-source PID in cluttered environments.

1.1.6. Cross-domain integration

Land operations are conducted in parallel with ongoing air and naval operations and remain compatible with them. Cross-domain dynamics (e.g., land-based radars influencing air operations, naval air defences affecting air corridors) may be incorporated in specific air scenarios where analytically useful.

1.2 Scenario catalogue

LAND-151 – Counter-sniper operation in a volatile urban area

> **Conflict type**
>
> NIAC – Alpha vs. Delta Armed Group (DAG)

> **Operation category**
>
> Urban counter-insurgency operations

> **Geographic setting**
>
> Gamma urban cluster, Delta Corridor (formerly contested area)

1. Scenario narrative

The Gamma Urban Cluster lies within the Delta Corridor, an area that was heavily contested earlier in the conflict and where Alpha continues to face persistent challenges to consolidating authority. Although large-scale fighting has subsided, DAG networks remain embedded within the population and continue to contest Alpha's presence through intimidation, violence, and selective attacks against security forces.

In recent weeks, DAG has increasingly relied on **sniper activity** to harass Alpha patrols operating near municipal buildings, transport corridors, and administrative facilities. These attacks are typically short in duration, highly precise, and conducted from civilian buildings. The use of upper floors, irregular firing intervals, and rapid displacement between positions has allowed DAG shooters to exploit urban density and uncertainty regarding civilian presence.

During a routine patrol, Alpha forces come under small-arms fire in central Gamma. One soldier is wounded and the patrol takes cover. Subsequent fire impacts close to the patrol's position, confirming the presence of a sniper. Fire pauses intermittently, permitting the shooter to observe Alpha reactions and adjust behaviour accordingly.

Efforts to localize the sniper are hindered by dense construction, limited sightlines, and ongoing civilian movement in adjacent streets and buildings. While some residents withdraw from the immediate area, the neighbourhood cannot be fully isolated without significant disruption to civilian life.

Failure to act risks further casualties and reinforces DAG's ability to impose costs on Alpha forces while operating from within the civilian environment. At the same time, engagement carries inherent risks due to uncertainty regarding exact shooter location, possible accomplices, and civilian presence within the structures involved.

Alpha commanders must determine how to neutralize the sniper while protecting ground forces and civilians under conditions of incomplete information and high operational sensitivity.

2. Mission and targets

Mission

Alpha land forces are tasked to **neutralize an active DAG sniper threat** in Gamma in order to protect friendly forces and civilians and restore freedom of movement.

Target

- DAG sniper(s) actively engaging Alpha forces

No authorization exists for area-wide fires or engagement of buildings beyond those assessed to be directly associated with the sniper threat.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision counter-sniper strike	Neutralize the identified sniper once the firing position is confirmed; (Alternative: if firing position is unknown, locate and then neutralize)	DAG sniper	Misidentification of firing point; civilian presence adjacent to target
Protective overwatch for ground forces	Detect and engage DAG fighters threatening counter-sniper teams during approach, positioning, or withdrawal	Armed DAG fighters attempting to engage Alpha teams	Friendly fire risk during close-proximity manoeuvre; Sensor confusion in dense urban environment
Escape-route interdiction	Prevent sniper escape once engagement begins	Sniper or accomplices, moving via stairwells, rooftops, or alleys	Loss of positive identification; Civilians using same routes

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Shooter location and firing position are fixed through a combination of acoustic cues, visual confirmation, and pattern-of-fire analysis; Indicators suggest a single shooter operating from a known floor	Shooter location is estimated only at block or building level; Reporting is delayed and does not allow precise localization of the firing position	Conflicting indicators suggest the shooter may be relocating between positions or operating with a spotter, degrading confidence in real-time targeting

Risk to civilians	Floors adjacent to firing position assessed to be unoccupied at the time of engagement, with limited civilian movement in the immediate vicinity	Civilians are present in adjacent apartments or lower floors, increasing the risk of incidental harm during engagement	Civilian occupancy cannot be confirmed, and movement patterns are irregular and difficult to predict
Urban density and layout	Building layout provides clear fields of observation and controlled access points for ground teams	Dense construction and interconnected interiors limit visibility and restrict safe manoeuvre	Internal layouts are poorly understood, and access routes may differ from available maps
Time pressure	The sniper remains static, allowing deliberate planning and coordination	Continued or escalating fire suggests imminent risk of further casualties if action is delayed	Shooter behaviour is inconsistent, adding uncertainty to how long the opportunity to engage will persist
Force availability	Dedicated counter-sniper teams and supporting elements are immediately available	Only limited ground forces are available, constraining options for containment and protection	Additional forces may become available, but timing and coordination are uncertain
Risk of friendly fire	Clear separation between friendly positions and likely engagement zones	Friendly forces are operating in close proximity to potential engagement areas	Movement of friendly units and civilians creates a dynamic context and uncertain proximity during the operation

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, as well as precautions and the choice of means and methods of warfare (particularly with respect to the incomplete information at hand, the presence of civilians and the high operational sensitivity).

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify, classify and select as the target? Is the target the sniper themselves or the sniper's location?
  - What parameters and data is it using to identify and classify the target?
  - How would the neutralization of the sniper be ensured if the target is the sniper's location?
    - Is there a choice of an alternative possible target that would achieve a similar military advantage?

- How would the LAWS identify, classify and select the target?
  - On what basis would the system characterize an individual as the target: based on biometrics, behaviour, a combination of these or any other technical methods?
  - What parameters and data is it using to identify and classify the target?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection for civilians?
    - On what parameters, if any, would it be acceptable under IHL for the system to be programmed, if at all, for the identification of a targetable fighter?
  - Is the LAWS capable of interpreting human behaviour?
    - Can the LAWS be reliably and accurately used for behaviour-based targeting in a manner that upholds compliance with IHL and its obligations and protections?
  - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?
  - Can the LAWS detect religious personnel?
    - What parameters and data is it using to identify and classify religious personnel as such?
    - Has the LAWS been programmed to not engage persons classified as religious personnel?

Precautions

- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning to civilians?
  - Is the system equipped to deliver a warning?

- What parameters and data is it using to assess whether a warning would be appropriate and feasible?

- In the light of the heightened risks to civilians due to the densely populated environment, the presence of civilians and the proximity of snipers to municipal buildings, transport corridors and administrative facilities, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lot or ISR capabilities are limited?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including its target selection or force application, or through the abortion or suspension of engagement, to avoid – and in any event minimize – risk of damage to civilian objects and incidental civilian injury or loss of life?
- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from striking the sniper?
  - What measures are in place to ensure that the LAWS does not engage the sniper if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury and damage to civilian objects?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context, particularly given the incomplete information at hand, the high operational sensitivities, as well as the risk of harm to civilians?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

LAND-152 – Targeting of gathered high-value insurgent leadership

Conflict type

NIAC – Alpha vs. Delta Armed Group (DAG)

Operation category

Urban counter-insurgency operations

Geographic setting

Gamma urban cluster, Delta Corridor

1. Scenario narrative

Despite the re-establishment of administrative control over Gamma, several neighbourhoods within the urban cluster remain under strong DAG influence. In these areas, the DAG maintains de facto control through intimidation, selective violence, and informal early-warning networks embedded in the local population. Alpha forces operate in these neighbourhoods intermittently and under persistent threat.

Recent intelligence indicates that the DAG intends to convene a **meeting of senior insurgent leaders and operational coordinators** in Gamma. Such meetings are rare and typically convened only when significant operational decisions are required, including the final planning of coordinated attacks, the allocation of resources, or the issuance of directives to multiple cells.

The meeting is assessed to be planned within a **residential neighbourhood** characterized by high civilian presence and limited road access. The area is assessed to be under effective DAG control, with lookouts positioned along key access routes and rapid alert mechanisms in place to warn participants of approaching Alpha forces. Civilian life continues largely uninterrupted in the surrounding streets and buildings.

Alpha intelligence assesses that the meeting, if allowed to proceed, will directly enable **imminent insurgent operations** elsewhere in Gamma. However, the window to act is narrow. Visible or poorly timed action risks dispersal of participants, while delay risks losing a rare opportunity to disrupt DAG coordination at a senior level.

Alpha commanders must decide whether and how to act against the meeting under conditions of partial territorial control by the DAG, continuous civilian presence, and limited ground forces available to isolate and access the target location.

2. Mission and targets

Mission

Alpha land forces are tasked to **target DAG leadership during a meeting** in order to disrupt imminent insurgent operations in Gamma.

Target

- Identified DAG leaders and operational coordinators assessed to be attending the meeting

Operations are limited to individuals directly linked to the meeting. No authorization exists for area-wide clearance or prolonged occupation of the neighbourhood.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Targeted leadership strike	Neutralize identified leaders during the meeting window	Named DAG leaders and coordinators inside the meeting location	Civilian co-presence; incomplete confirmation of attendance
Perimeter containment	Prevent escape of meeting participants once action begins	DAG security elements and designated exit routes	Friendly fire risk as ground forces manoeuvre within containment zone; Early detection triggering dispersal
Overwatch for ground assault	Provide precision engagement during ground entry or withdrawal	Armed DAG guards within or immediately around the building	Friendly fire risk due to proximity of friendly forces; Coordination failures

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Multiple sources corroborate the time, location, and attendance of the meeting, with confirmation of the presence of senior DAG figures; Biometric data of DAG individuals is available	Reporting confirms a meeting but lacks clarity on exact location or attendance, limiting confidence in target composition; Biometric data is not available	Conflicting reports suggest the meeting may be relocated, delayed, or attended by a different set of leaders; Biometric data is partial
Risk to civilians	Civilians can be temporarily isolated from the immediate building without significant disruption	Civilians are co-located within the target building or adjacent apartments, increasing exposure during engagement	Civilian presence inside the building cannot be confirmed, and movement in the area is fluid
Control of terrain	Alpha forces can approach and position without triggering DAG early-warning networks	The neighbourhood is under effective DAG control, with lookouts covering likely access routes	Control is fragmented, with some access routes monitored and others unobserved

Time pressure	The meeting window is assessed to last several hours, allowing for deliberate planning	Indicators suggest the meeting is imminent or already underway, requiring rapid action	Timing remains unclear, and the window to act may close suddenly
Force availability	One special forces team and sufficient regular troops are available to isolate and access the target	Only a single, small unit is available, limiting options for containment	Additional forces may be available, but timing and coordination are uncertain
Risk of friendly fire	Friendly force positions and movement routes are clearly deconflicted prior to engagement	Friendly forces must operate in close proximity within confined urban spaces	Uncertain proximity to civilians due to movement of both civilians and friendly forces

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction, as well as precautions, proportionality and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - Is the target the meeting participants (i.e., the high-value DAG leadership) or the meeting location?
  - What parameters and data is it using to identify and classify the targets?
  - How would the "disruption" of the DAG's coordination meeting be ensured if the target is its location?
    - Is there a choice of an alternative possible target would achieve a similar military advantage?
- What is the role of the LAWS?
  - When used for targeting DAG's leadership, is the system capable of – and would it be tasked with – target identification, verification and engagement, or specific tasks only?
  - To what extent would these parameters be in alignment with IHL obligations and protections?
- How would the LAWS identify, classify and select the target in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - How would the LAWS or an operator verify that it is a meeting of DAG leaders?

        - What parameters would the LAWS rely on to verify and validate the nature of the meeting?
        - What safeguards and measures are in place to minimize risks of false positives?
        - Would such parameters be in alignment with the presumption of civilian status under IHL?
    - What data is available for the LAWS to use for identifying targets?
        - What measures are in place to ensure that the veracity of the data used for the assessment by the LAWS?
        - What safeguards and measures are in place to minimize risks of false positives?
        - What specific measures are in place to ensure that the system's identification and classification of the target are documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

- Has the LAWS been programmed to only conduct a positive identification of targets, or has it been programmed to classify, on the one hand, civilians and civilian objects and, on the other, lawful targets and military objectives?
    - What measures are in place to minimize the risks of false positives, particularly given the presence of friendly forces and the heightened civilian presence in the area?
    - To what extent would these measures be in alignment with the presumption of civilian status under IHL?
- Can the LAWS detect and assess the loss of protection for persons?
    - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
        - On what parameters, if any, would it be acceptable under IHL for the system to be programmed for the identification of a targetable fighter?
    - Is the LAWS capable of interpreting human behaviour?
        - Can the LAWS be reliably and accurately used for behaviour-based targeting in a manner that upholds compliance with IHL obligations and protections?
    - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
    - Can the LAWS detect persons *hors de combat*?
        - What parameters and data is it using to identify and classify persons *hors de combat*?
        - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
        - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?

- Can the LAWS detect medical personnel?
  - What parameters and data is it using to identify and classify medical personnel as such?
  - Has the LAWS been programmed to not engage persons classified as medical personnel?
- Can the LAWS detect religious personnel?
  - What parameters and data is it using to identify and classify religious personnel as such?
  - Has the LAWS been programmed to not engage persons classified as religious personnel?

Precautions

- In the light of the heightened risks to civilians due to the urban environment, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What precautionary measures can be taken, or are in place, specifically in the context of target identification to ensure that constant care is taken?
- What measures and technical features are in place to ensure that target prioritization for the LAWS (e.g., the meeting location versus the meeting participants) would limit the risk of misidentification of targets or collateral damage?
  - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- What is the military advantage of neutralizing the meeting location itself versus the meeting participants? Are there any specific measures in place to ensure that the system's course of action is consistently aligned with this assessment?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - What measures are in place to ensure that the LAWS does not engage the target if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
  - Could assessments of risks of collateral damage conducted prior to deployment be uploaded to the LAWS?

- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What are the foreseeable direct and indirect effects of targeting the meeting?
  - To what extent could these be excessive when weighed against the concrete and direct military advantage anticipated from the operation?
    - How is "military advantage" measured in this context given the mission's aim to disrupt the meeting? What is the intended outcome?
      - How does this affect proportionality assessments?
      - What parameters does the LAWS use for such assessments?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving?

Denial of quarter

- With respect to the possible neutralization of identified leaders participating in the meeting, what measures are in place to ensure that LAWS would be deployed in compliance with the prohibition of denial of quarter?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?

LAND-153 – Persistent route security against IED threat

Conflict type

NIAC – Alpha vs. Delta Armed Group (DAG)

Operation category

Urban and peri-urban counter-insurgency operations

Geographic setting

Primary access routes into Gamma, Delta Corridor

1. Scenario narrative

A major road leading into and through Gamma constitutes a critical line of communication for Alpha forces. It is the primary route for the movement of quick reaction forces and the only road capable of supporting sustained manoeuvre by armoured vehicles. Disruption of this route significantly degrades Alpha's ability to respond rapidly to DAG activity elsewhere in the urban cluster.

The DAG has repeatedly used **improvised explosive devices (IEDs)** along this route to deny access, impose attrition, and signal continued influence despite Alpha's sustained control of the area. Emplacement methods are deliberately varied. Devices are sometimes planted at night, but also during the day, disguising activities as civilian roadwork or infrastructure maintenance.

Alpha lacks sufficient manpower to maintain a continuous physical presence along the entire length of the route. Patrols and clearance operations have reduced, but not eliminated, the threat. DAG adapts quickly, shifting emplacement locations and timing in response to observed patterns of Alpha activity.

Unlike acute crisis scenarios, the challenge here is **endurance**. The requirement is not to respond to a single imminent attack, but to sustain route security over an extended period under conditions of uncertainty, civilian traffic, and limited resources. Failure to do so risks cumulative losses, degraded mobility, and erosion of confidence among Alpha forces operating in Gamma.

Alpha commanders must determine how to ensure that the route remains usable while balancing persistence of surveillance, precision of detection and identification, and the risk of misidentifying hostile activity in a civilian environment.

2. Mission and targets

Mission

Ensure that the primary access route into Gamma remains usable and free from IED threats.

Target

- DAG operatives engaged in the preparation, emplacement, or activation of IEDs along the route

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Persistent IED interdiction	Detect, identify, and strike individuals preparing or emplacing IEDs	DAG emplacement teams at roadside, culverts, or infrastructure seams	Misclassification of civilian roadwork; Timing errors
Trigger-person neutralization	Detect and engage individuals preparing to activate emplaced devices	DAG trigger operators near observation points	Identification uncertainty; Secondary devices

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Pattern-of-life indicators reliably distinguish DAG emplacement activity from civilian behaviour along the route	DAG tactics, techniques and procedures deliberately overlap heavily with legitimate civilian roadwork and maintenance activities	DAG adapts tactics, degrading confidence in established indicators
Risk to civilians	Civilian traffic can be temporarily rerouted or reduced during high-risk periods	Civilians transit the route continuously, including during likely emplacement windows	Civilian traffic fluctuates unpredictably across time and locations
Persistence requirement	Threat can be addressed through intermittent monitoring and engagement	Continuous monitoring is required across extended periods	Required level of persistence is unclear and varies over time
Force availability	Sufficient assets available to sustain long-term monitoring and response	Assets are limited and must be prioritized across multiple tasks	Reinforcements may become available but cannot be guaranteed
Adversary adaptation	DAG methods remain consistent and predictable	DAG rapidly changes emplacement techniques and timing	DAG methods are known
Political tolerance for disruption	Temporary disruption of civilian movement and activities along the route is acceptable	Strong political pressure to minimize interference with civilian movement	Political guidance shifts in response to incidents

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly in the context of behaviour-based targeting), as well as precautions, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- How would the LAWS identify and select targets (i.e., the DAG operatives)?
  - What parameters and data is it using to identify and classify the targets?
  - On what basis would the system characterize an individual as a target: based on biometrics, conduct or a combination of these?
  - What specific measures are in place to ensure that the system's identification of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection for civilians?
    - On what parameters, if any, would it be acceptable under IHL for the system to be programmed for the identification of a targetable fighter?
  - Is the LAWS capable of interpreting human behaviour?
    - Can the LAWS be reliably and accurately used for behaviour-based targeting in a manner that upholds compliance with IHL obligations and protections?
  - What safeguards and measures are in place to minimize risks of false positives?
- On what data and parameters would it be acceptable for the system to base its assessment with respect to the identification of a DAG operative engaged in the preparation, emplacement or activation of IEDs along the route?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?

