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

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Other matters

Human Machine Touchpoints: The United Kingdom's perspective on human control over weapon development and targeting cycles

Submitted by the United Kingdom

I. Executive Summary

1. The UK believes that Lethal Autonomous Weapons Systems (LAWS) discussions should focus on the need for human control over weapon systems and explore methods by which this might be delivered and assured.
2. This paper makes the case that the degree of scrutiny already applied to the design, delivery, operation, regulation and disposal of weapons systems by responsible governments and militaries is sufficient to regulate the development of all such systems, including LAWS.
3. The UK contends that a much deeper discussion on the human control aspect of the LAWS debate is required, based on existing governance measures. Any proposed improvements to these measures need to be agile and adaptable and consider the range of existing regulation, processes, structures and industry standards already in place, as well as the political, strategic, operational and tactical context for the use of weapons systems in conflict.

II. Aim

4. This paper aims to explore key considerations of human control, and attempts to set out the existing range of national and international regulations and processes which already bind the design, development and operational use of all weapons systems and ensure adherence with our obligations under national and international law. The list of measures presented here may not be exhaustive and other states may use different processes and definitions to the UK; we aim to stimulate debate along these lines, and encourage the sharing of any relevant examples of good practice across the LAWS community of interest.

III. Introduction

5. The Group of Government Experts (GGE) meeting on Lethal Autonomous Weapons Systems (LAWS) in April 2018 made important progress on the themes of human/machine touchpoints and human control. The United Kingdom (UK) particularly welcomes the progress made in the 11 April session titled: "Further consideration of the human element in the use of lethal force; aspects of human machine interaction in the development, deployment

and use of emerging technologies in the area of Lethal Autonomous Weapons Systems”, which pointed to some useful ways to progress the debate.

6. The UK believes that discussions should continue to focus on the need for human control over weapon systems and that the GGE should seek agreement on what elements of control over weapon systems should be retained by humans. The UK does not possess fully autonomous weapon systems and is not developing them. Operation of our weapons will always be under human control as an absolute guarantee of human oversight and authority, and of accountability for weapons usage.

7. Focussing the GGE’s efforts on human control appears to be the most productive way forward, given the continuing lack of consensus on definitions, characteristics and even whether LAWS exist. The GGE debate on 11 April 2018 saw many participants call for human control of ‘critical functions’, often specifically referring to ‘select and engage’, but it was unclear precisely what these terms actually mean. Some states provided details on weapon development processes and targeting cycles.

8. The UK believes that the level, nature and primacy of human control over specific functions is the key consideration in the LAWS debate rather than technology, which is likely to change rapidly: systems will evolve, our understanding and ability to exploit them will improve and their use will continue to diversify. This will offer significant opportunities to enhance operational capabilities and could also increase confidence in continued adherence to International Humanitarian Law (IHL) through improved ability to distinguish between military objectives and collateral concerns. The GGE should look to establish which functions are ‘critical’ and must be subject to human control, and which could be delegated to machines operating under other safeguards. A technology-agnostic focus on human control will enable particular attention to be paid to the key elements influencing legal, ethical and technical considerations of LAWS, as opposed to debating definitions and characteristics which may never reach consensus.

9. During the April 2018 GGE meeting the Chair introduced the ‘sunrise’ diagram¹, which detailed four stages of the development and employment of weapons. Building on this diagram, Table 1 of Annex A describes multiple points at which human control can be considered throughout the lifecycle of a system. The Chair’s original stages 1-4 are included in the table, with the addition of stage 0, political control and stage 5, analysis, at the suggestion of other participants. An updated version of the sunrise diagram summarising these additional considerations is also included as Figure 3 to this paper.

IV. The UK’s view of Human Control

10. Warfare is highly complex and requires a high degree of human-machine teaming to support effective decision-making. Within tightly defined circumstances and in response to a specific problem, machines may make better decisions than a human; outside of these circumstances, the ability of a human to apply experience and judgement to a new situation will exceed that of machines. The effective combination of both will improve capability, accuracy, diligence and speed of decisions, whilst maintaining and potentially enhancing confidence in adherence to IHL. In a military context, computers are vital for activities that require the assimilation and processing of increasingly huge amounts of data such as navigation, system management or logistical calculations. Conversely, humans are vital for understanding context and evaluating consequences².

11. Regulation and oversight of human control within military systems extends across the lifecycle of the system. It must account for a spectrum of scale, intensity and complexity in conflict and consider the demands of a variety of cluttered, congested, complex and contested

¹ Chair’s slides, ‘Sunrise’ Diagram:

[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/026AE767E3591BC5C125826D0046D41E/\\$file/Chair's+slides.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/026AE767E3591BC5C125826D0046D41E/$file/Chair's+slides.pdf)

² For more on the UK Ministry of Defence’s thinking on the evolution of how humans will work with machines, see Joint Concept Note 1/18 Human-Machine Teaming, available at <https://www.gov.uk/government/publications/human-machine-teaming-jcn-118>

operational environments. Assessment, evaluation and revision of both the system and the surrounding political, strategic, operational and tactical ‘wrap’ is a continuous cycle rather than a linear, sequential process and a combination of factors are required to ensure human control at the appropriate points. These include, but are not limited to:

- National and international regulation, including appropriate international law;
- Specification (specifying systems requirements that ensure appropriate human control);
- Design (designed to require and enable human control with particular focus on human-machine interaction);
- Verification, validation and certification processes including legal reviews (specifically Article 36 weapons reviews);
- Operating procedures and processes (training, command and control, doctrine and Rules of Engagement (ROE)).

12. Taking a human-centric, through-life approach enables human control to be considered at multiple stages and from various perspectives. This includes across all Defence Lines of Development³, the acquisition of weapons systems and their deployment and operation.

13. NATO’s process for Joint Targeting is set out in detail in Allied Joint Publication 3.9 (AJP-3.9)⁴. Chapter 2 defines the six phases of the Joint Targeting cycle in figure 2.2 (see figure 1, below). Joint targeting applies to deliberate and dynamic targeting. Phases 1,2,3,4 and 6 will always include humans in the decision-making process. Certain steps within phase 5 (find, fix, track, target, engage, exploit and assess) may be automated⁵ and in several cases, have been for decades (e.g. torpedoes tracking targets) – **but only in certain circumstances and in line with the factors outlined at paragraph 8, above.**

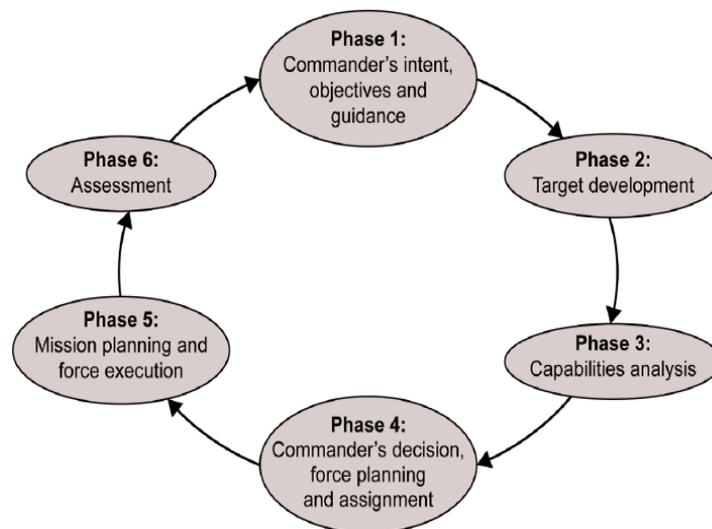


Figure 1: AJP 3.9 - The Joint Targeting Cycle

³ Training, Equipment, Personnel, Information, Concepts and Doctrine, Organisation, Infrastructure, Logistics, and Interoperability; described within Acquisition System Guidance (ASG) available at <https://www.gov.uk/guidance/acquisition-operating-framework>. The ASG provides the information, guidance and instruction that set out how the MOD conducts acquisition business.