- Can the LAWS detect medical personnel?
  - What parameters and data is it using to identify and classify medical personnel as such?
  - Has the LAWS been programmed to not engage persons classified as medical personnel?
- Can the LAWS detect religious personnel?
  - What parameters and data is it using to identify and classify religious personnel as such?
  - Has the LAWS been programmed to not engage persons classified as religious personnel?

Precautions

- In the light of the heightened risks to civilians due to the possible secondary effects from striking operatives handling IEDs (and possible subsequent explosion of the devices), what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the operatives handling IEDs?
  - What measures are in place to ensure that the LAWS does not engage the source of heavy fire if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context, particularly given the extended periods of uncertainty, civilian traffic and limited resources?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

LAND-154 – Reclamation of hydroelectric facility containing hazardous materials

Conflict type

NIAC – Alpha vs. Delta Armed Group (DAG)

Operation category

Area security / targeted interdiction

Geographic setting

Kappa Hydroelectric Dam, Eastern Alpha (near Beta border)

1. Scenario narrative

The Kappa Hydroelectric Dam lies in Eastern Alpha, in territory formerly contested during the inter-State phase of the conflict and now under Alpha control. The facility is critical to electricity generation and water management for downstream communities on the Alpha side of the border.

Recent reporting confirms that DAG fighters have **overrun the dam complex**, killing the security detachment and establishing control over key access points. Civilian staff have fled the site. Intelligence further indicates that **large quantities of highly toxic industrial chemicals** are stored within the facility, in proximity to intake and control systems.

The intended use of the chemicals is not fully understood. Some reports suggest that the DAG may intend to deliberately contaminate downstream water supplies as a coercive measure, while other reports indicate that the chemicals may be held as leverage or for later relocation. Regardless of intent, any uncontrolled release would pose severe environmental and humanitarian risks.

The dam itself is structurally intact, but any engagement involving imprecise fires risks rupturing storage containers. At the same time, delay increases the risk that the chemicals will be dispersed, released, or removed from the site.

Alpha forces have the capacity to conduct a **limited ground operation** to retake the facility, but must do so under tight constraints to avoid environmental harm and political escalation, particularly given the proximity to the Beta border.

2. Mission and targets

Mission

Eliminate DAG fighters occupying the Kappa Dam in order to regain control of the facility and enable the safe extraction of hazardous materials.

Targets

- DAG fighters occupying and defending the dam complex

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision engagement within facility	Neutralize DAG fighters controlling hazardous materials	Armed DAG fighters inside dam complex	Chemical dispersion from blast or secondary effects
Protective overwatch for insertion and extraction	Protect ground forces during entry, clearance, and withdrawal inside and outside the facility	DAG fighters engaging Alpha units	Friendly fire risk in confined spaces; Sensor degradation
Reinforcement interdiction	Detect, identify, and engage DAG fighters approaching the facility	DAG reinforcements along access roads or service routes	Misidentification; Escalation beyond facility perimeter

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Storage locations, quantities, and access points for chemicals are confirmed	Chemical storage is only partially mapped	Number and disposition of containers remain unclear
Risk to civilians	Downstream civilian exposure can be contained effectively if engagement is controlled	High downstream exposure if chemicals are released or dispersed	Exposure pathways depend on hydrological conditions and are uncertain
Environmental sensitivity	Chemicals are securely stored	Storage is fragile and vulnerable to rupture	Storage conditions cannot be fully assessed prior to engagement
Time pressure	No immediate indicators of release or movement	Indicators suggest imminent release or relocation	Ambiguous indicators surrounding release or relocation
Border escalation risk	Engagement remains clearly contained within Alpha territory	Actions risk misinterpretation as cross-border escalation	Political signalling from Beta is unclear
Force availability	Sufficient ground forces available for controlled clearance	Only limited forces available, constraining control of the site	Reinforcement timing is uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions (particularly with respect to the application of specific protections due to the nature of objects containing dangerous forces), alongside distinction (particularly with respect to the method of identification of targets; i.e., DAG fighters), proportionality and questions around the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Precautions

- In the light of the heightened risks to civilians due to the dam and risk of release of dangerous forces, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What precautionary measures can be taken, or are in place, to identify and classify military objectives given that the DAG fighters are operating in the dam complex?
- What measures are in place to ensure that the LAWS operates in continuous compliance with the additional protections provided for objects containing dangerous forces?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target, particularly in the light of the dangerous forces contained by the dam and with respect to the complex's integrity, risk of release of dangerous forces, and disruptions to power and water supply to civilians?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
  - Can the LAWS analyse the environment in which it is being deployed and adapt its course of action accordingly, including through the suspension or abortion of engagement? Can it identify scenarios where engaging individual targets could cause the release of dangerous forces (i.e., flooding) as a secondary effect?
- What measures are in place to ensure that the effects of attacks by the LAWS are strictly limited in time and space?
- What measures are in place for the LAWS to detect a degradation in its performance due to degraded sensors?
  - What has the LAWS been programmed to do in such situations?
  - Given the high sensitivities surrounding the environment in which the LAWS is to be deployed, what measures are in place if communications with the system were to be interrupted or sensors disrupted?
  - To what extent could such degradation affect the assessments necessary for compliance?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects, particularly in the light of risks with respect to the release of dangerous forces?

Distinction

- While the targets in this operation consist of DAG fighters occupying and defending the dam complex, and not the dam itself, the latter is subject to special protections due to its nature as an object containing dangerous forces. Could an attack against the DAG fighters located within the dam complex amount to an attack on the dam itself within the meaning of Article 15 of Protocol II to the Geneva Conventions?
  - How would this provision apply if, despite the targets being the DAG fighters, the foreseeable effects of the attack might release dangerous forces and the dam's integrity might be endangered?
- How would the LAWS identify and select targets (i.e., the DAG fighters)?
  - On what basis would the system characterize an individual as a target: based on biometrics, conduct, a combination of these or any other technical methods?
- What measures are in place to ensure verification of the target to the extent feasible, particularly when ISR coverage is intermittent or limited and sensors might be disrupted?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
  - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?

Proportionality

- What are the foreseeable direct and indirect effects of engaging the targets within the dam complex?
  - To what extent would it affect civilian life, particularly with respect to energy and water supply and risks of severe flooding? To what extent could that be excessive when weighed against the concrete and direct military advantage anticipated from the operation?
- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving?

Choice of means and methods of warfare

- How should the commander decide that the use of the LAWS is appropriate in this operational context, particularly given the high sensitivities of conducting the operation within the hydroelectric facility?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

LAND-155 – Clearance of insurgent hide site in complex border terrain

Conflict type

NIAC – Alpha vs. Delta Armed Group (DAG)

Operation category

Counter-insurgency operations in complex terrain

Geographic setting

Border highlands of Eastern Alpha

1. Scenario narrative

Following pressure on DAG networks in urban areas, insurgent activity has increasingly shifted towards **complex border terrain** characterized by rugged highlands, ravines, and limited infrastructure. These areas provide concealment, natural protection, and access to informal cross-border routes.

Alpha intelligence indicates that the DAG has established a **semi-permanent hide site** in the border highlands. The site is assessed to support sheltering of fighters, storage of weapons and equipment, and staging for movement between the Delta Corridor and cross-border networks.

The terrain severely restricts vehicle access, degrades communications, and limits long-range visibility. Weather conditions are variable and frequently degrade aerial surveillance. DAG elements in the area are assessed to possess captured heavy weapons capable of contesting low-altitude air operations.

Due to the proximity of the site to the Beta border and the risk of escalation or misinterpretation, the Alpha Government has **not authorized the use of air assets** with the exception of those locally launched and operating under the authority of the ground commander. Any effective action will therefore require a ground-based clearance operation under conditions of uncertainty and limited support.

Delay risks allowing the DAG to abandon the site, disperse fighters, or move equipment across the border. Premature or poorly coordinated action risks detection and escape.

2. Mission and targets

Mission

Locate, clear, and secure a DAG hide site in complex border terrain.

Targets

- DAG fighters occupying and defending the hide site
- Equipment directly supporting the site's operational function

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Hide site engagement	Neutralize DAG fighters within the hide site	DAG fighters in caves or shelters	Target dispersal; Limited battle-damage assessment
Terrain overwatch and containment	Monitor and engage escape routes during clearance	Fighters withdrawing towards the border	Loss of line of sight; Cross-border ambiguity
Protection of ground manoeuvre	Protect clearing forces during approach, entry, and withdrawal	Armed DAG defenders along approach routes	Friendly fire risk due to terrain masking; Coordination delays

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Hide site location, occupancy, and access routes are confirmed	Location is approximate and occupancy uncertain	Conflicting indicators suggest relocation or abandonment
Risk to civilians	Civilian presence in the area is minimal	Civilians operate in or transit near the hide site	Civilian patterns are unpredictable
Terrain complexity	Terrain allows controlled approach and containment	Terrain favours concealment and escape	Key terrain features are poorly mapped
Environmental conditions	Weather supports movement and observation	Weather degrades visibility and communications	Conditions change rapidly during the operation
Border escalation risk	Engagement clearly contained within Alpha territory	Actions risk triggering cross-border movement or response	Political signalling and reactions are unclear
Force availability	Sufficient ground forces available for clearance and containment	Only a small element available, limiting options	Reinforcements may arrive but timing is uncertain

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the method of target identification), as well as precautions and the prohibition of denial of quarter.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify, classify and select as the target?
  - Would it be legally sufficient for the LAWS to identify targets based on group size and other data points such as electronic signatures?
  - Other than the DAG fighters, would the target be the hide site or the military equipment located in and around the hide site that is deemed to be directly supporting the site's operational function?
    - In this context, what would be a legally accepted target profile?
- How would the LAWS identify and select the individual targets (i.e., the DAG fighters occupying and defending the hide site) in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to identify and classify the targets?
  - On what basis would the system characterize an individual as a target: based on biometrics, conduct, a combination of these or any other technical methods?
    - Is the LAWS capable of interpreting human behaviour?
    - Can the LAWS be reliably and accurately used for behaviour-based targeting in a manner that upholds compliance with IHL obligations and protections?
    - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?

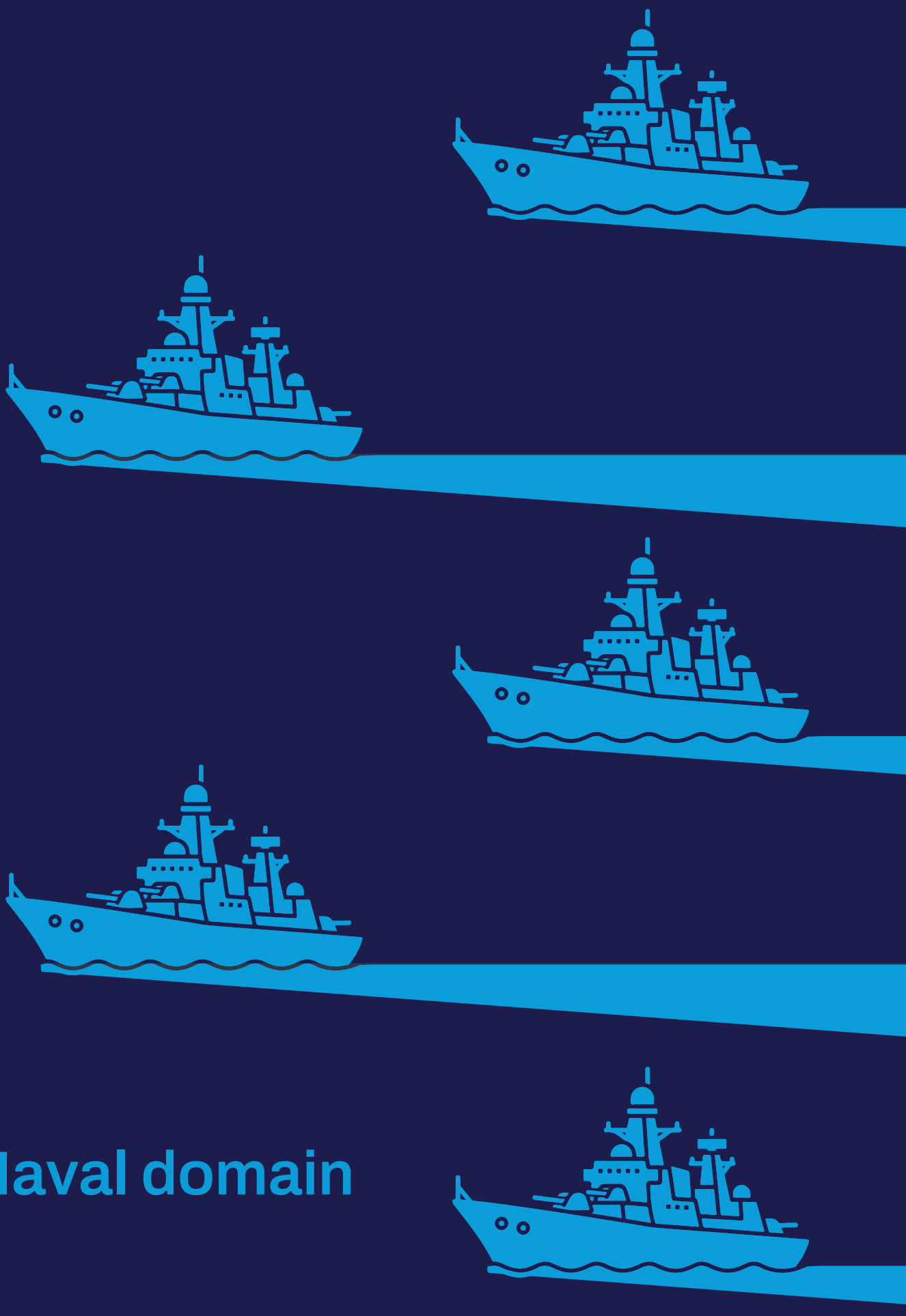
Precautions

- What measures are in place for the LAWS to detect a degradation in its performance due to the limited visibility, degraded communications and deteriorating weather conditions? What has the LAWS been programmed to do in such situations?

- To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

Denial of quarter

- What measures are in place to ensure that LAWS would be deployed in compliance with the prohibition of denial of quarter with respect to the fighters in the hide site?
  - Has the system been trained to identify acts of surrender and to adapt its course of action accordingly, including through the abortion or suspension of engagement?



2. Naval domain

2.1 Strategic anchor

Purpose of the Strategic Anchor

This strategic anchor establishes the authoritative baseline for naval domain analysis in the Sigma post-conflict environment characterized as a non-international armed conflict (NIAC).

It provides a common strategic, legal, and geographic reference for all naval NIAC scenarios and analytical exercises, ensuring coherence with the NIAC geopolitical framework and alignment with concurrent land and air strategic anchoring.

The anchor does not describe scenarios, operations, or force employment. It reinterprets the inherited Sigma war maritime battlespace through a NIAC lens, focusing on the application of force at sea and or originating at sea, including analysis of the potential use of lethal autonomous weapon systems (LAWS), under international humanitarian law applicable to NIAC.

Individual scenarios build on this anchor and inherit the anchor assumptions.

2.1.1. Strategic context

Following the cessation of interstate hostilities, maritime instability in the Sigma theatre does not arise from competing claims to maritime sovereignty or large-scale naval confrontation. Alpha retains sovereignty over its territorial waters and control over its ports, sea lanes, and maritime infrastructure.

Naval challenges instead stem from the persistence of organized armed violence conducted by the Delta Armed Group (DAG), which seeks to impose disproportionate political and economic costs on Alpha by exploiting the strategic importance of maritime trade, energy infrastructure, and market confidence.

Maritime violence is concentrated on disruption rather than control. The DAG does not seek sustained presence at sea, but rather aims to undermine Alpha's consolidation of authority by targeting symbols and enablers of post-war recovery. This includes threats to commercial shipping, port-adjacent infrastructure, offshore assets, and, occasionally, private sea traffic.

Naval activity in the NIAC context is further shaped by escalation sensitivity vis-à-vis Beta. Although Beta is not a party to the NIAC, its proximity, declared red lines, and residual naval capabilities impose constraints on Alpha's maritime use of force, reinforcing the need to manage escalation and attribution risks carefully.

2.2.2. Operational Naval Objectives

Operational objectives in the maritime domain during NIAC are asymmetric, limited in scale, and closely linked to economic security and State authority rather than sea control in the traditional sense.