⁴ “Allied Joint Publication 3.9: Allied Joint Doctrine for Joint Targeting (edition A version 1)” available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/628215/20160505-nato_targeting_ajp_3_9.pdf

⁵ “An automated or automatic system is one that, in response to inputs from one or more sensors, is programmed to logically follow a predefined set of rules in order to provide an outcome. Knowing the set of rules under which it is operating means that its output is predictable.” (JDP 0-01.1)

14. Further national and international work is required to define the circumstances under which specific phase 5 activities could be delegated to a machine. For example, there is a spectrum or ‘continuum’ of engagement which runs from pre-planned deliberate targeting through Combat Engagement to fires provided in defence of specified friendly forces. The processes involved at each level – whilst always subject to IHL – vary; as a general observation, as the level of time available to make decisions decreases, the level of risk increases. AJP-3.9 Section 1-4 and figure 1.1 refer (see figure 2, below). Outside the structures of Joint Targeting, close combat also brings significant complexity and is an area which – whilst too broad for in-depth analysis here – must be borne in mind; increased automation could significantly improve the survivability and combat effectiveness of individual soldiers, whilst also allowing them greater ability to comply with IHL.

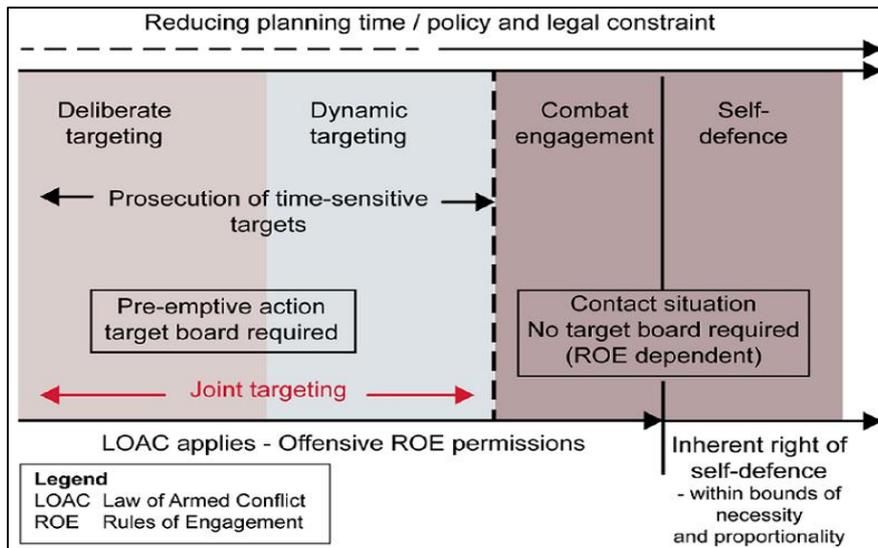


Figure 2: AJP 3.9 - The engagement continuum

15. The UK affirms that weapons should remain under the control of humans and considers this is assured by human control over the specific activities outlined in this paper, which are summarised in detail in Table 1 of Annex A.

V. Existing Systems

16. A limited number of point defence systems such as Counter Rockets, Artillery and Mortars (C-RAM) can currently operate in automatic mode in order to react to incoming threats at a speed which could not be matched by a human operator. However, there is always a person involved in setting the parameters of any such mode and monitoring engagements, with the option to intervene if circumstances change. Some existing offensive systems also have a high degree of automation in their ability to conduct terminal control of an attack: weapons with advanced sensors such as millimetric wave radar can operate beyond visual range (for example, the AIM 120 Advanced Medium-Range Air-to-Air Missile (AMRAAM)) or engage multiple targets from a single platform (such as Hellfire or Brimstone guided missiles). To a certain extent, such weapons systems are therefore carrying out elements of AJP 3.9 phase 5 targeting activity through automation. However, in all instances the parameters for an attack are subject to information received from trusted sources and cannot be arbitrarily changed by the weapon after launch. Any new weapon system must allow operators to comply with human-set ROE and targeting policies.

VI. Ensuring accountability

17. Accountability measures are built in throughout the weapon system lifecycle – from concept, to initial development, through the assessment of legal use and acceptance into service, and ultimately the decision to deploy a system operationally. This is assured by

compliance with the technical standards governing their development⁶, observance of national and international legal obligations and rigorous field testing procedures. As such, the UK already operates a robust framework for ensuring that any new weapon or weapon system can be used legally under IHL. New weapons and weapons systems are conceived and created to fulfil a specific requirement and are tested for compliance with international law obligations at several stages of development. They must allow operators and commanders to understand the operating parameters of the system and must also allow relevant ROE to be complied with.