State of Alpha

Alpha's naval objectives focus on protection, deterrence, and continuity. They include:

- safeguarding commercial shipping and lines of communication vital to economic recovery;
- protecting ports, offshore energy installations, and undersea infrastructure from asymmetric attack;
- enabling the application of maritime force where necessary against organized armed group activity; and
- reinforcing State authority and confidence in maritime governance without escalating the conflict.

Naval action is therefore framed as a supporting instrument of internal security and stabilization, conducted under strict legal and political constraints.

Delta Armed Group (DAG)

The DAG's maritime objectives are coercive and demonstrative rather than territorial. They include:

- disrupting commercial maritime activity to impose economic and political costs on Alpha;
- targeting or threatening port-adjacent infrastructure and offshore assets; and
- amplifying perceptions of insecurity to undermine post-war normalization.

In accordance with the NIAC geopolitical context, the DAG's access to military-grade equipment extends to maritime materiel, enabling limited use of missiles, uncrewed maritime systems (UMS), and uncrewed aerial systems (UAS) operating from coastal or port-adjacent areas. These capabilities do not allow control of maritime space, but they significantly shape the constraint environment for naval operations and the assessment of LAWS.

2.2.3. The Naval Battlespace

The NIAC maritime battlespace is geographically inherited from the Sigma war but functionally transformed. It remains closely linked to coastal terrain, ports, and maritime infrastructure, creating persistent interaction between naval, land, and air domains. Unlike the IAC context, however, naval activity is not defined by opposing fleets or contested sea control, but by asymmetric disruption, episodic violence, and economic vulnerability.

TABLE 1.

Maritime domain – Control and influence framework

***Note:** In the NIAC context, **insurgent influence at sea is non-territorial** and manifests through disruption, coercion, and risk generation rather than sustained presence.*

STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
Alpha maritime approaches Ports, harbours, and coastal waters, protected by naval and coast guard forces	**Central Sigma Sea Corridor** High-volume commercial shipping lane vulnerable to asymmetric disruption, despite State presence	**Commercial Shipping Routes (targeted)** DAG influence expressed through threats, attacks, and intimidation rather than actual control and sustained presence
Alpha Coastal Infrastructure Energy terminals, port-adjacent facilities, and logistics hubs secured but exposed to sabotage risks	**Western Approaches to the Beta Isles** Maritime space characterized by uncertainty and difficulty in attribution of hostile acts	**Port-Adjacent Waters** Areas used to stage maritime attacks using missiles, UMS, or suicide tactics
Territorial Waters Under State control	**Offshore Energy and Cable Zones** Infrastructure-rich areas vulnerable to covert or deniable attacks	–

2.2.4. Legal baseline, rules of engagement and additional guidance on the use of force

The situation constitutes a NIAC between Alpha and the DAG. All naval operations are governed by international humanitarian law applicable to NIAC, including protections for civilians, civilian vessels, and civilian objects.

Alpha applies national rules of engagement and guidance on the use of force consistent with international humanitarian law, including requirements related to distinction, proportionality, necessity, and precautions in attack. Particular attention is given to:

- positive identification standards in congested maritime environments;
- engagement authority near civilian shipping and critical infrastructure;
- escalation management and attribution sensitivity; and
- conditions for employing LAWS in the maritime domain, including:
  - thresholds for autonomous target engagement;
  - abort and override mechanisms; and
  - requirements for multi-source confirmation in cluttered or ambiguous environments.

Operations falling within the scope of domestic maritime law enforcement are outside the analytical scope of this document.

2.2.5. Integration with other domains

Naval operations are conducted in parallel with ongoing air and land operations and remain compatible with them. Cross-domain dynamics (e.g., contested air space affecting ISR and communications, land pressure on coastal installation) may be incorporated in specific naval scenarios where analytically useful.

2.1 Scenario Catalogue

The scenarios in the naval domain engage core IHL principles governing the conduct of hostilities, particularly distinction, proportionality, and precautions, as applied in this environment. These principles are further specified through the *lex specialis* of naval warfare including, but not limited to, rules relating to blockade, neutrality, and capture.

NAVAL-251 – Missile and UAS attack against merchant shipping under NIAC conditions

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Naval air defence / maritime protection operations

Geographic setting

Sigma Sea Corridor, Approaches to the Beta Isles

1. Scenario narrative

Recent intelligence indicates that DAG elements operating from coastal areas under their influence have acquired and adapted military-grade and improvised long-range attack capabilities for engaging targets at sea, including surface-to-surface missiles and uncrewed aerial systems (UAS). These systems are assessed to be operated from mobile launch sites located inland, exploiting terrain masking and civilian infrastructure to complicate detection and attribution.

Alpha naval forces are tasked with protecting maritime traffic in the corridor. The operational environment is characterized by high civilian traffic, limited warning times and the resulting risk that attacks may occur with little or no prior indication.

A merchant vessel transiting the Sigma Sea corridor reports abnormal radar contacts approaching from the direction of the coast. Shortly thereafter, Alpha naval sensors independently confirm inbound aerial tracks consistent with missile and UAS threats. The Alpha warship providing protection is operating beyond visual range of the merchant vessel which is tracked solely through radar returns and automatic identification system (AIS) data correlation. Defensive decisions must therefore rely on sensor-based track association and trajectory modelling rather than direct visual observation.

Alpha naval commanders must determine how to employ ship-based defensive systems to protect the merchant vessel within a compressed decision window.

2. Mission and targets

Mission

Protect commercial shipping transiting the Sigma Sea corridor from imminent missile and UAS attacks launched by the DAG from land.

Targets

- Incoming DAG missiles assessed to be directed against commercial vessels
- Incoming DAG UAS assessed to be conducting strike or terminal guidance functions

No offensive action against launch sites or DAG personnel ashore is authorized within this scenario.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Intercept of inbound missile	Engage and destroy incoming missile assessed to be directed against a merchant vessel	DAG surface-to-surface missile in terminal phase	Misclassification of track; Debris falling near civilian vessels; Risk of erroneous lock-on to merchant vessel radar return instead of inbound threat
UAS neutralization	Engage and destroy incoming UAS assessed to be conducting strike or terminal guidance functions	DAG UAS approaching merchant vessel	Misidentification of track; Engagement envelope affected by weather and sea state; Risk of erroneous lock-on to merchant vessel radar return instead of inbound threat
Persistent air defence escort	Maintain continuous defensive coverage for the merchant vessel during transit and engage inbound missiles and/or UAS as they are detected	Inbound DAG missiles and UAS assessed to be directed against the merchant vessel	Sustained sensor burden under intermittent radar degradation; Prioritization errors of multiple tracks; Risk of erroneous lock-on to merchant vessel radar return instead of inbound threat

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Naval sensors and external reporting confirm the launch of one or more missiles and/or UAS from coastal areas under DAG influence, with trajectories indicating a likely intercept course with the merchant vessel	ISR indicates heightened DAG activity along coastal areas adjacent to the corridor, but no confirmed launch activity has yet been observed	Sensor data confirms multiple airborne tracks, but analysts disagree on the number of weapons launched and whether all tracks represent genuine threats
Risk to civilians	Engagement occurs at sufficient distance from merchant vessels to reduce risk from debris or intercept effects	High density of merchant vessels in proximity to engagement zone increases risk from debris or misdirected defensive fire	Merchant vessel manoeuvring and civilian traffic patterns are dynamic, creating shifting proximity during engagement
Merchant vessel behaviour and coordination	Merchant vessel maintains steady course and speed, responds promptly to radio, and follows escort guidance	Merchant vessel executes uncoordinated evasive manoeuvres (course/speed changes) and is slow or inconsistent in radio response, degrading track association and intercept planning	Merchant vessel demonstrates periods of compliance and stable movement interspersed with unexpected manoeuvres, creating fluctuating confidence in track correlation
Threat mix	Single threat type (missiles only or UAS only) detected and classified	Combined missile and UAS attack increases engagement complexity	Number and type of inbound systems remain unclear during early detection
Environmental conditions	Sea state and weather conditions allow stable sensor performance and reliable track classification	Elevated sea state and degraded visibility reduce sensor stability and engagement envelopes	Intermittent radar degradation and fluctuating visibility affect confidence in track classification over time

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the system's ability to identify types of targets), along with precautions and proportionality considerations.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target?
  - What parameters and data is it using to identify and classify the targets?
  - How would it assess their targetability, particularly with respect to the incoming DAG missiles assessed to be directed against commercial vessels?
    - By what means does the LAWS determine the flag status of the vessels?
      - Has the LAWS been programmed, trained and tested to reliably and accurately identify merchant vessels?
    - Has the LAWS been designed and trained to engage all detected missiles, or only those with a trajectory intersecting that of a commercial vessel?
      - What parameters and data is it using to identify and classify the targets as military objectives?
  - Similarly, for incoming DAG UAS, has the LAWS been designed and trained to engage all detected UAS, or only those with behaviour indicating the conduct of a strike or terminal guidance functions? What parameters and data would the LAWS use to conduct its assessment?
  - Is the LAWS capable of identifying both types of target (i.e., DAG missiles and DAG UAS) based on sensor data?
    - Would any such capability be sufficient to comply with IHL obligations and protections?
    - Is there a choice of an alternative possible target that would achieve a similar military advantage?
- What measures and technical features are in place to ensure that target prioritization for the LAWS would limit the risk of misidentification of targets or collateral damage?
  - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- Can the LAWS identify the loss of protection for objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection?
  - What safeguards and measures are in place to minimize the risks of false positives?
  - Has the LAWS been programmed, trained and tested to comply with the applicable IHL tests (e.g., to establish an "act harmful to the enemy" that would lead to the loss of protection for hospital ships)?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?

- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?
- What has the system been designed and trained to do if shipwrecked persons are detected?
  - Has the LAWS been programmed to not engage persons classified as shipwrecked or wounded?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if shipwrecked or wounded are detected mid-operation)?

Precautions

- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Are there known or expected patterns in the civilian traffic in the operational area?
  - If so, has such information been uploaded to the LAWS, and is it capable of analysing and integrating these patterns into its outputs? Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Would the effects of deploying and using LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- In the light of the heightened risks to civilians due to the known risk of attacks occurring with little or no prior indication, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?
  - Are there specific measures in place to minimize civilian traffic?
  - Can the LAWS assist with such tasks?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - Has the LAWS been trained for the conditions under which the operation is unfolding (i.e., with elevated sea state and affected sensors and engagement envelopes)?
    - Were these conditions expected?

- To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, there is high civilian traffic and limited warning times, and circumstances are evolving?

NAVAL-252 – Asymmetric fast boat attack in a maritime chokepoint

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Maritime force protection / close-in defence operations

Geographic setting

Narrow maritime chokepoint along the Sigma Sea Corridor, Approaches to a major commercial port

1. Scenario narrative

Recent intelligence indicates that DAG elements operating from coastal areas under their influence have prepared for maritime attacks using manned fast boats. These are assessed to be commercially available vessels adapted for high-speed operations and, potentially, for carrying explosive payloads or armed personnel. DAG tactics emphasize speed, proximity, and exploitation of dense civilian maritime traffic to reduce warning times and complicate defensive responses.

The chokepoint forms a critical transit area for both commercial shipping and Alpha naval vessels. Maritime traffic density is high, with merchant vessels, fishing craft, and service boats operating in close proximity. The confined geography limits manoeuvre space and compresses engagement timelines.

Alpha naval forces routinely transit the area to support maritime security and ensure freedom of navigation. The operational environment is characterized by short detection-to-engagement timelines, mixed civilian and military vessel presence, and limited ability to establish exclusion zones without significant disruption to commercial activity.

An Alpha frigate enters the maritime chokepoint as part of a routine transit. Shortly thereafter, sensors detect several fast-moving surface contacts in the area, including some with apparent intercept bearings.

The confined waters limit manoeuvre options for both the Alpha vessel and surrounding civilian traffic. Relative speeds and short distances significantly compress the time available for detection, classification, warning, and engagement.

Alpha commanders must determine how to respond to potentially hostile fast boats while maintaining navigation safety and avoiding harm to nearby civilian vessels. Decisions must be taken rapidly as contacts close the distance.

2. Mission and targets

Mission

Protect Alpha naval vessels transiting the maritime chokepoint from imminent attack by DAG fast boats while minimizing risk to civilian vessels operating in the same area.

Target

- Manned fast boats assessed to be operated by the DAG and exhibiting hostile intent towards Alpha naval vessels

No offensive action against DAG personnel ashore or pre-emptive strikes against suspected staging areas is authorized within this scenario.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Engagement of predesignated hostile craft	Engage fast boat(s) specifically identified and designated as hostile by human operators	Fast boat confirmed by human operators to exhibit hostile intent towards Alpha vessel	Human misclassification of civilian craft; Delay between designation and engagement as contact closes; Difficulty maintaining positive identification in dense traffic
Force protection	Independently detect, classify, select, and engage fast boat(s) assessed by the system to pose imminent threat	Fast-moving surface contacts assessed by the system as hostile	Misclassification of civilian vessels under high traffic density; Errors in system's confidence threshold; Reduced human ability to intervene within compressed timelines

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Stable and reliable ISR allows for positive identification and tracking of all potential targets	ISR does not provide a stable and reliable surface picture	ISR allows only partial identification and tracking
Risk to civilians	Chokepoint is largely clear of small civilian craft during transit window	High density of merchant vessels, fishing craft, and service boats operating in close proximity	Civilian contact behaviour overlaps with hostile approach profiles, reducing confidence in early classification

Attack profile	Single fast boat approaching on clear intercept bearing	Multiple coordinated craft approaching from various bearings	Number and coordination of attacking craft remain unclear during early detection
Payload uncertainty	Clear indicators of explosive payload or armed personnel	Uncertainty whether craft carry explosive payloads or armed personnel	Payload characteristics cannot be confirmed prior to engagement
Environmental conditions	Sea state and weather conditions allow stable sensor performance and reliable track classification	Elevated sea state and degraded visibility reduce sensor stability and engagement envelopes	Intermittent radar degradation and fluctuating visibility affect confidence in track classification over time

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the assessment of hostile intent on the part of the boats), along with precautions, particularly given the presence of civilian traffic.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target in a manner that upholds IHL obligations and protections, including the presumption of civilian status in cases of uncertainty?
  - Can the LAWS distinguish between DAG vessels and civilian vessels? On what basis?
    - By what means does the LAWS determine the flag status of the vessels?
    - Has the LAWS been programmed, trained and tested to reliably and accurately identify civilian vessels?
    - On what basis would the system characterize a vessel as a target: based on computer vision or image reconnaissance, conduct, a combination of these, or any other technical methods?
  - What data and parameters is it using to identify, select and verify targets?
  - What safeguards and measures are in place to minimize risks of false positives?
- Is the LAWS capable of interpreting the behaviour of vessels?
  - What data and parameters is it using to identify and classify the targets as military objectives?
    - To what extent has the LAWS been programmed to consider hostile intent as forming part of the assessment on the target's status as military objective?

- What data and parameters would the system use to assess whether fast boats are operated by the DAG and exhibiting hostile intent?
- How would the system measure and determine hostile intent? To what extent would that align with requirements under IHL in order for the vessel to constitute a military objective?

  - What specific measures are in place to ensure that the system's identification of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

- Can the LAWS identify the loss of protection for objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection?
  - What safeguards and measures are in place to minimize the risks of false positives?
  - Has the LAWS been programmed, trained and tested to comply with the applicable IHL tests (e.g., to establish an "act harmful to the enemy" that would lead to the loss of protection for hospital ships)?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?
- What has the system been designed and trained to do if shipwrecked persons are detected?
  - Has the LAWS been programmed to not engage persons classified as shipwrecked or wounded?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if the shipwrecked or wounded are detected mid-operation)?

Precautions

- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and within the operational area, and to ascertain their status?
  - Are there known or expected patterns in the civilian traffic in the operational area?
  - If so, has such information been uploaded to the LAWS, and is it capable of analysing and integrating these patterns into its outputs? Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- In the light of the heightened risks to civilians due to the known risk of DAG fighters operating in the coastal areas, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS?
  - Are there specific measures in place to minimize civilian traffic?

- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

NAVAL-253 – DAG seizure of offshore energy platform

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Maritime security / offshore infrastructure protection operations

Geographic setting

Offshore energy platform in the Sigma Sea Corridor

1. Scenario narrative

Recent intelligence indicates that DAG elements have conducted a coordinated maritime assault against an offshore oil platform in the Sigma Sea corridor. The assault resulted in DAG fighters establishing full control of the installation. The group's subsequent intentions remain unclear and may include sabotage of the facility, exploitation of the platform for leverage, or use of the installation as a symbolic target.

At the time of the assault, the platform was staffed by civilian technicians and support personnel. The identity and number of civilian workers is known. However, there is uncertainty regarding whether any civilian casualties occurred during the assault.

Alpha does not have confirmed intelligence identifying individual DAG fighters present on the platform. However, Alpha received from the platform management company detailed biometric records of legitimate platform workers, which were collected for access control, safety compliance, and emergency response purposes.

Alpha naval forces are positioned in the vicinity of the platform and are tasked with freeing the installation from DAG control while avoiding damage to the oil rig and preventing harm to civilian personnel.