18. Targeting parameters for operations are based on political and strategic considerations at national government level. These decisions will include factors such as the legal basis for conflict, desired end states and identification of target sets. Consideration will also be given to limitations on the permissions and authorities delegated to deployed commanders – for example, limitations on the use of certain weapons or weapon systems, or constraints on specific modes of operation. Such measures are routinely reviewed and revised in accordance with changes in operational circumstances, and to ensure that they are aligned with the end states identified for a conflict; the process is cyclical rather than linear and/or sequential.

19. Once deployed, accountability is vested in the trained operators who employ the system, and in the decisions taken by commanders at every level who have operational or tactical responsibility for the conduct of a campaign and the specialists who advise them. Responsibility is discharged through the military Chain of Command, and accountability measures are set out clearly in the orders, directives and Standard Operating Procedures that are enforced by all responsible militaries engaged in the conduct of operations.

VII. Framework for considering human control

20. Figure 3 presents an expanded framework based on the Chair’s ‘sunrise’ diagram for considering the broad range of factors throughout the weapon system lifecycle that directly or indirectly influence the ability to exercise human control. The inner layer of the diagram describes the lifecycle using stages 0-5, the second layer provides some example activities which might fit within each stage, and the third layer highlights the importance of regulation and standards. This framework is not intended to be a linear process but instead describes the various perspectives from which human control should be considered and influenced to ensure operationally effective, legal and ethical use of weapon systems.

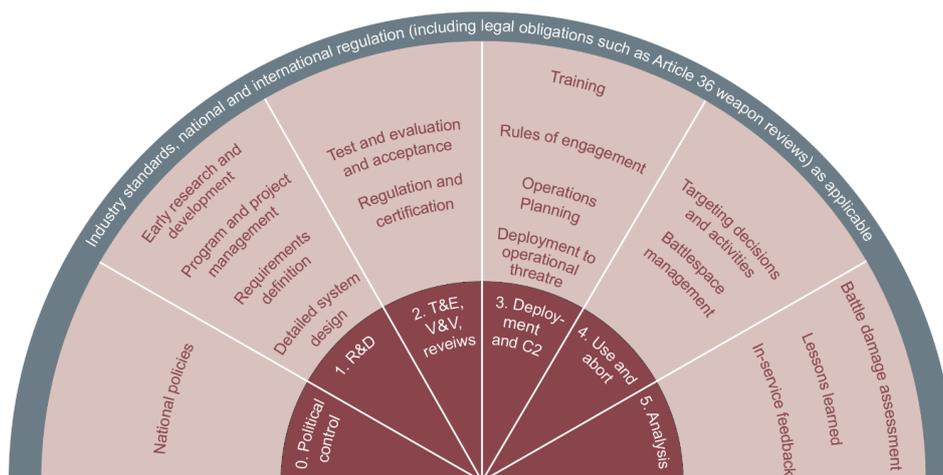


Figure 3. Framework for considering human control throughout the lifecycle of a weapon system

21. Table 1 of Annex A describes this framework in more detail including examples of activities which may sit within each stage.

⁶ For example, Defence Standard 00-056 Issue 6 states: “For all [safety related systems, including weapon systems] to which this Standard applies, a crown servant will retain responsibility and accountability for the Risk to Life...”.

Annex I

Table 1. Detailed framework for considering human control throughout the lifecycle of a weapon system.

Table 1 aims to illustrate the extensive degree of human involvement that already exists within the lifecycle of a weapon system. This table is based on current UK processes and includes examples of activities within each stage of the lifecycle which might either directly or indirectly involve human control. The UK considers that although these concepts are extensive and some of them complex, sharing our understanding of human control as a through-life process could assist in advancing the debate and building consensus.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
Stage 0: ‘Political Control’		
Decisions made by politicians, policy makers and military leadership. These will be routinely reviewed and revised and are cyclical rather than linear/sequential.		
Political Decisions	Decisions made by politicians, policy makers and military leadership.	<p>Decisions to enter an armed conflict.</p> <p>Decisions to resource a new capability.</p> <p>Framework for regulating the use of lethal force – including delegated permissions and authorities.</p>
Stage 1: ‘Research and Development’		
Research and development (R&D) activities throughout the weapon lifecycle. This particularly focusses on capability planning and the activities conducted early in the six phases of the UK Ministry of Defence acquisition lifecycle CADMID (Concept, Assessment, Demonstration, Manufacture, In-service, and Disposal). The UK MOD policy of Human Factors Integration (HFI) ⁷ is a risk based human centred Systems Engineering approach by which the human component of defence capability is considered. Including appropriate human related requirements within the Systems Requirements Document (SRD) will be critical to ensuring that suppliers deliver solutions that enable human control.		
Research and development (R&D) during early stages (pre-concept and concept) of acquisition	R&D to help the military define their capability needs, the users of the weapon system, and the context of use. These activities underpin consideration of human control later in the acquisition process.	<p>Experimentation and other research activities informing capability planning activities and decisions, policy, and doctrine.</p> <p>Technology Demonstrator Programmes (TDP) to help demonstrate the maturity of technologies.</p> <p>HFI activities such as Early Human Factors Analysis (EHFA) and Target Audience Description (TAD).</p>