ISR feeds provide intermittent coverage of activity on the installation, revealing armed individuals repositioning and occupying key locations.

Environmental conditions and the complicated structure of the platform hinder observation and tracking. Limited lines of sight reduce confidence in continuous identification of individuals.

2. Mission and targets

Mission

Free the offshore energy platform from DAG insurgents while preserving the integrity of the installation and preventing harm to civilians.

Target

- Individual DAG fighters present on the offshore platform

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision engagement on platform	Neutralize identified DAG fighters occupying key locations on the installation	Armed DAG fighters on specific levels or at access points	Misidentification due to biometric ambiguity; Risk to civilians in proximity
Protective overwatch for boarding forces	Engage DAG fighters threatening Alpha forces during approach, entry, or clearance	Armed DAG fighters engaging boarding teams	Friendly fire risk in confined structure; Limited lines of sight
Reinforcement interdiction at sea	Detect and engage DAG craft attempting to reinforce or extract fighters from the platform	DAG vessels approaching or departing the installation	Misclassification of civilian maritime traffic; Proximity to platform infrastructure

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR confirms the presence and movement patterns of armed individuals and identifies the location where civilian workers are being held or are sheltering	Communications cease after the assault; ISR resolution insufficient to confirm identities or distinguish fighters from civilians	ISR provides contradictory reports that seem inconsistent with behaviour visually observed
Risk to civilians	Location of civilian workers is confirmed, allowing separation from engagement areas	Fighters always remain in close proximity of civilian workers	Civilian casualties during the assault remain uncertain and civilian dispersal across the platform cannot be confirmed
Biometric confidence	Clear differentiation between workers and non-workers based on available records	Biometric records are incomplete and do not allow the clear differentiation of workers and non-workers	Biometric records are complete but observed behaviours create uncertainty regarding status (i.e. potential complicity of some platform workers)
Target density	Individual DAG fighters are scattered across the platform's levels and structures	DAG fighters operate in small groups and leverage improvised fortified positions on the platform	Distribution of fighters across platform remains unclear

Environmental conditions	Sea state and weather conditions allow stable sensor performance and effective mission oversight	Elevated sea state and degraded visibility reduce sensor stability and mission oversight	Intermittent ISR and fluctuating visibility partially affect mission oversight

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the identification of DAG fighters and the ability of the LAWS to differentiate between them and civilian personnel based on biometric data), along with precautions (particularly given the presence of civilian personnel on the oil platform and the potential impact an attack may have), as well as proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
- Can the LAWS reliably distinguish between DAG fighters and civilian personnel based on biometric data only?
- Can the LAWS detect persons *hors de combat* (e.g., in situations where fighters are surrendering or injured)?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
  - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?
- What has the LAWS been configured to identify and classify as a target?
  - How would the LAWS identify, classify and select the targets in a manner that upholds IHL obligations and protections, including the presumption of civilian status in cases of uncertainty?
    - Does the LAWS work on the basis of negative identification of fighters (i.e., all individuals that are not identified by biometrics as civilian would be assumed to be targetable)?
    - Does the LAWS have the ability to undertake the positive identification of DAG fighters based on conduct (i.e., those assessed to be participating directly in the seizure and occupation of the installation)?

- How can the tension between, on the one hand, the system's design and, on the other, the IHL rule that prescribes an assumption of civilian status in case of doubt be reconciled?
- How can the tension between, on the one hand, the system's design and, on the other, the need for fighters to meet a number of criteria in order to be considered as targetable under IHL be reconciled?

- What has the LAWS been configured to do in case of doubt or low confidence in target identification? Conversely, what has the LAWS been configured to do in case of doubt or low confidence in the identification of non-targets (i.e., civilian workers)?
- Can the LAWS act in a coordinated way to ensure the simultaneous targeting of all fighters? Or are targets engaged on an individual basis?

Precautions

- In the light of the heightened risks to civilians due to the constrained environment and the limited intelligence available, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What precautionary measures can be taken, or are in place, to identify and classify the targets in the light of these risks?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the target?
  - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, there are high risks to civilian workers and the platform itself, and circumstances are evolving?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this operational context, particularly given the limited intelligence available and the potential deployment of a LAWS configured to undertake a negative identification of targets?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?

NAVAL-254 – Maritime infiltration using unmarked vessels

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Maritime security / coastal interdiction operations

Geographic setting

Coastal approaches to a major urban centre along the Sigma Sea Corridor

1. Scenario narrative

Recent intelligence indicates that DAG is planning a coordinated attack in a major coastal urban area. The attack is assessed to rely on maritime infiltration, with DAG fighters using unmarked vessels to approach the coast and disembark near populated areas.

DAG tactics deliberately exploit the density and diversity of legitimate maritime activity near the coast. Small fishing boats, service craft, and locally operated transport vessels routinely operate in the area, particularly during early morning and evening hours. The vessels used by DAG are assessed to be indistinguishable in design from legitimate civilian craft.

Alpha authorities have advance warning of the planned attack window and assess that maritime movement will be used as the primary infiltration vector. However, the exact number of vessels involved, their points of departure, and their intended landing locations remain uncertain.

Alpha naval forces are tasked with preventing the maritime insertion of DAG fighters.

During the anticipated infiltration window, Alpha naval sensors and maritime surveillance systems detect a high volume of small-vessel activity, with contacts moving towards the coast. Most contacts exhibit patterns consistent with routine civilian behavior, while a subset displays movement profiles that may indicate coordinated action.

As the vessels close the distance to shore, the time frame for preventing a landing narrows rapidly. Intercepting all suspected vessels is not feasible given the number of contacts and available assets.

2. Mission and targets

Mission

Prevent the maritime infiltration of DAG fighters into the coastal urban area by intercepting hostile vessels before they reach shore.

Target

- Unmarked civilian-type vessels transporting DAG fighters for the purpose of conducting attacks ashore

No offensive action against DAG personnel ashore or against coastal infrastructure is authorized within this scenario.

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Engagement of predesignated infiltration vessels	Engage vessel(s) specifically identified and predesignated as transporting DAG fighters	Unmarked civilian-type vessel confirmed to be transporting DAG fighters	Human misclassification in high-traffic environment; Delay between designation and engagement as vessel nears populated shoreline
Fully delegated detect–identify–engage cycle	Independently detect, classify, select, and engage vessel(s) assessed to be conducting maritime infiltration	Small vessels displaying movement patterns assessed to be consistent with coordinated infiltration	Misclassification of legitimate civilian craft; Errors in system's confidence-thresholds; Engagement near populated coastline with reduced human oversight
Persistent coastal patrol and behavioural assessment	Patrol defined coastal sector, continuously assess behaviour of subset of vessels approaching shore, and engage those assessed to be conducting infiltration	Small vessels approaching landing areas and exhibiting coordinated or anomalous behaviour	Behavioural ambiguity in dense civilian traffic; Escalation risk from engagement near urban shoreline; Cumulative classification errors during sustained patrol operations

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR confirms number, type and appearance of the small vessels DAG will use, with departure times and likely approach sectors identified	ISR confirms intent and infiltration window but lacks precision on number of vessels, departure points, or landing sites	Reporting differs on number of vessels and landing areas; Correlation between departure points and detected contacts is incomplete
Risk to civilians	Engagement occurs well offshore with reduced civilian vessel density	Engagement occurs near populated shoreline with civilian boats and coastal infrastructure in proximity	Vessels approach shore intermittently, causing fluctuating proximity between engagement zones and civilian activity

Behavioural discrimination threshold	Infiltration vessels display coordinated timing, approach vectors, and deviation from civilian traffic patterns	Movement patterns overlap with legitimate fishing and service craft behaviour	Subset of vessels exhibit intermittent or ambiguous coordination
Distance to landing threshold	Interception occurs at extended range before vessels enter defined landing corridor	Engagement decision must be taken within final approach corridor to populated landing areas	Interception window narrows unpredictably due to vessel speed and traffic congestion
Classification confidence drift over sustained patrol	System confidence remains stable over repeated assessments during patrol operations	Repeated ambiguous contacts degrade system confidence calibration, increasing false positive and false negative rates	Confidence levels fluctuate during patrol, with intermittent recalibration required as traffic density shifts
Environmental conditions	Sea state and weather conditions allow stable sensor performance and reliable track classification	Elevated sea state and degraded visibility reduce sensor stability and engagement envelopes	Intermittent radar degradation and fluctuating visibility affect confidence in track classification over time

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and the protection of persons *hors de combat*, along with precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify, classify and select as the target?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a “misuse”?
    - What safeguards and measures are in place to minimize risks of false positives?

- Can the LAWS distinguish between DAG vessels and civilian vessels?
  - Alternatively, can the LAWS reliably identify vessels used by the DAG?
    - On what basis?
    - What data and parameters does it use to identify, select, and verify targets?
  - What safeguards and measures are in place to minimize risks of false positives?
  - Would such features be in alignment with the presumption of civilian status under IHL?

- How would the LAWS identify, classify and select targets as military objectives?
  - What parameters would the system use to assess whether an unmarked civilian vessel transporting DAG fighters is targetable?
  - To what extent would these align with requirements under IHL for such a vessel to constitute a military objective?
    - What specific measures are in place to ensure that the system's identification of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

Protection of persons *hors de combat*

- Can the LAWS search for, detect, collect and assist shipwrecked and wounded persons?
  - What parameters and data is it using to identify and classify persons as shipwrecked or wounded?

- What has the system been designed and trained to do if shipwrecked persons are detected?
  - Has the LAWS been programmed to not engage persons classified as shipwrecked or wounded?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become shipwrecked or wounded mid-operation)?

Precautions

- In the light of the heightened risks to civilians, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
- Would the effects of deploying and using LAWS make it necessary to give effective advance warning of incoming attacks to civilian vessels nearby?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the targets?
  - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic, there are high risks to civilian maritime traffic nearby and circumstances are evolving?

3. Air domain

3.1. Strategic anchor

Purpose of the Strategic Anchor

This strategic anchor establishes the authoritative baseline for air domain analysis in the Sigma post-conflict environment characterized as a non-international armed conflict (NIAC).

It provides a shared analytical reference for policy, legal, and military–strategic assessment, ensuring consistency with the NIAC geopolitical framework set out in at the beginning of this volume and coherence with concurrent land and naval strategic anchoring.

The anchor does not describe scenarios, operations, or force employment. It reinterprets the inherited Sigma war airspace through a NIAC lens, focusing specifically on air-delivered effects and the potential use of lethal autonomous weapon systems (LAWS).

Other air functions relevant to NIAC environments – such as surveillance, transport, or infrastructure monitoring – are acknowledged as contextual factors but fall outside the analytical scope of this document, which is limited to questions arising under international humanitarian law from the use of force.

3.1.1. Strategic context

Following the end of inter-State hostilities, air domain challenges in the NIAC context do not arise from contested airspace or adversarial air forces. Rather, they derive from land-based instability in formerly contested areas now under Alpha control, where uneven consolidation of authority and proximity to civilian populations shape the conditions under which force may be applied from the air.

Air activity in this context is further shaped by escalation sensitivity, particularly in relation to Beta. Although Beta is not a party to the NIAC, its proximity and stated red lines remain a standing constraint on air-delivered force, reinforcing the need for careful management of air activity that could be misinterpreted beyond the NIAC context.

The Delta Armed Group's access to military-grade equipment extends to the air domain. This includes limited access to military-grade uncrewed aerial systems (UAS), including armed variants, as well as the capability to produce improvised UAS by adapting commercial platforms. While these capabilities do not challenge State control over airspace, they introduce localized air domain risks and shape the constraint environment for air-delivered force, including the assessment of when and how to use LAWS.

3.1.2. Operational air objectives

Operational objectives in the air domain during NIAC are asymmetric, constrained, and subordinate to land-domain dynamics, reflecting the legal and political sensitivity of air-delivered force.

State of Alpha

Alpha's objectives in the air domain are limited and conditional. They centre on:

- enabling the application of force from the air where necessary to counter organized armed group activity, including by supporting operations in other domains;
- supporting the restoration and consolidation of State authority in formerly contested areas; and
- employing air-delivered effects in a manner consistent with IHL obligations and escalation management.

Delta Armed Group

The DAG does not seek to control airspace or contest air superiority. However, its access to military-grade and improvised UAS enables it to pursue limited air-domain objectives, including:

- generating localized air threats to Alpha's forces as well as to critical infrastructure and commercial shipping;
- offsetting asymmetries in firepower through UAS employment;
- increasing proximity risks to civilians and civilian objects, thereby complicating the lawful application of force from the air; and
- shaping the legal, political, and strategic costs associated with air-delivered effects, including the potential use of LAWS.

For the DAG, the air domain serves as a space of constraint and disruption, rather than as a contested operational space.

3.1.3. The Air Battlespace

Air operations take place across the same named regions used in the land and naval strategic anchors, expressed through the airspace framework described below. Airspace control in the NIAC environment remains uncontested and continuous.

However, the constraint environment for air-delivered effects varies across the theatre and reflects land- and naval-domain conditions, as described in the NIAC control and influence framework in the introduction of this volume. The presence of insurgent UAS capabilities contributes to this constraint environment by introducing asymmetric, localized air-domain risks.

TABLE 1.

Air domain – Control and influence framework

STATE CONTROL	CONTESTED / UNSTABLE	INSURGENT INFLUENCE
National Airspace (general) Alpha retains operational control of airspace across the Sigma region	**Airspace above Sigma Mountains and Delta Corridor** Airspace characterized by degraded situational awareness and increased risk to low-altitude operations	**Low-Altitude Airspace (localized)** DAG influence through use of UAS for surveillance, targeting, and attack
Airspace above Alpha Southern Lowlands (urban) Controlled environment supporting civil aviation and security operations	**Airspace above Maritime Infrastructure** Increased vulnerability due to asymmetric threats against ports, vessels, and offshore assets	**Approach and Departure Zones (select)** Areas near key infrastructure where UAS activity poses persistent risk
Strategic Air Assets and Bases Protected and under effective state control	**Transit Airspace for Internal Security Operations** Operationally active but exposed to asymmetric interference	–

3.1.4. Legal baseline, rules of engagement and further guidance on the use of force

The situation constitutes a NIAC between Alpha and the DAG. All air operations are governed by international humanitarian law applicable to NIAC. Protections apply to medical aircraft, and civilian aircraft in established corridors.

Alpha applies national rules of engagement and guidance on the use of force consistent with IHL, including requirements related to distinction, proportionality, precautions in attack, and the use of force in self-defence. In particular, rules and guidance are provided to:

- set positive identification (PID) standards including multi-sensor confirmation requirements;
- regulate use of force and engagement authority near civilians and protected objects; and
- define conditions for employing LAWS including:
- thresholds for autonomous target engagement;
- abort/override contingencies under EW degradation; and
- requirements for multi-source PID in cluttered environments.

3.1.5. Integration with other domains

Air operations are conducted in parallel with ongoing land and naval operations and remain compatible with them. Cross-domain dynamics (e.g., land-based radars influencing air operations, naval air defences affecting air corridors) may be incorporated in specific air scenarios where analytically useful.

3.2 Scenario catalogue

AIR-351 – Neutralization of an urban air-denial pocket

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Offensive counter air operation / destruction of enemy air defences

Geographic setting

Gamma urban cluster, Delta Corridor, Sigma theatre

1. Scenario narrative

The Gamma urban cluster has become a focal point of ongoing internal security operations as Alpha seeks to contain and disrupt Delta Armed Group (DAG) activity along the Delta Corridor. While Alpha maintains overall control of national airspace, recent DAG actions have increasingly constrained low-altitude air operations in and around Gamma, affecting ISR coverage and rotary-wing access in support of ground forces.

The urban environment is characterized by dense residential and industrial infrastructure, high civilian movement, and a complex electromagnetic background. DAG activity is embedded within mixed-use areas, exploiting rooftop access, short activation windows, and rapid relocation to complicate detection and response.

The DAG air-denial capability includes mobile anti-air artillery mounted on pick-up trucks, portable electronic warfare devices (e.g., jamming devices) and man-portable air defence systems (MANPADS). These capabilities are highly mobile, are used in an intermittent and localized manner rather than persistent in a fixed location, creating uncertainty around the threat and avoiding sustained exposure to Alpha countermeasures.

Recent intelligence opens a window of opportunity to engage and destroy/degrade DAG's air-denial capabilities. Alpha commanders assess that further delay risks allowing the DAG to consolidate its local advantage and expand the area in which air operations are constrained.

2. Mission and targets

Mission

Restore reliable ISR and rotary-wing access over the Gamma urban cluster by destroying or degrading DAG air-denial assets.

Targets

- EW devices on rooftops
- MANPADS firing positions within dense urban blocks
- Vehicle mounted anti-air artillery systems

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Precision strike against EW capabilities	Neutralize identified air-denial emitter once location is confirmed	Rooftop location associated with EW capabilities	Misidentification of emitter; civilian presence within mixed-use structures
Engagement of MANPADS firing position	Neutralize short-range air threat once firing position is identified	DAG fighters equipped with MANPADS	Incomplete confirmation of launcher location; civilian co-location
Engagement of vehicle-mounted anti-air artillery systems	Engage mobile air-denial component during movement between positions or when stationary	Pick-up truck with anti-air artillery systems	Loss of positive identification during movement; civilian traffic in proximity

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR positively identifies all targets and their locations; ISR feed is stable and reliable	Sensor-based ISR is unavailable, HUMINT confirms presence in the area of all air denial assets (EW, MANPADS and anti-air artillery), but current locations are unconfirmed	After initial positive identification of targets, ISR feeds are intermittently degraded by urban clutter and suspected jamming
Risk to civilians	Civilian movement is low and predictable in affected districts	Civilian movement is high and continuous near target sites	Civilian movement patterns are irregular and vary across neighbourhoods
Intensity and sophistication of DAG EW activity	Activity is intermittent and localized, allowing controlled targeting of discrete locations	Emissions are frequent, geographically dispersed, and coordinated with ground movements	The scale and quality of DAG EW capability remain unclear
Proportion of military-grade versus improvised DAG air-denial equipment	Limited military-grade assets are identified and distinguishable from improvised systems	Military-grade assets are more prevalent than assessed, increasing threat to air operations	The mix of improvised and military-grade systems cannot be conclusively determined
Communications degradation affecting command and control	Communications remain stable during engagement planning and execution	The engagement takes place in a fully communication denied environment	The extent and duration of communications degradation fluctuate during operations

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions issues, as well as distinction, proportionality, and the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the military equipment, parts of it, their location or their operators?
  - What parameters and data are used to characterize, identify and assess the targetability of persons and objects? To what extent are they in alignment with IHL obligations and protections?
  - Is there a choice of an alternative possible target among several military objectives that would achieve a similar military advantage?
  - What safeguards and measures are in place to minimize risks of false positives
- How would the LAWS identify, classify and select the target?
  - On what basis would the system characterize an individual as the target: based on biometrics, computer vision, behaviour, a combination of these or any other technical methods?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?
  - Can the LAWS detect medical personnel?
    - What parameters and data is it using to identify and classify medical personnel as such?
    - Has the LAWS been programmed to not engage persons classified as medical personnel?
  - Can the LAWS detect religious personnel?
    - What parameters and data is it using to identify and classify religious personnel as such?
    - Has the LAWS been programmed to not engage persons classified as religious personnel?

- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten and ensure their protection?
  - Has the LAWS been programmed to not engage protected objects?
    - If protected objects are detected, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?
    - What safeguards and measures are in place to minimize risks of false positives?
  - Can the LAWS detect and assess the loss of protection for protected persons, including medical and religious personnel?
    - What parameters and data is it using to assess such loss of protection?
    - What safeguards and measures are in place to minimize the risks of false positives?
- Can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such feature be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a “misuse”?
    - What safeguards and measures are in place to minimize risks of false positives?
  - For medical units and transports specifically, can the LAWS identify whether these objects are being used outside their humanitarian function to commit acts harmful to the enemy?
    - What parameters and data is it using to assess such use?

Precautions

- In the light of the heightened risks to civilians due to the urban environment, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What precautionary measures can be taken, or are in place, to identify and classify military objectives in the light of the heightened risks to civilians?
  - Has the system been trained and tested for deployment in cluttered, dense residential areas?
    - To what extent would this knowledge affect the commander's decision to deploy LAWS in this scenario?
- Can the LAWS prioritize targets?
  - If so, what measures and technical features are in place to ensure that target prioritization for the LAWS would limit the risk of misidentification of targets or collateral damage?
    - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the targets?
  - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Would the effects of deploying and using the LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- What measures are in place for the LAWS to detect a degradation in its performance due to the environment? What has the LAWS been programmed to do in such situations?
  - To what extent could such degradation affect the assessments necessary for compliance with IHL obligations and protections?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- What other means and methods of warfare could be deployed in this context to achieve the intended mission?
- Can other types of weapon systems be fielded for the purpose of supporting engagement with different targets in different circumstances?
  - Is there such a need for compliance with IHL obligations and protections?

AIR-352 – UAS attack on a forward operating base

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Defensive counter-air operations / point air defence operations

Geographic setting

Forward operating base on the periphery of the Sigma Mountains, Sigma theatre

1. Scenario narrative

Alpha maintains a forward operating base (FOB) near Sigma Mountains to support operations against the Delta Armed Group (DAG). The base hosts rotary-wing aircraft, short-range UAS, and support elements enabling troop movement, casualty evacuation, and ISR coverage. The location is austere, with limited infrastructure and reduced depth compared to permanent bases.

The surrounding area is characterized by rugged terrain, dispersed settlements, and intermittent civilian movement. While Alpha retains overall control of the airspace, the FOB is in an environment where DAG elements exploit low-altitude approaches and gaps in coverage.

Recent activity indicates DAG intent to conduct coordinated UAS attacks against fixed or semi-fixed military installations, timed to exploit periods of aircraft vulnerability during ground operations, take-off, or landing.

Increased low-altitude activity coincides with scheduled rotary-wing sorties. Multiple air contacts are detected as approaching at high speed towards the base.

2. Mission and targets

Mission

Detect, identify, and destroyed incoming DAG UAS in order to protect aircraft, personnel, and critical base infrastructure and maintain sortie generation in support of ground operations.

Target

- DAG UAS

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Intercept and neutralization of incoming UAS	Detect, track, and engage incoming UAS approaching the FOB	DAG UAS	Misclassification of civilian air objects; engagement near base infrastructure
Strike against UAS launch systems / ground control location upon confirmation	Engage launch systems or controllers operators once launch location is confirmed	DAG UAS launch systems and operators	Incomplete confirmation of location of launch site/ system and of operators; potential civilian proximity

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR detect and identify a mix of repurposed commercial and military-grade UAS; Targets are positively identified and tracked reliably; ISR also identifies DAG elements controlling the UAS	Isolated reports of commercial UAS approaching the FOB perimeter; Limited sensor coverage at very low altitude	ISR detect and identify incoming targets, but sensor alerts include false positives from nearby civilian activity; Uncertainty remains over the location of launch points and of ground operators
Risk to civilians	Civilian movement in surrounding rugged terrain is absent during engagement	Civilian movement near the FOB perimeter increases risk during engagement	Civilian presence is unpredictable during engagement
Density and coordination of incoming UAS	Limited number of UAS with low coordination	Multiple UAS approaching simultaneously in coordinated fashion	Number and coordination level of UAS remain unclear
Mix of commercial and military-grade systems	Systems are primarily repurposed commercial UAS	Systems are primarily military-grade, increasing threat to aircraft and infrastructure	Composition of incoming systems cannot be conclusively determined
Availability and responsiveness of counter-UAS measures	Counter-UAS measures are fully operational and responsive but limited in range	Counter-UAS measures are not available	Counter-UAS measures are available but not sufficient to counter the incoming threat
Weather and visibility conditions	Weather supports detection and engagement	Adverse weather degrades detection and engagement capability	Weather conditions fluctuate during the engagement window

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns precautions, as well as distinction.

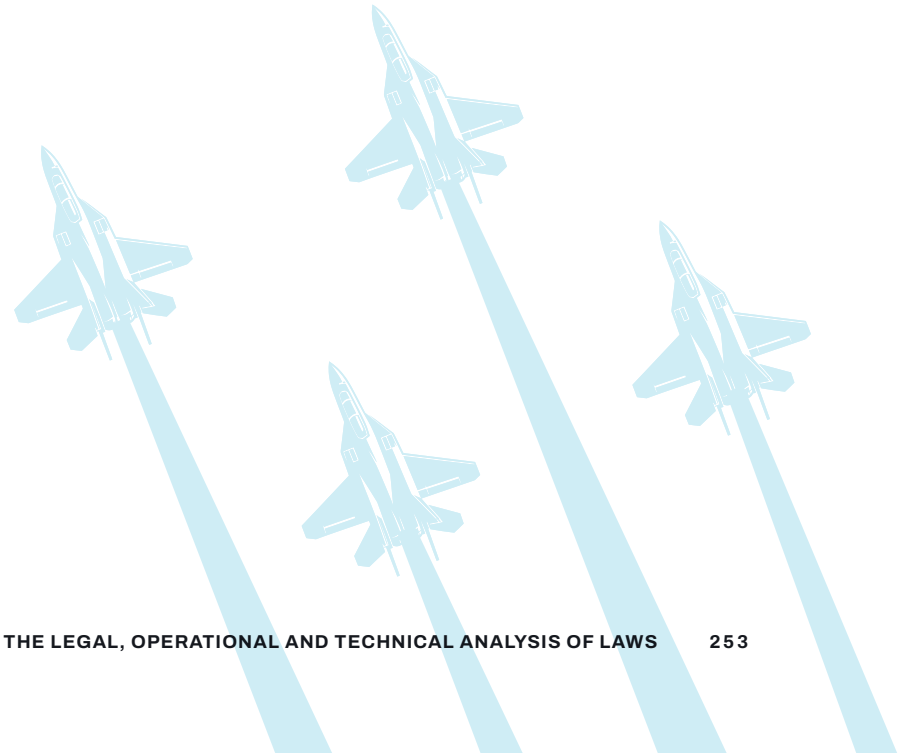
Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- How would the LAWS identify, classify and select the targets as military objectives in a manner that upholds IHL obligations and protections, including the presumption of civilian status in cases of uncertainty?
  - Can the LAWS distinguish between military and civilian UAS?
  - What parameters and data is it using to identify and classify the targets as military objectives? To what extent are they in alignment with IHL obligations and protections?
  - What safeguards and measures are in place to minimize risks of false positives?
- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten and ensure their protection?
  - Has the LAWS been programmed to not engage protected objects?
    - If protected objects are detected, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Conversely, can the LAWS detect the loss of protection for objects?
  - Can the LAWS assess the loss of protection for civilian objects?
    - What parameters and data is it using to assess such loss of protection for civilian objects?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Would such features be in alignment with the presumption of civilian status under IHL?
  - Can the LAWS identify the misuse of protected objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such misuse?
    - How would the system classify a “misuse”?
    - What safeguards and measures are in place to minimize risks of false positives?

Precautions

- What measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - What measures are in place to prevent the presence of civilian UAS (e.g., through the closure of airspace)?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from engaging the targets?
  - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
  - To what extent should the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- Can the LAWS anticipate and assess collateral damage? To what extent is it proactively able to minimize risk of collateral damage? Conversely, to what extent must risk reduction be initiated and undertaken by a human operator?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
  - Are there known or expected patterns in the civilian traffic in the operational area?
    - If so, has such information been uploaded to the LAWS, and is it capable of analysing and integrating these patterns into its outputs?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?



AIR-353 – Interdiction of armed group ammunition convoy in mountainous terrain

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Operational interdiction operations / supply route interdiction

Geographic setting

Mountain passes and valleys of the Sigma Mountains, Sigma theatre

1. Scenario narrative

The Sigma Mountains form a rugged and sparsely governed region characterized by narrow valleys, limited road infrastructure, and frequent weather-induced visibility constraints. The Delta Armed Group (DAG) exploits this terrain to move personnel, weapons, and supplies between dispersed operating areas while minimizing exposure to Alpha ground forces.

Alpha retains overall control of the airspace, but air operations in the Sigma Mountains are constrained by terrain masking, limited sensor coverage, and the presence of civilian traffic using the same routes as DAG logistics elements. Air assets play a critical role in detecting and interdicting time-sensitive movements that cannot be reliably addressed by ground forces alone.

ISR and HUMINT report the presence of a small convoy consisting of three commercial trucks transporting weapons and ammunition currently in transit. Weather forecasts indicate deteriorating conditions that may further limit ISR coverage. Commanders assess that delay risks allowing DAG supplies to reach dispersed units and enable subsequent operations.

2. Mission and targets

Mission

Destroy the weapons and ammunition convoy to disrupt DAG sustainment efforts.

Target

- Small convoy consisting of three commercial trucks

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Convoy strike	Engage identified DAG convoy during movement along mountain route	Three commercial trucks	Misidentification due to civilian traffic; terrain masking affecting confirmation

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Multi-source ISR confirms repeated DAG use of specific route and number, nature and type of vehicles used; HUMINT confirms presence of weapons and ammunition on the trucks	ISR confirms the movement of three vehicles matching description, but presence of weapons and ammunition cannot be confirmed	ISR feeds provide inconsistent vehicle classification; Uncertainty persists over which route the convoy will be following
Risk to civilians	Civilian vehicles are sparse and clearly distinguishable	High overlap between civilian and DAG vehicle movement	Civilian traffic patterns vary unpredictably
ISR persistence over mountainous terrain	Sensor coverage is stable across key passes and valleys	Terrain masking and weather severely restrict ISR coverage	Coverage varies across routes and time windows
Weather and visibility effects	Weather conditions do not limit ISR or communication during engagement	Adverse environmental conditions prevent ISR coverage	Weather conditions change rapidly during operation resulting in inconsistent ISR coverage and communication availability

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction and precautions, as well as the choice of means and methods of warfare.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- Given the mission's aim of destroying the convoy to disrupt sustainment efforts by the DAG, what has the LAWS been configured to identify and classify as a target? Would the target be the vehicles or the roads?
  - Will the LAWS be tasked with identifying targets and, if so, on what basis?
  - What parameters and data is it using to identify and classify the targets as military objectives?
    - What parameters are used to characterize, identify and assess the status of specific vehicles involved in DAG logistical movements?
    - Has the LAWS been developed, trained and configured accordingly?
- How would the LAWS identify, classify and select the targets as military objectives in a manner that upholds IHL obligations and protections, including the presumption of civilian status in cases of uncertainty?
  - Can the LAWS distinguish between military and civilian vehicles?
  - How would such assessments be made: based on image recognition, conduct, a combination of these or any other technical methods?
  - What safeguards and measures are in place to minimize risks of false positives?
  - What specific measures are in place to ensure that the system's identification and classification of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?

Precautions

- In the light of the heightened risks to civilians due to the known civilian traffic, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
  - Are there known or expected patterns in the civilian traffic in the operational area?
    - If so, has such information been uploaded to the LAWS, and is it capable of analysing and integrating these patterns into its outputs?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the convoy?
  - What measures are in place to ensure that the LAWS does not engage the convoy if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Choice of means and methods of warfare

- How would the commander decide that the use of LAWS is appropriate in this context?
  - To what extent is this choice in line with the obligation to take all feasible precautions in the choice of means and methods of warfare, with a view to avoiding – and in any event minimizing – incidental loss of civilian life, injury to civilians and damage to civilian objects?
- What measures are in place to ensure that the LAWS deployed and used in this scenario is not of a nature to cause superfluous injury or unnecessary suffering?
- What other means and methods of warfare could be deployed in this context to achieve the intended mission?

AIR-354 – Time-sensitive targeting of a senior armed group commander

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Strategic leadership targeting operations / leadership decapitation strikes

Geographic setting

Semi-urban corridor linking rural districts to the Gamma urban cluster, Delta Corridor

1. Scenario narrative

Alpha intelligence assesses that a senior DAG commander responsible for coordinating operations across multiple cells is operating within a semi-urban corridor connecting rural safe havens to the Gamma urban cluster. The area is characterized by mixed residential, commercial, and agricultural activity, with frequent civilian movement along road networks.

The commander is believed to move irregularly, using civilian vehicles and avoiding predictable patterns. Air assets provide the primary means to locate and track the target within a limited time window.

HUMINT indicates that the DAG commander has boarded a civilian vehicle in a small convoy and is now on the move. The vehicles will soon reach an area where visual contact will be lost and ISR opportunities will be limited. ISR windows are narrowing, and the opportunity to act is assessed as limited.

2. Mission and targets

Mission

Kill the senior DAG commander in order to disrupt DAG operational coordination.

Target

- The DAG commander

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Targeted strike on identified commander	Kill the senior DAG commander once positive identification is confirmed	The DAG Commander	Misidentification among multiple occupants of the vehicle
Engagement of convoy vehicle	Engage the vehicle assessed to be transporting the commander	Vehicle transporting the commander	Misidentification among multiple candidate vehicles; Incomplete confirmation of occupant identity; potential civilian traffic proximity

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Correlated ISR and HUMINT provides positive ID and narrows candidate vehicles; Limited escort observed	Reports diverge on location and direction of movement. Decoys may be employed. Civilian traffic obscures identification	HUMINT indicates presence but timing is uncertain. Multiple candidate vehicles identified
Risk to civilians	Civilian movement along the road network is limited at the moment of engagement	Frequent civilian movement along mixed residential and commercial road networks increases risk during engagement	Civilian traffic density fluctuates and cannot be fully confirmed at the time of engagement
Target identification confidence thresholds	Positive identification achieved prior to engagement	Identification relies on incomplete correlation of sources	Confidence thresholds vary due to conflicting indicators
Engagement window duration	Sufficient time available before visual contact is lost	ISR windows are narrowing and visual contact will soon be lost	Weather conditions change rapidly during operation resulting in inconsistent ISR coverage and communication availability
Weather and visibility effects	Weather conditions are favourable and support stable ISR and communications during tracking and engagement	Adverse environmental conditions prevent ISR coverage	Weather conditions change rapidly during operation resulting in inconsistent ISR coverage and communication availability

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to target identification), along with precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- What has the LAWS been configured to identify and classify as a target? Would it be the DAG commander, fighters generally or objects (e.g., convoys, parts of the convoy or individual vehicles)?
  - What parameters and data are used to characterize, identify, and assess the targets?
  - If the commander is to be the target, by what means will they be identified?
    - What data and other parameters would the LAWS identify, select and verify the target?
- How would the LAWS identify and select targets – both persons and objects – in a manner that upholds IHL obligations and protections, including the presumption of civilian status in cases of uncertainty?
  - On what basis would the system characterize an individual as the target: based on biometrics, computer vision, behaviour, a combination of these or any other technical methods?
  - Would the LAWS consider the civilian vehicles in the civilian–military convoy as military objectives?
    - What safeguards and measures are in place to minimize risks of false positives?
    - To what extent would they be in alignment with the presumption of civilian status under IHL in situations of uncertainty?
- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
  - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
    - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?
- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
    - What parameters and data is it using to assess such loss of protection for civilians?