⁷ <https://www.gov.uk/government/publications/human-factors-integration-in-defence-systems-jsp-912> sometimes referred to as Human Systems Integration (HSI) in other nations.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
Program and project management	Management of risk throughout the capability management process including those impacting upon human control.	Risk management process JSP 892 and the use of HFI RAIDO ⁸ register to document and track human factors considerations. Portfolio, Program and Project Management. Through Life Management Plan (TLMP).
Definition of requirements	Consideration of human control during the definition of the user needs, system requirements and associated assessment criteria.	Definition of Concepts of Employment (CONEMP). User Requirements Document (URD). System Requirements Document (SRD). Assessment criteria and test methods defined in the Integrated Test, Evaluation and Acceptance Plan (ITEAP). Lessons from in-service and legacy systems.
Detailed system design	This will usually be conducted by industry building upon earlier activities. Those activities particularly relevant to human control include HFI activities (including human-centred design) and the development of the concept of use (CONUSE). In order to enable operators to exercise human control during use, the users' needs and the context in which the system will be used must be considered throughout the system design.	HFI activities during systems design are conducted in accordance with the HFI Plan with oversight from the MOD acquisition project team in order to manage HFI issues and risks throughout the system design process. Human-Centred Design ⁹ (HCD) is the process by which interactive systems are designed to be useable and useful by focusing on the users' needs and the context in which the system will be used. The user community shall also develop a concept of use (CONUSE) for the capability building upon the CONEMP. Learn from legacy systems, technical design guidance and standards, and research to inform the design of the human-machine interaction.

⁸ RAIDO stands for Risks, Assumptions, Issues, Dependencies, Opportunities.

⁹ Human Factors Integration technical guide for Human Centred Design for military human computer interfaces available at <https://www.gov.uk/guidance/acquisition-operating-framework> and ISO 9241-210:2010 Ergonomics of human-system interaction: Human-centred design for interactive systems.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
Legal reviews	Legal scrutiny of the weapon's compliance with international law.	UK conducts Article 36 legal reviews at multiple procurement milestones and additional reviews if there is a change in system use of capability. ¹⁰
<p>Stage 2: 'Testing and Evaluation, Verification and Validation, Reviews'</p> <p>Assessment of the system to provide confidence in its performance within the intended context of use. These activities would focus on compliance with the requirements documents, defence and civil regulation and certification requirements, and relevant legal requirements.</p>		
Test and evaluation (T&E) and acceptance	The proposed solution will be assessed against the user and system requirements in accordance with the UK MOD Integrated Test, Evaluation and Acceptance (ITEA) Process ¹¹ . The aim of this process is to gain confidence that the solution is fit for purpose in the military environment across all Defence Lines of Development (DLoDs) and through life, it is safe to use, and it meets the user's needs. It is also a means of identifying and managing technical and operational risks.	<p>Appropriate assessment criteria and test methods shall be defined in the Integrated Test, Evaluation and Acceptance Plan (ITEAP) based on the requirements documents.</p> <p>Trial activities to assess the level of compliance against HFI requirements.</p> <p>Manage risk through input to project documentation such as the Through Life Management Plan (TLMP), Hazard Log, Safety Case, and Project Risk Register.</p> <p>Software Verification and Validation (V&V) activities in accordance with defence and civil standards.¹²</p>
Regulation and certification	The system will need to comply with relevant defence and civil regulation and certification requirements.	Regulation and certification by relevant regulatory authorities such as the Defence Ordnance, Munitions and Explosives Safety Regulator (DOSR) ¹³ , depending on the system.

Stage 3: 'Deployment, Command and Control'

Planning and preparation activities which enable the system to be used effectively within the specific operational theatre. This involves taking into consideration the threat, environmental, legal and organisational context and using this to inform the preparation of the force elements to be deployed as well as the constraints under which they must operate.

Training	Training and testing of operators and commanders in safe and effective use of	Pre-deployment training specific to theatre of operations.
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¹⁰ For more details on how the UK conducts weapon reviews see <https://www.gov.uk/government/publications/uk-weapon-reviews>

¹¹ Guidance on the UK MOD Integrated Test, Evaluation and Acceptance (ITEA) Process is available at <https://www.gov.uk/guidance/acquisition-operating-framework>.

¹² Standards such as Defence Standard 00-056 and 00-055 and the process within IEC 61508 may be applicable in relation to software V&V and safety.

¹³ <https://www.gov.uk/government/organisations/defence-safety-authority>

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
	the system. For example this is likely to include an understanding of the capabilities and limitations of the system and any modes of operation. Training must take into consideration the specific challenges associated with the theatre of operations including the requirements of IHL.	Appropriate mixture of individual, team and collective training. Appropriate mixture of live and synthetic training.
Rules of Engagement (ROE)	Development of ROE to underpin effective Command and Control. ROE will be tailored to the specific mission and operational environment and will take into account national and international law.	Legal advice during the development of ROE. Management of changes to ROE. Training of personnel in ROE.
Operations Planning	Planning at the strategic, operational and tactical levels of command. This will involve multiple planning activities which will impact the use of lethal force. Doctrine set out in AJP-5 describes the fundamental aspects of planning joint operations at the operational level during multinational force deployment. ¹⁴	Operational constraints and parameters such as the limits of operational freedom of action and control measures such as command and control relationships, and allocation of areas of responsibility. Operational appreciation activities which form the basis for situational awareness at all levels of decision making. Planning activities within the joint targeting process which link strategic-level direction and guidance with tactical targeting activities. ¹⁵
Deployment to operational theatre	Assessment of equipment prior to deployment, modification to theatre standards if required, and planning of training and any specific rules of engagement for that equipment.	Modification to systems to comply with Theatre Entry Standard (TES) to meet the threat and environmental conditions encountered in the specific operational theatre. If extensive, may require further legal review as previously noted.

Stage 4: 'Use and Abort'

Activities during the use of a weapon system which influence human control. These focus on decisions made at the tactical level by commanders and operators as well as the pre-

¹⁴ Allied Joint Publication 5: allied joint doctrine for operational level planning with UK national elements available at <https://www.gov.uk/government/publications/ajp-05-allied-joint-doctrine-for-operational-level-planning>

¹⁵ As described in "Allied Joint Publication 3.9: allied joint doctrine for joint targeting (edition A version 1)" available at <https://www.gov.uk/government/publications/allied-joint-doctrine-for-joint-targeting-ajp-39a>.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
	defined Standard Operating Procedures (SOPs) and Tactics, Techniques and Procedures (TTPs) governing the way in which a weapon system is to be used within the specific operational context.	
Battlespace Management	Coordination of individual force elements in order to combine and integrate all elements of a joint force across the seven dimensions of the battlespace (maritime, land, air, space, information, electromagnetic, and time) in line with JDP 3-70. ¹⁶ This might include both multinational and non-military actors.	<p>Combat Identification process in order to increase operational effectiveness and avoid fratricide.</p> <p>Generation and maintenance of situational awareness based on intelligence and other information sources shared using communications and information systems (CIS).</p> <p>Common Operating Picture.</p> <p>Common Tactical Picture.</p>
Joint Targeting: Setting parameters	<p>Set parameters for decision-makers, ensure sufficiently informed. ‘Targeting policy and direction retained at the highest possible joint level...authority delegated to lowest level.’ In support of this, military commanders must receive training in international law and be supported by a legal advisor.</p> <p>Control measures specified including delegation of target engagement authority, listed for lethal and non-lethal engagement: target sets and categories, restricted targets and no-strike entities, time-sensitive targets (TST). Produce target materials/lists.</p>	<p>Translation of strategic guidance into tactical-level activities against approved target sets.</p> <p>AJP 3.9 Targeting: Commander’s intent, objective and guidance, Target Development (analysis, validation, nomination, vetting, prioritisation), Capabilities Analysis, Commander’s Decision (see figure 1, above).</p> <p>Analysis of appropriate combination of lethal and non-lethal capabilities to achieve the required effects (‘weaponeering’).</p> <p>Force Planning, Mission Planning and Force Execution.</p> <p>Theatre-specific targeting direction, ROE.</p>
Joint Targeting: Find	Fuse information from intelligence, surveillance and reconnaissance (ISR) assets to detect target in named area of interest and identify conditions that make it appropriate for target engagement.	<p>Target execution activity within phase 5 ‘Mission planning and force execution’ of joint targeting cycle as described in AJP 3.9.</p> <p>Theatre-specific Targeting direction.</p>
Joint Targeting: Fix	Geo-locate the target and conduct initial risk assessment to consider the level of risk to the force, the risk to operational success,	Target execution activity within phase 5 ‘Mission planning and force execution’ of joint targeting cycle as described in AJP 3.9.