        - Can the LAWS assess and establish direct participation in hostilities and, if so, using what parameters and data?

- Is the LAWS capable of interpreting the vehicles' behaviour?
    - Can the LAWS be reliably and accurately used for behaviour-based targeting in a manner that upholds compliance with IHL obligations and protections?
    - What safeguards and measures are in place to minimize risks of false positives?
    - Has the LAWS been developed, trained and configured for compliance with IHL obligations and protections?
    - What safeguards and measures are in place to minimize risks of false positives?
- What has the LAWS been configured to do in case of doubt or low confidence in target identification?
    - What degree of confidence in available intelligence is required for the LAWS to classify a vehicle or person as a target?
    - To what extent would these parameters be in alignment with the presumption of civilian status under IHL in situations of uncertainty?

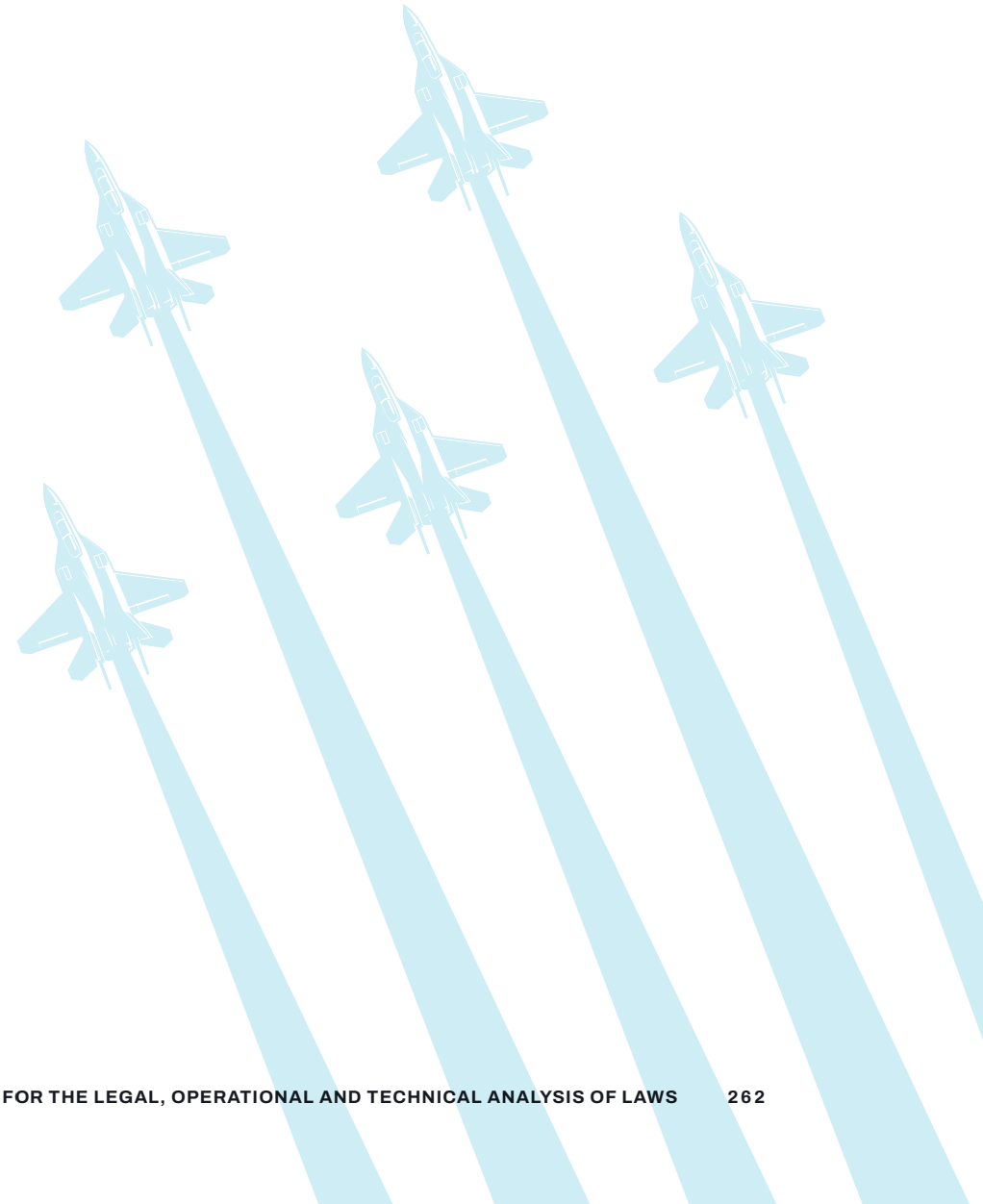
Precautions

- In the light of the heightened risks to civilians due to the semi-urban environment and possibility of civilian movement, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
    - Can the LAWS adapt its course of action, including target selection and force application, to avoid – and in any event minimize – risk of damage to civilian objects and incidental loss of civilian life or injury to civilians?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects at they are encountered in and around the locations through which the vehicles are moving and to ascertain their status?
    - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
    - Are there known or expected patterns in the civilian traffic in the operational area?
        - If so, has such information been uploaded to the LAWS, and is it capable of analysing and integrating these patterns into its outputs?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the targets?
    - What measures are in place to ensure that the LAWS does not engage the targets if the expected incidental harm would be excessive?
    - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?

- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly if the environment is dynamic and circumstances are evolving (e.g., in regard to civilian presence)?



AIR-355 – Armed reconnaissance in a densely populated urban area

Conflict type

NIAC (Alpha vs. Delta Armed Group)

Operation category

Armed reconnaissance operations / area search and strike operations

Geographic setting

Inner districts of the Gamma urban cluster, Delta Corridor

1. Scenario narrative

Within the Gamma urban cluster, the DAG operates through small cells relying on concealment within densely populated neighbourhoods. Activities are short duration and designed to avoid pattern detection while supporting broader DAG operations.

Alpha employs armed reconnaissance to identify and respond to dynamic targets that cannot be addressed through pre-planned strikes. The urban environment presents challenges including high civilian density, electromagnetic clutter, and limited ISR persistence.

Intelligence confirms that a large gathering of DAG elements is currently happening at a location outside the reach of available ground forces patrolling the Gamma urban cluster. The operational window is assessed as narrow.

2. Mission and targets

Mission

Detect and engage time-sensitive DAG activities in order to deny DAG freedom of movement through air action.

Target

- Gathered DAG elements

3. LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS
Engagement of large gathering of DAG elements	Neutralize DAG elements during confirmed gathering	DAG elements at identified meeting location	Civilian co-presence; incomplete confirmation of composition of the group

4. Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	ISR and HUMINT confirm gathering of a large number of DAG elements and purpose of the gathering (pre-attack coordination)	ISR and HUMINT are fragmented; Purpose of the gathering is not confirmed	Number of DAG elements participating at the gathering and gathering location are uncertain
Risk to civilians (area-wide)	Gathering occurs in a sparsely populated area with civilian presence and movement is limited, known and fully predictable	Gathering occurs in a highly populated area	Gathering occurs in a transit area between neighbourhoods, with limited permanent presence but unpredictable traffic patterns
Risk to civilians (at gathering)	All meeting participants are active DAG elements; no civilian at gathering location or in the vicinity	Non-DAG elements are reported at the gathering	Conflicting reports over presence of non-DAG elements at the gathering
Weather and visibility effects	Weather conditions are favourable and support stable ISR and communications during engagement	Adverse environmental conditions prevent ISR coverage	Weather conditions change rapidly during operation resulting in inconsistent ISR coverage and communication availability

5. International humanitarian law guiding questions

> **Key issues**
>
> This scenario primarily concerns distinction (particularly with respect to the nature and identification of possible targets), along with questions around precautions and proportionality.

Specifically, the following questions are of relevance to the application of international humanitarian law in the context of this scenario.

Distinction

- In the light of the mission's aim to detect and engage time-sensitive DAG activities in order to deny the DAG freedom of movement and to support ground forces, what has the LAWS been configured to identify and classify as a target? Would it be the gathering location, the attendees, fighters in general, DAG vehicles, military equipment, parts of any of these or their operators?
  - What parameters and data is it using to identify and classify the targets?

- Is there a choice of an alternative possible target among several military objectives that would achieve a similar military advantage?

- How would the LAWS identify and select targets?
  - What parameters and data are used to characterize, identify and assess the targetability of these persons and objects under IHL?
  - Has the LAWS been developed, trained and configured accordingly?

- Can the LAWS detect protected persons? What has it been programmed to do to uphold their protection?
  - Can the LAWS detect persons *hors de combat*?
    - What parameters and data is it using to identify and classify persons *hors de combat*?
    - Has the LAWS been programmed to not engage persons classified as *hors de combat*?
  - Has the LAWS been programmed to continuously conduct such assessments and to adapt its course of action accordingly, including through the abortion or suspension of engagement (e.g., if fighters become *hors de combat* mid-operation)?

- Can the LAWS detect protected objects? What has it been programmed to do to uphold their protection?
  - Can the LAWS identify a specially protected object?
  - What parameters and data is it using to identify and classify a protected object as such? Has it been trained on locally relevant data (e.g., the use of the red cross versus the red crescent for computer vision-based assessments of marked objects)?
  - What parameters and measures are in place to heighten and ensure their protection?
  - Has the LAWS been programmed to not engage protected objects?
  - If protected objects are detected, has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?

- Can the LAWS detect and assess the loss of protection for persons?
  - Can the LAWS detect and assess the loss of protection for civilians in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - What parameters and data is it using to assess such loss of protection for civilians?
  - What safeguards and measures are in place to minimize risks of false positives?

- Can the LAWS detect the loss of protection for objects in a manner that upholds the presumption of civilian status in cases of uncertainty?
  - Can the LAWS assess the loss of protection for civilian objects?
  - What parameters and data is it using to assess such loss of protection for civilian objects?
  - What safeguards and measures are in place to minimize risks of false positives?

Precautions

- In the light of the heightened risks to civilians due to the urban environment and the possibility of civilian movement, what measures are in place to ensure that constant care to spare civilians is taken in the deployment and use of the LAWS, particularly in the event that overall contact with the system is lost or ISR capabilities are limited?
- What measures and technical features are in place to ensure that target prioritization for the LAWS (i.e., across the different DAG assets) would limit the risk of misidentification of targets or collateral damage?
  - How?
  - What specific measures are in place to ensure that the system's prioritization of targets is documented, particularly to support the deploying State's obligation to conduct effective investigations in cases of alleged violations of IHL?
- Has the LAWS been programmed to continuously detect civilian movement and protected persons and objects as they are encountered and to ascertain their status?
  - Has the LAWS been programmed to adapt its course of action accordingly, including through the abortion or suspension of engagement?
- Would the effects of deploying and using LAWS make it necessary to give effective advance warning?
  - Is the system equipped to deliver a warning?
  - What parameters and data is it using to assess whether a warning would be appropriate and feasible?
- Do the technical functions of the LAWS enable support for the anticipation and assessment of collateral damage that might result from targeting the targeted DAG elements?
  - What measures are in place to ensure that the LAWS does not engage the source of heavy fire if the expected incidental harm would be excessive?
  - To what extent would the deploying State consider that risk reduction should be initiated and undertaken by a human operator? On what legal basis?
- What has the LAWS been configured to do in case of doubt or low confidence in target identification?
- What firing parameters would be suited to the circumstances of the scenario?
  - To what extent are these parameters aligned with the legal obligation to take constant care to spare the civilian population, civilians and civilian objects, and to avoid – and in any event minimize – incidental loss of civilian life, injury to civilians and damage to civilian objects?

Proportionality

- What features or operating constraints of the LAWS can ensure that the proportionality assessment remains valid immediately prior to each strike in order to ensure that incidental harm is not excessive, particularly as assessments on the expected incidental harm on civilian infrastructure at various points around the different DAG assets might evolve due to changing variables?
- How is military advantage assessed in this context in the light of the mission's aim to "detect and engage time-sensitive DAG activities in order to deny the DAG freedom of movement through air action"?
  - What are the foreseeable direct and indirect effects from the engagement of different DAG assets on civilians, particularly with respect to the expected incidental harm? How does the latter relate to the military advantage anticipated from the mission?
- Is the LAWS capable of anticipating and assessing collateral damage for each of the DAG assets identified as targets?

Annex A. Acronyms and abbreviations

AIS	Automatic identification system
ASW	Anti-submarine warfare
ASUW	Anti-surface warfare
C2	Command and control
CAP	Combat air patrol
CAS	Close air support
CSAR	Combat search and rescue
C-UAS	Counter-unmanned aerial system
DAG	Delta armed group
DCA	Defensive counter-air
DEAD	Destruction of enemy air defences
ECM	Electronic countermeasures
EOD	Explosive ordnance disposal
EW	Electronic warfare
HUMINT	Human intelligence
HVT	High-value target
IAC	International armed conflict
ICRC	International Committee of the Red Cross
IHL	International humanitarian law
ISR	Intelligence, surveillance and reconnaissance
LAWS	Lethal autonomous weapon system
MANPADS	Man-portable air defence systems
MCM	Mine countermeasures
NIAC	Non-international armed conflict
NEO	Non-combatant evacuation operation
NOTAM	Notice to air missions
OCA	Offensive counter air
PID	Positive identification
POW	Prisoner of war
ROE	Rules of engagement
SAG	Surface action group
SAM	Surface-to-air missile
SEAD	Suppression of enemy air defences
SIGINT	Signals intelligence
SOF	Special operations forces
UAS	Unmanned aerial system
UCAS	Uncrewed combat air systems

Annex B. Methodology

Expert-led process

In the lead-up to the elaboration of the scenarios, UNIDIR conducted a series of expert consultations over several months in 2025 and 2026 with multidisciplinary and regionally diverse groups of military, technical, legal and academic experts. Separate groups were convened for each domain of warfare. The initial rounds of consultation were domain-specific, followed by cross-domain consultations in the final stage in order to foster cross-domain feedback and exchanges.

Methodology

The elaboration of the scenarios followed an iterative process. The first consultations were dedicated to elaborating and validating a typology of military operations for each domain, and co-creating a scenario template to guide the development of the individual scenarios.

The typology of operations aimed to capture all types of operations in each domain that might include use of force, regardless of whether LAWS might be expected to be used for a given operation. For example, for the land domain, the typology included a category titled "ground manoeuvre operations", which was divided into several subcategories, such as "defensive operations", which were further broken down into specific tactical actions, such as "area defence", "mobile defence", "retrograde operations", "counterattack", "spoiling attack", "force protection". The typology provided a starting point to organize and structure the discussions but did not mean that each narrow example would warrant a distinct scenario.

The subsequent consultations were dedicated to scenario development. In practice, this meant populating the typology with concrete ideas of operational situations that were then expanded into full-fledged scenarios. These consultations teased out examples and options for building the scenarios, as well as variables and details to include in the scenarios. UNIDIR consolidated these materials. A sample of scenarios for each domain was stress-tested by each expert group with the aim of validating the early scenario versions, as well as the language used in the narrative (including legal and technical terms). The final consultations focused on reviewing the full catalogues of scenarios and obtaining domain-specific and cross-domain feedback.

Domain-specific approach

The rationale for addressing each domain separately was to capture specific issues across these domains (while acknowledging that distinctions are not always clear-cut and that military operations frequently take place across domains of warfare–as represented in the scenarios). Domain-specific scenarios permitted a more granular approach to the analytical questions accompanying each scenario. While the IHL principles surrounding the conduct of hostilities remain applicable regardless of domain, the specific measures that parties to a conflict must undertake to ensure compliance in the deployment and use of LAWS may differ significantly across domains. The complexities arising from distinct domains of warfare can provide States with a broader array of legal and operational questions to explore.

Annex C. Typology of operations

This annex presents the typology of military operations that served as a conceptual reference during the development of the scenarios. While the catalogue provides a selection of representative scenarios, it does not aim to cover all possible operational contexts in which LAWS could be employed. The typologies provided here therefore offer a reference framework for users who may wish to develop additional scenarios while maintaining conceptual consistency with the structure of the catalogue. The annex is divided into four sections:

- **Section A** presents a selection of operation types that exist across all warfare domains, with domain-specific manifestations. The selection presented here applies to land operations, although some elements are cross-domain, and the selection can be used as a model reference for other domains. The section includes operations where use of force may be necessary but is secondary to the primary objective as described in the respective categories.
- **Sections B–D** present of operation types organized by domain. Operations are not divided by conflict type (i.e., international or non-international) but rather by purpose and type of target and as such they may be applicable to either conflict type or to both.