¹⁶ As described in “Joint Doctrine Publication 3-70: battlespace management” available at <https://www.gov.uk/government/publications/battlespace-management>.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
	and the risk of collateral damage.	Theatre-specific Targeting direction.
Joint Targeting: Track	Target is continuously monitored to ensure situational awareness. ISR capabilities are assigned and prioritised to monitor a target continuously until the point of successful target prosecution and engagement assessment.	Target execution activity within phase 5 'Mission planning and force execution' of joint targeting cycle as described in AJP 3.9. Theatre-specific Targeting direction.
Joint Targeting: Target	Satisfy restrictions including Collateral Damage Estimate (CDE) and ROE before confirming Positive Identification (PID). Gain final approval for engagement and align engagement capabilities.	Target execution activity within phase 5 'Mission planning and force execution' of joint targeting cycle as described in AJP 3.9. Theatre-specific Targeting direction.
Joint Targeting: Engage	Closely monitor the target and its engagement to maintain situational awareness and identify opportunities for exploitation.	Target execution activity within phase 5 'Mission planning and force execution' of joint targeting cycle as described in AJP 3.9. Theatre-specific Targeting direction.
Joint Targeting: Exploit	Identify immediate or longer-term opportunities for exploitation during the planning phase and develop branch plans. These can then be executed if the appropriate conditions arise.	Target execution activity within phase 5 'Mission planning and force execution' of joint targeting cycle as described in AJP 3.9. Theatre-specific Targeting direction.
Combat Engagement and defensive fires	Actions against an adversary involving tactical coordination of joint fires in accordance with ROE. This will involve deliberate planning to specify, amongst other things, levels of authorisation for weapon use.	Relevant ROE. Joint fires coordination procedures. Collateral damage assessment. Theatre-specific Targeting direction.
Abort/fail safe	Some systems that employ high degrees of automation may be capable of an 'abort' function, wherein an engagement can be terminated if circumstances change – for example, transient civilians entering the effects area. Similarly, weapons designed to 'fail	Monitoring of the target area. Human and machine interaction in conducting an engagement. Relevant ROE. Theatre-specific Targeting direction.

<i>Stage</i>	<i>Detail</i>	<i>Example activities (not exhaustive)</i>
	<p>safe' will not arm if certain system criteria are not met – such as failure to guide, loss of a data link or a mechanical fault. Increased automation could improve the viability and availability of both functions – particularly in a denied electromagnetic environment.</p>	
<p>Stage 5: 'Analysis'</p>		
<p>Activities to consider whether a system is being used and operating as intended.</p>		
<p>Joint Targeting: Assess</p>	<p>Analysis to determine whether the objectives have been achieved or the desired effect realised. This will support a possible re-engagement decision. This stage will also involve Battle Damage Assessment (BDA) in order to assess the results of military action.</p>	<p>Phase 6 (and end of phase 5) of joint targeting cycle as described in AJP 3.9.</p>
<p>In-service feedback and lessons learned</p>	<p>The period following the introduction into service of a new system is critical in identifying any undesirable behaviour, design issues, incompatibilities between existing processes and practices and capabilities of the system.</p>	<p>Feedback shall be recorded and managed using established incident management and lessons identified / learned processes.</p>