Section A. Cross-cutting operations

A1. Personnel recovery and extraction operations

Operations where use of force may be necessary but is secondary to the primary objective of protecting, recovering, or securing designated personnel in hostile, uncertain, or emergency situations.

A1.1. Combat search and rescue (CSAR)

Recovery of isolated personnel in hostile territory via ground forces, helicopter, or special operations forces.

- **Time-sensitive CSAR:** Immediate recovery with available forces
- **Deliberate CSAR:** Planned recovery operation after intelligence preparation

A1.2. Non-combatant evacuation operations (NEO)

Evacuating civilians (typically own nationals or designated persons) from hostile or uncertain foreign territory.

- **Uncertain NEO:** Evacuation when host State cannot ensure security
- **Hostile NEO:** Evacuation against opposition from hostile forces

A1.3. Special operations exfiltration

Extraction of special operations forces, intelligence personnel, or agents from denied areas.

- **Planned Exfiltration:** Scheduled extraction after mission completion
- **Emergency/Break-contact Exfiltration:** Unplanned extraction due to compromise/enemy pressure
- **Reconnaissance Team Extraction:** Recovery of long-range reconnaissance elements

A1.4. Hostage / prisoners of war (POW) rescue operations

Recovery of captives held by hostile forces or non-State armed groups.

- **Building Assault:** Assaulting structure holding hostages/POW
- **Vehicle Interdiction:** Stopping and recovering hostages in transit
- **Barricaded Hostage Rescue:** Resolving siege/standoff situations
- **Mass Hostage Rescue:** Large-scale operations (e.g., theatre, school, hospital)

A2. Object and infrastructure protection operations

Operations conducted to protect, secure, or maintain control over designated objects or infrastructure the loss, destruction, or compromise of which could generate significant military, humanitarian, environmental, or societal consequences. While the use of force may occur, it is secondary to the primary objective of safeguarding the object or infrastructure.

A2.1. Protection of installations containing dangerous forces

Operations aimed at securing installations the destruction of which could release dangerous forces capable of causing severe civilian harm. These installations receive special protection under international humanitarian law.

- **Dam Protection Operations:** Protecting dams to prevent catastrophic flooding or deliberate sabotage
- **Dyke / Flood Barrier Protection Operations:** Protecting levees and flood barriers the destruction of which could cause large-scale inundation
- **Nuclear Power Plant Protection Operations:** Securing nuclear generating facilities to prevent radiological release

A2.2. Protection of hazardous industrial site

Operations aimed at securing industrial facilities containing hazardous materials the damage or destruction of which could cause significant environmental contamination, public health emergencies, or large-scale civilian harm.

- **Chemical Plant Protection:** Securing facilities producing or storing toxic industrial chemicals

- **Refinery and Petrochemical Complex Protection:** Protecting large hydrocarbon processing facilities with high explosion or contamination risk
- **Hazardous Materials Storage Site Protection:** Securing storage sites for toxic, flammable, or reactive materials

A2.3. Protection of critical infrastructure

Operations conducted to protect infrastructure essential for the functioning of society, military operations, or national security.

- **Energy Infrastructure Protection:** Power plants, substations, oil and gas facilities
- **Transportation Infrastructure Protection:** Ports, airports, rail hubs, bridges, and logistics nodes
- **Communications Infrastructure Protection:** Telecommunications hubs, satellite ground stations, data centres
- **Water and Essential Services Infrastructure Protection:** Water treatment plants, major pumping stations, urban utilities
- **Industrial Infrastructure Protection:** Major industrial sites the destruction of which could disrupt national production or logistics, including the military industrial base

A2.4. Protection of specially protected civilian objects

Operations conducted to secure civilian objects that receive specific protection under international humanitarian law due to their humanitarian, cultural, or civilian character.

- **Hospital and Medical Facility Protection:** Securing hospitals, field medical units, and medical compounds
- **Humanitarian Relief Facility Protection:** Protection of warehouses, distribution centres, or humanitarian hubs
- **Cultural Property Protection:** Protection of museums, monuments, archives, and historic sites

Section B. Typology of land operations

B1. Ground maneuver operations

Force-on-force combat operations involving movement to gain positional advantage, destroy enemy forces, or defend territory. Includes offensive operations, defensive operations, armoured warfare, and breaching/mobility operations.

B1.1. Offensive operations

Operations designed to defeat, destroy, or neutralize enemy forces and seize terrain.

- **Attack:** Direct assault on enemy positions
- **Movement to Contact:** Advancing to gain/regain contact with enemy forces
- **Exploitation:** Rapidly following up success to disorganize enemy
- **Pursuit:** Catching or cutting off hostile force attempting to escape
- **Penetration:** Breaking through enemy defensive lines

B1.2. Defensive operations

Operations to defeat enemy attacks, gain time, retain key terrain, or develop conditions for offensive operations.

- **Area Defence:** Retaining specific terrain by absorbing enemy attacks
- **Mobile Defence:** Using manoeuvre and counterattacks to defeat attacks
- **Retrograde Operations:** Organized movement away from enemy (delay, withdrawal, retirement)
- **Counterattack:** Offensive action within defensive operation
- **Spoiling Attack:** Pre-emptive attack to disrupt enemy offensive preparations
- **Force Protection:** Base defence, convoy security, checkpoint security

B1.3. Breaching operations

Operations to overcome natural and human-made obstacles to enable manoeuvre.

- **Obstacle Breaching:** Defeating minefields, wire, barriers
- **Bridge Operations:** Seizing, securing, or destroying bridges
- **Urban Breach:** Creating entry points through walls/fortifications
- **Fortification Reduction:** Reducing bunkers, strongpoints

B2. Urban and complex terrain operations

Combat operations in densely built areas, subterranean environments, and complex terrain that restricts mobility and observation and where operations are characterized by terrain constraints.

B2.1. Urban offensive operations

Attacking and clearing urban areas held by enemy forces.

- **Urban Assault:** Attacking into urban area from outside
- **Building Clearance:** Room-by-room, floor-by-floor operations
- **Block Clearance:** Systematic clearing of city blocks
- **Precision Urban Strike:** Targeted attacks on specific structures or forces
- **Urban Isolation:** Surrounding and isolating enemy urban strongpoint

B2.2. Urban defensive operations

Defending urban areas against enemy attacks.

- **Urban Strongpoint Defence:** Fortified building/block defence
- **Urban Ambush Operations:** Engaging enemy in prepared kill zones
- **Counter-Infiltration:** Detecting and defeating enemy infiltration
- **Building Defence:** Fortifying and defending key structures

B2.3. Subterranean operations

Combat in tunnels, sewers, underground facilities, metro systems.

- **Tunnel Warfare:** Operations in tunnel networks
- **Underground Facility Assault:** Attacking bunkers, command centres
- **Metro/Subway Combat:** Urban underground mass transit systems
- **Sewer System Operations:** Movement and combat in urban drainage

B2.4. Complex terrain operations

Operations conducted in environments where terrain, climate, or environmental conditions significantly restrict mobility, visibility, communication, and sensor performance.

- **Mountain Warfare:** Combat operations conducted in mountainous terrain characterized by steep elevation changes, restricted mobility corridors, and challenges associated with altitude and weather
- **Jungle and Dense Forest Warfare:** Operations conducted in heavily vegetated terrain where dense foliage limits visibility, manoeuvre, communications, and sensor effectiveness
- **Desert Operations:** Operations conducted in arid environments characterized by extreme temperatures, limited cover and concealment, and long lines of sight that shape manoeuvre and engagement dynamics
- **Arctic and Extreme Cold Weather Operations:** Operations conducted in environments where extreme cold, snow, ice, and seasonal light conditions affect mobility, logistics, and equipment performance
- **Littoral Terrain Operations:** Operations conducted in coastal and near-shore environments that create complex manoeuvre conditions and environmental constraints

B2.5. Trench warfare

Operations conducted in and around entrenched defensive systems composed of interconnected trenches, fighting positions, and fortified firing points.

- **Trench Clearing:** Assaulting and systematically clearing enemy-held trench segments, bunkers, and fighting positions to seize control of the trench system
- **Defence of a Trench System:** Holding and defending established trench networks against enemy assaults, including repelling attempts to penetrate or overrun defensive positions

B3. Fire support operations

Fire operations employing artillery, rockets, missiles, mortars, and other ground-based fire systems to support manoeuvre forces, shape the battlefield, or achieve independent operational effects.

B3.1. Offensive fire support

Fire missions conducted to degrade, disrupt, or destroy enemy forces, equipment, and positions in support of manoeuvre operations or to achieve operational effects at range.

- **Suppression Fires:** Fires intended to temporarily degrade the performance or effectiveness of enemy forces, preventing effective movement or engagement
- **Neutralization Fires:** Fires intended to render enemy personnel or materiel ineffective for a limited period of time without necessarily destroying them
- **Destruction Fires:** Fires intended to permanently eliminate enemy forces, equipment, or fortified positions
- **Harassing Fires:** Intermittent fires intended to disrupt enemy movement, degrade morale, or impose operational uncertainty
- **Interdiction Fires:** Fires conducted to disrupt, delay, or prevent enemy movement, reinforcement, or logistical activity
- **Counter-Battery Fires:** Fires directed against enemy artillery, rocket, or mortar systems to suppress or destroy their firing capability

B3.2. Ground-based air defence fire operations

Fire operations conducted by ground-based systems to detect, track, and engage hostile aerial threats in order to protect forces, infrastructure, or operational areas.

- **Point Air Defence:** Protection of specific high-value assets such as command posts, logistics hubs, or critical infrastructure
- **Area Air Defence:** Protection of broader operational areas against aerial threats
- **Mobile Air Defence Support:** Air defence systems accompanying manoeuvre forces to protect them from aircraft, helicopters, or unmanned aerial systems

- **Counter-Unmanned Aerial Systems Fires:** Engagement of hostile drones or loitering munitions using ground-based air defence systems

B4. Special operations

Operations conducted by specially organized, trained, and equipped forces employing unconventional tactics and techniques.

B4.1. Direct action operations

Short-duration strikes and small-scale offensive actions.

- **Raids:** Swift penetration to seize, destroy, capture, or recover
- **Ambushes:** Surprise attacks from concealed positions
- **Direct Action Missions:** Capture/kill high-value targets
- **Facility Seizure:** Capturing key infrastructure/facilities
- **Sabotage Operations:** Destroying critical enemy capabilities and infrastructure

B5. Irregular warfare operations

Operations conducted against non-State armed groups employing insurgent, guerrilla, or terrorist tactics. These operations typically involve dispersed adversaries, populated environments, and irregular methods in protracted conflicts.

B5.1. Counter-irregular force operations

Operations conducted to locate, disrupt, capture, or destroy irregular armed groups, their leadership, and supporting networks, while restricting their ability to operate within the population or across borders.

- **Area Security and Cordon Operations:** Isolating and securing populated areas through cordon-and-search operations, checkpoints, and other movement-control measures to detect and disrupt irregular activity
- **Targeted Raids and High-Value Target Operations:** Precision operations aimed at capturing or eliminating insurgent or terrorist leaders and key personnel
- **Interdiction and Border Control Operations:** Disrupting supply lines, infiltration routes, and cross-border movement of fighters, weapons, and materiel
- **Counter-Guerrilla Patrols and Ambush Operations:** Patrols, sweeps, and ambushes conducted to locate and engage irregular forces operating in dispersed formations
- **Sanctuary and Base Camp Destruction Operations:** Identifying and destroying insurgent camps, training facilities, and logistical support sites
- **Counter-IED Operations:** Detecting, neutralizing, and defeating improvised explosive devices and associated networks responsible for their emplacement

Section C. Typology of naval operations

C1.Surface warfare operations

Naval operations conducted to detect, engage, and destroy enemy surface vessels or other maritime targets operating on the sea surface.

C1.1. Surface engagement operations

Operations conducted by surface naval forces to engage and defeat enemy warships or other hostile vessels.

- Fleet Engagement: Direct combat between opposing surface naval forces, including engagements between combat warships[1]
- Engagement of Auxiliary or Merchant Vessels: Use of force against commercial vessels when they are employed by the enemy for military logistics, supply, or operational support

C2. Undersea warfare operations

Naval operations conducted to detect, track, and engage submarine threats or to employ submarines against enemy maritime forces.

C2.1. Anti-submarine warfare operations

Operations conducted to detect, track, and engage hostile submarines in order to protect naval forces and maritime lines of communication.

- **Submarine Hunting Operations:** Coordinated operations employing surface ships, aircraft, or submarines to locate and engage hostile submarines
- **Submarine-on-Submarine Engagements:** Direct undersea combat between opposing submarines

C2.2. Submarine attack operations

Operations conducted by submarines to engage enemy surface vessels or maritime targets.

- **Submarine Surface Attack Operations:** Torpedo or missile attacks against enemy warships or other vessels
- **Submarine Maritime Interdiction Operations:** Use of submarines to disrupt enemy maritime movement and logistics

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1 For the purposes of this Compendium, 'combat warships' refers to surface naval vessels designed and employed for combat operations, excluding auxiliary and support vessels.

C3. Naval air and missile defence operations

Naval operations conducted to detect, track, and engage hostile aircraft, missiles, or other aerial threats targeting naval forces or maritime assets.

C3.1. Naval air defence operations

Operations conducted to protect naval forces from airborne or air-delivered threats.

- **Area Air Defence Operations:** Protection of naval task groups or maritime areas from aircraft and missile attack (including cruise, ballistic, or anti-ship missiles)
- **Anti-Air Warfare Engagements:** Engagement of hostile aircraft, helicopters, or unmanned aerial systems
- **Point Defence Operations:** Close-range defensive systems protecting individual ships against imminent aerial threats

C4. Naval mine warfare operations

Naval operations conducted to employ sea mines to deny maritime areas to the enemy or to detect and neutralize enemy mines in order to ensure safe maritime passage.

C4.1. Offensive mining operations

Operations conducted to deploy sea mines in order to deny enemy access to maritime areas or restrict naval movement.

- **Strategic Mining Operations:** Laying mines to deny enemy access to major ports, choke-points, or key maritime approaches
- **Operational Area Denial Mining:** Deploying mines to restrict enemy naval manoeuvre in contested maritime zones
- **Defensive Barrier Mining:** Laying minefields to protect friendly ports, anchorages, or coastal approaches

C4.2. Mine countermeasure operations

Operations conducted to detect, clear, or neutralize naval mines to ensure freedom of navigation for friendly forces.

- **Mine Hunting Operations:** Locating and identifying individual mines using specialized sensors and uncrewed systems
- **Mine Sweeping Operations:** Clearing mines using mechanical, acoustic, or magnetic sweeping systems
- **Explosive Ordnance Disposal Operations:** Neutralizing or destroying identified mines using divers or uncrewed systems

C5. Naval power projection operations

Naval operations conducted to project force from the sea onto inland or coastal targets in order to influence events ashore.

C5.1. Amphibious warfare operations

Operations conducted to project ground forces ashore from the sea in order to establish a military presence on land.

- **Amphibious Assault Operations:** Forcible entry operations conducted from sea to land to establish a lodgement ashore
- **Amphibious Raid Operations:** Limited-duration operations conducted from the sea to seize, disrupt, or destroy specific targets ashore, followed by withdrawal
- **Amphibious Landing Operations:** Landing of forces in a permissive or lightly contested environment to deploy combat power ashore

C5.2. Naval strike operations

Operations conducted by naval forces to engage land-based targets.

- **Naval Missile Strike Operations:** Ship- or submarine-launched missile attacks against targets ashore
- **Naval Gunfire Support Operations:** Naval artillery used against coastal targets or in support of land or amphibious operations
- **Deep Strike Operations:** Long-range precision attacks conducted against high-value or strategic targets

C5.3. Naval special warfare operations

Special operations conducted from the maritime domain to achieve strategic or tactical effects.

- **Naval Special Operations Infiltration:** Insertion of special operations forces from maritime platforms
- **Underwater Demolition Operations:** Sabotage of ports, coastal infrastructure, or anchored vessels

C6. Sea control and maritime security operations

Naval operations conducted to establish and maintain the ability to use designated maritime areas while denying or limiting enemy access to those same waters.

C6.1. Sea lane security operations

Operations conducted to ensure the safe movement of commercial shipping and naval logistics through maritime routes.

- **Convoy Escort Operations:** Protection of merchant shipping or logistics vessels against enemy attack
- **Freedom of Navigation Operations:** Demonstrating and maintaining the right to transit through international waters

C6.2. Maritime interdiction and blockade operations

Operations conducted to prevent the movement of enemy forces, weapons, or supplies through maritime routes.

- **Maritime Blockade Operations:** Denying enemy access to ports, sea areas, or maritime supply routes
- **Maritime Interdiction Operations:** Visit, board, search, and possible seizure of vessels suspected of supporting enemy operations

Section D. Typology of air operations

D1. Counter-air operations

Air operations conducted to achieve and maintain air superiority by destroying, neutralizing, or degrading enemy air and air defence capabilities.

D1.1. Offensive counter-air operations

Air operations conducted to destroy, disrupt, or degrade enemy air capabilities at their source before they can be employed against friendly forces.

- **Pre-Emptive Air Strikes:** Attacks against enemy air assets or infrastructure prior to or at the outset of hostilities
- **Suppression or Destruction of Enemy Air Defences:** Operations targeting surface-to-air missile systems, radar installations, and integrated air defence networks
- **Air Base Attack Operations:** Strikes against runways, hangars, fuel storage, and maintenance facilities to degrade enemy air operations

- **Aircraft Destruction Operations:** Attacks against enemy aircraft on the ground or during take-off and landing
- **Command and Control Node Strikes:** Attacks against command, control, communications, computers, intelligence, surveillance, and reconnaissance nodes supporting enemy air operations

D1.2. Defensive counter-air operations

Air operations conducted to detect, intercept, and defeat enemy air and missile threats targeting friendly forces, assets, or territory.

- **Air Intercept Operations:** Fighter engagements against hostile aircraft attempting to penetrate defended airspace
- **Combat Air Patrol Operations:** Continuous fighter patrols over designated areas to detect and intercept hostile aircraft
- **Area Air Defence Operations:** Integrated defence of operational areas against aircraft, cruise missiles, or other airborne threats
- **Point Air Defence Operations:** Protection of specific high-value assets such as command centres, air bases, or critical infrastructure against imminent threat

D2. Air interdiction operations

Air operations conducted to attack enemy forces, supplies, infrastructure, or lines of communication in order to disrupt or delay their ability to conduct military operations.

D2.1. Strategic Interdiction Operations

Air attacks conducted against infrastructure or systems that sustain enemy military capability at the national level.

- **Transportation Network Attacks:** Strikes against railways, bridges, ports, and logistical hubs
- **Energy Infrastructure Attacks:** Targeting power generation facilities, fuel depots, or energy distribution networks
- **Communications Infrastructure Attacks:** Strikes against communication nodes supporting national military coordination

D2.2. Operational interdiction operations

Air attacks conducted against enemy military forces and logistical systems in order to disrupt operational manoeuvre or reinforcement.

- **Supply Route Interdiction:** Attacks against roads, convoys, or logistical corridors

- **Troop Concentration Strikes**: Attacks against staging areas or assembling combat formations
- **Command Node Strikes:** Targeting operational headquarters or command posts

D3. Close air support (CAS) operations

Air operations conducted against hostile targets in close proximity to friendly forces and requiring detailed integration with ground manoeuvre units.

D3.1. Immediate close air support

Air strikes conducted in response to urgent requests from ground forces engaged in combat.

- **Troops-in-Contact Support Operations:** Emergency strikes against enemy forces actively engaging friendly units

D3.2. Planned close air support

Air strikes pre-coordinated with ground operations to support manoeuvre forces during offensive or defensive operations.

- **Pre-Planned Strike Missions:** CAS missions scheduled in advance to support planned ground manoeuvre
- **On-Call Close Air Support:** Aircraft placed on standby to provide rapid support when requested by ground forces
- **Fire Support Coordination Operations:** CAS missions integrated with artillery, rocket, or naval fire support

D3.3. Armed reconnaissance operations

Search and attack missions conducted in assigned areas to locate and engage enemy forces or targets of opportunity.

- **Area Search and Strike Operations:** Air patrol of designated areas to identify and attack enemy targets
- **Convoy and Movement Interdiction:** Attacks against enemy vehicles or units detected during reconnaissance patrols
- **Target-of-Opportunity Engagements:** Engagement of enemy forces discovered during reconnaissance missions

D4. Strategic attack operations

Air operations conducted against targets the destruction or neutralization of which directly affects the enemy's war-making capability, strategic posture, or political will.

D4.1. Strategic leadership targeting operations

Strikes against leadership structures or strategic command networks directing military operations.

- **Leadership Decapitation Strikes:** Targeting senior political or military leadership
- **Strategic Command Node Attacks:** Strikes against national-level command and control centres

D4.2. War production targeting

Attacks against facilities supporting the enemy military industrial base.

- **Defence Industrial Facility Strikes:** Attacks against weapons factories or military production plants
- **Military Supply Production Disruption:** Targeting facilities producing ammunition, vehicles, or equipment

D4.3. Economic infrastructure targeting

Attacks against economic centres or commercial infrastructure supporting the enemy war effort.

- **Financial Infrastructure Attacks:** Strikes against financial or economic hubs supporting war financing
- **Commercial Logistics Disruption:** Attacks against major transportation or commercial distribution hubs

D4.4. Dual-use infrastructure targeting

Strikes against infrastructure serving both civilian and military purposes.

- **Transportation Infrastructure Strikes:** Bridges, railways, and logistics hubs supporting military movement
- **Energy Infrastructure Attacks:** Power generation or fuel distribution systems supporting military operations

D4.5. Weapons of mass destruction infrastructure targeting

Attacks against facilities associated with nuclear, chemical, or biological weapons development or storage.

- **Nuclear Facility Strikes:** Attacks against nuclear weapon development or storage sites
- **Chemical and Biological Facility Strikes:** Targeting infrastructure associated with chemical or biological weapons programs

D5. Counter-sea operations

Air operations conducted against naval forces or maritime infrastructure to deny or degrade enemy maritime capabilities.

D5.1. Anti-surface warfare

Air operations conducted against enemy surface vessels or maritime targets.

- **Warship Engagement Operations:** Air strikes against enemy combat warships
- **Amphibious Force Disruption Operations:** Attacks against landing ships and amphibious assault forces
- **Merchant Vessel Interdiction:** Strikes against supply ships or maritime logistics vessels
- **Port and Naval Base Attack Operations:** Attacks against port facilities and naval infrastructure

D5.2. Anti-submarine warfare

Air operations conducted to detect, track, and engage enemy submarines in order to protect maritime forces and sea lines of communication.

- **Submarine Hunting Operations:** Use of maritime patrol aircraft or helicopters to locate and attack enemy submarines

Annex D. Scenario template

The purpose of this template is to provide users with a tool they can use to design additional scenarios for analysis. Each section of the scenario is introduced with an explanation. The purpose of scenarios for this project is not to be exhaustive or exact replicas of real world complexities. Rather it is to provide realistic, plausible, and comparable cases with which users can conduct their analysis.

Scenario header

The header is intended to help users identify the scenario's main characteristics, helping with scenario categorization and selection. Such characteristics include:

- Domain (land, naval or air) and serial number to uniquely identify each scenario and facilitate scenario selection
- Conflict type (international or non-international) and belligerent
- Category of operation (selected from the typology or created ad hoc)
- Geographic setting

A scenario header takes the following format:

[Domain]-[Serial Number] – [optional scenario title]

> **Conflict type**
> [IAC or NIAC] – [Actor X, Y, etc.]

> **Operation category**
> [selected from domain-specific typology of operations]

> **Geographic setting**
> [high-level indication of where the scenario is taking place]

1. Scenario narrative

The narrative is a brief description of the scenario. It should provide adequate context and a description of the evolution of events that leads to the imminent use of force. The scenario narrative should not include pre-made decision on the use of certain weapon systems or present outcomes. The narrative should focus on the broader contours of the case which will be elaborated in the following sections.

2. Mission and targets

The mission and targets section should state in one sentence the mission statement and intended target(s) to engage, as well as the effect(s) to be achieved. If the scenario is intended

to be analysed from the perspective of multiple actors, ensure that mission statements and targets are specified for each party.

- **Mission:** State the tactical objective(s) to be achieved in the specific context of the scenario. Optional: State how the tactical objective contributes to a higher level operational outcome (e.g., 'Neutralize enemy defensive positions to enable follow-on manoeuvre').
- **Target(s):** State the specific targets to be engaged as part of this scenario (e.g., a specific command node, or military unit, or location, not a generic target set).

This section can also be used to add any specific information regarding authorizations and restrictions that are relevant to the specific scenario (e.g., whether there is clearance for area-wide strikes beyond designated structures).

3. LAWS employment options

This section provides an overview of possible options for the employment of LAWS in the execution of the mission and pursuit of the specified target(s). Focus on use of LAWS to deliver kinetic effect, excluding all mission functions limited to intelligence, surveillance and reconnaissance, for example.

If the scenarios are intended to assess a specific system (existing or in development), then the options should be limited to the system's capabilities. If instead the scenario is intended to explore potential uses of LAWS at a more conceptual level or to inform future system development, then specify a broad range of possible employment options, regardless of technical feasibility, legal permissibility or military desirability. These parameters should be understood as part of the analysis and not part of the scenario itself.

For each employment option, specify the role that LAWS would play, the specific mission function, the likely target(s) and key operational risks.

LAWS options take the following format (the content here is for illustrative purposes):

LAWS role	Mission function	Likely targets	Key operational risks
Precision urban strike	Neutralize confirmed command node and defensive firing positions within identified buildings	Opponent command element; Fortified infantry firing points; Anti-armour team on upper floors	Misidentification of specific floor or unit; Potential civilian presence on lower floors; Structural effects within multi-story buildings
Protective overwatch in support of ground manoeuvre	Provide persistent observation and engagement against emerging threats during ground manoeuvre	Opponent forces repositioning within the cluster and engaging friendly forces	Sensor degradation from smoke; Friendly fire risk during close-proximity manoeuvre

4. Operational variables to consider

The operational variables section allows users to:

- complement the scenario narrative with additional factors and variables (e.g., intelligence picture, risks to civilians, environmental factors); and
- modify the complexity of the scenario by adding or removing variables and by choosing between three different conditions for each variable (favourable, adverse, uncertain)

When developing the operational variables, it is recommended to have a variable that speaks to the reliability of the intelligence picture and a variable that clearly implicates risks to civilians. Other variables can be added as needed. When doing so, each variable should be described in three different conditions:

a. **Favourable:** The best-case scenario for the operational variable in the given context
b. **Adverse:** The worst-case scenario for the operational variable in the given context
c. **Uncertain:** Uncertainty and variability apply to the given operational variable

By selecting one or more variables and modifying the level of adversity for each, users have a high degree of control of the overall complexity of the scenario to facilitate wide-ranging and in-depth analysis.

Operational variables take the following format (the content here is for illustrative purposes):

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN
Intelligence reliability	Multi-sensor ISR tracks convoy departure, composition, and vehicle types with high confidence; High value truck positively identified	ISR intermittent due to cloud cover and rural clutter; Convoy size and composition unconfirmed; High-value truck not positively identified	Conflicting ISR and HUMINT reporting on number of vehicles and presence of high-value materiel
Risk to civilians	Civilian traffic density low along projected route during interdiction window	Civilian vehicles interspersed within convoy and transiting near canal bridge	Civilian traffic patterns fluctuate unpredictably along corridor
Vehicle discrimination	Clear differentiation between armoured escort and civilian vehicles	Military cargo trucks resemble civilian commercial freight vehicles	Emissions or signatures suggestive but not conclusive of military payload

A full, clean template is provided in the following page.

[Domain]-[Serial Number] — [optional scenario title]

Conflict type

[IAC or NIAC] – [Actor X, Y, etc.]

Operation category

[selected from domain-specific typology of operations]

Geographic setting

[high-level indication of where the scenario is taking place]

Scenario narrative

Mission and targets

Mission

Target(s)

LAWS employment options

LAWS ROLE	MISSION FUNCTION	LIKELY TARGETS	KEY OPERATIONAL RISKS

Operational variables to consider

VARIABLE	FAVOURABLE	ADVERSE	UNCERTAIN

Annex E. Key international humanitarian law principles

Each scenario is accompanied by a suite of questions relevant to the application of international humanitarian law in that context. The questions are generally organized thematically around the following key principles that emerge in each scenario.

Distinction

Definition

The International Committee of the Red Cross (ICRC)'s Study on Customary International Humanitarian Law defines the principle of distinction as follows for individuals: "The parties to the conflict must at all times distinguish between civilians and combatants. Attacks may only be directed against combatants. Attacks must not be directed against civilians".[1]

In the same vein, the rule of distinction also provides for the distinction between civilian objects and military objectives; it also prohibits attacks directed against civilian objects: "The parties to the conflict must at all times distinguish between civilian objects and military objectives. Attacks must not be directed against civilian objects".[2]

Applicability

The ICRC Study further establishes this rule as "a norm of customary international law applicable in both international and non-international armed conflicts", both in the context of individuals and objects.[3]

Key provisions

- International armed conflict: articles 48, 51(2), 52(1) and 52(2), 1977 Additional Protocol I to the 1949 Geneva Conventions
- Non-international armed conflict: common article 3 to the 1949 Geneva Conventions; article 13(2), 1977 Additional Protocol II to the 1949 Geneva Conventions

Protection of persons *hors de combat*

Definition

The ICRC Study defines the protection of persons *hors de combat* through a prohibition of attacking them, described as follows: "Attacking persons who are recognised as *hors de combat* is prohibited. A person *hors de combat* is:

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1 International Committee of the Red Cross, Customary International Humanitarian Law (Volume I: Rules) (Cambridge University Press, 2005) at pp. 3–5.

2 Ibid., p. 25.

3 Ibid., pp. 3–5 and 25.

- anyone who is in the power of an adverse party;
- anyone who is defenceless because of unconsciousness, shipwreck, wounds or sickness; or
- anyone who clearly expresses an intention to surrender".[4]

Applicability

The ICRC Study further establishes this rule as "a norm of customary international law applicable in both international and non-international armed conflicts".[5]

Key provisions

- International armed conflict: articles 41(1), 41(2) and 85(3)(e), 1977 Additional Protocol I to the 1949 Geneva Conventions
- Non-international armed conflict: common article 3 to the 1949 Geneva Conventions; article 4(1), 1977 Additional Protocol II to the 1949 Geneva Conventions

Precautions

Definition

The Compendium refers to both precautions in attack and precautions against the effects of attacks. The ICRC Study defines both principles as follows:

Principle of precautions in attack: "In the conduct of military operations, constant care must be taken to spare the civilian population, civilians and civilian objects. All feasible precautions must be taken to avoid, and in any event to minimise, incidental loss of civilian life, injury to civilians and damage to civilian objects".[6]

Principle of precautions against the effects of attacks: "The parties to the conflict must take all feasible precautions to protect the civilian population and civilian objects under their control against the effects of attacks".[7]

Applicability

The ICRC Study further establishes both principles as "[norms] of customary international law applicable in both international and non-international armed conflicts".[8]

Key provision

- Precautions in attack:
  - International armed conflict: article 57, 1977 Additional Protocol I to the 1949 Geneva Conventions

4 Ibid., p. 164.

5 Ibid.

6 Ibid., p. 51.

7 Ibid., p. 68.

8 Ibid., pp. 51 and 68.

- Non-international armed conflict: article 13(1), 1977 Additional Protocol II to the 1949 Geneva Conventions[9] Precautions against the effects of attacks:
- International armed conflict: article 58(c), 1977 Additional Protocol I to the 1949 Geneva Conventions
- Non-international armed conflict: article 13(1), 1977 Additional Protocol II to the 1949 Geneva Conventions

Proportionality in attack

Definition

The ICRC Study defines the principle of proportionality as follows: "Launching an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, is prohibited".[10]

Applicability

The ICRC Study further establishes this rule as "a norm of customary international law applicable in both international and non-international armed conflicts".[11]

Key provisions[12]

- International armed conflict: articles 51(5)(b) and 57, 1977 Additional Protocol I to the 1949 Geneva Conventions

Choice of means and methods of warfare

Definition

The ICRC Study defines the rules surrounding the choice of means and methods of warfare as follows: "The use of means and methods of warfare which are of a nature to cause superfluous injury or unnecessary suffering is prohibited".[13] It also provides that "the use of weapons which are by nature indiscriminate is prohibited".[14]

In the same vein, the ICRC's Study also provides specific precautionary rules surrounding the choice of means and methods of warfare: "Each party to the conflict must take all feasible precautions in the choice of means and methods of warfare with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects".[15]

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9 Noting that precautions in non-international armed conflict are mostly based on customary international law, see ibid., pp. 51–67.

10 Ibid., p. 46.

11 Ibid.

12 Noting that the principle of proportionality in non-international armed conflict is not codified in the 1949 Geneva Conventions or its 1977 Additional Protocols; it is primarily based on customary law, in addition to its inclusion in Amended Protocol II to the Convention on Certain Conventional Weapons; see ibid., pp. 48–49.

13 Ibid., p. 237.

14 Ibid., p. 244.

15 Ibid., p. 56.

Applicability

The ICRC Study further establishes this rule as "a norm of customary international law applicable in both international and non-international armed conflicts".[16]

Key provisions[17]

- International armed conflict: articles 35(1) and 57(2)(a)(ii), 1977 Additional Protocol I to the 1949 Geneva Conventions

Denial of quarter (prohibition of)

Definition

The ICRC Study defines the rule surrounding the prohibition of denial of quarter as follows: "Ordering that no quarter will be given, threatening an adversary therewith or conducting hostilities on this basis is prohibited".[18]

Applicability

The ICRC Study further establishes this rule as "a norm of customary international law applicable in both international and non-international armed conflicts".[19]

Key provisions

- International armed conflict: article 40, 1977 Additional Protocol I to the 1949 Geneva Conventions
- Non-international armed conflict: article 4, 1977 Additional Protocol II to the 1949 Geneva Conventions

16 Ibid.

17 Noting that the basis for limits on the choice of means and methods of warfare primarily stem from customary law, see ibid., pp. 57–58, 239–240 and 246–247.

18 Ibid., p. 161.

19 Ibid.

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